Costs and Returns of Betel Vine in Bagawanpur-1 Block of Midnapur (East) District of West Bengal, INDIA

Abstract

This research study focuses on the possibility of Betel Vine cultivation in Bagawanpur-1 Block of Midnapur (East) District. Cultivation of Betel leaf has been found to be a profitable enterprise and also a good source of gainful employment for family members. This production pattern of betel vine is in compliance with the biological nature of perennial crops. It is observed that the yield has started increasing from the 2nd to 6th year and then it started to fall. The pattern of average annual total return realized by the sample farmers of the study area is seen to be consistent with that of the leaf production and it is gradually moving upwards starting from 2nd year and have reached the maximum level during the period of 3-6th year and from 7th year, it has shown a declining trend till final year i.e., 15th year. Average annual net return complies similarly as that of physical and gross return across the ages of the boroj i.e., starting farm negative net return in the first year, gradually increases with the increase of age of the plants up to 6th year when it reaches its maximum level and then gradually declines and attain the lowest level at the age of 15thyear.

Introduction

Betel Vine (*Piperbetle Linn*.) is a perennial, evergreen plants belonging to piperaceae family i.e.; the black paper family. The vine is raised by vegetative propagation. Betel vine is cultivated mainly under artificially erected structure known as Boroj, this is built from locally accessible materials, such as, bamboo stems, jute sticks, paddy straw, petioles, banana leaves, etc. The betel vine leaves, bright green in colour, are called Paan, which are mostly used for chewing purpose.

Varieties: Based on shape, size, brittleness and taste of leaf blade, Betel Vine is classified into pungent and non-pungent varieties. Important betel vine varieties cultivated in West Bengal are Bangla, Sanchi, Mitha, Kali Bangla and Simurali Bangla

In international market, it has also significant demand and is able to earn substantial foreign remittance in different Betel Vine cultivated countries. The Betel Vine production in India generates a yearly national income of Rs. 6000–7000 million, while at the same time, roughly Rs. 30–40 million worth of leaves are exported to other nations (Das *et al.,* 2016). The crop provides a National Income to the tune of Rs. 6000-7000 million every year and at

the same time it also provides an income of Rs. 800-1000 million to the state of West Bengal (Guha, 2006).

Economics of betel vine cultivation

Cultivation of Betel Vine is essentially an occupation of small and marginal farmers who have got very small holdings. The initial investment in Betel Vine cultivation is quite heavy, but the returns are also equally good per unit area. Betel vine crop is known for its greater potentialities in generating income and employment at the farm level. Cultivation of betel vine requires skilled and trained farm labourers, assured source of irrigation and proper disease management, maintenance of humidity and shade, adequate knowledge of marketing practices, etc. Betel vine cultivation also requires short-term and long-term planning; proper guidance to farm labourers in regard to day-to-day functions, such as, types of leaves to be plucked, training and tying the vine, etc. (Patil, 2015).

Therefore, an attempt has been made to study the economics of Betel Vine cultivation with a view to assess the costs and returns structure Under this pretext, the present study has been undertaken with the following specific objective:

Objectives:

1) To study costs and returns structure of Betel Vine cultivation by the sample farmers in Bhagwanpur-I Block of Midnapur (East) District of West Bengal.

Materials and Methods

A scientific study of any problem requires a systematic investigation using appropriate method and procedure to reach a reliable, unbiased, and practical conclusion. The details of the research method are explained and presented under the following heads:

(i) Selection of study area

(ii)Sources of data

(iii)Analytical tools and techniques

Selection of District and Block

Midnapur (East) District has been selected purposively owing to large concentration of betel vine growers. Midnapur (East) District is located in the southern part of West Bengal. Bhagwanpur-1 Block**,** has been also selected purposively for the present study. A cluster of two villages, such as, Mahammadpur and Mabarakpur, has been selected in Bhagwanpur-1 Block. Complete list of Betel Vine growers of this cluster has been made and fifty Betel Vine growers have been finally selected with the help of Simple Random Sampling Without Replacement Method (SRSWRM) for this research study.

3.2. Sources of Data

Primary data related to the costs and returns structure have been collected in a pre-structured schedule through personal interview method.

