

Cost of Lac Cultivation and Its Profitability in Purulia District- A Case Study

Dr. Jyoti Prakash Mandal¹
Prof. Jaydeb Sarkhel²



Abstract

In order to find cost of lac cultivation and its profitability we have collected data through three stages stratified sampling method and ultimately choose 50 sample farms which are comprised of marginal farm, small farm and medium farm. Lac crop has two strains Rangeeni and Kusumi. In this paper we have shown cost of cultivation of the two strains individually as well as for the three each size group of farms in different angles. Side-by-side revenue earning also calculated to arrive at the profitability concept for each strain and each size group of farms. Which size group of farm reaps most profit is also discussed with reason. In a nut shell this paper will highlight medium size group of farm is standing in the most advantageous position compared to all.

Key-words: Farm, Small Farm, Marginal Farm, Profitability, Cultivation.

1. Introduction

The forest and sub-forest dwellers of the Purulia district having only limited areas for cultivation, meagre irrigated land and limited scope of irrigation systems mainly depend on rainfed agriculture and forest for their livelihood. But forests of the district are blessed with the plenty of lac host trees such as *Kusum*, *Palas*, *Ber* and *Babul*. Lac cultivation is simple with no involvement of high technology and very low investment. It is eminently suited to the farmers living in the vicinity of the forests including women as it demands only their part time attention. In the district its cultivation provides an important additional income next only to the agriculture. Farmers are also dependent on lac cultivation for their livelihood and Lac is regarded as an important source of cash flow to the marginal, small and large farmers in the district. In fact the district produces highest quality of *Rangeeni* lac, which comes from *Palas* and *Ber* trees. *Kusumi* crop is also produced when lac insect thrived on *Kusum* trees.

¹ Assistant Professor in Economics, Raghunathpur College, Raghunathpur, Purulia. Pin-723133; Phone No.-9531644055; E-mail-jyotiprakash1757@gmail.com

² Professor; Department of Commerce; The University of Burdwan; Golapbag; Burdwan; West Bengal; Pin-713104; Phone No.- 9434100250 E-mail-jaydebsarkhel@gmail.com

2. Review of Literature

“Lac Cultivation in Purulia District”(2001)- A Status report gives us brief insight about lac activities in Purulia on the basis of survey conducted by “Office of the District Magistrate & Collector” Purulia in the year 2001. From the proceedings of the “National Symposium on Lac Industry – Convergence for Resurgence, 20-21.09.2004” we can get a conception of cost associated with lac cultivation. The thesis “Economics of Lac Industry in India” by Ratna Mukherjee (2002) has put special attention on Purulia’s lac cultivation with the help of empirical data.

3. Objectives of the Study

The present paper is an endeavour to throw light on cost of lac cultivation including its profitability for two strains of lac crop Kusumi and Rangeeni. The study deals with the lac production pattern and is concerned with the collection of the primary data from the selected farmers for the year 2010-11. Over the year an analysis of cost, return in lac cultivation is attempted in this paper.

4. Data Source and Methodology

The study adopts the multi-stage stratified purposive sampling method to select lac growers in Purulia district. In stage I the major lac producing blocks of Baghmundi, Balarampur and Jhalda-1 of Purulia District, West Bengal were purposively selected for the present study. In stage II major lac producing villages from previously selected blocks were chosen. In stage III specific number of sample growers had been selected with an aim to make study over 50 lac growers. The selected sample farms according to their respective size groups are given in Table-1. The primary data were collected for the commercial *Rangeeni* crop and *Kusumi* crop for the year 2010-11. Each of the 50 sample farms of the selected villages under study and a few traders involved in their marketing of lac produce were contacted in order to fill in the schedule. Questionnaires relating to the objectives of the study had been developed for collection of information from lac farmers regarding the cost of lac cultivation, return and net return from lac activities. The database of this paper includes both published sources and primary data.

