Estimation of Cost of Cultivation, Return and Benefit-Cost Ratio of Betel Vine Farmers in Different Farm Groups of Bankura District

ABSTRACT

Agriculture is the skeleton of the Indian Economy and the stabilizing point of the social structure and economic sketch of the country. Apart from providing National Income, ensuring food security or generating employment, Agriculture is the main stay behind the cultural commonality and the economic homogeneity of the society. The present study on betel vines was executed in Taldangra Block of Bankura district, West Bengal. The locale of the study was chosen through purposive sampling due to the dominance of commercial betel cultivation. Sampling was also done following the principle of convenient sampling as the study area had earlier been known to the researchers. To minimize the recall biases a personal rapport was established with the farmers before surveying & data collection. The study was conducted in the Agricultural year 2023-24 by Primary data collection from 120 farmers of seven randomly selected villages. Primary data were individually taken to assess the cost of establishment of the betel orchard, maintenance cost for its continuity, total costs of cultivation, returns and the benefit-cost ratio obtained by the farmers through a semi-structured and pretested schedule employing Participatory Rural Appraisal (PRA) as per requirement. The result indicated that the total costs of cultivation for marginal, small, medium, semi-medium and large farmers are respectively 457943, 441850. 430115, 425828 and 419168 ₹. The cost-benefit ratios for marginal, small, medium, semi-medium and large farmers are 2.4, 2.5, 2.44, 2.2 and 2.7. The benefit-cost ratio for large farmers was the highester: 2.7 and for marginal farmers it was lowestr, that is 2.2.

Commented [U1]: What was the objective of this study?

Commented [U2]: You need to clarify the difference between these groups of farmers. We don't see it in the text.

Commented [U3]: No. The lowest was for the semi-medium farmers (2.2) according to the data listed above.

KEYWORDS

Purposive Sampling, Convenient Sampling, Pretested Schedule, Recall Biases, Participatory Rural Appraisal, Cost of Cultivation, cost-benefit Ratio, farm economic evaluation

INTRODUCTION

In India, medicinal plants like ghrito kumari, pudina, adrak, sarpagandha, tulsi, brahmi, poppy, basak, thankuni, pan are some traditionally used medicinal and aromatic plants and some of them are being used on a commercial scale for their medicinal importance.

Betel vine is one of the most important medicinal plants, which is intricately attached to the fabric of our culture. Its cultivation has been commercialized for a long time (leaves being the economical part). It is also known as the 'neglected green gold' of India. The scientific name of Betel is *piper betel*, belonging to the plant family Pipereaceae.

The betel leaves are very nutritive and contain a considerable amount of vitamins and minerals. The primary constituents of betel leaves are vitamins B, C and carotene, also rich in a phenolic alkaloid 'Eugenol', found in cinnamon, clove and bay leaves also. Leaves help in digestion and remove the foul smell of the mouth. It is good for the respiratory system hence is used in the treatment of cold and cough, bronchitis and other respiratory diseases or to soothe the respiratory tract while in the presence of any aggressive foreign body. Freshly crushed leaves have been used as an antiseptic for cuts and wounds since old periods.

Almost there are 40 popular varieties of betel vines are found in the Indian subcontinent, out of which 30 are found in West Bengal. For a long time, West Bengal has been known for its betel nut cultivation and higher genetic diversity of different varieties. Major varieties of betel vines of West Bengal are Bangla Pan, Sanchi, Mitha pati, Kali bangla, simaruli bangla pan.

Important planting seasons in India are described below.

Table 1. Different planting seasons in different states

State	Season
Andhra Pradesh	September-October
Assam	April-May and August-September
Bihar	June-July September and May-June
Karnataka	July-August

Odisha	May-June and September-November
Madhya Pradesh	January-March and September-November
Maharastra	July-August and October-November
West Bengal	June-July and September-October

Major betel growing countries in the globe are India, Thailand, Bangladesh and Srilanka, i.e., Southeast Asian belt. In India, betel leaf is mostly grown in Assam, Andhra Pradesh, Karnataka, Bihar, Gujarat, Madhya Pradesh, Odisha, Rajasthan, West Bengal and Maharashtra. In India, betel vine is grown in over 50,000 ha. area providing almost an annual turnover of 1000 Crores. India exported 6,159.39 MT of betel leaves around the world which was worth Rs. 26.18 Crores during 2020-21. India is the major exporter of betel leaves to countries like Afghanistan, Australia, Germany, Hongkong, Kenya, Nepal, Bangladesh, Canada, France, United Kingdom, UAE, Saudi Arabia, Qatar, Yemen, Oman, Pakistan, USA and the United Kingdom. In India, it is consumed by about 15-20 million people and generates direct or indirect employment opportunities for almost 20 million people. Besides employment generation, it also contributes to the nation by forex (foreign exchange) earnings. India has good export potential as per the trends of previous years with rising demands at the worldwide level.