3.3. Analytical Techniques:

To fulfil various objectives set out mainly percentage analysis techniques has been employed and tabular method has been engaged for the presentation of results.

3.3.1. Concept of Cost Measures:

To study the costs and returns structure of Betel Vine cultivation, the cost concepts widely used in farm management study is applied. These cost concepts and the items of costs included under each concept are given below:

Cost A_1:

1) Value of hired labour
2) Value of owned bullock labour
3) Value of hired bullock
4) Value of owned machinery
5) Value of hired machinery
6) Value of fertilizer
7) Value of seed
8) Value of manure
9) Value of plant protection materials
10) Irrigation charges
11) Canal water charges
12) Land revenue, cess and other taxes
13) Depreciation on farm implements
14) Depreciation on farm building, machinery and irrigation structure
15) Interest on working capital
16) Miscellaneous expenses

Cost A_1= Sum of those 16 components

For the convenience of the analysis, **Cost D** concept has been employed in the present study which includes Cost A_1 and imputed value of family labour. Here, Cost D has been considered as the total cost of cultivation of betel vine.

3.3.2. Concept of Return:

1) **Gross Return**: - Gross return is obtained by multiplying the physical quantity of output, produced in a year with its average market price.

   So, total return from betel vine (Rs. /Ha.) = Physical output (leaf/ha.) X Average market Price (Rs. /lakh)

2) **Net Return**: - It is obtained by deducting the total cost from the gross/total return.

3) **Return - Cost ratio:** This concept is important as it shows how much profitable the farming business is. It is given by—**Gross return/Total cost**

Survey method has been followed during the collection of field level data. The research study is related to the agricultural year 2018-19.

Results and Discussion

Cost and Returns

Costs and returns structure estimated at reference year prices as shown in Table.1. A sizeable amount must be made available for the nurturing of Betel leaf boroj right from the setting up of the boroj. Just after the boroj establishment, several management practices are required, where costs must be incurred. Some amount of money needs to be spent on fertilizers, irrigation, intercultural operation etc. over the year from the very first year of betel boroj establishment.

The Table.1 reveals the item-wise break-up of cost of cultivation. The cost incurred on hired human labour is estimated to be the highest irrespective of size group. Farmers of group-I have paid Rs.1,23,030.30 per ha for payment of hired human labour accounting 48.03 per cent of total CostA_1 and the same for group-II is recorded to be Rs.1,21,343.65 (49.41 per cent). The average expenditure for payment of hired human labour is found to be Rs. 1,22,558.30 per ha (48.4 per cent). Cost of manures and fertilizers are found to be third highest cost component measuring 10.15 per cent of Cost A_1 on an average. Interest on working capital comes next in terms of both absolute value as well as in percentage terms accounting Rs.23,015.40 per ha and 9.09 per cent respectively. The imputed value of family labour during the first year of establishment for payment of services of factors are estimated to be Rs.19,734.24 per ha on an average with small variation across the groups. Adding the imputed value of family labour engaged during the first year to Cost A_1, Cost D has been derived. The average cost incurred for the nurturing of boroj in 1st year is Rs. 2,72,903.64 per ha in Bhagwanpur-I Block as measured in terms of Cost D when farmers belonging to various farm size groups are taken together.

Table.1: Estimation of Cost A_1 and Cost D of Betelvine Cultivation by Sample Farmers Classified According to Size of Boroj for 1st Year (2005-06)in Bhagwanpur-I Block (at Reference Year Prices (Rs. / ha)

Items	Group-I (n=36)	Group-II (n=14)	Overall
Machinery Charges (land preparation)	3,500.04 (1.36)	3,736 (1.52)	3,566.10 (1.40)

Planting Material	55,400.20 (21.63)	50,857.07 (20.70)	54,128.12 (21.38)
Hired human Labour	1,23,030.30 (48.03)	1,21,343.65 (49.41)	1,22,558.03 (48.40)
Manures and Fertilizers	26,342.57 (10.28)	24,038.45 (9.78)	25,697.42 (10.15)
Insecticide & Pesticides	5,832.87 (2.27)	5,578.59 (2.27)	5,710.41 (2.25)
Irrigation	5,814.45 (2.27)	5,341.15 (2.17)	5,681.92 (2.24)
Miscellaneous	12,917.00 (5.03)	12,359.00 (5.02)	12,812.00 (5.03)
Interest on Working Capital	23,283.74 (9.09)	22,325.39 (9.09)	23,015.40 (9.09)
Cost A_1	2,56,121.17 (100 .00)	2,45,579.30 (100.00)	2,53,169.40 (100.00)
Imputed Value of Family Labour	20,704.52	17,239.22	19,734.24
Cost D	2,76,825.69	2,62,818.52	2,72,903.64

