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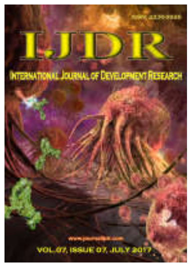

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# IMPACT OF SELECTED FEED ADDITIVES ON REELING TRAITS OF MULBERRY SILKWORM HYBRID PM × CSR$_2$ AT FARMERS FIELD CONDITION

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**ABSTRACT**

Field study was undertaken to know the impact of standardized feed additives on reeling traits of silkworm hybrid, *Bombyx mori* L. PM × CSR$_2$. Silkworm hybrid were reared on mulberry leaves fortified with feed additives flour combination of horse gram + grain amaranthus (50:50) dusting on leaves lead to significantly longer filament length, higher cocoon filament weight, superior denier, lower sericin content, higher fibroin content and renditta, in chosen farms of three farmers each in selected five villages of Kolar district.



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## INTRODUCTION

The exclusive food plant of *Bombyx mori* L. is mulberry from which silkworm derives entire nutritional requirement for growth. Being a sole source of food, mulberry alone may not provide all the nutrients required for silkworm growth and development. Mulberry leaf with additional nutrients like glycine, phenylalanine, glucose, jaggery, molasses and milk powder have best tested  for improving cocoon quality. The nutritional status of Mulberry leaves can also be improved by enriching with extra nutrients before feeding silkworms, so as to improve the quality and quantity of cocoon. Scanty experiments with farmer's participation and field trials with feed additives have been undertaken; hence present work was extended from lab to land with farmer's participation. In sericulturally most advanced country like Japan (which was once the global leader in silk production) soybean was used extensively in silkworm rearing (particularly in artificial diets), as it is a potential source of protein. In fact, even the human local population uses soybean extensively in their diet on account of its nutritive qualities.

## MATERIALS AND METHODS

Fifteen farmers were selected randomly in five villages; @ 3 farmers per village, where silkworm rearing was practiced throughout the year. V$_1$ shoots of mulberry harvested from irrigated mulberry garden were supplemented with pre tested treatments of feed additives as confirmed in laboratory trial. Bulk rearing was done up to 3$^{rd}$ moult and worms were separated following feed additive treatments with daily once feeding schedule. 5 g of each feed additive were weighed and placed in plastic measuring cups were then marked to facilitate measuring levels. Each feed additive application was through measuring cups having ensured the flours were sieved (150 µ) and dusted on mulberry shoots @ 5g/kg of shoots based on marked levels of measuring cups and fed to silkworm hybrid (PM×CSR$_2$) during late age (fourth instar) 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 with three replication were maintained. The rearing was in accordance with standard package (Dandin *et al.,* 2014). In previously undertaken laboratory experiment, Jayalakshmi hybrid ($ND_7$×$CSR_2$) was reared, 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 is already popular among farmers besides it is the ruling multi× bivoltine hybrid. 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.

## RESULTS

Popular silkworm hybrid PM × $CSR_2$ selected for field trial were reared on mulberry shoots fortified with Horse gram flour + Grain Amaranthus flour (50:50) and also CFTRI mixture in five selected villages on chosen farms of three farmers each. Significantly maximum filament length (892.10 m, 891.88 m, 891.22 m, 893.10 m, 892.66 m) (Table 1), higher cocoon filament weight (0.184 g, 0.185 g, 0.185 g, 0.186 g,

**Table 1. Influence of feed additives on single cocoon filament length (m) of Mulberry silkworm hybrid PM × $CSR_2$**

| Treatments | KAMBALA HALLI # | DODDA HALLI # | KANIGANA HALLI # | KUMAGUNTA # | BYEPALLI # |
|---|---|---|---|---|---|
| $FA_4$ | 892.10 | 891.88 | 891.22 | 893.10 | 892.66 |
| $FA_8$ | 863.55 | 863.99 | 863.77 | 863.88 | 863.66 |
| $FA_{10}$ | 822.55 | 823.32 | 824.44 | 823.66 | 824.33 |
| F-Test | * | * | * | * | * |
| SE.m ± | 0.9426 | 0.9875 | 0.6016 | 0.7694 | 0.5917 |
| CD at 5 % | 3.7005 | 3.8767 | 2.3617 | 3.0205 | 2.3230 |

