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Economics of muga culture – a case study in Coochbehar district of West Bengal

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ABSTRACT

The study attempts to trace about the economics of Muga silkworm (Antherea assamensis) rearing in Coochbehar district of West Bengal. Micro level study in two most important blocks in Coochbehar district namely, Dinhata-I and Coochbehar-II reveals that an annual investment of around Rs. 15,600 for maintenance of one acre of Som tree garden (host plant for Muga silkworm) and rearing of corresponding quantity of Muga Dfls (disease free layings) are required. A Muga rearer, on an average, can earn a net income of Rs. 17005.62 over prime cost, Rs. 15,149.64 over Cost A_1 and Rs. 12,341.37 over Cost C respectively from one acre of Som plantation. Seasonal distribution of returns show that the Muga farmers obtain highest return from ***Kotia*** *and* ***Chotua*** *rearing seasons and the lowest return is received in* ***Bhodia*** *season. Rearers of Dinahata-I block are found to be more efficient in terms performance of productivity compared to the rearers of Coochbehar-II block. This is thought to happen mainly due to the relatively better managerial ability of the rearers of Dinhata-I block and relatively less distance (within 65 mts) of Muga (Som) garden from the residence. Estimates of return reveals that a rupee investment in the* ***Kotia,*** *the main commercial season of Muga silk worm rearing, a Muga rearer can earn Rs. 2.70 and is found to have a very good economic prospect. It has capacity to afford better livelihood opportunity.*

Key Words : Explicit cost, implicit cost, muga culture and net return

Silk in India or elsewhere is an item of luxury. The best known type of silk is obtained from cocoons made by the larvae of the mulberry silkworm (*Bombyx mori)* reared in captivity. Mulberry sericulture contributes about 95 per cent of the world total silk production. Muga silk, one of the three non-mulberry silks, has got its uniqueness for golden yellow colour and is produced by the silkworm (*Antherea assamensis)*. India is the only country in the world where this semi-domesticated silkworm is widely cultured. At present, about 11.33 per cent of India's raw silk production is contributed from non-mulberry source (Table 1). But changes have taken place with regard to contribution of muga, tasar and eri in total non mulberry silk production in India. Share of muga, which was about 11 per cent during 1980-81, has gone down to 5.64 per cent only during 2007-08 (Table 2).

Coochbehar, famous for its royal historical background, is a northern district of West Bengal, lies in the fringe of Brahmaputra valley. Therefore, sensing the potentiality of climatic suitability of muga silkworm rearing in this district, attempts had been made to introduce muga culture in the district under the joint patronization of Directorate of Sericulture, Govt. of West Bengal and Central Silk Board, Ministry of Textiles, Govt. of India. At present there are about 665 households involved in Muga culture with an extent of about 680 acres of

Table 1: Mulberry and non-mulberry raw silk production in India

Year	Raw silk production (in tonnes)	
	Mulberry	Non-mulberry
1980-81	4593.0 (91.11)	448.0 (8.89)
1985-86	7029.0 (89.01)	868.0 (10.99)
1990-91	11486.0 (91.45)	1074.0 (8.55)
1995-96	12884.0 (92.63)	1025.0 (7.37)
2000-01	14432.0 (91.01)	1425.0 (8.99)
2005-06	15445.0 (89.25)	1860.0 (10.75)
2006-07	16525.0 (89.45)	1950.0 (10.55)
2007-08	16245.0 (88.67)	2075.0 (11.33)

Source : Annual Reports of Central Silk Board, Ministry of Textiles

* Figures within bracket indicate percentage to total raw silk production.

Table 2 : Performance of non-mulberry silk production in India

Year	Raws silk production (in tonnes)		
	Tasar	Eri	Muga
1980-81	265.0(59.15)	135.0(30.13)	48.0(10.72)
1985-86	464.0(53.46)	352.0(40.55)	52.0(5.99)
1990-91	380.0(35.38)	624.0(58.10)	70.0(6.52)
1995-96	194.0(18.93)	745.0(72.68)	86.0(8.39)
2000-01	237.0(16.63)	1089.0(76.42)	99.0(6.95)
2005-06	308.0(16.56)	1442.0(77.53)	110.0(5.91)
2006-07	350.0(17.95)	1485.0(76.15)	115.0(5.90)
2007-08	428.0(20.63)	1530.0(73.73)	117.0(5.64)

Source : Annual Reports of Central Silk Board, Ministry of Textile

* Figures within bracket indicate percentage to Total Non mulberry raw silk production