TheTable.2 displays the cost incurred during the 2nd year of cultivation in Bhagwanpur-I Block. The share of hired human labour, manures and fertilizers and interest of working capital are estimated to be Rs. 54,088.77, Rs. 30,856.19 and Rs. 11,063.38 per ha and their percentage contribution are recorded to be 44.44, 25.35 and 9.09 per cent respectively on an average. The average cost of cultivation (Cost D) is Rs. 1,48,940.20 per ha in Bhagwanpur-I Block in which the contribution of imputed value of family labour is found to be Rs. 27,243.01 per ha on an average.

Table.2: Estimation of Cost A1 and Cost D of Betelvine Cultivation by Sample Farmers Classified According to Size of Holding for 2nd Year (2006-07, 2007-08 and 2008-09) in Bhagwanpur-I Block (at Reference Year Prices (Rs. / ha)

Items	Group-I (n=36)	Group-II (n=14)	Overall
Hired Human Labour	54,285.70 (44.02)	53,582.40 (45.43)	54,088.77 (44.44)
Manures and Fertilizers	31,710.57 (25.71)	28,659.20 (24.35)	30,856.19 (25.35)
Insecticide & Pesticides	8,202.65 (6.65)	72,90.45 (6.19)	7,947.23 (6.53)

Irrigation	5,645.67 (4.57)	5,449.07 (4.63)	5,590.62 (4.59)
Land Taxes	525.00 (0.42)	525.00 (0.44)	525.00 (0.43)
Interest on Working Capital	11,209.95 (9.09)	10,698.51 (9.09)	11,063.38 (9.09)
Miscellaneous	11,730.00 (9.51)	11,479.00 (9.75)	11,626.00 (9.55)
Cost A1	1,23,309.54 (100)	1,17,683.63 (100)	1,21,697.19 (100)
Imputed Value of Family Labour	28,949.22	22,855.60	27,243.01
Cost D	1,52,258.76	1,40,539.23	1,48,940.20

The Table.3 displays the cost incurred during the 3rd -6th year of cultivation in Bhagwanpur-I Block. An item-wise break up of cost reveals that cost incurred on hired human labour is highest irrespective of size group-I Expenditure on hired human labour is estimated to be Rs. 69,843.75 per ha for sample farmers belonging to group-I and the same for group-II are estimated to be Rs.69391.07 per ha with an average of Rs.69,717.00 per ha. Expenditure on manures and fertilizers and irrigation come next in descending order of the absolute value as well as percentage contribution to total CostA_1 with the value of Rs.31,411.64 and Rs.5,258.86 per ha and 22.41 and 3.75 per cent respectively.

The average cost incurred is calculated to be Rs. 1,67,709.04 per ha in Bhagwanpur -I Block measured in terms of Cost D. Small variation in Cost A_1 and Cost D across the farm size groups is also recorded.

Table.3: Estimation of Cost A_1 and Cost D of Betel Vine Cultivation by Sample Farmers Classified According to Size of Holding for 3rd – 6th Year (2010-11, 2011-12, 2012-13 and 2013-14) in Bhagwanpur-I (at Reference Year Prices) (Rs. / ha)

Items	Group-I (n=36)	Group-II (n=14)	Overall
Hired Human Labour	69,843.75 (49.34)	69,391.07 (50.07)	69,717.00 (49.75)
Manures and Fertilizers	31,515.32 (22.26)	31,145.05 (22.47)	31,411.64 (22.41)
Insecticide & Pesticides	9,200.00 (6.49)	7,902.17 (5.70)	8,836.60 (6.30)
Irrigation	5,266.82 (3.72)	5,238.40 (3.78)	5,258.86 (3.75)
Land Taxes	525.00 (0.37)	525.00 (0.37)	525.00 (0.37)

