CHAPTER – I

INTRODUCTION

Background

Betel vine (*Piper betle L)* is known by its many names across the country and abroad. In Indian subcontinent it is known as pan in Hindi, Tambula in Sanskrit, Villayadela in Kannada, Vettilakkoti in Malyalam, Vettilai in Tamil, Tamalapaku in Telugu, Videch-pan in Marathi, Nagarbel in Gujrati and pan in Bangala. In foreign languages it is known as Tanbol in Arabic and Burg-e-Tanbol in Persian. It belongs to *piperaceae* family and is a perennial climber cultivated for its leaf. It is a shed loving plant and originated from Malaysia according to De Cando. Historically, the word pan in Hindi and other Indian languages is probably a derivative of the Sanskrit word 'pan' meaning leaf. It has been very intimately connected with the ancient Indian history, religion and culture as is evident by many references in the early Sanskrit literature (3000 BC), like Vedas, Ramayana, Mahabharata, Mahavansha, etc. Marcopolo (1295 AD) took notice of the pan chewing habit of the people in south India. Over the centuries, pan chewing had become so prevalent that serving and chewing of pan had been raised to the level of a fine art at the Mughal Darbar, particularly during the Akbar's regime. In course of time, offering the 'bida' of betel vine has become a symbol of offering and acceptance of mutual love and friendship.

Betel vine has been under cultivation in India for centuries. In fact, no Hindu religious ceremony is complete without pan. It is also offered after lunch and dinner and also during other social get together.

The medicinal properties of pan was recognized during 600 A D when Ayurvedic system of medicine came into practice. Betel leaves are beneficial to the throat and remove viscidity in human beings. Leaves help in digestion and tend to remove the bad smell of the mouth. The juice of betel leaves is used as an adjunct to pills administered in the Ayurvedic medicines. The fresh crushed leaves are used as antiseptic for cuts and wounds. It is also good for the respiratory system and is used in treatment of bronchitis, cough and cold (Chopra et al, 1958). The leaves of the

pan plant have been traditionally used for chewing. Pan chewing is considered as a good and cheap source of dietary calcium. It increases digestive capacity when used with lime. Besides, it neutralizes the acidity and acts as blood purifier. Main constituents of betel leaves are vitamin B and C, carotene, and other elements. The oldest authentic Ayurvedic therapy books describe betel vine, honey and Tulsi as nectar (Amrit). In short, betel leaf is one of the grandmother's remedies, prescribed as traditional medicine, by experienced, older members of the family.

The harmful effects of pan as described in the Ayurvedic texts are that it weakens teeth, impairs health and deadens the taste buds of the tongue. In the Indian subcontinent, where chewing tobacco with pan is a common habit, cancer of the mouth is very common. But the educated Indians are of the opinion that moderate use of betel leaf is not merely innocuous but that it may even be conducive to good health. As per Einsiedlen, Switzerland (1943**) "Everything is poisonous, and nothing is not poisonous, only the dose makes a thing poisonous."**

Pan is grown in moist tropical region in the world. It has been grown under two conditions i.e., natural conditions and controlled conditions. In natural condition in the tropical forest region on the tree it can grow as tall as the tree (Western regions & north eastern regions). Cultivation under controlled conditions (bareja) is in practice in the sub-tropics. The south region where humidity and temperature do not fluctuate abnormally and high humidity with moderate sunshine prevails throughout the year, the natural condition of betel vine growing is practiced.

The cultivation under controlled condition is practiced where there is relative humidity is often low and temperature remains high (above 40°C) in summer and low (below 10°C) in winter. The microclimate plays an important role in the production of good quality betel leaves. This ideal condition is provided by artificial means, popularly known as Bareja. The exact period of beginning of the prevailing system of pan cultivation is not known. However, as per literature available in charak, this practice is mentioned as older than 600-400 BC.

The first record of any structure, which may be called as greenhouse, is not known. However, it is believed that the first glasshouse/greenhouse dates back four to five hundred years. The glasshouses are useful in colder climates (winter) when thermal

properties of glass conserve heat and maintain temperature to the extent suitable for plant growth. Such structure loses its utility during summers when higher temperature inside the glass house is detrimental to the plant. This limitation was overcome once refrigeration technology was developed in 1920. This technology is highly sophisticated and its running costs are high. The cultivation of betel vine under control conditions is also a case of creating an indigenous system of 'environmental chamber' with the material available in nature. As consequence of advancement in greenhouse/glasshouse construction technology, now it is quite easy to shift plants from their natural habitat and grow them under controlled condition throughout the year in subtropical region with significantly low cost.

The plant betel vine thrives best under shade, which provides low light intensity, mild temperature (10°C to 30°C), high humidity with 1450-1700 mm rainfall and frequent irrigation throughout the year. Hot wind burns the tender leaves and causes wilting while cold wave cause yellowing of leaves. The land suitable for cultivation of this crop is upland having well drained with loamy to clay loamy soil. Soil with good water holding capacity and slight acidic to neutral soil are considered to be ideal for its cultivation.

Presently betel vine is cultivated extensively in India in almost all the states barring Haryana, Punjab, Himachal Pradesh and Jammu & Kashmir. The extent of its cultivation in different major states is given here under:

Table No. 1.1: Estimated Area under Betel vine Cultivation in Major States of India (1995)

SN	Name of the States	Area in (ha)	In %
1.	Andhra Pradesh	2900	5.80
2.	Tamil Nadu	5500	11.00
3.	Karnataka	8700	17.40
4.	Kerala	3300	6.60
5.	Orissa	5000	10.84
6.	Gujarat	200	0.40
7.	Maharashtra	2700	5.40
8.	Madhya Pradesh	1250	2.50
9.	Rajasthan	50	0.10
10.	Uttar Pradesh	2000	4.00
11.	Bihar	3200	6.42
12.	West Bengal	3000	6.00
13.	Assam	3000	6.00
14.	Others	9200	17.56
15.	**Total**	**50000**	**100.00**

Source: National Botanical Research Institute, Lucknow.

In India it is grown over an area of about 50,000 hectare. The annual turn over of betel vine is estimated at Rs. 10,000 million. More recently betel leaves are being exported from India to UK, USA, Canada, Pakistan, Bangaldesh, Malaysia, Singapore, Srilanka and other Arabian countries, earn 198 lakh rupees annually through foreign exchange. Its cultivation is highly labour intensive and offers employment to about 2.0 million families engaged in cultivation, trading and commerce in betel leaf throughout India.

In Bihar, making special structure for growing pan known as "BAREH/BAREJA" creates artificial and favourable conditions. An area of 4000 hectares is reported to be under this crop in Bihar. The estimated annual net income worked out to the tune of Rs. 50,000 per hectare for *"Desi," "Bangla,"* etc. pan whereas, in case of *"Magahi"* variety of pan, the estimated annual net income is very high up to Rs. 80,000 per hectare. The demand of *"magahi"* pan in foreign countries is very high making it an important source of foreign exchange. The major betel vine growing districts of Bihar is given in table 1.2.

Table No. 1.2: Area under Betel vine Cultivation in Major Districts of Bihar (2000).

(In ha)

SN	**District**	**Area**		**Percentage**	**Number of Betel vine Growers** *(Nos)*
		ICAR Co-rdntd	Own Estimated		
1.	Bhagalpur	110	150	3.75	20,500
2.	Munger	130	100	2.50	35,500
3.	Begusarai	136	140	3.56	25,400
4.	Khagaria	140	140	3.56	30,800
5.	Katihar	100	100	2.50	25,400
6.	Purnea	230	200	5.00	35,500
7.	Madhepura	84	75	1.87	12,300
8.	Saharsa	70	70	1.80	15,200
9.	Saran	120	100	2.50	64,500
10.	Samastipur	180	200	5.00	45,400
11.	Muzaffarpur	80	90	2.25	16,000
12.	Vaishali	280	300	7.50	1,75,300
13.	Sitamarhi	120	150	3.75	45,400
14.	Siwan	22	25	0.62	35,400
15.	Gopalganj	12	20	0.50	30,500
16.	East Champaran	240	250	6.25	40,000
17.	West Champaran	200	225	6.26	32,400
18.	Nawada	80	90	2.25	55,300 (Magahi)
19.	Gaya	60	75	1.87	62,500 (Magahi)
20.	Aurangabad	140	150	3.75	80,500 (Magahi)
21.	Nalanda	120	125	3.25	60,500 (Magahi)
22.	Darbhanga	230	250	6.25	50,600
23.	Madhubani	272	275	6.87	75,400
24.	Others	344	700	16.59	1,00,000
	Total	**3500**	**4000**	**100.00**	**11,51,000**

Source: i. ICAR Co-ordinated Research Project, RAU, Samastipur
ii. Own Estimation through various sources.