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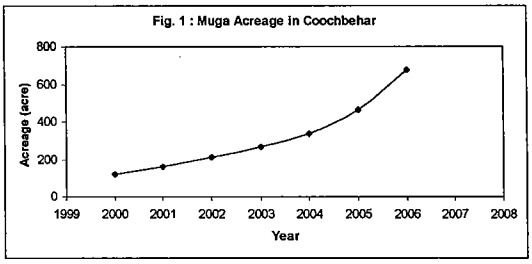
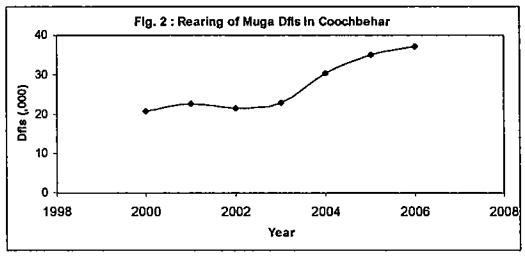
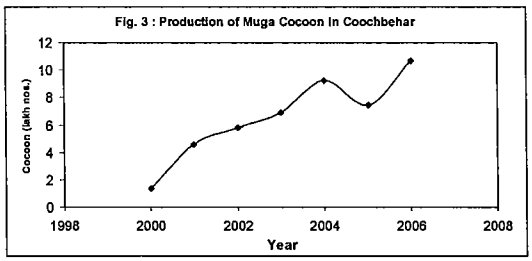
muga host plantation (Fig. 1, 2 and 3). Now, the question comes, will the venture be a remunerative one for the farming folk of this area or not? Therefore, an attempt has been made in this study to know about the 'economics' of Muga culture at the farmers' level in this district.







MATERIALS AND METHODS

The present study is based on micro-level information collected through door to door survey of Muga silkworm farming households in Coochbehar district. Muga culture is an economic activity and has been spread in ten blocks of the district of which Dinhata-I and Coochbehar-II blocks share the major areas. As the enterprise is quite new in this area, the muga rearers are quite scattered. Coochbehar-II and Dinhata-I blocks are found to be two most important blocks in Coochbehar district in terms of area coverage under Muga silkworm rearing and hence, data for the present study have been culled covering a total of 15 farmers from two villages in Coochbehar-II block and 20 farmers from five villages in Dinhata-I block. The villages in each block are selected on the basis of availability/intensity of muga households there and finally, the muga rearers are selected randomly. For the present study, data pertaining to one agriculture year *i. e.,* 2007-08 are obtained by 'survey' method. As because there are the practice of undertaking rearing of Muga silkworm during four seasons namely, *Chotua* (Seed, P_1), *Jethua* (Commercial), *Bhodia* (Seed, P_1), *Kotia* (Commercial) - collection of data have been made in four round, once in the end of every rearing season. The study aims to find out the cost and return prospect from the avocation of Muga silkworm rearing. Therefore, in order to work out the 'economics' of Muga silkworm rearing, the cost of production of Muga cocoon as well as of leaf of host plant (*i.e.,* Som) have been worked out by using the feasible standard cost concepts. Simple statistical methodologies have been employed to work out the 'economics'.

RESULTS AND DISCUSSION

Social and economic parameters, which are given in table 3, depict that the Muga rearers are at relatively disadvantageous position especially, on the question of perception and adoption of improved technologies on maintenance of Som/Soalu plantation (the host plant for Muga silkworm) and also on Muga silkworm rearing. They, not only, are having relatively poor educational back up (upto class-VI/VII, on an average) but also are having less female counterpart (two female per three male) to take part in rearing activities which is an absolute essential (Saraswathi and Sumangala, 2001) for making the venture economic. Average age of the farm family head (who are having poor education upto class III/IV only) is more than 50 years which is not at all favourable for improving adoption capability and in reality, the score on extension contact is below 3.0 too. About 50 per cent of the Muga farm families do take Muga rearing avocation alongwith other crop's farming and allocate 39 per cent of total land holding for raising the Muga silkworm's host plant (Som/Soalu plantation). Thus, the average size of a Som/Soalu garden becomes 0.80 acre and whereas the gardens in Dinahata-I remain adjacent (65-70 mts) to the residence, those of Coochbehar-II remain far away (around 250 mts.) from it. This length of distance may play a critical role in 'economic' application of inputs and the 'management' capacity of the Muga rearers also. These two attributes are supposed to have inverse association with distance of farm field from the farm household. The size of a Muga farm family is around five members.