Interest on Working Capital	12,867.58 (9.09)	12,598.26 (9.09)	12,738.61 (9.09)
Miscellaneous	12,325.00 (8.70)	11,781.00 (8.50)	11,637.00 (8.30)
Cost A1	1,41,543.47 (100)	1,38,580.95 (100)	1,40,124.71 (100.00)
Imputed Value of Family Labour	29,256.15	23,285.37	27,584.33
Cost D	1,70,799.62	1,61,866.32	1,67,709.04

The Table.4 presents the various costs incurred during the 7^{th}-10^{th} year of cultivation in Bhagwanpur-I Block. An item-wise break up of cost reveals that cost incurred on hired human labour is the highest irrespective of size group. Expenditure on hired human labour is estimated to be Rs.68,816.25 per ha by sample farmers of group-I and the same for group-II are accounted to be Rs.66,720.85 per ha with an average of Rs.68229.53 per ha. Expenditures of manures and fertilizers and insecticide & pesticides come next at tandem in terms of the absolute value as well as percentage contribution to total CostA_1 with the value of Rs. 36,301.66 and Rs. 5,495.57 per ha and 25.74 per cent and 3.89 per cent respectively.

The average recurring cost is Rs. 1,68,312.70 per ha in Bhagwanpur-I Block measured in terms of Cost D. Small variation in Cost A_1 and Cost D across the farm size groups is also observed.

Table.4: Estimation of Cost A_1 and Cost D of Betel Vine Cultivation by Sample Farmers Classified According to Size of Holding for 7^{th}-10^{th} Year (2014-15, 2015-16, 2016-17, 2017-18 and 2018-19) (at Reference Year Prices) in Bhagwanpur-I (Rs. / ha)

Items	Group-I (n=36)	Group-II (n=14)	Overall
Hired Human Labour	68,816.25 (48.43)	66,720.85 (48.29)	68,229.53 (48.39)
Manures and Fertilizers	36,557.70 (25.73)	35,643.28 (25.80)	363,01.66 (25.74)
Insecticide & Pesticides	5,534.22 (3.89)	5,396.17 (3.90)	5,495.57 (3.89)
Irrigation	5,102.62 (3.59)	4,771.50 (3.45)	5009.91 (3.55)
Land Taxes	525.00 (0.36)	525.00 (0.38)	525.00 (0.37)
Interest on Working Capital	12,915.87 (9.09)	12,558.38 (9.09)	12,817.06 (9.09)
Miscellaneous	12,623.00 (8.88)	12,527.00 (9.06)	12,609.00 (8.94)
Cost A_1	1,42,074.67 (100.00)	1,38,142.18 (100.00)	1,40,987.73 (100.00)
Imputed Value of Family Labour	28,540.60	24,199.07	27,324.97
Cost D	1,70,615.27	1,62,341.25	1,68,312.70

The Table.5 depicts the recurring cost incurred during the 11th-15th of cultivation in Bhagwanpur-I Block. The share of hired human labour, manures and fertilizers and interest of working capital are estimated to be Rs. 68,954.37, Rs. 37,325.27 and Rs. 13032.61 per ha and their percentage contribution are recorded to be 48.09, 26.03 and 9.09 per cent respectively on an average. The average variable Cost D is Rs. 1,71,725.38 per ha in Bhagwanpur-I Block in which the contribution of imputed value of family labour is found to be Rs. 28,366.66 per ha on an average.

Table .5: Estimation of Cost A_1 and Cost D of Betel Vine Cultivation by Sample Farmers Classified According to Size of Holding for 11th-15th Year (2014-15, 2015-16, 2016-17, 2017-18 and 2018-19) in Bhagwanpur-I Block (at Reference Year Prices) (Rs. / ha)