As stated earlier betel vine is a cash crop. It has hundreds of varieties grown all over the country. In Bihar, there are five to six most common varieties such as *"Bangla," "Deshi", "Calcuttia," "Magahi," "Kapoori"* and *"Semehi."* This is high-risk crop both during production and marketing because betel vine leaves are highly perishable and susceptible to change in weather conditions. Unawareness of technical know-how among the growers across the districts makes the problem further deplorable in cases of both production and marketing stages.

As per our information, in the state of Bihar, no systematic study had been conducted on economics of production and marketing of betel vine despite its significant contribution to income and employment generation in betel vine growing districts of the state. The objectives of the proposed study placed before the Ministry of Agriculture, Government of India for the year 2004-05 were as under:

Objectives

The study has been undertaken with the following objectives:

i. *To assess the input-output analysis of betel vine.*

ii. To study the size and pattern of employment in betel vine cultivation.

iii. To study the marketing of betel vine with particular reference to marketing channels and price spread; and

iv. To identify constraints in betel vine productions and marketing and explore its developmental possibilities.

Scope of the Study

The present study has been planned to answer the following questions:

i. *Does the betel vine production offer economic possibilities of the sampled districts?*

ii. Is the pattern of marketing ideal?

iii. What type of constrains prevail in production and marketing?

Answer of these questions is expected to provide necessary clue to the problems facilitating suitable solution on policy and practice levels, if due attention is paid by the Government and the cultivators concerned.

Limitations

i. The present study is confined to two districts of the state. Hence, the results obtained from this study may not be generalized for whole of the state.

ii. In conducting the project work, certain problems, i.e., shortage of time and other necessary infrastructural facilities appeared to point out that in place of Madhubani district, Bhagalpur was selected. It was another limitation of the study.

iii. The growers are very much unorganized and not habituated to maintain proper production and marketing statistics of their products.

IV. The traders are very much reluctant to furnish data regarding actual price prevailing in the market and profit earned etc. Thus, it is very difficult to obtain fully accurate basic output data.

V. Since prices of betel vine are highly fluctuable, growers/traders fail to supply exact quantum of benefit/profit earned from its production and trade.

VI The primary data related to input-output comes on the basis of recall method. However, utmost care and precautions have been taken to arrive at the prices nearer to average data. The inherent fluctuation in the prices of betel vine and its growers and traders being unorganized and maintaining no proper statistics gives rise the above-mentioned limitations in the study.

VII. The secondary data relating to area of this particular crop district wise in the state are level not available for recent years. Therefore, it also limits the scope of the study.

Methodology

Selection of District, Block and Village

For the purpose of the study, Bhagalpur and Vaishali districts were selected purposively because these occupied larger areas of 150 hectares and 300 hectares respectively under betel vine cultivation amongst major growing districts of the state. The study area was confined to Kahalgaon and Pirpainti blocks of Bhagalpur and Hazipur and Bidupur blocks of Vaishali, because they possessed larger potential areas under betel vine cultivation among the blocks of selected districts. A list of

betel vine growing villages from the respective blocks was obtained from the Government offices. One village from each of the sampled block was chosen purposively on the basis of larger scale of cultivated area across the villages under the block. Bhawanipur and Tarwa villages were chosen from Kahalgaon and Pirpainti block respectively of Bhagalpur district. The villages namely: Choti Yusufpur and Daudnagar were chosen from Hazipur and Bidupur blocks of Vaishali district respectively. Most of these villages are situated on the roadside. The details of the procedure is presented hereunder:

Sampling Procedure				
Stage – I	**District – I**		**District - II**	
	Bhagalpur		**Vaishali**	
Stage – II	**Block – I**	**Block – II**	**Block – I**	**Block – II**
	Kahalgaon	Pirpainti	Hazipur	Bidupur
Stage – III	Village – I	Village – II	Village – III	Village – IV
	Bhawanipur	Tarwa	Choti Yusufpur	Daudnagar

Selection of Growers

The sample growers who had grown betel vine in the agricultural year July 2003 to June 2004 were taken into account. In choosing the sample betel vine growers attempt was made to select the sizeable number of growers, as per the proposed study design but in course of preparing of growers' list it was found that the cultivation of this crop is in very meagre area and so it was very difficult to categorize the growers according to their land class size which was ranging between 0.05 to 0.30 hectares as per the record available in respective block offices. The village wise probability proportion method for the selection of ultimate growers was adopted. About 15 per cent of the betel vine growers formed the sample size of the study. The detail of the procedure adopted is presented hereunder:

Table No. 1.3: Selection of Sample Growers

Selected Villages	**Total Number of Growers under The Villages**	**Number of Sample Growers**	**% tage of Sample Growers to Total Growers**
Bhawanipur	126	19	15.07
Tarwa	134	20	14.92
Choti Yusufpur	109	17	15.59
Daudnagar	115	18	15.65
Total	484	74	15.28

In total 74 growers from four villages namely Bhawanipur, Tarwa, Choti Yusufpur and Daudnagar were selected for in depth study. The break-up of the total is presented in the table no. 1.3 above.

Selection of Market Functionaries (Traders)

In order to examine the price spread of producer and retailers of betel vine, two pan markets from the two sampled districts were chosen, namely: Bhagalpur pan market and Hajipur pan market. A sample of 5 local traders, 5 retailers and 2 wholesalers from each sampled district was selected for investigating the betel vine marketing channels within and outside the state. In this way, a total of 10 local traders, 10 retailers and 4 wholesalers were investigated.

Method of Data Collection

The data related to production and marketing were collected by survey method. The reference year of the data was July 2003 to June 2004. First of all secondary information related to potential block, villages, general information related to cultivation of betel vine, area under the crop was collected from the offices of the respective sampled blocks and districts. Then the sampled growers were surveyed and information related to input-output of cultivation, its practices, etc. were collected. Lastly, the marketing aspect was studied with the help of sample traders in order to obtain information about betel vine production and marketing. The research team visited sampled areas twice with well structured and pre-tested questionnaire-cum-schedule for collection of desired information.

After the collection of information these were arranged in tabular form for analysis and interpretation. General tabular analysis was done with the help of simple average and percentage.

Calculation of Costs

i. Labour Cost

Three types of labour were found engaged in these activities:

a. Hired Labour
b. Family Labour
c. Permanent Labour

The cost of labour was worked out on the basis of wage rate prevailing in the sampled area (Villages). As per the standard rule, two child days were considered equivalent to one adult and 1.5 *'Female Labour Day'* to one adult made Labour Day.

II. Land Cost

The payment made by the grower, either on owned or leased individual plot was worked out on the basis of prevailing rate including taxes.

Interest on capital investment both for fixed and working capital was charged @ 10 per cent per annum.

The other input costs, like: manures, fertilizers, insecticides, pesticides, irrigation, etc. were calculated on the basis of market value prevailing during the reference year.

The costs of building, machineries and implements were worked out at the current market price less depreciation.

Terms used in the Study

Marketing: Process by which betel vine reaches from the producers to the final consumers.

Local Trader: Normally resides in the village and purchases betel vine from the cultivators.

Wholesaler: Who purchase betel vine from local traders and sells to the retailers.

Commission Agents: Who generally do not directly take part in sell and purchase of betel vine and only negotiate between the two traders.

Marketing Costs: Refer grading, transport cost, storage cost, packing cost, sales tax, market charge, etc.

Marketing Charge: It includes the charges paid by buyer and seller in transaction of betel vine, i.e., weighing, handling, market fee, etc.

Price Spread: It determines the differences between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce.

Marketing Margins: It includes an estimation of the producers' share in the consumer's rupee, the cost of marketing functions and the margins of intermediaries.