Table 3 : Some important social and demographic traits of the muga rearers in Coochbehar district of West Bengal.

Traits/Features	Unit of expression	Dinhata-I	Cooch-behar-II	Average of two blocks
Family size	Number	5.15	4.67	4.86
Education[1]	Score	1.51	1.31	1.43
Male: Female	Ratio	1000:544	1000:926	1000:667
Age of family head	Years	54.30	46.40	50.41
Farmers having only Muga culture	Percentage	45.0	46.67	45.71
Farmers having Muga culture with farming	Percentage	50.0	53.33	51.43
Size of Som garden	Acre	0.80	0.67	0.77
Area under Som garden	Percentage	37.04	42.00	39.14
Information source	S. O. and F.S.	S. O. and F.S.	S.O. and F.S.	S.O. and F.S.
Extension contact[2]	Score	2.85	3.06	2.94
Distance of Som garden from the homestead area	mts	63.75	249.00	143.00
No. of Som plant	Nos./ bigha	237	217	228

S.O. : Seri. Officials; F. S. : Fertilizer Shops

*[1] **score** for education - illiterate : 0, upto class IV : 1,class V- class X : 2, above class-X : 3.*

[2]The muga rearers were asked 'whether they had discussion at sericulture offices, any bank or financial institutions, other offices or participated in any 'Krishi Mela, Workshop, Seminars etc'. Scor 1 and 0 were assigned if the answer were 'yes' or 'no' respectively.

Muga culture in Coochbehar is not too old origin and Muga silkworm is a monorace. Though the primary food plant of muga silkworms are Som (*Machilus bombycina* King) and Soalu (*Litsea polyantha* Juss.), rearing is undertaken mainly on the leaves of som plants. Muga silkworm is multivoltine in nature and 5-6 crops can be raised in a year, in general. The crop cycle of this commercially exploited semi domesticated silkworm in Coochbehar is presented in Table 4. Out of these crops, four crops, namely, *Chotua, Jethua, Bhodia* and *Kotia* are undertaken by the muga rearers of Coochbehar district; while seasons like *Jethua* and *Kotia* are undertaken as commercial crops, *Chotua* and *Bhodia* are undertaken as seed crop. The seed crops like *Jarua* and *Aherua* are hazardous due to various biotic and abiotic factors. These two crops are not undertaken by the rearers.

Table 4 : Seasons of muga silkworm rearing in Coochbehar district

Crop	Season	Month covered	Status	Date of brushing
Jarua	Winter	Dec.-Feb.	Pre-Seed (P-2)	17 – 20 th Jan.
Chotua	Early Spring	Mar.-April	Seed (P-1)	25 – 28 th March
Jethua	Spring	May-June	Commercial	14 - 17 th May
Aherua	Early Summer	July	Pre-seed (P2)	03 – 06 th July
Bhodia	Late Summer	Aug.-Sept.	Seed (P-1)	22 – 26 th August
Kotia	Autumn	Oct.- Nov.	Commercial	11 – 15 th Oct

Source : Chakravorty *et al.* (2008) and Das *et al.* (2008)

Som plants are perennial in nature and its leaves are utilized differentially in different rearing seasons. It is estimated that a total sum of about Rs. 15,134 is required for establishment of one acre of Som garden (Department of Sericulture, Govt. of West Bengal, Coochbehar). An additional estimated annual sum of Rs. 15,643.23/- is required for maintenance of that Som garden and the subsequent rearing of Muga silkworm (Table 6). Three types of maintenance cost namely, **Prime Cost**, **Cost A_1** and **Cost C** have been calculated. The monetary cost of rearing muga silkworm inclusive of maintenance cost of muga host plant garden constitutes the **Prime Cost**. The idea about **Cost A_1** has been arrived by adding interest on working capital @ 12 per cent, depreciation and repair of farm tools and machinery, apportioned part of Establishment Cost for setting up muga garden with Prime Cost. The value of **Cost C** is obtained by adding imputed value of family labour with Cost A_1.

Of course, there remains seasonal variation in maintenance cost of the garden as the number of dfls (disease free layings) reared varies according to seasons. More number of dfls are reared in commercial seasons that is in *Jethua* and *Kotia*. These two commercial seasons share about two-third (65 per cent) of the total number of dfls reared in a year. On an average, the Muga farmers rear a total of 766 (1719 per acre) dfls in a year and there is a very little differentiation in between the two blocks under study in this regard. But, they (the blocks) differ considerably in respect of cocoon production/productivity. While the rearers of Dinhata-I block harvest, on an average, 47 cocoons per dfl, those of Coochbehar-II block harvest only 35 cocoons per dfl (Table 5). The total number of cocoon production per Muga dfl in seed crop is slightly more than that of commercial crops and it is true for both the blocks. This difference in cocoon production is supposed to have great impact on the question of 'economization'.