Table 1: Size – Group Wise Distribution of Sample Farms

Size Group	No. of Available Farms	No. of Selected Sample Farms	From Jhalda-1 Block	From Baghmundi Block	From Balarampur Block
1. Marginal Farms (<2.5 acres)	456	21	15	5	1
2. Small Farms (2.5-5 acres)	294	18	12	4	2
3. Medium Farm (> 5 acres)	118	11	8	2	1
Total	868	50	35	11	4

Cultivators grow lac entirely in the traditional way. The majority of the lac produced is grown on trees around the villages, and on cultivated or semi-cultivated agricultural land on trees growing on waste land such as road side and uncultivated land; and under semi-jungle conditions. The point to be noted is that lac does not grow well under absolute jungle conditions; it grows best under plantation and orchard conditions.

5. Costs Associated with Lac Agriculture

A) Fixed Cost: Lac cultivation requires minimal investment in the form of small tools. Some fixed cost incurred in mechanisation of lac cultivation operations in different stages- a) Pruning- b) Inoculation (infestation) –c) Broodlac removal and collection- d) Spraying for insect and pest control- e) Lac harvesting- f) Scraping-.

B) Prime or Variable Cost: The different cost items falling under variable cost of producing lac crop are i) Family Labour: ii) Seed (Brood): (Brood used for the production of the two strains of lac crop (Rangeeni and Kusumi) is generally raised on the farmer's field. Brood cost in each farm size group was evaluated at the market price.) iii) Interest: interest on working capital was charged at the rate of 30 percent per annum for a period of 6 months only from village money lenders.

6. Cost of Production, Gross Income and Net Income from Lac Activities

Cost of cultivation and returns in lac cultivation obtained from survey data, are presented in Table-2. This table also provides information on net profit, profit per tree, net profit per acre output-input ratio.

Table 2: Economics of Lac Cultivation and Returns (per 10 Host Trees)

Particulars	Palas		Ber		Kusum	
	Quantity	Value (Rs.)	Quantity	Value (Rs.)	Quantity	Value (Rs.)
Cost						
Labour	80 MD	8,000	100MD	10,000	151MD	15,100
Broodlac	30 Kg	1,800	50 Kg.	3,000	100 Kg.	11,000
Other input		600		500		1,200
Depreciation on fixed input		520		860		935
Interest on Total Investment		480		387		663
Total Cost		11,400		14,747		28,898
Return						
Broodlac	350 Kg	21,000			300 Kg	33,300
<i>Phunki</i>	6 Kg	450	10 Kg	750	20 Kg	2,500
<i>Ari-sticklac</i>	40 Kg	2,600	350 Kg	26,250	80 Kg	9,600
Gross Return		24,050		27,000		45,400
Net Profit		12,650		12,253		15710
Profit per tree		1,265		1,225.30		1,571.70
Output Input Ratio		2.11		1.83		1.57
Number of Trees per Acre.	310		200		110	
Number of Operated Tree per Acre.	155		200		45	

Net Profit per Acre	Rs1,96,075.00	Rs. 2,45,060.00	Rs. 70,726.50
Cost of Production of Broodlac	Rs. 31.29/Kg	-	Rs. 89.05/Kg
Cost of Production of Sticklac	Rs. 61.29/Kg	Rs. 63.65/Kg	Rs. 126.60/Kg

MD- Man Days valued @ Rs. 100 per day; Rangeeni broodlac cost @ Rs. 60 per Kg; Kusumi broodlac cost @ Rs. 110 per Kg; Rangeeni Phunki rate Rs. 75 per Kg.; Kusumi Phunki rate Rs. 125 per Kg.; Rangeeni (Palas) Ari-sticklac rate Rs. 65 per Kg.; Rangeeni (Ber) Ari-sticklac rate Rs.75 per Kg.; Kusumi Ari-sticklac rate Rs. 120 per Kg.