Review of Literature

Production of betel vine in India and its States has long history, though specific studies in this field are limited. In 1978, the Government of West Bengal reported that a piece of 16.5 decimal of land under the betel vine cultivation was considered to be an economically viable unit for sustenance of a five-member family. Saniyapan & Maimu Thu (1982) conducted a comparative study and found that per acre cultivation expenses were high in betel vine in comparison to banana and sugarcane. They also found that per acre income in betel vine cultivation was six times higher than that of banana and sugarcane. On that basis, they suggested that the crop 'betel vine' is more remunerative than banana and sugarcane. Sen & Roy (1982), have reported that there is considerable regional disparity in betel vine production. In some regions of the country, this crop is very risky and un-remunerative, so other horticultural plants are replacing this. Grade & Galgalikar (1982), in their study found that the cost of establishment of betel vine bareja was maximum, followed by human labour. They have also worked out the input output ratio, which is 1:2.10. It is fairly high. Meenakshi Sundaram et. al (1987) observed that betel vine is a highly capital and labour intensive crop. Acharjee & Sen Gupta (1991) observed that the yield of betel leaves varied in various months of the year. It was comparatively low during the winter months than in the summer months. Cost of cultivating a hectare of betel vine during the first three years (since establishment), was Rs. 45,000. The cost benefit ratio is 1:1.85.

The marketing of betel vine has been wide spread and scattered throughout the country. On this aspect also specific studies are very limited. Sen (1982) reported that there is special betel leaves market. He also found that the local market was not quite large compared to the total marketable surplus of leaves. Singh, R P (1986), in his studies, observed that some undesirable conditions prevail in course of marketing and affect the economy of the growers and traders. They stated some constraints, i.e., monopoly of the buyers, malpractices, inadequate transport and insufficient export promotion, etc. Grade & Galgalikar (1987) examined the price spread in betel leaf, which consisted of producer, trader, agents, wholesaler, and

retailers. He finds that the producer's share in the consumer's rupee was 45 per cent. Acharjee & Sengupta (1991) observed in their study that betel vine farmers had been exploited by several middlemen during marketing because the farmers grew the crop with their indigenous knowledge and skill and long farm experience without any awareness of scientific techniques.

CHAPTER – II

PROFILE OF SAMPLE DISTRICTS, VILLAGES AND SAMPLE GROWERS

In this chapter, an attempt has been made to project the overview of the sample districts, villages and socio-economic profiles of the sample households. As discussed in the earlier chapter, two districts viz., Bhagalpur and Vaishali of the state have been chosen for collection of required data. From each district, two blocks were picked up. From each block one village was chosen. The detail of the above has been presented in table 2.1.

Table No. 2.1: Profiles of Sample Districts viz., Bhagalpur and Vaishali

(Census 2001)

SN		Particulars	Bhagalpur	Vaishali
1.		Geographical area (ha)	254300	201870
2.		Number of Blocks (Nos)	16	16
3.		Number of inhabitat villages (Nos)	1519	1399
4.		Number of electrified village (Nos)	NA	565
5.		Net Sown Area (ha)	151845 (59.71)	152369 (75.48)
6.		Gross Cropped Area	189806	233611
7.		Cropping Intensity	1.25	1.53
8.		Net Irrigated Area (ha)	59222	76670
9.		Total Number of holdings (No)	372177	475159
	a.	Below 1 ha (No)	185397 (49.80)	439683 (92.0)
	b.	Between 1 to 2 ha (No)	76234 (20.50)	24214 (5.0)
	c.	Above 2 ha (No)	110546 (29.70)	11262 (3.0)
10.		Rainfall (Normal mm)	1176.10	1168
11.		Rainfall (Actual mm) 2003-04	1287.70	936
12.		Total Population	2423172	2712389
	a.	Male Population	1291658 (53.3)	1412276 (52.06)
	b.	Female Population	1131514 (46.7)	1300113 (47.94)
	c.	Rural Population	1978538 (82.0)	2522521 (93.0)
	d.	Scheduled Caste Population	254433 (10.5)	525118 (19.36)
13.		Population density	946	1332
14.		Population below poverty line	NA	45.0
15.		Classification of Workers		
	a.	Cultivators	170019	313576
	b.	Agricultural Labourers	412459	242159
	c.	Households in Industry	53324	17521
	d.	Other Workers	351991	90279

Source: Directorate of Economics & Statistics, Government of Bihar.
Figures in parenthesis show respective percentages

Bhagalpur district is divided centrally across, from west to east, by the river Ganga. On the northern part lies the Naugachia subdivision, and the other two subdivisions, viz., Bhagalpur Sadar and Kahalgaon lie on its southern bank. The district is divided into 16 CD blocks. There were 1519 inhabited villages. The population of the district (as per the 2001 census) was 24.23 lakh, out of which rural population was 19.78 lakh i.e., 82 .00 per cent. The proportion of population belonging to SC was 10.05 per cent of the total population. Male and female ratio in the district was 53.30:46.70. Literacy rate was 49.50 per cent. The economy of the district is dominated by agriculture, as approximately 80.00 per cent of the population depends directly or indirectly on agriculture for their livelihood. Chief crops are: paddy, wheat, maize, pulses, oilseeds and vegetables apart from fruit crops of mango, litchi, banana and guava, etc.

Vaishali district is situated in the northern part of the state. River Ganges forms a natural boundary between the state capital (Patna) and Vaishali district. The district is divided into 16 CD blocks. There are 1399 inhabited villages. The population of the district as per 2001 census was 27.12 lakh; out of which rural population was 25.22 lakh i.e., 93.00 per cent. The population belonging to SC was 19.36 per cent. In the total population, male-female ratio was 52.06:47.94. The population living below poverty line was 45.00 per cent. The district is basically agricultural in character. Rice, maize and wheat are the main crops of the district. Sugarcane, betel vine, tobacco and potato are the main cash crops grown in the district. The district is also famous for banana production. Cultivation of vegetables and fruits is also popular in the district. The details of other information can be seen from table – 2.2.

Demographic Features of the Sample Villages

The village wise profile are presented in table 2.2

Table No. 2.2: Demographic Features of Sample Villages (2001 Census)

SN	Particulars	Bhagalpur		Vaishali	
		Bhawanipur	Tarawa	Choti Yusufpur	Daudnagar
1.	Number of households	371	523	823	684
2.	Total population	1870	2510	3530	3064
3.	Male population	952 (50.91)	1307 (52.07)	1831 (51.87)	1613 (52.65)
4.	Female population	918 (49.09)	1203 (47.93)	1699 (48.13)	1451 (47.35)
5.	Literacy percentage	33.85	30.28	40.49	43.61
6.	SC population (%)	17.22	3.49	17.62	18.87
7.	ST population (%)	0.97	4.11	---	---

Source: Respective Block Offices.

Bhawanipur and Tarawa villages are situated in Kahalgaon subdivision of Kahalgaon and Pirpainti block respectively. Agriculture is the prime source of earning of the inhabitants of the village. Bhawanipur village is about 15 kms away from the block headquarter, whereas Tarawa village is 3 kms away from the block office. In both the villages, numbers of households were 371 and 523 respectively. It may be seen from the table that, total population of Bhawanipur village was 1870. The total population of Tarawa village was 2510 and out of it, 52.07 per cent were male and 47.93 per cent were female. The literacy percentages of both the villages were 33.85 and 30.28 respectively. The SC and ST population in former village were 17.22 per cent and 0.97 per cent respectively. In Tarawa village, this population was 3.49 per cent and 4.11 per cent respectively.

Similarly, Choti Yusufpur village of Vaishali is situated at about 3 km distance from Hazipur block and Daudnagar was about 15 km away from the block office. As per latest census, the total population of Choti Yusufpur was 3530. The male and female population constituted 51.87 per cent and 48.13 per cent respectively. In the village, 40.49 per cent of the total population was literate. The SC population in total population was 17.62 per cent. In sampled village of Daudnagar, the total population was 3064. In both the sampled villages, there were no ST population.

Land Classification of Sample Villages

The village wise land classification is presented in table No. 2.3. The data indicates that in Bhawanipur village, the total geographical area is 503 hectares. Out of the total geographical area of 392.95 hectare, net cultivated area constituted 78.18 per cent. Out of the total net cultivated area, about 63.25 per cent had irrigational facilities. Intensity of cropping was 167 per cent and per capita cultivated land was 0.21 ha. In Tarawa village of the same district, the total geographical area was 418 ha. Out of the total geographical area, 321.15 hectares were net sown area. Out of the total sown area, net irrigated area was 68.76 per cent. The intensity of cropping was 181 per cent. The per capita cultivated land was 0.13 ha.