West Bengal is the largest betel-producing state of the country. The total area under betel vine cultivation is almost 18690 hectares. About two-thirds of the total production of the country is contributed by West Bengal, comprising about 4-5 lakhs of boroj (Paul, 2021). Betel leaves worth 150 crores have been exported from West Bengal to other states of the countries a year. West Bengal produces about 1.39 crores of betel leaves per year (Nandi, Kar and Taparia, 2022). Most of the post-harvest products of betels are highly sold in Bihar, and Uttar Pradesh are produced from the betel grown in West Bengal. Here major betel vine growing districts are East Midnapur, Howrah, West Medinipur, Bankura, East Medinipur, and Nadia. East Medinipur district ranks first in terms of area under betel vine cultivation. Several regions of this district neighboring to Bankura district which is another betel vine growing district and famous for producing well-sainted betel leaves, hence selected as the locale of the study. The area under the betel vine field has recorded an increasing trend in Bankura. This golden crop provides livelihood to 25 million families in the

country. Betel leaves worth about Rs. 30-40 million are exported to the Middle East and European countries (Guha, 2006).

LITERATURE REVIEW

Kumar~~, Yadav~~ ***et al. (2023)*** conducted a research on betel farming in Uttar Pradesh. The study found betel growing as a significant cash crop due to its high benefit-cost ratio (2.3). However, it is a labor- and capital-intensive crop and best suited for small-scale farmers in Uttar Pradesh for its stable supply of employment and income.

Dey *et al*. (2022) studied the economic analysis of the production and marketing of betel leaf in the Balasore district in Odisha. He concluded that in the initial year, the one-time cost of boroj construction for the betel growers was 289300 ₹. The annual cost of cultivation was 90007 ₹ and the net return was 146072 ₹.

Sathya *et al.* (2022) studied on the economic analysis of the production of betel vine in Thanjavur district of Tamil Nadu and concluded that the cost and return of the betel vine farm per acre was worked out to be 37 lakh ₹/acre and the average gross return was 8 lakh ₹ /acre. The result of the study indicated that betel vine cultivation is highly profitable in comparison to other crops and the benefit-cost ratio obtained was 2.3.

Palanichamy~~, Rohini~~ ***et al.*** **(2022)** conducted a study on Tanjavore District of Tamil Nadu focusing on the betel vine production and constraints faced by the betel growers. The study found that the cost of the betel vine farm was worked out to be ₹3. 37 lakh/acre and the average gross return was ₹ 8 lakh/acre. The result of the study points out that betel vine cultivation is highly profitable with a benefit-cost ratio of 2.5 approximately.

Mondal~~, Saha~~ ***et al.*** **(2020)** conducted a study on the rejuvenation of the betel farming economy in South Bengal in the post-cyclone period. They took primary data from 51 betel farmers of Fingha Dhaowri village of South 24 Parganas in West Bengal. The construction of a boroj of 10 decimals costs 0.8 to 1.5 lakh ₹ including first-year maintenance, based on the assistance from Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGA) and state government disaster relief fund.

Rahman et al. (2019) studied the profitability and the existing marketing channel of betel leaf in Bagerhat district, Bangladesh. It was concluded that farmers received the highest profit in the 4th

year with a B-C Ratio of 1.62. Market margin analysis showed that farmer's sales price was 31.25 ₹, 210.43 ₹ and 331.56 ₹ for small, medium and large betel leaf farmers respectively, the reason being differently sized leaves have different levels of demand.

Pavithra H.K. (2016) studied on economic analysis of betel leaf farming in Tumkur district, Karnataka. They observed that betel vine cultivation was well recommendable for its economical feasibility. It yielded IRR of 29% and 24% and with benefit-cost ratios of 1.37 and 1.26 in Gubbi and Pavagada- two separate taluks respectively. Farmers of Pavagada taluk incurred higher marketing costs (₹. 160/Pindi) than those of the Gubbi taluk farmers (₹. 83/Pindi) (Pindi is the local unit of counting leaves).