**Table 2. Influence of feed additives on single cocoon filament weight (g) of Mulberry silkworm hybrid PM × $CSR_2$**

| Treatments | KAMBALA HALLI # | DODDA HALLI # | KANIGANA HALLI # | KUMAGUNTA # | BYEPALLI # |
|---|---|---|---|---|---|
| $FA_4$ | 0.184 | 0.185 | 0.185 | 0.186 | 0.185 |
| $FA_8$ | 0.180 | 0.181 | 0.182 | 0.181 | 0.181 |
| $FA_{10}$ | 0.176 | 0.177 | 0.177 | 0.177 | 0.177 |
| F-Test | * | * | * | * | * |
| SE.m ± | 0.0007 | 0.0004 | 0.0002 | 0.0004 | 0.0005 |
| CD at 5 % | 0.0029 | 0.0015 | 0.0007 | 0.0015 | 0.0018 |

Note: $FA_4$: Horse gram flour + Grain Amaranthus flour (50 : 50 %)
$FA_8$: CFTRI mixture (100 %)
$FA_{10}$: Control / Unsupplemented
# Mean of three farmers

**Table 3. Influence of feed additives on denier of Mulberry silkworm hybrid PM × $CSR_2$**

| Treatments | KAMBALA HALLI # | DODDA HALLI # | KANIGANA HALLI # | KUMAGUNTA # | BYEPALLI # |
|---|---|---|---|---|---|
| $FA_4$ | 1.874 | 1.874 | 1.872 | 1.877 | 1.868 |
| $FA_8$ | 1.893 | 1.893 | 1.896 | 1.892 | 1.892 |
| $FA_{10}$ | 1.937 | 1.944 | 1.942 | 1.940 | 1.943 |
| F-Test | * | * | * | * | * |
| SE.m ± | 0.0020 | 0.0018 | 0.0014 | 0.0021 | 0.0023 |
| CD at 5 % | 0.0080 | 0.0070 | 0.0053 | 0.0084 | 0.0090 |

**Table 4. Influence of feed additives on sericin content (%) of Mulberry silkworm hybrid PM × $CSR_2$**

| Treatments | KAMBALA HALLI # | DODDA HALLI # | KANIGANA HALLI # | KUMAGUNTA # | BYEPALLI # |
|---|---|---|---|---|---|
| $FA_4$ | 23.24 | 23.31 | 23.25 | 23.21 | 23.42 |
| $FA_8$ | 24.66 | 24.53 | 24.56 | 24.65 | 24.55 |
| $FA_{10}$ | 25.72 | 25.66 | 25.75 | 25.59 | 25.69 |
| F-Test | * | * | * | * | * |
| SE.m ± | 0.1484 | 0.0361 | 0.1144 | 0.1490 | 0.1085 |
| CD at 5 % | 0.5825 | 0.1417 | 0.4492 | 0.5849 | 0.4258 |

Note: $FA_4$: Horse gram flour + Grain Amaranthus flour (50 : 50 %)
$FA_8$: CFTRI mixture (100 %)
$FA_{10}$: Control / Unsupplemented
# Mean of three farmers

**Table 5. Influence of feed additives on fibroin content (%) of Mulberry silkworm hybrid PM × $CSR_2$**

| Treatments | KAMBALA HALLI # | DODDA HALLI # | KANIGANA HALLI # | KUMAGUNTA # | BYEPALLI # |
|---|---|---|---|---|---|
| $FA_4$ | 76.75 | 76.67 | 76.63 | 76.75 | 76.56 |
| $FA_8$ | 75.33 | 75.46 | 75.42 | 75.34 | 75.43 |
| $FA_{10}$ | 74.27 | 74.33 | 74.24 | 74.36 | 74.30 |
| F-Test | * | * | * | * | * |
| SE.m ± | 0.1513 | 0.0439 | 0.1609 | 0.1590 | 0.1138 |
| CD at 5 % | 0.5940 | 0.1723 | 0.6317 | 0.6240 | 0.4467 |