Table No. 2.3: Village wise Land use Classification

(In ha.)

SN	Classification of Land	Sampled Village			
		Bhagalpur		Vaishali	
		Bhawanipur	Tarwa	Choti Yusufpur	Daudnagar
1.	Geographical Area	503.00 (100.00)	418.00 (100.00)	538.00 (100.00)	329.00 (100.00)
2.	Cultivated Wasteland	4.73 (0.94)	4.31 (1.03)	4.47 (0.83)	2.54 (0.77)
3.	Uncultivated Wasteland	34.31 (6.82)	25.21 (6.03)	28.46 (5.29)	20.34 (6.18)
4.	Pasture Land	0.46 (0.09)	0.55 (0.13)	0.65 (0.12)	0.27 (0.08)
5.	Current Fallow	3.68 (0.73)	3.39 (0.81)	3.77 (0.70)	2.90 (0.88)
6.	Other Fallow	1.36 (0.27)	1.59 (0.38)	2.21 (0.41)	1.19 (0.36)
7.	Area under Tree, etc.	43.93 (8.74)	40.38 (9.66)	48.32 (8.98)	26.09 (7.93)
8.	Land under Non-Agricultural used	21.28 (4.23)	21.45 (5.13)	30.35 (5.64)	19.84 (6.03)
9.	Net Sown Area	393.25 (78.18)	321.15 (76.83)	419.81 (78.03)	255.87 (77.77)
10.	Net Irrigated Area	248.73 (63.25)	220.83 (68.76)	340.05 (81.09)	190.22 (74.34)
11.	Gross Cropped Area	658.66 (167)	582.57 (181)	803.14 (191)	499.10 (195)
12.	Cultivated Land per capita (ha)	0.21	0.13	0.12	0.09

Source: Record from Village Level Worker in respective Villages.
Figures in parenthesis show percentage.

The table further indicates that Choti Yusufpur village of Vaishali district has 538 ha of geographical area. Out of it about 78.03 per cent is net cultivated land. The net irrigated area out of net cultivated area is around 81.09 per cent. The intensity of cropping is 191 per cent and per capita cultivated land in this village is 0.12 ha. In Daudnagar village of the same district, the total geographical area was 329.00 ha, out of which 77.77 per cent is net cultivated area. About 74.34 per cent of net cultivated land was irrigated. The per capita cultivated land in the village is 0.09 ha.

The overall analysis indicates that in all the sampled villages, the intensities of cropping were high. It is due to high irrigational facilities in the areas.

Cropping Pattern of Sample Villages

The village wise cropping pattern is worked out and presented in table 2.4.

Table No. 2.4: Village-wise Cropping Pattern (2003-04)

(In ha)

SN	Particulars	Bhagalpur		Vaishali	
		Bhawanipur	Tarwa	Choti Yusufpur	Daudnagar
1.	Cereals	195.61 (49.74)	173.52 (54.03)	165.79 (39.49)	118.42 (46.28)
2.	Pulses	33.00 (8.39)	30.22 (9.41)	18.14 (4.32)	35.70 (3.95)
3.	Oilseeds	12.00 (3.08)	6.97 (2.17)	10.04 (2.39)	4.97 (1.94)
4.	Cash Crops	16.80 (4.27)	11.92 (3.71)	37.28 (8.88)	25.64 (10.02)
5.	Betel Vine	74.84 (19.03)	52.16 (16.24)	88.63 (21.11)	44.58 (17.42)
6.	Vegetables	36.34 (9.24)	35.39 (11.02)	41.31 (9.84)	23.83 (9.31)
7.	Fruits	24.54 (6.25)	10.99 (3.42)	58.65 (13.97)	28.35 (11.08)

Source: Respective Village Record Obtained from VLWs.
Figures in parenthesis indicate percentage of GCA

It may be observed from the table No. – 2.4 that in Bhawanipur village cereals were grown in 49.74 per cent of the gross cropped area followed by betel vine in19.03 per cent. Vegetables, pulses, fruits, cash crops, and oilseeds are grown in 9.24, 8.39, 6.25, 4.27 and 3.08 per cent respectively. In Tarawa village, cereals occupied 54.03 per cent of the GCA followed by betel vine, vegetables, pulses, cash crops, fruits and oilseeds in 16.24, 11.02, 9.41, 3.71, 3.42 and 2.17 per cent areas of GCA respectively. As such, about 1/5th of the gross cultivated area was under betel vine cultivation, which was significantly high in the villages.

The data also indicates that in Choti Yusufpur and Daudnagar villages, cereals cultivation occupied about 39.49 per cent and 46.28 per cent respectively of the gross cropped area. Betel vine is the next important crop, which constituted 21.11 per cent and 17.42 per cent of the area in cropping pattern. Fruit is the third most important crop, which constituted 13.97 per cent and 11.08 per cent respectively. The other crops were vegetables, cash crops, pulses and oilseeds covering about 10.00 per cent of the GCA.

It may be observed here that cereals are the main crops in all the sampled villages. The next important crop in the area however, is betel vine. Thus, the entire sampled areas are predominantly betel vine growing regions only next to cereals. It is mainly due to suitability of the soil and climate for growing betel vine.

Irrigation Facilities in the Sampled Areas

It was observed during the course of field survey that in the villages of sampled district of Bhagalpur, the main sources of irrigation were ponds, tanks, wells and ditches in betel vine cultivation field. Tube wells were negligible in number.

In sampled villages of Vaishali district, growers were found using tube wells for irrigation. The main source of uplifting tube well water was diesel pump set, but the scale of irrigation through it was very low. It was also observed that more than 80.00 per cent of the betel vine cultivated area was irrigated through artificial sources of irrigation. The quantum of artificial irrigation depends upon rain, if rainfall is normal during the year; farmers use less of artificial irrigation. As per VLW's records, the water table and in sampled villages of Bhagalpur district ranged from 50 feet to 170 feet deep and in Vaishali, from 20 feet to 70 feet for abundant supply of water.

The texture of the soil is suitable for installing tube wells in the sampled areas of Bhagalpur and Vaishali both. Availability of ground water is sufficient to meet irrigational requirement of betel vine. But numerous inhibiting factors were present there, which compelled them to depend on traditional sources of irrigation in place of ground water irrigation. Some inhibiting factors like: diesel used as fuel in pump sets was costly and its becoming costlier day-by-day, erratic and insufficient supply of electricity, alternative source of energy for diesel, betel vine growers being unorganized and poor with insufficient capital to adopt new technology for growing betel vine, scarce, complex and untimely institutional support and indifferent attitude of the Government etc existed prominently which compelled farmers to use former source of irrigation.

Agricultural Wages in Sampled Villages

It was observed in field survey that in all the sampled villages, the engagement of family labour was higher in the total supply of labour. It was also observed that under betel vine cultivation, male, female and child labours were commonly employed. The nature of works of the male, female and child labours were different. The male labourers were generally employed for hard work, i.e., land preparation, 'Bareh' construction, pit digging, etc; while female labourers were generally employed for light hard work in comparison to their male counterparts i.e., inter-culturing, harvesting, packing, grading, etc. In Bhagalpur district, female labourers

were not found engaged in the cultivation and other practices of betel vine in both the sampled villages. The child labour was generally employed for watching the 'bareja.' In Vaishali district, the average rate of wages was recorded at Rs. 40 to 45 for eight hours a day. In sample villages of Bhagalpur district, the prevailing rate was Rs. 50 to 55 per day i.e., for 8 hours. It was also reported by the growers that they made payment for child in amount just half of the wage paid to male labourers and payment made for female was 66 per cent of the wage of male labourers.