Source: Compilation of primary data gathered through survey

In estimating cost of production and income generation we consider input and output during 2 complete cycles such as Baisakhi & Katki for Palas and Ber trees while Jethwi and Aghani for Kusum tree. The main component of cost, requirement of broodlac per tree, is 3kg, 5kg and 10kg for Palas, Ber and Kusum respectively. For every 20 host trees (Rangeeni) for sticklac cultivation, 8 to 9 trees will be utilized for broodlac production, average production of broodlac per host tree being 40 kg. Estimated production of sticklac is 40 Kg. @ 4kg. /tree for Palas tree, for Ber tree it is 350 kg. (yield @35kg. /tree). In the case of Kusum tree it is 8 kg. per tree. Estimated income from selling broodlac @ Rs60/Kg and sticklac @ Rs. 65(Rs. 75 for Ber trees) is shown in Table 2 as Rs. 24,050 for Palas tree (Rs. 27,000 for Ber Tree). As prices of both Kusumi broodlac and sticklac are higher compared to Rangeeni crops the estimated income from Kusumi trees is also much higher compared to Rangeeni host trees. If production of broodlac is considered, estimated production of broodlac in Rangeeni crop is 35 kg per tree, while in case of Kusum trees it was 30kg per tree. Output to input ratio is significantly higher in lac cultivation on Palas and Ber trees (i.e. 2.11 and 1.83 respectively), whereas this ratio is 1.57 for lac cultivation on Kusum tree. Ultimately net profit earned per tree is Rs.1,265 for Palas tree, Rs.1,2255.30 for Ber tree and for Kusum tree it is Rs 1,572 (with captive use of broodlac produced by trees under the study). Per acre different kinds of lac host trees and their utilization are also presented in Table-2. The pooled results showed that percentages of operated trees per acre are 50% for Palas, 100% for Ber and 32% for Kusum tree. Low percentage of utilization of Kusum tree is due to its large size and higher input in the form of broodlac which the farmers are generally unable to procure because of high price at the time of scarcity.

A) Total and per Tree Cost of Production of Lac

Rangeeni Crop: Table-3 shows that total cost of production of Rangeeni crop incurred by all farm size group was Rs. 20,52,005.40 out of which the marginal, small and medium size group of the farms shared Rs.5,84,077.60, Rs.5,85,964.00 and Rs.8,81,963.80 respectively, constituting about 28.46, 28.56 and 42.98 percent of the total cost of production. It was found that the total cost of production was higher on the medium size group as compared to other size groups because this size group possessed larger number of trees.

Average cost of production per tree incurred by all farm size group was Rs.1,138.10. The marginal, small and medium size group of the farms shared Rs.1,112.50, Rs.1,114.00 and Rs.1,172.80 respectively. It was found that per tree cost of production was higher on medium size group as compared to the marginal and small size group of the farms. The possible

reason might be that the utilisation of labour was more on medium size group as compared to other size group of the farms.

Table 3: Total and per Tree Cost of Production of Rangeeni and Kusumi Crop

Crop		Farm Size group			Total/ Average
		Marginal	Small	Medium	
Rangeeni	Number of Trees	525	526	752	1803
	Cost of Production (in Rs.)	5,84,077.60 (28.46%)	5,85,964.00 (28.56%)	8,81,963.80 (42.98%)	20,52,005.40
	Cost of Production Per Tree (in Rs.)	1,112.50	1,114.00	1,172.80	Avg-1,138.10
Kusumi	Number of Trees	147	145	196	488
	Cost of Production (in Rs.)	3,33,163.90 (29.90%)	3,30,838.70 (29.69%)	4,50,329.60 (40.41%)	11,14,332.20
	Cost of Production Per Tree (in Rs.)	2,266.40	2,281.60	2,297.60	Avg-2,283.50

(Figures within the parentheses indicate percentage to total. Avg- Average)

Source: Compilation of primary data gathered through survey

Kusumi Crop: It is also evident from Table-3 that total cost of production of Kusumi crop incurred by all farm size groups was Rs. 11,14,332.20 and the shares of marginal, small and medium size group of the farms were Rs.3,33,163.90, Rs.3,30,838.70 and Rs. 4,50,329.60 respectively which constituted about 29.90, 29.69 and 40.41 percent of the total cost of production. It was found that total cost of production was higher on medium size group compared to marginal and small size groups of farms.