Mandal and Mandal (2016) studied the financial feasibility and constraints of betel vine cultivation in the coastal area of Sundarbans, West Bengal. Sundarban is ecologically a vulnerable region in the era of global warming as the coastal regions are gradually losing their mean sea level (MSL) height and the locale of the study was chosen there to observe the condition as a betel growing zone. They observed that the payback period was 2.81 years, IRR was estimated as 45%, NPV was 134614 ₹ and B-C Ratio was 1.25.

Tholkappian (2014) conducted a study in Thanjavur district of Tamil Nadu by collecting primary data from both organic and conventional betel growers. He collected data from 30 organic and 30 conventional farmers during the 2012-2013 agricultural season. The main objective of the study was to frame a comparative study concerning the economic viability and fruitfulness of organic and conventional betel farming in the study area. The result found was that net return from betel leaf was higher in organic farms (-45,212 ₹ per acre in organic farms compared to conventional farms 36,802 ₹ per acre). Similarly, the gross return was- 78,100 ₹ per acre from organic farms and- 72,250 ₹ per acre from conventional farms.

Kandle (2013) studied the economics of the production of betel vine in the Kelawe area of Thane district. He concluded that at each sett near about 52 to 55 cuttings were harvested and generally one betel vine sett gets ₹50. The whole betel vine orchard required drip irrigation and the expenditure of irrigation facilities was ₹ 28,000. The net profit from the betel leaves garden was about ₹. 1,00,000 to 1,50,000 in 1 Ha. Area

Vinayak Rao (2013) conducted a research on production and marketing of betel leaf in Amravati district. Regarding the cost of cultivation, they found that the established production cost per hectare of the orchard is 237603.86 ₹ and the bearing cost per hectare for the orchard was 15840.19

₹ (considering 15 years shelf life of the orchard). Per hectare production was 400777.96 lakh betel leaves and per hectare net return obtained was 106848.36 ₹. The input-output ratio at cost A, cost B and cost C were observed to be 2.06, 1.43 and 1.36.

RESEARCH METHODOLOGY

In all kinds of research and most specially in Social Science, taking samples is a crucial task since it's not generally possible to tabulate or account an entire population wholly. Here, for sampling, we need to follow some scientific principles to avail the sample regression function (SRF) from the population regression function (PRF). Hence using sampling techniques, we collect data from the entire population to have it as a true and most accurate representation of the entire population where social scientists can make their operations and research observations. Then before coming to a decision, we need to discuss and conclude from taken samples utilizing analytical tools. Samples give a clear and undeniable imagery of the population. In economic analysis also it is not possible and highly time-consuming, labor and capital-intensive to take datasets from all farmers, producers, middlemen, market functionaries or orchard owners and others, hence social scientists must rely on samples. It also critically depends on the usage of appropriate analytical tools for data analysis before reaching proper inference.

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The methodology adopted for the present study of data collection and the techniques used are described under the following heads –

(3:1) Sampling framework

(3.2) Collection of data

(3.3) Analysis of data

3.1 Sampling framework

3.1.1. Selection of District **:**

The state of ….comprises 23 districts, among these districts **Bankura** district was selected purposively for the present study because ….

3.1.2. Selection of Block **:**

There are 23 blocks in Bankura district. Out of them **Taldangra** block was selected purposively for this study, due to high betel vine cultivation and higher no. of betel growers and orchard owners in this region.

Commented [U5]: OK.

3.1.3. Selection of Villages :

A complete list of all villages within the block was prepared with the help of the block office. Out of which 5% of villages were selected randomly for the present study.

Commented [U6]: How many villages? Precise it.

Fig. 1 – Map of the Study Area (composed by Arc GIS Software)

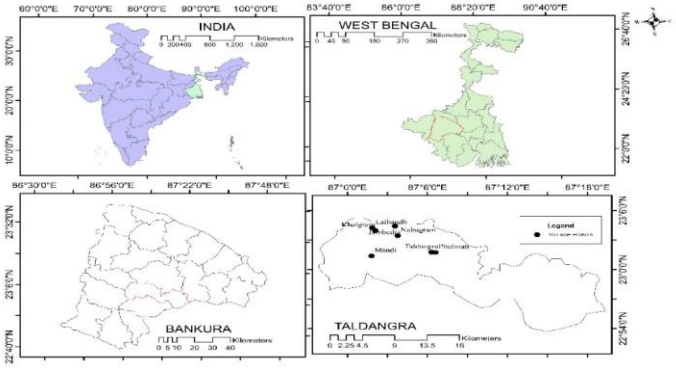

Table. 2 Total no. of villages selected in Taldangra block

Commented [U7]: Why 7 villages?

