

Bivoltine Seed Cocoon Production in Eastern Dry Zone : An Economic Analysis

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Abstract

The study on economic analysis of bivoltine seed cocoon production in eastern dry zone of Karnataka revealed that the variable cost was Rs 87,631.95, accounting for 84.92% of the total cost. The gross returns was Rs 229,044.00 kg of with a net return of Rs 1,25,845.05. To get these net returns 22,944.00 kg of mulberry leaf was used along with human labor 534.54 man days and 1,560.24 dfls. Further, the farmers rearing bivoltine seed cocoons in less than one acre of mulberry gardens incurred less cost of Rs 92,937.93 and rearers with more than one acre of mulberry garden incurred Rs 111, 986.70 to get a net return of Rs 113, 504.05 and Rs 93,847.82, respectively, indicating the higher net returns in small size farms. Studies revealed that four seed cocoon crop rearings were uneconomical and five seed cocoon crop rearing was economical. However, if the government brings about the price fixation based on quality of seed cocoons rather than fixing the price based on number of cocoons per kilogram of weight it can increase the return and act as substitute for Chinese silk in the international market.

Key words : Bivoltine, Cocoon price, Cost benefit ratio, Policy implications, Cocoon production.

Agriculture plays an important role in the economic development of India. Nearly 70% of population are dependent on agriculture for livelihood, facing under or and disguised unemployment. Studies indicated that marginal productivity of labor is tending towards zero or negative in traditional agriculture. Risk and uncertainty are high due to 70% of net sown area is under rainfed agriculture which is unpredictable. Indian peasants facing uncertain market situation with cereals production becoming uneconomical. Sericulture is recognized as Kalpavriksha with moriculture and silkworm rearing. Mulberry sur-

vives the worst ravages of drought and responds quickly to favorable weather and hence this enterprise is highly remunerative with minimum investment but rich frequent dividends in tropical states, spreading over four to six harvests per year (2—7).

Sericulture enterprise is practiced by rich and poor with gainful employment to all age people and rural women. Although globally silk accounts for 0.2% of all textile fiber, the production is growing at steady state. India has the unique distinction of producing all the four commercially exploited varieties of silk

Table 1. Physical input-output relationship in bivoltine seed cocoon production.

	Item	Unit	Qty per acre of mulberry garden	Qty per 100 kg of cocoons	Qty 100 layings
1	Layings	Number	1560.24	173.951	—
2	Mulberry leafs	Kg	22944.00	2556.94	1470.54
3	Human labor	Man days	534.54	59.95	34.26
4	Bullock pair	Pair days	15.31	1.71	0.98
5	Mountages	Number	358.24	39.93	22.96
6	Yield of cocoons	Kg	896.90	—	57.43

Table 2. Cost of bivoltine seed cocoon production under irrigation per acre per year. *Includes the labor used for harvesting mulberry leaves also. **Includes the costs on electricity/Kerosene/oil and other lighting media. ***Refers to the cost of cocoon production including the value of by products like, manure and gantu.

Item	Costs (Rs)	Per cent of total cost	Per cent of operational or fixed cost	Cost per kg of cocoons (Rs)
A Operational Costs	87631.95	84.92	100.00	97.69
(i) Layings	3900.60	3.77	4.45	4.35
(ii) Mulberry leaves	22944.00	22.33	26.18	25.58
(iii) Human labor*	32072.40	31.08	36.60	35.76
(iv) Bivoltien labor	3827.50	3.71	4.37	4.27
(v) Hire charges	3582.40	3.47	4.09	3.99
(vi) On mountages marketing	5574.80	5.40	6.36	6.22
(vii) Repairs & maintenance of rearing room and equipment	7956.80	7.71	9.08	8.87
(viii) Interest on working capital	4172.95	4.04	4.76	4.65
(ix) Miscellaneous costs**	3600.50	3.49	4.11	4.01
B Fixed Cost	15566.43	15.08	100.00	17.35
(i) Depreciation of assets & equipments	6500.68	6.30	41.76	7.25
(ii) Interest on fixed capital	7500.50	7.27	48.08	8.36
(iii) Insurance	1565.25	1.52	10.06	1.74
C Total Cost (A+B)	103198.38	100.00	115.05	115.05
D Net Costs***	98154.38			109.43

viz. mulberry, tasar, eri and muga, ranking second with 13.5% of world production. Indian silks are exported to more than 60 countries with foreign exchange earnings worth Rs 3,000 crores for the year 2006-07 (1). The 11th Five Year Plan aims at replacing 10% of silk by bivoltine. Silkworm seed cocoon is the sheet anchor of sericulture, therefore the production and supply of quality seed is vital for the development of sericulture industry. The demand for disease free layings in the country is worth more than 100 crores of which Karnataka accounts for 50%. Government grainages supplies 45% of seeds while 55% is supplied by LSP. Both of them requires quality seed cocoons of which bivoltine is of prime importance as a male component. From the point of government grainages, LSPs, rearers, innovators, reelers, extension workers, bankers and technocrats lot of risks involved in seed cocoon production for obtaining higher net profits. Hence, the study was conducted in seed area of Anekal taluk. Such studies are rare in Karnataka but useful to bivoltine seed cocoon rearers and new business entrepreneurs.