Main Sources of Credit in the Sample Villages

In general, it was observed that the growers borrowed from moneylenders in large scale followed by friends, banks and other non-institutional agencies for the cultivation of betel vine in almost all the sampled villages. It was also found that, the non-institutional sources of credit were made available to them at very high rate of interest i.e., above 20 per cent annually. Reported version of some growers is worth noting here that betel vine being a highly risky crop, the moneylenders took security from them in the form of gold, silver, and other costly materials for providing loan. In both the sampled areas, particularly in Bhagalpur, some growers also reported that institutional sources of finance, like: banks take illegal commission for sanctioning the loan even in cases of Kishan Credit Card Holders. The other socio-economic parameters like machinery and equipments, size of holdings, live stock positions, infrastructural development, marketing facilities, etc. have been discussed here under:

Machinery and Equipments

It was observed during field survey, that in general, no farm machinery were used for the cultivation of betel vine. The per hectare availability of farm equipments was found higher in case of village – IV followed by village – I, village – III and Village – II. As between the two sampled districts, the district of Vaishali was found to have made higher investment in implements. Generally, in both the sampled districts, almost every grower in his farming operations used small equipments like: spade, gainta, khurpi, etc.

Size of Holdings

It was found that cent percent growers in both the sampled areas were operating on less than 10-15 decimals, i.e., 5-8 kathas of land. Thus, it could be termed as least

land-intensive crop. The variations in distribution of operational holdings were found almost same in the all the four sampled villages of both the sampled districts, namely Vaishali and Bhagalpur. The average size of holding was about 8 katha (15 decimals) in Bhagalpur district. It was relatively smaller in Vaishali district i.e., 7.60 katha. It is interesting to note that the size and number of holding were quite low which might be due to very high cultivation cost of the crop. As per discussions with the growers, it was known that from one katha of land, where betel vine was cultivated, annual net return from it varied from Rs. 1000 to Rs. 2000. It also came to our knowledge that majority of the farming land under betel vine were on leased in basis for 3-5 years.

Live Stock Position

As per our surveyed data, the distribution of livestock was seen uneven across the sampled villages.

Table No. 2.5: Farm Households Owning Livestock at the Village Level.

Villages	Proportion of Household Owning Livestock	
	Vaishali	Bhagalpur
Village – I	77.1	57.9
Village – II	100.00	95.00
All average	85.00	65.00

As revealed from village level data, it could be observed that in Vaishali, about 85.00 per cent of households and in Bhagalpur about 65.00 per cent household were owing lives tocks. The livestock position was relatively higher in Vaishali district in comparison to Bhagalpur district.

Infrastructural Development

It was observed that the levels of development of infrastructure, like: roads, electricity, irrigation, storage were not satisfactory and the position of development in headquarter and the remote villages widely varied in the sense that the remote areas were having poor facilities in regard to above infrastructural items. The connecting roads from villages to districts were in poor conditions being cemented, metallic and kacha roads in both the sampled districts. In case of supply of electricity it was found that erratic supplies of power was available in the remoter villages, generally

available for 5-6 hours only). On the other hand, in headquarter of the districts and villages nearer to it, about 15 hours electricity supply was provided as reported by most of the headmen of the surveyed households.

The irrigational facilities in the sampled villages were observed extremely high and extremely low, which might be due to availability of canals, tube-wells, wells and ponds in the areas. In both the sampled districts, (Vaishali and Bhagalpur) important device of irrigation was tube wells. Generally, growers of betel vine use two prominent irrigation devices, i.e., ponds and tube wells for irrigating their betel vine crop.

Marketing Facilities

Marketing of betel vine crop is quite complex and risky due to its perishable nature, seasonal production and bulkiness. The spectrum of prices from producer to consumer, which is an outcome of demand and supply of transactions between various intermediaries at different levels in the marketing system, is also unique.

In general, it was observed that in both the sampled districts, viz., Bhagalpur and Vaishali, one market each at the respective district headquarters were located. Growers sent their produce daily to these markets for sale to traders and retailers for the consumers. It was also found that in Vaishali district, a **PAN FARMER'S DEVELOPMENT SAMITEE** was functioning since one decade by the side of main high way for Patna. In the sampled areas, pan markets were operative for few hours everyday at early morning 6.00 am to 8.00 am. The prices of pan are governed mainly by the supply. It was also observed that the price mainly depended on the variety, size, health of leaves, etc. it has come to know that due to good transportation facilities, a sizeable quantity of betel leaves from the state of West Bengal come in the district of Vaishali almost everyday. The sizes of leaves were comparatively bigger than that of Bihar in general and Vaishali district in particular. Thus, the demand of Bengal's pan is considerably higher and this caused reduced or less prices for locally produced betel leaves in Bihar due to high supply of betel leaves from outside the state. Some wholesalers reported that for about 300 days in a year, they send betel leaves to Kanpur, Lucknow, Delhi and other big cities/towns of neighbouring states. In the state of Bihar, demand for a variety, namely, haldia (pila patta) from Orissa and West Bengal is in significant quantity. Besides, good

quantities of Mitha Patta and Hara patta were significantly imported in the state of Bihar from West Bengal and Orissa. Thus, it can be said that the prices of locally produced betel leaves solely depend upon the supply of this commodity from outside the state. It was however, observed that price was always settled on the basis of the quality of leaves. In Hazipur, the leaves were generally sold either by auction or by negotiation with commission agents. Small growers sell their produces directly to the whole sellers/retailers on cash payment. The traders (local) used to send their leaves in the cities, like: Banaras, Kanpur, Lucknow, etc. every day in the light of the order given to them. When leaves are supplied against such orders, the damage and loss caused during transportation are usually borne by traders. Supplies to the commission agents in excess of advance orders or without orders, were usually at their own risks. In the sampled areas, as well as in the state of Bihar, mainly five months, viz., October, November, December, January and February are considered good for high return and had a better keeping quality which increases the rate of the produce. From March to September, the crop leaves are sold at lowest rates due to poor quality of leaves. Similarly, in sampled district of Bhagalpur, there is a centrally located market of betel vine in the district headquarter namely, Mirzan Hatt, where the marketing is done for betel leaves. The growers use to send their betel leaves also to the markets of Samastipur, Muzaffarpur, etc. in side the state. The other marketing practices were more or less same like Vaishali district.

In nutshell, it can be said that in both the sampled districts, there were lack of proper facilities of marketing of betel leaves.

CHAPTER – III

ECONOMICS OF BETEL VINE CULTIVATION

Before examining the economics of betel vine production it is very important to know about agronomy of this crop. In this chapter an attempt has been made to describe details about agronomy of the crop and present the analytical results of economics of production and employment pattern of this crop in the study area. Therefore, this chapter has been divided in three sub-heads i.e., Agronomical Condition for Cultivation, Economics of Betel vine Production and Employment Pattern:

1. AGRONOMICAL CONDITION FOR BETEL VINE CULTIVATION

i. Climate

Conducive environment for commercial betel vine cultivation comprises artificial shade, presence of considerable humidity and adequate supply of moisture in the soil, moderate and even temperature throughout the year. Thus, its cultivation is best done under controlled condition or shade condition. The ideal weather condition for the plant is mild temperature, i.e., about 10°C in winter and about 40°C in summer for good growth of this shade loving plant. About 170 cm rainfall and presence of high humidity (60 to 80%) throughout the year is ideal for this crop. Below 10°C and above 40°C temperatures cause wilting. The vines grow fast and their vegetative growth is good under high humidity. The amount of air movement affects the rate of evaporation and is therefore, one of the chief factors controlling water relations of betel vine.

ii. Soil

Exceptionally well-drained, fertile soil, rich in humus, is the best for betel vine cultivation. It is grown in varieties of soils (sandy loam to clay). The clay soil is not good for the crop because it favours disease during the rainy season. However, this

crop is very sensitive to saline and alkaline soils. The best performance is noticed in upland having slight alkaline to neutral soil with 7to7.5 p^H. Soil with good water holding capacity and organic matter content is considered ideal. Loamy soil with a porous substratum below is also excellent. In both the sampled districts soils are fit for its cultivation.

iii. Selection of Site

Betel vine is known to be very sensitive to stagnant water; therefore, selection of site for its cultivation requires adequate attention. In the study area and the state of Bihar this crop is generally grown in upland areas where soil level with a gradual slope is maintained for drainage of excess water.