Serial No.	Selected Villages
1	Taldangra
2	Phulmati
3	Jambedia
4	Khalgram
5	Lalbandh
6	Mandi

7	Nabagram

3.1.4. Selection of Respondents (Farmers**) :**

A complete list of farmers was obtained from the selected gram panchayats of the block. Out of total villages, 10% of Respondents were selected randomly and then selected respondents were divided based on land holding size.

Table.3. Selection of respondents

Serial No.	Villages	Total no. of Betel farmers						Total no. of respondents					
		Marginal	Small	Semi-medium	Medium	Large	Total	Marginal	Small	Semi-medium	Medium	Large	Total
1	Taldangra	30	30	50	20	30	160	3	3	5	2	3	16
2	Phulmati	40	70	30	20	20	180	4	7	3	2	2	18
3	Jambedia	0	30	50	60	20	160	0	3	5	6	2	16
4	Khalgram	0	20	80	60	20	180	0	2	8	6	2	18
5	Lalbandh	40	40	60	40	0	180	4	4	6	4	0	18
6	Mandi	40	20	50	50	0	160	4	2	5	5	0	16
7	Nabagram	10	90	0	80	0	180	1	9	0	8	0	18
Total		160	300	320	330	90	1200	16	30	32	33	9	120

Commented [U8]: There's a statistical table which indicates the number of respondents according to the size of the population.
If the population size N is 1000, the sample size n must be at least 286.
If it's N=1200, the sample size needed is $n=N/(1+N.e^2)=1200/(1+1200x0,05^2)=300$

3.1.5. Selection of Market :

The primary and secondary markets were purposively selected for the present study.

3.1.6. Selection of Market Functionaries :

A list of all market functionaries of both primary and secondary markets was prepared out\ of the total market functionaries 10% of market functionaries were selected randomly from the market for the present study. These market functionaries were considered for data collection

Table. 4 Selection of Market Functionaries

Serial No.	Market Functionaries	Total No.	Selected
1	Processing Unit	0	0
2	Commission Agents	40	4
Total		40	4

Period of Study**:**

The data were collected ~~for~~ during the Agricultural year 2023-2024

3.2. ANALYTICAL TOOLS~~-~~:

To fulfill the specific objectives of the study, based on the nature and extent of the data, the following analytical tool was employed.

Cost A_1 : Cost A1 +rent for leased in land

Cost B_1 : Cost A1 + interest on the value of owned fixed capital assets (excluding land)

Cost B_2: cost B1 + rental value of owned land (net of land revenue) and rent paid for leased land

Cost C_1 : cost B1 + imputed value of family labour

Cost C_2: cost + imputed value of family labor

Cost C_{2*}: Cost C2 adjusted to take into account the valuation of human labor at the market rate or statutory minimum wage rate whichever is higher

Cost C_3: Cost C2* + value of management input at 10%of total cost (C2*) Cost C is the total cost of cultivation

Measures of Farm Income :

Commented [U9]: You didn't indicate them of to hear.

Commented [U10]: ???

Commented [U11]: ???

1. Farm business income = Gross income – Cost A_1
2. Family labour income = Gross income – Cost B
3. Net income = Gross income – Cost C
4. Farm investment income = Farm business income – Imputed value of family labor
5. Gross Income = No. of main products X Price of each product

Benefit-Cost (B: C) Ratio:

The ratio of economic yield to biological yield. Also, the ratio of the present worth of gross return of the present worth of costs. It is the ratio of the sum of the project or policy's discounted benefit to the sum of its discounted costs. If BRC >1 go ahead with the project/policy.

Formula

$$\text{Benefit Cost Ratio} = \frac{Net\ Revenue}{Total\ Cost} = \frac{Gross\ Revenue - Total\ Cost}{Total\ Cost}$$

Commented [U12]: OK. But, where is the formula of Gross revenue and that of Total cost?

3.2.2. Programming Language Applied: Arc GIS

Arc GIS is an online Geographic Information System (GIS) software developed in 1999. It is highly used for creating study area maps for determining position at a global or geographical scale.

RESULTS & DISCUSSIONS

The cost incurred in cultivation is generally classified into the following categories for ease of understanding.

- Establishment Cost (1st year)
- Maintenance Cost (2nd year)
- Total Cost of cultivation (CoC)

Commented [U13]: What the relationship between these different costs?
Is CoC=Establishment cost + Maintenance cost? You need to explain.