Items	Group-I (n=36)	Group-II (n=14)	Overall
Hired Human Labour	69,342.46 (47.98)	67,956.43 (48.55)	68,954.37 (48.09)
Manures and Fertilizers	37,658.54 (26.05)	36,468.32 (26.05)	37,325.27 (26.03)
Insecticide & Pesticides	5,692.85 (3.93)	5,498.46 (3.92)	5,638.42 (3.93)
Irrigation	5,386.73 (3.72)	4,862.89 (3.47)	5,240.05 (3.65)
Land Taxes	525.00 (0.36)	525.00 (0.37)	525.00 (0.36)
Interest on Working Capital	13,137.45 (9.09)	12,723.21 (9.09)	13,032.61 (9.09)
Miscellaneous	12,769.00 (8.03)	11,921.00 (8.51)	12,643.00 (8.81)
Cost A_1	1,44,512.03 (100.00)	1,39,955.31 (100.00)	1,43,358.72 (100.00)
Imputed Value of Family Labour	29,564.57	25,286.34	28,366.66
Cost D	1,74,076.60	1,65,241.65	1,71,725.38

The Table.6 will examine the average cost of cultivation of Betel Vine per year incurred by the sample farmers of the study region separately for Bhagwanpur-I Block of Midnapur (East) District. In Bhagwanpur Block-I, the sample farmers have made an expenditure of Rs.

2,63,683.91 per ha in the first year which is dropped down to Rs. 1,62,059.56 /ha in second year. From 3rd year onwards, the average expenditure shows an upward movement and have reached the maximum level of Rs. 1,84,461.59/ha/yr. during the age of 11-15th years on an average as Cost D.

Table.6: Estimation of Average Cost of Cultivation Over the Years in Bhagwanpur-I Block (at Reference Year Prices) (Rs. /ha)

Year / Size group	Bhagwanpur-I				
	1st	2nd	3rd -6th	7th -10th	11th-15th
I(n=36)	2,67,302.66	1,65,155.55	1,82,253.12	1,83,216.40	1,87,055.05
II(n=14)	2,53,664.28	1,54,098.45	1,73,593.57	1,73,687.97	1,77,792.72
Overall	2,63,483.91	1,62,059.56	1,79,828.45	1,80,548.44	1,84,461.59

. With reference to the Table.7, after estimating the average cost of cultivation of betel Vine per year, we will now concentrate on the assessment of the average annual production of leaves according to the age of the boroj. In the year of establishment i.e., in the 1st year, the plantation is not ready for any commercial production of leaves. Plucking of leaves starts from 2nd year and gradually increases with the increase in the age of the plant and reaches the maximum level at the age of 6 years and then gradually starts declining.

In Bhagwanpur-I Block, the average number of leaves plucked in 2nd year is recorded to be 59.42 lakh/ha and continues to produce more and more leaves with the increase in age and attain the highest productivity level of 74.65/ha/year during the period of 3 to 6 years of age. From 7th year, the production of leaves starts to decline and the average annual production during the age of 7-10 year is worked out to be 61.39 lakh/ha/year and then drastically reduced to an annual production of 57.65 lakh/ha on an average during the last phase of economic life of the boroj i.e., during the age of 11-15th years. Variation in leaf production across the farm size groups in recorded to be very negligible.

Table.7: Estimation of Average Annual Production of Betel Leaf in Bhagwanpur -I Block (at Reference Year Prices)(Lakh leaf/ha)

Year	Bhagwanpur-I

Size / group	1st	2nd	3rd -6th	7th -10th	11th-15th
I(n=36)	0	59.45	74.82	61.65	57.39
II(n=14)	0	59.37	74.15	60.75	58.34
Overall	0	59.42	74.63	61.39	57.65

According to the Table.8, in Bhagwanpur-I Block, the annual average gross return/ha is worked out to be Rs. 9,45,372.20 per ha and the maximum gross return of Rs. 11,87,363.00 per ha is realized by the farmers during the age of 3-6th year. It has reduced to Rs. 976714.9 per ha during the period of 7-10th year and the lowest annual average gross return of Rs. 9,17,211.50 per ha is obtained during 11-15th year of age of the boroj.

