

Influence of Standardized Feed Additives on Economics of Mulberry Silkworm $CSR_2 \times CSR_4$ and Jayalakshmi at Laboratory Condition

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Received 12 June 2017; Accepted 14 July 2017; Published online 29 July 2017

Abstract An experiment was carried out at laboratory condition, to know the influence of standardized feed additives on economics of mulberry silkworm hybrids $CSR_2 \times CSR_4$ and $ND_7 \times CSR_2$ (Jayalakshmi). The results revealed that, Horse gram flour + Grain Amaranthus flour (50 : 50) registered 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, respectively over unsupplemented control. However labor

cost was constant in all treatments including unsupplemented control (Rs 1400.)

Keywords Silkworm hybrid, Feed additives, Horse gram, Grain amaranthus, CFTRI mixture.

Introduction

Mulberry silkworm, *Bombyx mori* L. undoubtedly a monophagous insect derives all nutritional requirements such as carbohydrates, proteins (amino acids) and vitamins from mulberry leaves to enable larval growth and development leading to good cocoon quality. Due to variation in soil fertility, management practices and agro climatic conditions, Mulberry leaves produced are not adequately nutritionally balanced and demands enrichment of nutrients. Among all supplements, dietary proteins play a vital role in the development of silkworm, *Bombyx mori* L. To achieve these requirements, the present investigation was conducted using a popular and a new silkworm hybrid ($CSR_2 \times CSR_4$ and $ND_7 \times CSR_2$ also named as Jayalakshmi) and two feeding schedules under laboratory conditions where worms were

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Table 1. Economics of feed additives on mulberry silkworm hybrid $CSR_2 \times CSR_4$ under laboratory condition. Labor cost is assumed to be constant.

Feed additive treatments	Cocoon yield/100 DFLs	Increase in cocoon yield over control Absolute (kg)	(%)	Market price of cocoons (Rs/kg)	Total value realized (Rs)	Cost of feed additives (Rs)	Labor cost (Rs)	Net profit (Rs)	Returns per rupee of expenditure (Rs)
FA ₁ : Ragi flour (100%)	81.52	3.52	4.51	140.00	11412.80	15.00	1400	9997.80	8.06
FA ₂ : Horse gram flour (100%)	80.86	2.86	3.66	139.14	11250.86	37.50	1400	9813.36	7.83
FA ₃ : Ragi flour + Horse gram flour (50 : 50%)	88.57	10.57	13.55	156.44	13855.89	52.50	1400	12403.39	9.54
FA ₄ : House gram flour + Grain Amaranthus flour (50 : 50%)	91.68	13.68	17.53	160.46	14710.97	67.50	1400	13243.47	10.02
FA ₅ : Fine mesh Ragi flour + 20% Activated Horse gram flour (50 : 50%)	85.72	7.72	9.89	150.31	12884.57	52.50	1400	11432.07	8.87
FA ₆ : 80% Activated Horse gram regular flour + 20% Ragi regular flour	89.66	11.66	14.94	157.21	14095.44	52.50	1400	12642.94	9.70
FA ₇ : 80% Fine mesh Ragi flour + 20% Activated Horse gram fine mesh flour	86.03	8.03	10.29	152.18	13092.04	52.50	1400	11639.54	9.01
FA ₈ : CFTRI mixture (100%)	90.65	12.65	16.21	158.38	14357.14	62.50	14400	12894.64	9.82
FA ₉ : Activated Green gram flour (100%)	87.49	9.49	12.16	155.34	13590.69	75.0	1400	12115.69	9.21
FA ₁₀ : Control / Unsupplemented	78.00	—	—	127.00	9906.00	—	1400	8506.00	7.07

reared with fortified mulberry with feed additives and the economics was studied.

Materials and Methods

Mulberry silkworm hybrids of $CSR_2 \times CSR_4$ and $ND_7 \times CSR_2$ (Jayalakshmi) were experimented with V_1 mulberry shoots harvested from irrigated garden and separately supplemented individually or in combination with nine different flours in appropriate ratio besides maintaining unsupplemented control. Bulk rearing was done upto third moult and worms were separated, to maintain two feeding schedules (once daily and alternate day) with feed additive treatments. The flours of 5g/10g each of feed additives were weighed and placed in plastic measuring cups in order to mark levels of each cup.

The feed additive application was mediated through measuring cups having ensured the flours were sieved (150 μ) and dusted on mulberry shoots

@ 5g/10 g per kg of shoots based on marked levels and provided to silkworm hybrids ($CSR_2 \times CSR_4$ and $ND_7 \times CSR_2$) by plastic sieves during late age. There were two batches in the schedule of feed additive application. Shoots dusted with the feed additive were provided once daily during fourth instar till spinning. In the second batch, feed additives were provided once every alternate day from fourth instar till spinning. In both batches however, the remaining two feeds/day were normal (unsupplemented). In order to keep the bed dry and facilitate easy moulting, feeding was resumed half an hour later after dusting bed disinfectant (Resham Jyothi), when more than 95% of the worms were out of moult [1]. The data were analyzed statistically using three way factorial CRD (completely randomized design). Economics of some was evaluated.