**Table 6. Influence of feed additives on renditta of Mulberry silkworm hybrid PM × $CSR_2$**

| Treatments | KAMBALA HALLI # | DODDA HALLI # | KANIGANA HALLI # | KUMAGUNTA # | BYEPALLI # |
|---|---|---|---|---|---|
| $FA_4$ | 6.686 | 6.710 | 6.723 | 6.716 | 6.713 |
| $FA_8$ | 6.836 | 6.826 | 6.830 | 6.830 | 6.833 |
| $FA_{10}$ | 7.376 | 7.386 | 7.393 | 7.393 | 7.393 |
| F-Test | * | * | * | * | * |
| SE.m ± | 0.0067 | 0.0070 | 0.0097 | 0.0090 | 0.0056 |
| CD at 5 % | 0.0263 | 0.0276 | 0.0379 | 0.0353 | 0.0221 |

Note: $FA_4$: Horse gram flour + Grain Amaranthus flour (50 : 50 %)
$FA_8$: CFTRI mixture (100 %)
$FA_{10}$: Control / Unsupplemented
# Mean of three farmers

0.185 g) (Table 2), superior denier (1.874, 1.874, 1.872, 1.877, 1.868) (Table 3), lower sericin per cent (23.24, 23.31, 23.25, 23.21, 23.42) (Table 4), higher fibroin per cent (76.75, 76.67, 76.63, 76.75, 76.56) (Table 5) and renditta (6.686, 6.710, 6.723, 6.716, 6.713) (Table 6), respectively were observed with flour of horse gram + grain amaranthus in five villages of Kolar district. The next best values were observed on feed additive CFTRI mixture, in respect of filament length (863.55 m, 863.99 m, 863.77 m, 863.88 m, 863.66 m) (Table 1), higher cocoon filament weight (0.180 g, 0.181g, 0.182 g, 0.181 g, 0.181 g) (Table 2), superior denier (1.893, 1.893, 1.896, 1.892, 1.892) (Table 3), lower sericin per cent (24.66 per cent, 24.53 per cent, 24.56 per cent, 24.65 per cent, 24.55 per cent) (Table 4), higher fibroin per cent (75.33 per cent, 75.46 per cent, 75.42 per cent, 75.34 per cent, 75.43 per cent) (Table 5) and renditta (6.836, 6.826, 6.830, 6.830, 6.833) (Table 6), respectively, in Kolar district. Comparatively lower values were recorded in unsupplemented control, in the villages of Kambala halli, Dodda halli, Kanigana halli, Kumagunta and Byepalli in respect of filament length (822.55 m, 823.32 m, 824.44 m, 823.66 m, 824.33 m) (Table 1), higher cocoon filament weight (0.176 g, 0.177 g, 0.177 g, 0.177 m, 0.177 g) (Table 2), superior denier (1.937, 1.944, 1.942, 1.940, 1.943) (Table 3), lower sericin per cent (25.72 per cent, 25.66 per cent, 25.75 per cent, 25.59 per cent, 25.69 per cent) (Table 4), higher fibroin per cent (74.27 per cent, 74.33 per cent, 74.24 per cent, 74.36 per cent, 74.30 per cent) (Table 5) and renditta (7.376, 7.386, 7.393, 7.393, 7.393) (Table 6), respectively.