Average cost of production per tree incurred by all farm size groups was Rs. 2,283.50, on the other hand the cost of production per tree for marginal, small and medium size group were Rs. 2,266.40, Rs.2,281.60 and Rs. 2,297.60 respectively. The results depicted that, per tree cost of production was higher on medium size group as compared to marginal and small size groups of farms. The possible reason might be that the labour utilization on medium size group of the farms was higher as compared to other size group of farms.

Overall picture revealed that the cost of production for Rangeeni and Kusumi crops incurred by medium size group was higher as compared to the other size groups. This may be because of the fact that the medium size group of the farms possessed larger number of trees as compared to marginal and small size group of the farms.

B) Total and Per Tree Gross Return of Lac

Per tree average gross return was directly related with the average yield per tree and the rate of sale per kilogram.

Rangeeni Crop: It can be seen from Table 4 that the total gross return from Rangeeni crop earned by all size groups was Rs.43,27,200.00 and the share of marginal, small and medium size group of the farms were Rs.12,60,000.00, Rs.12,62,400.00 and Rs.18,04,800.00 respectively, constituting about 29.12, 29.18 and 41.70 percent of the total gross return. It was observed that gross return earned by medium size group was higher as compared to

marginal and small size group of the farms. This was because of the fact that larger numbers of trees were found on medium size group as compared to other size groups of farms. Gross return earned per tree by each size group was the same that is Rs.2400.00. This is because of the fact that production per tree was the same in each size group and market price was also the same in the study area.

Table 4: Total and Per Tree Gross Return of Lac

Farm Size Group	Rangeeni		Kusumi	
	Gross Income (in Rs.)	Gross Income Per Tree (in Rs.)	Gross Income (in Rs.)	Gross Income Per Tree (in Rs.)
Marginal	12,60,000.00 (29.12%)	2,400.00	6,17,400.00 (30.12%)	4,200.00
Small	12,62,400.00 (29.18%)	2,400.00	6,09,000.00 (29.71)	4,200.00
Medium	18,04,800.00 (41.70%)	2,400.00	8,23,200.00 (40.17%)	4,200.00
Total/Average	43,27,200.00	Avg.-2,400.00	20,49,600.00	Avg.-4,200.00

(Figures within the parentheses indicate percentage to total and Avg.- means Average.)

Source: Compilation of primary data gathered through survey

Kusumi Crop: It may be observed from Table-4 that the total gross return from Kusumi crop earned by all farm size groups was Rs.20,49,600.00. The shares of marginal, small and medium size group of the farms were Rs.6,17,400.00, Rs.6,09,000.00 and Rs. 8,23,200.00 respectively which constituted about 30.12, 29.71 and 40.17 percent of the total gross return. It was found that gross return earned by medium size group was higher as compared to other size groups of farms because this size group possessed larger number of trees as compared to marginal and small size group of the farms.

Overall picture revealed that gross return per tree from Kusumi crop was nearly double than that of Rangeeni crop. This was because of the fact that the market price of the product of the Kusumi crop was higher than that of Rangeeni crop. It was also found that the various size groups of farms had no effect on the gross income per tree for both the Rangeeni as well as Kusumi crops. It was observed that there was no effect of more investment in different size group of the farms Table 4 shows that gross income remained same in all the cases.

C) Total and Per Tree Net Return of Lac

The net returns represent the difference between the value of total return and total cost incurred in the production process. In other words, it is the difference between receipt and total expenses. It measures the combined return of the cultivator's resources for his labour, capital and management. The net profit reflects upon the returns to the cultivators over cost incurred.