iv. Land Preparation

Generally in the study area for new plantation, deep ploughing is done during early summer (end of April month). After ploughing, upper soil is left exposed in sun for two months (April-May), because it reduces the microorganism population as well as soil borne pathogens. During the first week of June, two or three ploughing with harrowing is done. After that, about 350 quintals of compost on per hectare basis is mixed in the soil. Thereafter, field is again ploughed fifteen days before planting. In such ploughed fields farmers add needed some insecticides and pesticides for bringing insects and pests population below the economic threshold level. Thereafter bed is raised. The optimum size of bed is raised from place to place by 30 cm to 50 cm. The main aim for raising bed is to facilitate drainage from the field.

v. Bareja Construction

The study area is highly affected with fluctuations in climatic conditions. Such fluctuations are not conducive to the crop growth. Thus, to avoid this condition, growers were to cultivate this crop under controlled environmental condition. Therefore, in sample areas ‘Pan’ has to be grown in closed conservatories (locally called ‘Barejas’) with a view to protect the vines from desiccation in summer and cold in winter. ‘Bareja’ are generally rectangular in shape and its normal size is often 50 to 30 Sq metre. Generally barejas are small because its maintenance ought to be easy and their cost of erection is within manageable limits. In Bihar, bareja structure is made up of locally available materials such as bamboos, khar, straw, jute, sticks, arhar stalks, munj and a variety of grasses. Since the system was developed

indigenously, variation in terms of materials used are observed in both sample Bhagalpur and Vaishali districts. The construction of bareja looks like a mundop. Its height is about 3-5 metres. This is surrounded with thatched walls roof. The walls are strengthened with bamboo poles fixed at distance of about 2.0 metre each. The top roof is covered with thick straw with longitudinally divided bamboo poles supported by bamboo posts inside the bareja. The distance from one horizontal pole to another is about 2 metres to 2.5 metres. Criss cross supporting poles are used instead of erected poles. The wall and the top are covered with bamboo sticks and straw in order to protect the plants and soil surface from direct sunrays. Roof is thatched twice in a year, first at the time of construction of new bareja, and second, after the rainy season. Structure of the bareja is built strongly, so as to withstand strong winds and storms. This shape carries sound logic in terms of humidity and temperature control. The expected economic life of a bareja, on an average, is about five years from its erection.

vi. Features of Bareja

Betel vine plants require high humidity and mild temperature for their growth. In the study area humidity and temperature are very fluctuating from season to season. Thus, its cultivation is possible only by partially regulating the two critical factors. The design of bareja is such that it ensures suitable humidity levels within. Evaporation of water within the bareja not only raises the humidity, but also lowers the temperature. It is very crucial for plant survival during extreme summer, when low humidity coupled with high temperature can whither and damage the plants by photo inhibition. Blocking the intensity of light coming to the surface can effectively reduce the heating effect of solar radiation. The top of the bareja is designed to block check light by spreading dry leaves or straw at the top (MANDOP). During summer the thatching is thick so that more than 75.00 per cent incident of solar radiation is blocked. This reduces intensity of light falling on the tender leaves and soil, so that it could effectively check increase in air and soil temperature inside the bareja. During the rainy season when climate is most suitable for the growth of vines, the thatching on the top is reduced so that about 50.00 per cent of the incident of solar radiation reaches the leaves and soil. With the onset of winter when temperature starts falling, the grass cover at the top is increased to some extent in order to avoid frost and cold injury. During this period, the incident of light in the

bareja is more than in summer. The growth of plant during winter is very slow or even stopped.

vii. Time of Planting

The betel vine-planting season varies from one place to another across the state. In Vaishali district or north Bihar, it is planted during the last week of June to the last week of August. In the same region it is also planted during the last week of February to first week of March. But the rainy season (July-August) is the most common season for spreading the planting material in sampled district.

In Bhagalpur district or South Bihar, it is generally propagated/planted between mid-February to mid-March, when climate is mild and nearly optimum for its growth. However, the monsoon planting reduces mortality rate and cost of maintenance of the new plants in new bareja. In February-March, the mortality rate and cost of maintenance become higher.

viii. Number of Cutting/Seed Used:

Generally cuttings with one or two nodes along with attached leaves are used as the propagating materials. The cutting having one node vine is found most economical. Before planting, furrows are constructed. The width of these furrows is about 50 cm. In the furrows ridges are constructed. In the ridges two rows of budded vine with a mother leaf is planted at 10 to 15 cm distance. For one hectare of planting, about 1,50,000 cuttings are required. The rate of seed/cutting varied with the variation of variety. It ranged from 1,25,000 to 1,60,000 for planting of one hectare of land. The length of sets varies considerably from region to region, but in Bihar, the sets are generally used at about 30-40 cm distance.

ix. Spacing

The optimum inter-vine spacing is the distance, which gives the highest economic return of betel leaves per unit area. In other word, spacing is positively correlated with the canopy of the plant of a particular variety. In north and south Bihar where Bengla / Deshi or Magahi varieties are popularly grown in row to row spacing of 100 cm and 80 cm respectively. On the ridges two rows of Bangla and three rows of Magahi varieties are planted along the length at plant spacing of 15 cm. Thus, plant population is increased almost double in case of Magahi as compared to Bengla.

x. Planting Method

Normally, dibbling method is used for planting. Planting is done with the help of khurpi (a hand operated implement). For planting, a hole is made with khurpi, so that the internodes below the bud point is dipped in soil, but must be touching with surface soil. The hole is completely packed with the help of thumb finger. After that, planted material is covered with khar or straw. This planted betel vine plant needs to be watered twice a day with the help of watering cane or sprinkler. During irrigation special care is needed that after twenty days of continuous irrigation, cover on the plants needs to be removed. The newly planted bareja is maintained very carefully. Over irrigation is avoided. A larger moist straw is spread on the planted vines to avoid evaporation.

xi. Fertilizer Application

The nutritional requirement of vines depends on the variety, type of cultivation, soil, climatic condition, etc. However, its requirement must be very much limited. It is a perennial crop; fertilizer is applied at bi-annual intervals for ensuring optimal production of quality leaves. In a year, about 100 kg Nitrogen, 100 kg P_2O_5 and 150 kg K_2O with cake are applied in four splits. During the application of fertilizer, sufficient moisture in the field is required. If soil cakes, such as: mustard cake, castor cake, karanj cake, neem cake are abundant, then only half of the recommended chemical fertilizers is used, and for the rest, farm organic fertilizers are added to the soil. Besides, inorganic and organic fertilizers, spray of zinc sulphate is also found good for high yield of the crop.

xii. Irrigation

Betel vine is very fastidious in its water requirements. It needs a moist soil, but not too wet. That is to say, it requires frequent but light irrigation all round the year. The plantation has to be located near the source of irrigation, which may be a pond, or tank, a canal, or irrigation well. Frequencies of irrigation depend upon intensity of light and humidity of atmosphere. During the summer season, irrigation is given almost every day in the new plant and weekly in the old plant. During winter season, irrigation is reduced to a fortnight interval. During rainy season, ordinarily no irrigation is done, unless there are adverse climatic conditions. Excess of irrigation causes decay of roots and dropping of leaves. Irrigation in betel vine crop was given

through sprinkler or pot. The pot method is very costly because of intensive labour use needed in it.

xiii. Weeding/Inter-Culturing

Keeping the plantation free from weeds, its immediate removal is necessary. An advantage of growing betel vine in closed conservatory or under shade is that it remains generally weed free. Only in a year during the month of November and in June, lowering of vines is done. The main aim of this practice is to give earthing to the vines lying on the soil surface. Thereafter, staking is done with the help of supporting materials. Each vine is supported with bamboo sticks or sharkanda (like wooden sticks). Each supporting material is tied at the roof and inserted into the soil. When vine reaches to the roof of bareja, it starts lowering. Auxiliary branches are removed from the main vine regularly in monsoon season. During monsoon all the leaves up to a height of 2 feet from the soil surface, are removed to reduce the infection of soil borne disease or pathogens. The growers keep the bareja always neat and clean.