## DISCUSSION

The late age silkworm hybrid, PM × $CSR_2$ (Kolar gold) reared on mulberry shoots with flour combination of feed additives with daily once feeding schedules, were accepted and exhibited superior larval and reeling traits than control (unsupplemented). Improved nutrient status of mulberry shoots by these feed additives might have encouraged larval growth and development. The protein content of mulberry leaves ($V_1$ variety) was estimated (22.20 per cent). Horse gram + Grain Amaranthus as well as CFTRI mixture are a rich source of protein, fat, minerals and carbohydrate. The success of cocoon crop mainly depends on three major factors, viz., quality of layings, quality of leaf used and the method of rearing adopted. The results are in agreement with the work of Prasanna Kumar *et al.* (2001) who evaluated the effect of 'Green leaf' a commercial foliar applicant on the nutritional status of Mulberry leaf ($V_1$) and reported enhanced mulberry growth and development, thereby increasing all silkworm economic traits. This may be due to fact that nutrional composition of foliar applicant may have influenced the silk output of *Bombyx mori*. In the field study of CSR hybrid performed by Susheelamma *et al.*(2003), $S_{13}$ and $S_{34}$ Mulberry varieties exhibited better economic traits having good cocoon yield and returns at Chamarajanagar and Kollegal regions of Karnataka and Thalavadi regions of Tamil Nadu. This may be due to pH of the soil and soil fertility status in mulberry gardens. Cauvery hybrid ($BL_{67}$×$CSR_{101}$) performed better in Tamil Nadu than other places of Karnataka and Andhra Pradesh, especially with regard to cocoon yield. Sericulture in India is chiefly dependent on multivoltine × bivoltine hybrids as large number of farmers thrive on it. This hybrid produces gradable silk when compared to traditional hybrid, PM×$NB_4D_2$ (Umadevi *et al.,* 2005). Dandin *et al.* (2006) studied the performance of 'Jayalakshmi hybrid' ($ND_7$×$CSR_2$) along with control PM×$CSR_2$ in laboratory as well as field conditions. The new hybrid recorded best in all qualitative and quantitative traits. The hybrid is under large scale testing with the farmers of Andhra Pradesh, Karnataka and Tamil Nadu. The hybrid may reach the A grade quality of silk in domestic markets.

India is the second largest producer of Mulberry silk, although the area under Mulberry was virtually declining and there was a constant growth in raw silk production. Kolar gold (PM×$CSR_2$) performed higher for all economic traits over other hybrids *viz*., $CSR_2$×$CSR_4$ and PM×C-nichi in Mandya district of Karnataka. This hybrid was preferred by farmers and reelers due to its advantages over other two hybrids (Hiriyanna *et al.,* 2007). Phyto-ecdysteroid hormone was tested at Regional Sericulture Research Station, Anantpur and with the selected farmers at field level. This hormone improved all qualitative and quantitative traits of silkworm and thereby getting 80 per cent early maturity of silkworms due to availability of nutrient sources (Venugopal *et al.,* 2008).

## REFERENCES

Dandin, S. B., Ravindra Singh, Raghavendra Rao, D., Sudha, V. N., Umadevi, K., Kariappa, B. K., Basavaraja, H. K. and Premalatha, V. 2006. Jayalakshmi: A promising multi × bi hybrid. *Indian Silk*, 45 (4): 5-6.

Dandin, S.B., Jayant Jayaswal and Giridhar, K. 2014. *Handbook of Sericulture Technologies*. Central Silk Board, Bangalore, India, P. 349.

Hiriyanna, Munikrishnappa, H. M., Mahadevamurthy, T. S. and Geethadevi, R. G. 2007. Comparative performance and economics of Kolar gold with other population hybrids in Karnataka. *Indian J. Seric.,* 46: 69-71.

Prasanna Kumar, G. S., Lokesh, G. and Ananthanarayana, S. R. 2001. Field performance of silkworm hybrids through foliar application. *Proc. Natl. Sem. Mulb. Seri. Res. India, Nutritional Management and Quality Improvement in Sericulture,* pp. 131-135.

Susheelamma, B. N., Mala V. Rajan and Raju, V. S. 2003. Potentiality of CSR hybrid reared on $S_{13}$ and $S_{34}$ mulberry varieties under semi-irrigated conditions. *Natl. Conf. on Tropi. Seri. for Global Competitiveness, CSR&TI, Mysore,* P. 82 (Abst.14).

Umadevi, K., Sudha, V. N., Prakashmurthy, D. P., Raghavendra Rao, D., Ravindra Singh, Premalatha, V. and Kariappa, B. K. 2005. Evaluation of new multivoltines × bivoltine hybrid "Cauvery" ($BL_{67}$ × $CSR_{101}$) of the silkworm, *Bombyx mori* L. *Indian J. Seric.,* 44: 131-133.

Venugopal, A., Vidyunmala, S., Sivarami Reddy, N., Kanika Trivedi and Nirmal Kumar, S. 2008. Effect of phto-ecdysteroid hormone on the ripening and spinning in silkworm, *Bombyx mori* L. under semi-arid conditions of Andhra Pradesh. *Inter. Conf. on Trends in Seribiotechnology*-2008, Anantapur, 27-29$^{th}$ March, P. 68 (Abs. 42).

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