Methods

The study was conducted in Anekal Taluk of

Bangalore district, Karnataka State. The stratified multistage random sampling design was utilized. Ten villages were selected i.e., five each from Sarjapur and Attibele hoblies. From each village five bivoltine seed cocoon producers i.e. total of 50 rearers were randomly selected. The rearers again categorized into size of holding i.e., less than one acre and more than

Table 3. Return from bivoltine seed cocoon production per acre of mulberry garden.

Item	Unit	Quantity	Value (Rs)
Main Product			
Seed cocoons	Kg	896.96	224000.00
By-Product			
Manure	Cart loads	14.92	3730.00
Gantu	Cart loads	4.38	1314.00
Gross return from seed cocoon production	Rupees		229044.00
Total cost of seed cocoon production	Rupees		103198.95
Net return from seed cocoon production	Rupees		125845.05
Benefit cost ratio			1 : 2.20

Table 4. Costs and returns from bivoltine seed cocoon per acre of mulberry garden based on size of the enterprise.

Particulars	Unit	Average area (1, 16) (n=50)	Classification (acre)		
			Less than one area (0.55) (n=22)	One acre and above (1.64) (n=28)	
1	Layings (dfls)	Rupees	3900.60	3354.52	4,500.86
2	Mulberry leaves	Rupees	22,944.00	20,865.00	23,496.68
3	Human labor	Rupees	32,072.40	28,865.00	35,279.64
4	Bullock labor	Rupees	3,827.50	3,444.75	4,210.25
5	Hire charges on mountages	Rupees	3,582.40	3,224.16	3,940.64
6	Miscellaneous cost	Rupees	21,305.05	19,174.55	23,435.56
7	Total variable cost	Rupees	87,631.95	78,928.14	94,863.63
8	Total fixed cost	Rupees	15,566.43	14,009.79	17,123.07
9	Total cost	Rupees	1,03,198.38	92,937.93	11,1,986.70
10	Yield of seed	Kg	896.96	812.25	995.63
11	Cost per kg	Rupees	115.05	114.42	112.48
12	Value of cocoons	Rupees	2,24,240.00	2,03,062.50	2,48,907.50
13	Value of by products	Rupees	5,044.00	3,379.48	6,708.52
14	Gross return	Rupees	22,90,044.00	2,06,441.98	2,55,616.02
15	Net return	Rupees	1,25,845.05	1,13,504.05	1,43,629.32
16	Benefit cost ratio	–	1 : 2.20	1 : 2.22	1 : 2.82

one acre. Again the enterprise was categorized into four, five and six crops. Thus, the study constituted 50 farmers from 10 villages as samples. The data were collected by direct interview method by administering a pre-tested schedule and analyzed for economic attributes.

Results and Discussion

Technical Relationship

The average area under mulberry for 50 farmers was 1.16 acres. The inputs used in bivoltine seed cocoon production for one acre of land are shown in Table 1. The rearers produced 896.96 kg of seed cocoons by feeding 22,944.00 kg of mulberry leaves.

To produce 100 kg of cocoons, different inputs used were 173.95 dfl's 2,557.94 kg leaves, 59.95 man days of human labor, 1.71 days of bullock labor and 39.93 mountages. Further, 1,470.54 kg of leaves, 34.26 man days of human labor, 0.98 pair days of bullock labor and 22.96 mountages for 100 layings were utilized for yielding on an average 57.43 kg of cocoons.

Operational and Fixed Costs in Bivoltine Seed Cocoon Production

The cost analysis of different components of seed cocoon production are classified under two heads viz. variable and fixed costs (Table 2). As there are tremendous enhancement of input costs in the seed area due to industrialization, the cost of mulberry leaf

Table 5. Annual costs and returns from four, five and six bivoltine seed cocoon crop rearers (Rs per acre).

Item	Unit	Four cocoon crops (n=4)	Five cocoon crops (n=35)	Six cocoon crops (n=11)	
		Value (Rs)	Value (Rs)	Value (Rs)	
1	Variable cost	Rupees	75446.61	68963.69	73,727.35
2	Fixed cost	Rupees	12398.94	13685.22	13505.83
3	Total cost	Rupees	87845.55	82648.91	87233.18
4	Gross return	Rupees	155902.50	194117.50	181937.50
5	Net return	Rupees	68056.95	107468.59	94704.32
6	B : C : ratio	Co-efficient	1 : 1.77	1 : 2.34	1 : 2.08
7	Extent of loss	Per cent	10.50	10.28	12.60