Table 5: Rearing of muga silkworm and production of cocoons in Coochbehar district.

Blocks	Annual rearing of dfls (Nos.)		Production of cocoons (Nos.)		
	Per garden	Per acre	Per garden	Per acre	Per dfls
Dinhata-I	794	1734	37148	81,291	46.79
Coochbehar-II	726	1695	25474	58,593	35.09
Average	766	1719	32236	71,694	42.08

Table 6: Annual cost of production of muga cocoon in Coochbehar district.

Blocks	Prime cost (Rs.)		Cost A_1 (Rs.)		Cost C (Rs.)	
	Per garden	Per acre	Per garden	Per acre	Per garden	Per acre
Dinhata-I	8528.01	15695.70	9540.69	17556.54	11051.19	20339.61
Coochbehar-II	7970.81	15527.52	8896.44	17330.70	10378.63	20218.11
Average	8290.92	15643.23	9264.60	17480.37	10762.96	20307.48

Table 7 : Pospect of gross return and net return in Muga silkworm rearing in Coochbehar district,

Blocks	Gross return (Rs.)		Net return (Rs.) over					
			Prime Cost		Cost A_1		Cost C	
	Per garden	Per acre	Per garden	Per acre	Per garden	Per acre	Per garden	Per acre
Dinhata-I	19785.08	36414.24	11257.07	20718.54	10247.39	18860.22	8736.89	16080.15
Coochbehar-II	13992.17	27257.43	6021.36	11729.91	5095.23	9925.77	3613.04	7038.16
Average	17311.90	32648.85	9021.98	17005.62	8029.31	15149.64	6540.94	12341.37

In fact, there is a little variation in maintenance cost of Som garden in two blocks, but they differ widely in terms of net return prospect. On an average, a muga rearer of Dinhata-I block earns Rs.36,414.24 and that of Coochbehar-II block earns Rs. 27,527.43 from muga avocation. Margin of net return has been calculated from important consideration – over explicit/prime (material) cost, over Cost A_1 and Cost C. A rearer of Dinhata-I block with one acre of Som plantation, can earn an annual income of Rs. 20,718.54 over Prime cost, Rs. 18,860.22 over Cost A_1 and Rs. 16080.15 over Cost C. In comparison, Coochbehar-II block can earn only Rs 11,729.91 over Prime Cost, Rs. 9925.77 over Cost A_1 and Rs. 7038.16 over Cost C. Thus, net return prospect from Muga culture is found to be better in Dinhata-I block.

Now, the question arises why does this difference exists in net return in between these two blocks? One of the major possible factors may be the proximity of Som garden just beside the residential complex in Dinhata-I block leading to better management. Rearing of Muga silkworms which are wild in nature, require constant supervision, close vigil and careful nourishment since the very first day of larval stage of this tiny worm. Situation of Som garden within 65 mts distance (Table 3) makes it convenient to undertake these jobs with ease. This also makes it easier for the family members (especially, women) to attend the rearing as and when required. The Muga rearers of this block have relatively higher family size and are having more male members which makes it possible to support the labour-intensive Muga culture more efficiently.

Table 8 : Prospect of return per rupee investment in muga culture in Coochbehar district,

Block	Return per Rupee investment				Overall
	Jethua	Bhodia	Kotia	Chotua	
Dinhata-I	2.62	1.99	2.91	1.86	**2.31**
Coochbehar-II	1.88	1.77	2.34	1.26	**1.75**
Average	2.32	1.90	2.70	1.61	**2.08**

Finally, we turn towards the prospect of return from the rearing of Muga silk worm avocation per rupee investment. A perusal to Table 8 shows that maximum return prospect is available in *Kotia* which is main commercial crop season in this area. On an average, a rearer can earn Rs. 2.70 from a rupee investment in this season. Of course, the rearers of Dinhata-I block receive nearly three times of their rupee investment in this season which is considered to be high in any standard. Return prospects in different season are also displayed in the table. Thus, it can be said that Muga silkworm rearing is a good farming avocation and found to have very good economic prospect. So, it has capacity to afford better livelihood opportunity for farming folk of this area and has the potential to get spread further in future.

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