Results and Discussion

The economics of mulberry silkworm with the in-

Table 2. Economics of feed additives on mulberry silkworm hybrid Jayalakshmi ($ND_7 \times CSR_2$) under laboratory condition. Labor cost is assumed to be constant.

Feed additive treatments	Cocoon yield/ 100 DFLs	Increase in cocoon yield over control absolute (kg)	(%)	Market price of cocoons (Rs/kg)	Total value realized (Rs)	Cost of feed additives (Rs)	Labor cost (Rs)	Net profit (Rs)	Returns per rupee expen- diture (Rs)
FA ₁ : Ragi flour (100%)	84.00	8.00	10.52	125.68	10557.12	15.00	1400	9142.12	7.46
FA ₂ : Horse gram flour (100%)	83.78	7.78	10.23	124.86	10460.72	37.50	1400	9023.22	7.27
FA ₃ : Ragi flour + House gram flour (50:50%)	92.60	16.60	21.84	135.20	12519.52	52.50	1400	11067.02	8.62
FA ₄ : Horse gram flour + Grain Amaranthus flour (50:50%)	94.67	18.67	24.56	142.14	13456.39	67.50	1400	11988.89	9.17
FA ₅ : Fine mesh Ragi flour + 20% Activated House gram flour (50:50%)	89.77	13.77	18.11	132.46	11890.93	52.50	1400	10438.43	8.18
FA ₆ : 80% Activated House gram regular flour + 20% Ragi regular flour	93.66	17.66	23.23	135.68	12707.78	52.50	1400	11255.28	8.74
FA ₇ : 80% Fine mesh Ragi flour + 20% Activated House gram fine mesh flour	90.00	14.00	18.42	133.12	11980.80	52.50	1400	10528.3	8.24
FA ₈ : CFTRI mixture (100%)	94.46	18.46	24.28	136.28	12873.00	62.50	1400	11410.5	8.80
FA ₉ : Activated Green gram flour (100%)	92.46	16.46	21.65	134.82	12465.45	75.0	1400	10990.45	8.45
FA ₁₀ : Control / Unsupplemented	76.00	—	—	121.00	9196.00	—	400	7796.00	6.56

fluences of feed additives was worked out in laboratory trial. So far, no work has been done with regard to this aspect.

In the present investigation, mulberry silkworm hybrid $CSR_2 \times CSR_4$ reared on mulberry shoots fortified with Horse gram flour + Grain Amaranthus flour (50 : 50) registered maximum cocoon yield (91.68 kg/100 DFLs), absolute values obtained were 13.68 kg and registered 17.53% absolute increase over control, highest market price of cocoon Rs 160.46/kg, total value realized was Rs 14710.97, cost of treatment was Rs 67.50 and maximum net profit was Rs 13243.47 with maximum returns per rupee spent was Rs 10.02 followed by CFTRI mixture (90.65 kg/100DFLs; 12.65kg, 16.21% Rs 158.38/kg; Rs 14357.14; Rs 62.50; Rs 12894.64 and Rs 9.82 respectively) over control (78.00 kg/100 DFLs, Rs 127.00/kg, Rs 9906.00, Rs 8506.00 and Rs 7.07, respectively). However labor cost was constant in all treatments including unsupplemented control (Rs 1400) (Table 1). Hence these feed additives have future in sericulture.

Mulberry silkworm hybrid Jayalakshmi was reared on mulberry shoots fortified with Horse gram flour + Grain Amaranthus flour (50 : 50%) and registered maximum cocoon yield (94.67 kg/100DFLs), absolute yield was 18.67 kg with 24.56% increase over control, highest market price of cocoon was Rs 142.14/kg, total value realized was Rs 13456.39, the cost of treatment was Rs 67.50 maximum net profit of Rs 11988.89 maximum returns per rupee of expenditure was Rs 9.17 followed by CFTRI mixture (94.46 kg /100DFLs; 18.46 kg with 24.28%, Rs 136.28kg; Rs 12873.00; Rs 62.50 Rs 11410.50 and Rs 8.80, respectively) over control (76.00 kg/100DFLs; Rs 121.00/kg; Rs 9196.00; Rs 7796.00 and Rs 6.56 respectively). While labor cost was constant in all treatments including unsupplemented control (Rs 1400) (Table 2).

The higher returns were obtained by selling the harvested from feed additive provided batches when compared to unsupplemented control. This not only gives scope for boosting up the production of cocoons but also leads to an increased profit margin.

From the present investigation, it is clear that the feed additive has certainly improved the qualitative features of hybrid silkworms in the production of better commercial characters.

Supplementation of mulberry leaf with *Kohiko silcare* feed to silkworm hybrid $CSR_2 \times CSR_4$ and obtained good economic traits of silkworm. Similarly returns per rupee of investment was higher (Rs 13.40) with *Kohiko silcare* @ 1000 g/100 DFLs which was surprisingly sprayed [2]. Leaf quality plays a very important role in sericulture and contributes to 38% crop success. 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.

India is the second largest producer of mulberry raw silk. Mandya and Chamarajanagar districts of Karnataka were selected for irrigated and rainfed areas for a 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. The multivoltine hybrid, Kolar gold performed best in comparison to other hybrids in respect to productivity and economics, even with less input usage [3].

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