Rangeeni Crop: From Table 5, it can be seen that the total net return from Rangeeni crop earned by all farm size groups was Rs.22,75,194.50. The marginal, small and medium size group of the farms shared Rs.6,75,922.40, Rs.6,76,436.00 and Rs.9,22,836.20 respectively constituting about 29.71, 29.73 and 40.56 percent of the total net return. It was observed that net return was higher on the medium size group of the farms as compared to marginal and

small size group of the farms. It was also found that the number of trees was higher on the medium size group of the farms as compared to small and marginal size group of farms.

Average net return per tree earned by all farm size groups was Rs. 1,261.90 and that of marginal, small and medium size group of farms were Rs.1,287.50, Rs.1,286.00 and Rs.1,227.20 respectively. It was found that although total net return was higher on the medium size group of the farms but net return per tree was slightly higher on the marginal size group as compared to other size groups of farms because this size group incurred lower cost of production as compared to small and medium size group of farms and also because gross return per tree was same in each size group of farms.

Table 5: Total and per Tree Net Return of Lac

Farm Size Group	Rangeeni		Kusumi	
	Net Income (in Rs.)	Net Income Per Tree (in Rs.)	Net Income (in Rs.)	Net Income Per Tree (in Rs.)
Marginal	6,75,922.40 (29.71%)	1,287.50	2,84,236.10 (30.39%)	1,933.60
Small	6,76,436.00 (29.73%)	1,286.00	2,78,161.30 (29.74%)	1,918.40
Medium	9,22,836.20 (40.56%)	1,227.20	3,72,870.40 (39.87%)	1,902.40
Total/Average	22,75,194.50	Avg.-1,261.90	9,35,267.80	Avg.-1,916.53

(Figures within the parentheses indicate percentage to total and Avg.- means Average)

Source: Compilation of primary data gathered through survey

Kusumi Crop: The table further revealed that the total net return from Kusumi crop earned by all farm size groups was Rs.9,35,267.80 out of which the marginal, small and medium size groups of farms shared Rs. 2,84,236.10, Rs.2,78,161.30 and Rs. 3,72,870.40 respectively which constituted about 30.39, 29.74 and 39.87 percent of the total net return. It was found that net return was higher on the medium size group as compared to other size group of the farms. This was due to the fact that higher gross return was found on medium size group of the farms as compared to marginal and small group of the farms. It was due to the fact that number of trees was higher on the medium size group of the farms as compared to other size groups.

Average net return per tree earned by all farm size groups was Rs.1,916.53. In the case of marginal, small and medium size group of farms net return per tree were Rs. 1,933.60, Rs.1,918.40 and Rs.1,902.40 respectively. It was observed that net return per tree was slightly higher on the marginal size group although total net return was more on medium size group as compared to the other size groups. This was mainly due to the fact that the cost of production incurred by marginal group of the farms was lower as compared to small and medium size groups of the farms.

Thus, overall picture revealed that per tree net return of two crops (Rangeeni and Kusumi) differed slightly whereas per tree gross return of two crops was same in case of all size groups. The reason for the marginal differences was due to difference in cost of production which made slight variation in net return. Thus Table 5 revealed that the net return per tree from Rangeeni crop was lower than that from Kusumi crop. The result indicated that the marginal groups of the farmers were getting more remuneration from each crop as compared

to that of small and medium size group of the farms. This may be because of the fact that resources were better utilised on the marginal size group as compared to other size groups. This finding confirms as expected because marginal farms own only limited land resources and they don't have other alternative for income generation and thus such category of farmers give more emphasis on lac cultivation These farmers may be called regular lac growers.

D) 't' Value : It was found from Table 6 that net return from Rangeeni crop was higher in all the farm size groups than that in the Kusumi crop. To find out whether the average net income per grower derived from Rangeeni crop (R^-) was higher than the average net income derived from Kusumi crop (K^-), 't' test was performed for two independent variables. At 5 percent level of significance the result was found to be significant, meaning thereby the average net income per grower from Rangeeni crop was actually higher than that of Kusumi crop which was higher in each group.