Betel growers have to invest a certain amount before the onset of betel cultivation, in the initial years. Generally, it is the gestation period where we have to invest before getting the fruit of farming. The investments made by the farmers in establishing the crop right from the pre-planting

stages to the first cutting fall under the establishment cost. It includes various expenditures including Field Preparation, weeding, field preparation, Purchase of bamboo, bricks, nylon, jute sticks, farmyard manure etc. Nylon is necessary for giving a net as a barrier so grazing animals cannot eat them. Manures and fungicides are applied in the soil before boroj construction. Totalling both establishment cost and maintenance costs we get the total costs of cultivation. Here the establishment cost denotes the fixed costs and maintenance Cost denotes the variable costs that are necessary to carry on the operations that are going on.

Table 5. : Cost of the establishment of betel vines per Ha. of betel leaf cultivation for different sizes of groups						
Serial No.	Particulars	Expenditure Variation as per farmers' category [₹]				
		Marginal	Small	Semi-medium	Medium	Large
1	Field Preparation	98000	92000	88000	85000	82000
2	Labor for wedding & field preparation	58000	60000	61500	63000	63500
3	Purchase of small bamboo	28000	25000	25500	25300	25000
4	Purchase of large bamboo	170000	160000	155000	163000	150000
5	Jute sticks	90000	88000	86500	86300	86000
6	Nylon net	11500	11000	10750	10700	10600
7	Bricks	5000	4900	4900	4800	4750
8	Straw	2500	2500	2500	2500	2500
9	Iron wire	140000	138000	136000	135000	134500
10	Farmyard Manure	20000	20000	20000	20000	20000
11	Fungicide application	50000	50000	50000	50000	50000
12	Labor for fungicide preparation	55000	53000	52500	51000	50000
13	Labor for manure application	58000	56000	52500	51000	50000
14	Seedlings	80000	80000	80000	80000	80000
15	Water sprayer	4500	4500	4500	4500	4500
16	Irrigation	15000	13000	12500	12350	12000
17	Labor for Boroj construction	28000	27000	26500	25000	24000
18	Labor for vines plantation	3000	3000	3000	3000	3000
19	Lime	300	300	300	300	300
20	Rope	3500	3400	3350	3300	3200
21	Fertilisers	20000	20000	20000	20000	20000
22	Labor for fertilizer application	2000	1900	1700	1650	1600
23	Pesticides & Insecticides	5000	5000	5000	5000	5000
24	Labor for Pesticides & Insecticide application	2000	1900	1800	1750	1700
25	Others	10000	9000	9000	8500	7500
TOTAL		959300.00	929400.00	913300.00	912950.00	891650.00

From Table 5 the average establishment cost of betel vine per hectare for different sizes of farmers can be understood. The establishment cost of a betel vine orchard for the marginal farmer was Rs. 959300, for small farmers, it was 929400 Rs. and for semi-medium, medium and large the establishment cost per hectare was Rs. 913300, Rs.912950 and Rs.891650 respectively. It is evident that Betel farming is a small-scale farming.

Table 6. Maintenance cost of betel vine per hectare of betel leaf cultivation for different sizes

Serial No.	Particulars	Expenditure Variation as per farmers' category [₹]				
		Marginal	Small	Semi-medium	Medium	Large
1	Preparatory Tillage	38000	35500	34000	33500	33000
2	Ploughing	0	0	0	0	0
3	Manuring	58000	56000	53000	52500	52000
4	Fertilisers	3768	3700	3700	3600	3600
5	Weeding	6000	5500	5300	5100	5000
6	Pruning	80000	79000	77700	77100	77000
7	Chemicals	20000	20000	18000	18000	17500
8	Harvesting	28000	26000	25000	24000	23000
9	Packaging	28000	26000	25000	24000	23000
10	Total Hired Labour	42000	41700	41200	41000	40500
11	Total Family Labour	1200	1200	1200	1200	1200
12	Irrigation	15000	13000	12500	12350	10000
13	Others	9000	8000	8000	7000	7000
TOTAL		328968.00	315600.00	304600.00	299350.00	292800.00

From Table 6, the maintenance cost of betel vine per hectare per year for different sizes of farmers can be understood. The maintenance cost for marginal farmers was Rs.328968, for small it was Rs. 315600 and for medium, semi-medium, and large it was Rs. 304600 Rs.299350 and Rs. 292800 respectively.