Table.8: Estimation of Size Wise Average Gross Return Over the Years in Bhagwanpur-IBlock (at Reference Year Prices)(Rs. /ha)

Year / Size / group	Bhagwanpur-I				
	1st	2nd	3rd -6th	7th -10th	11th-15th
I(n=36)	0	9,45,849.50	11,90,386.00	9,80,851.50	9,13,074.90
II(n=14)	0	9,44,576.70	11,79,727.00	9,66,532.50	9,28,189.40
Overall	0	9,45,372.20	11,87,363.00	9,76,714.90	9,17,211.50

On the basis of the Table.9, now, It will estimate the net return over total cost of cultivation measured in terms of Cost D realized by the sample farmers of Bhagwanpur-I Block. Average annual net return behaves similarly as that of physical and gross return across the ages of the boroj i.e., starting farm negative net return in the first year, gradually increases with the increase of age of the plants up to 6th year when it reaches its maximum level and then gradually declines and attain the lowest level at the age of 15th year. Here it is to be noted that farmers have not earned any income in the year of establishment as no commercial leaf production is possible.

Table 9: Estimation of Net Return Over the Years in Bhagwanpur-IBlock (at Reference Year Prices)(Rs. /ha)

Size / Year	Group I			Group-II		
	Gross Cost	Gross Return	Net Return	Gross Cost	Gross Return	Net Return
1st	2,76,825.69	0	-2,76,825.70	2,62,818.52	0	-2,62,818.52
2nd	152258.76	9,45,849.50	7,93,590.73	1,40,539.23	9,44,576.70	8,04,037.46
3rd-6th	1,70,799.62	11,90,386.00	10,19,586.40	1,61,866.32	11,79,727.00	10,17,860.67
7th-10th	1,70,615.27	9,80,851.50	8,10,236.23	1,62,341.25	9,66,532.50	8,04,191.25
11th-15th	1,74,076.60	9,13,074.90	7,38,998.29	1,65,241.65	9,28,189.40	7,62,947.75
Average	1,88,915.19	8,06,032.38	67,117.19	1,78,561.39	8,03,805.12	6,25,243.72

The return cost ratio indicating return per rupee of investment over Cost A_1 and Cost D has been presented in Table.10. It reveals that this return-ratio in case of farmers belonging to lowest farm size group of Bhagwanpur -I Block is estimated to be 4.99 and 4.27 at CostA_1 and Cost D respectively whereas, in case of farmers having more than 1.0 ha of holding size, it is worked out to be 5.15 and 4.50 at CostA_1 and Cost D respectively. The average return - cost ratio for all the sample farmers of this block is accounted to be 5.07 and 4.38 measured over cost A_1 and cost D respectively.

Table.10: Estimation of Size-wise Cost, and Output-Input Ratio from Betel Leaf Cultivation in Bhagwanpur-I Block (at Reference Year Prices)

Size Group	Bhagwanpur-I				
	Total Cost (Rs. /Ha)		Gross Return (Rs. /Ha)	Output – Input Ratio	
	Cost A1	Cost D		Cost A1	Cost D
I(n=36)	8,07,560.91	9,44,575.97	60,30,162.90	4.99	4.27
II(n=14)	7,79,941.38	8,92,806.98	60,19,025.40	5.15	4.50
Average	7,93,751.10	9,18,691.50	40,24,594.05	5.07	4.38

Summary and Conclusions

The summary of the results so obtained from the analysis of data have been highlighted which are as below.

1. This production pattern is consistent with the biological nature of perennial crops. It is observed that the yield has started increasing during 2nd to 5th year and declined from their after and among the boroj.
2. The pattern of average annual total return realized by the sample farmers of Bhagwanpur-I Block is observed to be consistent with that of the leaf production. It is gradually moving upwards starting from 2nd year and have reached the maximum level during the period of 3-6th year and from 7th year, it has shown a declining trend till final year i.e., 15th year.
3. Average annual net return behaves similarly as that of physical and gross return across the age of the boroj i.e., starting farm negative net return in the first year, gradually increases with the increase of age of the plants up to 6th year when it reaches its maximum level and then gradually declines and attain the lowest level at the age of 15th year.
4. It is to be noted that the cultivation of betel leaf is highly labour intensive because the crop is grown under temporarily made cover which restricts the use of machine to perform intercultural operations. Besides cultivation, a large number of labour is required for conducting various marketing activities.

The present investigation clearly highlights the feasibility of betel Vine cultivation in Midnapur (East) District. Betel leaf has been found to be a good source of gainful employment for family labour also.

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