xiv. Insect-Diseases Control Measures

The betel vine crop is attacked by a number of fungal and bacterial pathogens and they cause many types of diseases to the plant. The most common, which was found in the study area, was marginal blight, Anthracnose and leaf spot affecting both leaves and vines. Pathogens also affect roof, stem and leaf roof to a large extent. The affected plant dies suddenly. Among the bacterial diseases, leaf spot is more common in newly planted crop and bareja. The crop also suffers a lot with red spider mite. It causes turning of leaf lamina into brick red and it becomes unfit for consumption. For controlling pests, diseases and insects, growers commonly use pesticides, insecticide in their bareja. But some progressive farmers reported that they used integrated approach for pest and diseases' management in their fields. For controlling disease, they use natural method i.e., in the bareja adequate drainage facilities, were provided, disease prone leave and vines were removed and buried in the soil outside the bareja. They also use Bordeaux mixture frequently for stem and leaf not infected. They also control the white fly and snails live pests through chemical pesticides. At the stage of harvesting, farmers did often use pesticides, insecticides to make the soil germ free. Only exposure of soil to sunlight is resorted

under soil protection measure. This type of natural method is cheaper but less effective. Almost all cut pieces of betel stems were not subjected to their deinsecticidation at the stage of plantation, poverty and ignorance of peasants accounted for such negligence at this stage.

xv. Harvesting

Harvesting of leaves started after 6 months from the time of planting. It depends upon season and market conditions, financial needs of the growers and the condition of leaves. In the rainy season frequent harvesting is done. But the leaves were picked throughout the year when it became mature. The most common method of picking is hand picking. During the picking of leaves special care is taken by the growers that leaves are not harvested within 10 to 15 days of spray of pesticides. Roughly 30 lakh leaves were harvested annually from one hectare of land.

2. ECONOMICS OF BETEL VINE PRODUCTION

A detailed breakup of various cost components of betel vine production has been presented in Table No. 3.1. Cost items have been grouped into two subheads i.e., variable cost and working fixed cost. The variable cost consisted of material used in the cultivation like construction of Bareja, vine cutting costs, land preparation cost, fertilizer cost, plant protection cost, irrigation cost, inter-culturing cost, harvesting cost, packing cost, interest on working cost and risk cost. On the other hand, the fixed cost comprised of land revenue, depreciation, and interest on fixed capital other than land cost. For evaluation of various cost items, we have assumed/estimated the following:

i. Hired Labour

The hired labour was evaluated at the prevailing wage rate in sample villages that is on an average Rs. 55/- per adult male unit per day of 8 hours.

ii. Family labour

Family labour was evaluated at the rate of wages paid to the hired labour on the basis of wage rates prevailing in the locality.

iii. Land Revenue

It refers to the payment made by the landowner to the government in the term of taxes.

iv. Interest on Capital was estimated as

a. *Fixed Capital*

   It has been charged at the rate of 10 per cent per annum on the value of farm implements; machinery, etc.

b. *Working Capital*

   Interest on working capital was charged at the rate of 10 per cent per annum.

v. Rental Value of Own Land

It was calculated on the basis of annual charge of land prevailing in the area and it is estimated to be Rs. 1000/- for one ha of land for one year.

vi. Depreciation Costs were calculated as per standard formula provided for various fixed assets.

vii. Risk on working capital was treated as cost because of the hazardous nature of betel vine cultivation due to drought, hail, frost or attack of insects and disease. The risk on it was calculated at minimum of 10 per cent of the cost.

The per hectare variable cost, on an average, amounted to Rs. 78986.68 which was worked out to be 81.69 per cent of the total cost in cultivation of betel vine. The per hectare expenditure on working fixed cost, on an average, amounted to Rs. 17677.46 which has been worked out to be 18.31 per cent of the total cost of cultivation. The sum of variable and working fixed costs, on an average, amounted to Rs. 96664.14 per hectare. The village wise expenditure on cultivation indicates that in all the four sampled villages per hectare cost varied with the situational variations of the villages. In sampled villages I and village II of Bhagalpur district, amongst the variable cost items per ha.,

Table 3.1: Various Cost Components of Betel vine Cultivation in the Sampled Villages.

(Rs. Per ha)

SN	Particulars of Cost Heads	Bhagalpur		Vaishali		All
		Village –I (19)	Village – II (20)	Village – III (17)	Village – IV (18)	Average of the Villages (74)
A.	**Operational or Variable Cost**					
1.	Construction Cost of Bareja	21153.00	21326.00	20978.64	21442.28	21230.06
2.	Land Preparation and Vine transplanting	4729.38	4348.26	4160.38	4486.20	4436.50
3.	Fertilizer Application	5153.45	4874.60	5166.32	5430.26	5148.37
4.	Pesticides Application	2889.25	2744.62	3029.64	3125.18	2939.79
5.	Irrigation Charge	7805.68	7672.65	7460.40	7925.84	7719.63
6.	Inter-culturing Operations	15277.63	15679.44	15423.90	15326.42	15431.55
7.	Harvesting of the Crop	14489.69	14872.74	14671.24	14861.32	14716.79
8.	Packing, Marketing and Maintenance	5208.39	5101.44	5488.04	5520.81	5319.86
9.	Annual repair cost of Bareja	1964.50	2016.39	2128.42	2079.42	2044.13
10.	All Variable Cost (Sub Total)	78670.97	78636.14	78506.98	80197.73	78986.68
B.	**Fixed Cost**					
11.	Rental Value of Land	1000.00	1000.00	1000.00	1000.00	1000.00
12	Interest on Working Capital @ 10 %	7867.09	7863.61	7850.69	8016.27	7898.67
13.	Risk on Working Capital @ 10 %	7867.09	7863.61	7850.69	8016.27	7898.67
14.	Land Revenue	26.50	26.50	26.50	26.50	26.50
15.	Depreciation	664.00	785.30	964.70	1024.80	853.62
16.	Total Fixed Cost Sub-Total	17424.68	17539.02	17692.58	18083.84	17677.46
17.	Sum of Cost A + B	96095.65	96175.16	96199.54	98281.57	96664.14

like construction of bareja on an average amounted to Rs. 21153.00 and Rs. 21326.00 respectively. Expenditure on construction of bareja was highest in respect of all other expenditures, because it required various materials and a large number of labourers. Thus, barejas are very costly item in the cultivation of betel vine crop. This structure is the prerequisite for cultivation of this crop because the crop is shade loving and highly affected by weather conditions like cold, heat and air (wind blow) etc. The economic life of bareja is about five years. Per hectare expenditure on preparing land and transplanting vine on an average was Rs. 4729.38 and 4348.26 in village I and village II respectively. Expenditures on land preparation and vine transplantation were lower due to cost of vine cuttings being very meagre and only one time expenditure in a year was born. The life span of vine cutting in the field is good for about fifteen to twenty years. Expenditure on fertilizer vaired from Rs.

5153.45 to Rs. 4874.60 in village – I and village – II respectively. The higher expenditure was borne by village – I than in village – II. It is due to differences in their location making differences in cost of transportation. The expenditure on pesticide application varied from Rs. 2889.25 and Rs. 2744.62, in village – I and village – II respectively.

Betel vine crop is mostly cultivated under irrigated condition in both the sampled villages of the district. Thus, irrigation was an important cost item in the cultivation of betel vine. The per hectare expenditure on irrigation was found to have varied from Rs. 7805.68 and Rs. 7672.65 in village – I and Village – II respectively. The higher cost incurred in irrigation may be due to its being done mostly by pot method and in this application more labour is required. Thus, the cost of irrigation was found higher in both the sampled villages.

In the application of inter-culturing generally, lowering of vine is done at least three times in a year. Expenditure in this operation varied from Rs. 15277.63 to Rs. 15679.44 in village – I and Village – II respectively. This operation constituted higher amount of expenditure after the construction of bareja because its being most important operation and highly labour intensive work. Besides lowering the vine as one operation, which was equally important in the cultivation of the crop, was addition of soil at least twice in a year and it is also a labour intensive operation. Thus, the expenditure on inter-culturing, an other operation was also done by the growers i.e., supporting of vine. Due to large number of vine it requires a good number of supporting materials.

Expenditure on harvesting of the betel vine crop is found higher due to inherent necessity of the construction of bareja and inter-culturing operation in its cultivation. On an average, per hectare expenditure on this varied from Rs.14489.69 to Rs. 14872.74, in village – I and village – II respectively. The higher cost of harvesting may be due to its performance by human labour and this practice requires a large number of labourers.

Expenditure on packaging materials, marketing and maintenance of the harvested leaves varied from Rs. 5208.39 to Rs. 5101.44 in village – I and village – II respectively. It is also a labour intensive job.