of own garden produced in 0.97 acre and purchased from 0.03 acre, valued at rupee one per kg of leaf is considered. The cost of seed cocoon production per acre was found to be Rs 103,198.38, while operational and fixed costs accounted are 84.92 and 15.08%, respectively. The human labor is most important contributing to 31.08% of total cost. The next major expenditure was on mulberry leaves amounting to 22.23% of total cost or 26.18% of variable cost. Repair and maintenance of equipments was the next portion (Rs 3,956.80) accounting 9.08% of variable cost. Least cost was observed with dfl's, bullock labor and miscellaneous amounting less than 4% each of the total cost and variable cost. The fixed costs included depreciation on rearing room and equipments, premium for crop insurance and interest on fixed capital which together amounted to Rs 15,566.43 accounting 15.08% of the total cost. Although, the total cost of seed cocoon production per acre mulberry amounts to Rs 103,198.38, the net cost after deducting the value of by products (Rs 5,044.00) for manure and gantu worked out to be Rs 98,154.38 per acre. The yield of seed cocoons per acre of mulberry garden was 896.96 kg and total cost of production per kg of seed cocoons was estimated to be Rs 115.05. The net operational and fixed costs were Rs 78.60 and Rs 13.96, respectively, incurred to produce one kg of seed cocoon. The major costs were human labor (Rs 35.76) and mulberry leaves (Rs 25.08), while third highest was fixed cost (Rs 17.35). The remaining variable costs together amounted to Rs 36.36.

Returns from Bivoltine Seed Cocoon

The gross and net returns per acre of bivoltine seed cocoon production are presented in Table 3. An average yield of 896.96 kg of seed cocoons per acre (main products) valued at Rs 224,000.00 was obtained. The main by-products were manures of 14.92 cart loads (valued at Rs 3,730.00) and gantu of 4.38 cart loads (valued Rs 1,314.00). Thus the gross return per acre from seed cocoon production business amounted to be Rs 229,044.00. The per acre total cost of seed cocoon production was estimated to be Rs 103,198.95. Thus, the net return accrued from the bivoltine seed cocoon production was Rs 125,845.05.

The gross and net return from one kilogram of bivoltine seed cocoons were Rs 255.36 and Rs 140.30,

respectively. The wide variation of price for bivoltine seed cocoons depending on the quality (8), ranging from Rs 250.00 to Rs 350.00. The gross and net income per rupee of investment was Rs 2.20 and Rs 1.22.

Returns to Investments for Bivoltine Seed Cocoon Production by Size of the Enterprise

Table 4 presents the costs and returns on per acre bivoltine seed cocoon production having an area under mulberry less than one acre, and one acre and above. The cost and return shows direct relationship with size of area under mulberry. The empirical data indicates that high total cost of Rs 111,986.70 was incurred by big farms, compared to Rs 92,937.93 incurred by small farms. The yield of cocoons was 995.63 kg and 812.25 kg for both the farms, respectively. Further, the net return per acre of 28 farms having more than one acre accounts for Rs 143,629.32 compared to Rs 113,504.05 for 22 farms having less than one acre size of farms. The total cost incurred per acre were Rs 111,986.70 and Rs 92,937.93 by two groups of farms while the gross return per rupee of investment were Rs 2.82 and Rs 2.22, respectively.

Relationship between Number of Crops, Yield and Net Returns from Bivoltine Seed Cocoon Enterprise

It was observed that the number of cocoon crops raised annually varied from four to six based on availability of mulberry leaves and dfls. Hence, an analysis was done to know the effect of number of crops on yields of and net returns from bivoltine seed cocoon enterprise (Table 5).

The number of respondents producing four, five and six cocoon crops per year were four, 35 and 11, respectively. The total and variable costs incurred in bivoltine seed cocoon production per acre varied with the number of crops taken per year. The total costs incurred by rearers raising four, five and six cocoon crops were Rs 87,845.55, Rs 82,648.91 and Rs 87,233.18, respectively. Similarly, variable costs were Rs 75,446.61, Rs 68,963.69 and Rs 73,727.35, respectively. The total and variable costs were lowest for five cocoon crops compared to others. The yield of cocoons was 760.02

kg per acre and net return was highest (Rs 107,468.59) with farmers taking five cocoon crops. Farmers rearing four seed cocoon crops realized the lowest net returns (Rs 68,056.95). The extent of loss in seed cocoon crops due to diseases was 10.50, 10.28 and 12.60% with those raising four, five and six seed cocoon crops, respectively. The five seed cocoon rearers per year incurred a loss of 10.28% and earned the minimum net returns.

Policy Implication

The present study indicates that the return from bivoltine seed cocoon production was highly profitable. The important reason for accruing high profit is minimum support price fixed by seed cocoon regulated market varying from Rs 250 to Rs 350 per kg of cocoons. One of the important focuses of Indian sericulture is to strengthen bivoltine silk production domestically and discourage imports to the tune of 8000 MT of Chinese silk. However, many farmers opined during the field study that rearing of bivoltine silk cocoons is risky required more capital than commercial rearings. The government has come up with price policy and insurance but scale economies are not coming forth because of IT and BT commercialization and industrialization of the seed cocoon area of Anekal taluk with high wage rate. This encourages only small and marginal farmers and landless laborers for taking up this activity with family labor as micro-enterprise. Also package could be recommended to

grow mulberry in more than one acre of area and rearing of five cocoon crops per acre per year as most profitable enterprise.

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