Table 6: Calculation of 't' Value for Differences of Mean Net Income Derived from Rangeeni Crop and Kusumi Crop.

Marginal	Rangeeni (R)	R*R	Kusumi(K)	K*K
1	28511	812877121	10802	116683204
2	32651	1066087801	14921	222636241
3	29456	867655936	11221	125910841
4	32333	1045422889	14411	207676921
5	29112	847508544	11904	141705216
6	32302	1043419204	14446	208686916
7	30446	926958916	12522	156800484
8	32908	1082936464	14905	222159025
9	30902	954933604	12812	164147344
10	34546	1193426116	14646	214505316
11	30333	920090889	12211	149108521
12	34911	1218777921	13446	180794916
13	31804	1011494416	14752	217621504
14	34511	1191009121	13402	179613604
15	31535	994456225	14846	220403716
16	34902	1218149604	13833	191351889
17	31933	1019716489	14711	216413521
18	34303	1176695809	13911	193515921
19	31545	995087025	14502	210308004
20	32341	1045940281	11530	132940900
21	34637	1199721769	14502	210308004
	675922	21832366144	284236	3883292008
Mean of R (R^-) =	32186.76		Mean of K (K^-) =	13535.05

Variance of R (S^2_k) = 1807210.65

Variance of R (S^2_r) = 3831283.19

Source: Compilation of primary data gathered through survey

Here we have to test null hypothesis $H_0 : \bar{R} = \bar{K}$

Against, the alternative $\bar{R} \neq \bar{K}$

$$\text{As we know } t_{cal} = (\bar{R} - \bar{K}) / \sqrt{(S_R^2 / 21 + S_K^2 / 21)}$$

$$t \text{ value} = 35.99539$$

Here $t_{cal} > t$ with $(n_R + n_K - 2)$ degrees of freedom at 5% level of significance = 1.96

Since calculated 't' is much greater than tabulated 't', it is highly significant at 5% level of significance. So there is a significant difference between the net profit earned from Rangeeni crop and from Kusumi crop for marginal group of farms.

The average net income from Rangeeni crop was two and half times more than average net income derived from Kusumi crop. It was found during the survey that the larger number of trees was put under production of Rangeeni crop by all size groups of the farms as compared to Kusumi crop.

Table 7: Mean Net Income per Grower in the Three Holding Sizes

Farm Size Group	Crops Rangeeni	Crops Kusumi
	Mean Net Income (in Rs.)	Mean Net Income (in Rs.)
Marginal	32,186.76	13,535.05
Small	37,579.77	15,453.39
Medium	83,894.18	33,897.27

Source: Compilation of the data

If we calculate 't' values for finding out differences of mean income derived from each crops for small farm and medium farm, the same result will be obtained. Over all we can conclude that the analysis of 't' value was found to be significant at 5% level of significance which indicated that the net income derived from Rangeeni crop was actually higher than that of Kusumi crop.

7. Conclusion

It has been seen that the production of medium farm size group is large. Again maintenance, overseeing and overhead charges are kept low by this farm size group. Most of all farms retained a portion of their previous crop for use as brood for the next crop. Since brood is not purchased and crops are successful it would be possible to make large profit even at the prevailing lower price of sticklac. As previous four years 2007-08, 2008-09, 2009-10 and 2010-11 had been very adverse; the purchase of brood is very much expensive in the year under study, and may even be unobtainable for the small and marginal farmers. The necessity of purchasing brood for the group of farmers at high rate swallowed any profits they might have made. The sale of broodlac on the other hand is remunerative and thereby medium farm size gets comparatively high return. Loss of weights by sticklac on storage as much as 30% or more goes against the interest of small and marginal cultivators. The group of cultivators either cannot afford, or is not prepared to risk, the amount of brood necessary to infect fully all the trees under their possession. Therefore optimum infection to obtain the maximum return is not of great importance to them.

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