Table 7. Costs of cultivation per Ha. of betel leaf cultivation for different sizes of groups

Serial No.	Particulars	Marginal [₹]	Small [₹]	Semi-medium [₹]	Medium [₹]	Large [₹]
1	Total Hired Labour	42000	41700	41200	41000	40500
2	Preparatory Tillage	38000	35500	34000	33500	33000
3	Ploughing	0	0	0	0	0
4	Manuring	58000	56000	53000	52500	52000
5	Fertilisers	3768	3700	3700	3600	3600
6	Weeding	6000	5500	5300	5100	5000
7	Pruning	80000	79000	77700	77100	77000
8	Chemicals	20000	20000	18000	18000	17500
9	Harvesting	28000	26000	25000	24000	23000
10	Packaging	28000	26000	25000	24000	23000
11	Irrigation	15000	13000	12500	12350	10000
12	8% of establishment cost	76744	74352	73064	73036	71332
13	Cost A (1-12)	**395512**	**380752**	**368464**	**364186**	**355932**
14	Rental value of owned land	12000	12000	13000	13000	15000
15	Land revenue	900	900	900	900	900
16	Depreciation on fixed capital	1680	1630	1780	1930	1980
17	Interest on fixed capital	5020	5200	5670	5900	6050
18	Cost B (13-17)	**415112**	**400482**	**389814**	**385916**	**379862**
19	Family human labor	1200	1200	1200	1200	1200
20	Cost C (18-19)	**416312**	**401682**	**391014**	**387116**	**381062**
21	Managerial Cost (@10% of Cost C)	41631	40168	39101	38712	38106
22	Total Cost (20-21)	**457943.00**	**441850.00**	**430115.00**	**425828.00**	**419168.00**

Commented [U14]: Cost of cultivation?

From Table 7, the cost of cultivation in betel leaf cultivation per hectare for different farm sizes can be comprehended. The cost A for marginal, small, semi-medium, medium and large farmers are calculated to be 395512, 380752, 368464, 364186, 355932 rs. Calculated Cost B for marginal, small, semi-medium, medium and large farmers are- 415112, 400482, 389814, 385916, 379862 rs,

Including the family human labour, we get the cost C which are 416312, 401682, 391014, 387116, 381062 rs. The total cost we obtain after adding 10% of managerial costs are 457943, 441850. 430115, 425828 and 419168 rs.

Table 8: Returns per Ha. of betel leaf cultivation for different sizes of groups

Serial No.	Particulars	Marginal	Small	Semi-medium	Medium	Large
1	Yield in 1st year [in panaa]	150	152	154	156	158
2	Yield 1st year onwards [in panaa]	310	304	308	312	316
3	Total Cost	**457943**	**441850**	**430115**	**425828**	**419168**
4	Total Establishment Cost	959300	929400	913300	912950	891650
5	Total Maintenance Cost	328968	315600	304600	299350	292800
6	Net returns	1099063	1104625	1049481	936821.6	1131754
7	Cost A	**395512**	**380752**	**368464**	**364186**	**355932**
8	Cost B	**415112**	**400482**	**389814**	**385916**	**379862**
9	Cost C	**416312**	**401682**	**391014**	**387116**	**381062**
10	Farm Business Income [₹]	385432	401400	431300	436150	450100
11	Farm Labour Income [₹]	384452	398520	418320	440970	445020
12	Cost Benefit Ratio	2.4	2.5	2.44	2.2	2.7

Commented [U15]: How is it calculated?

From Table 8 the return and benefit-cost ratio of different farm sizes can be understood. The benefit-cost ratio for large farmers was higher: 2.7 and for marginal farmers it was lower, that is 2.2.

Commented [U16]: Why there is no application of your formula of Benefit Cost Ratio? We don't see in the table "Gross revenue". And there are a lot of costs.

CONCLUSION

The study was based on 120 sample respondents. The sample average size of the farm families was 2.8 Ha. Although there is a high Establishment Cost so many farmers are running behind betel farming for an attractive benefit- cost ratio where in all cases they are drawing almost double of

their expenditures. This provides a good level of livelihood and income for their cultivation in the next years and in comparison to cereals in the case of betel vines, the effects of climate or uncertainty regarding price fluctuation is very low as it is not highly weather dependent. Marginal farmers are cultivation in a small area so they have little profitability in comparison to others and for the same reason, the large farmers have having highest B-C Ratio.

RECOMMENDATION

One recommendation can be submitted from the authors' side. A direct channel of connection should be established between farmers and government agencies so that farmers can be subsidized in production costs like supplying raw materials, equipment, and agrochemicals. It would lead to a decrease in their production costs highering their profit.

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