Expenditure on straw varied between Rs. 1964.50 and Rs. 2016.39 in village – I and village – II respectively. It is used for repairing of bareja every year due to rain and destruction by strong wind. Total expenditure on variable items varied from Rs. 78670.97 to Rs. 78631.14 in village – I and village – II respectively.

The working fixed cost varied between Rs. 17424.68 and Rs. 17539.02 in village – I and village – II respectively. The depreciation and interest on fixed capital constitutes a maximum amount out of in the total fixed cost. It varied from Rs. 664.00 in village - I to Rs. 785.30 in village – II.

The per hectare average cost (variable and fixed) was worked out for village – I at Rs. 96095.65 and village – II at Rs. 96175.16.

In sampled village -III and village IV, of Vaishali district amongst variable cost items, construction of bareja constituted on an average, Rs. 20978.64 and Rs. 21442.28 in village – III and village – IV respectively. In regard to expenditures on land preparation and vine transplantation the costs were worked out to be Rs. 4160.38 and 4486.20 in village – III and village – IV respectively. Expenditure on fertilizer varied from Rs. 5166.32 to Rs. 5430.26 in villages III & IV respectively. The expenditure on pesticide varied from Rs. 3029.64 and Rs. 3125.18 which is 3.11 and 3.20 per cent in village III & IV respectively. The expenditure on irrigation in the sampled villages varied from Rs. 7460.40 and 7925.84 in villages III & IV respectively. Expenditure on inter-culturing operations varied from Rs. 15423.90 and Rs. 15326.42, in villages – III and IV respectively. Expenditure on harvesting of the crop varied from Rs. 14671.24 to Rs. 14861.32 in villages – III & IV respectively. Expenditure borne on packaging, marketing and maintenance of betel vine crop varied from Rs. 5488.64 and Rs. 5520.81 in village – III and village – IV respectively.

Expenditures on straw varied from Rs. 2128.42 and Rs. 2079.42 in village – III & village – IV respectively. The total variable cost varied from Rs. 78506.98 and Rs. 80197.73 in village – III & IV Vaishali district. The working fixed cost varied from Rs. 17692.58 and 18083.84, in villages – III & IV respectively. Thus, on an average per hectare cost varied from Rs. 96199.54 to Rs. 98281.57 in villages – III & IV respectively.

The average of all the four sampled villages in regard to expenditures borne in cultivation of betel vine, amongst the variable cost expenditure on construction of bareja amounted to Rs. 21230.06 followed by inter culturing operation Rs. 15431.55. Harvesting of the crop was Rs. 14716.79 irrigation charges Rs. 7719.63 packing, marketing and maintenance Rs. 5319.36, fertilizer cost Rs. 5148.37 land preparation cost Rs. 4436.50 pesticide cost Rs. 2939.79 and straw cost Rs. 2044.13. The total variable cost borne in the cultivation was Rs. 78986.68 and fixed cost was Rs. 17677.46. The total per hectare average cost have been workout at Rs. 96664.14.

The above analysis indicated that major items of expenditure in betel vine cultivation included construction of bareja, inter culturing operations (lowering of vine, addition of soil and supporting of vine materials), fertilizer and manures, plant protection, irrigation harvesting, packing, etc. It is concluded from the analysis that betel vine though being a labour intensive also require very high capital in the production process. Detailed breaks up of various costs components in percentage terms have been presented under table 3.1.A.

Table No. 3.1.A: Various Cost Components of Betel vine Cultivation in Sampled Villages.

(% tage / ha)

SN		Particulars of Cost Heads	Bhagalpur		Vaishali		All Village Average
			Village – I	Village – II	Village – III	Village - IV	
A		**Operational or Variable Cost**					
	1.	Construction of Bareja	22.01	22.17	21.80	21.82	21.96
	2.	Land preparations transplanting	04.92	04.52	04.32	04.56	04.59
	3.	Fertilizer application	05.36	05.06	05.37	05.52	05.33
	4.	Pesticide application	03.00	02.85	03.14	03.18	03.04
	5.	Irrigation	08.12	07.97	07.75	08.06	07.98
	6.	Inter-culturing	15.89	16.30	16.03	15.59	15.96
	7.	Harvesting	15.07	15.46	15.25	15.12	15.22
	8.	Packaging, Marketing, Maintenance,	05.42	05.30	05.70	05.62	05.59
	9.	Annual repair of Bareja	02.04	02.09	02.21	02.11	02.11
	10.	**Total Cost on 'A'**	**81.83**	**81.72**	**81.57**	**81.58**	**81.69**
B		**Fixed Cost**					
	1.	Rental value of land	01.04	01.03	01.04	01.02	01.03
	2.	Interest on Working Capital	08.18	08.17	08.16	08.15	08.17
	3.	Risk on Working Capital	08.18	08.17	08.16	08.15	08.17
	4.	Land Revenue	00.02	00.02	00.02	00.02	00.02`
	5.	Depreciation	00.75	00.89	01.05	01.08	00.92
	6.	**Total Cost on 'B'**	**18.17**	**18.28**	**18.43**	**18.42**	**18.31**
		Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

Table 3.1.A gives a detailed breakup of various cost components incurred in betel vine production in percentage term. In case of village – I, the percentage reveals

that the variable cost constitutes about 81.83 per cent and fixed cost 18.17 per cent in total cost. Out of the total variable cost major cost heads were identified as construction of bareja (22.01 %), inter culturing (15.89 %) and harvesting (15.07 %). Similarly, in case of village – II the variable costs constitute 81.72 per cent and fixed cost constitutes 18.28 per cent of the total cost. Major costs were found more or less same like village – I. In village – III and Village – IV of Vaishali district, the percentage is indicate that out of the total cost borne in the cultivation of betel vine, the variable costs constitute 81.58 per cent and 81.69 per cent respectively. However, the fixed cost constitutes 18.42 and 18.31per cent respectively. The overall average indicates that out of the total cost, variable cost constituted 81.69 per cent and fixed cost 18.31 per cent. It may be concluded from the table that there were very marginal variations in both operational and fixed costs, in terms of percentage across the sampled villages. The reason for this may be the cost borne out in operational activities (particularly for construction of bareja, land preparation, irrigation inter culturing and harvesting) sharing major portion of costs involved in cultivation in almost all the sampled villages of the study area. Thus, the percentage variation in costs was recorded very negligible across the villages under study.

The above worked out cost components only provide a broad idea about the pattern of expenditure in betel vine cultivation per hectare. It would be more interesting to probe further various items included and cost involved in different cost components studied and presented in table 3.2. A detailed study has been made in respect of construction of bareja; land preparation, use of fertilizer, pesticides and irrigation in order to project clear picture of the pattern of expenditure in different cost items included in these operations. The details are presented under following sub-headings.

i. Construction of Bareja

The table 3.2 depicts data on per hectare cost for construction of bareja.

Table No. 3.2: Construction Cost of Bareja. (One year)

(Rs./ha)

SN	Items	Village-I	Village-II	Village-III	Village-IV	All Villages
1.	Bamboo	10027.40	10637.65	10983.40	10816.45	10603.88 (49.95)
2.	Sticks	1485.55	1526.64	1519.25	1524.23	1513.80 (7.13)
3.	Wire	1070.42	1105.65	1090.85	1130.40	1099.22 (5.18)
4.	Paddy straw	1985.30	2010.50	2037.45	2066.30	2023.79 (9.54)
5.	Coconut Strings	1362.40	1403.90	1445.60	1455.70	1415.96 (6.67)
6.	Labour	5221.93	4639.66	3985.56	4449.20	4573.41 (21.53)
	Total	**21153.00**	**21326.00**	**20978.64**	**21442.28**	**21230.06 (100.00)**

Note: Figures in parenthesis indicate percentages

It may be seen from the table that the main item of expenditure was bamboo, which accounted for Rs. 10603.88 (49.95%) on an average and varied across the sampled villages from Rs. 10027.40 in village – I to Rs. 10983.40 in village – III. The next item after bamboo was labour which accounted for Rs. 4573.41 (21.53%) on an average and varied from Rs. 3985.56 in village III to Rs. 5221.93 in village – I. The expenditure on paddy straw on an average was Rs. 2023.79 (9.54%) followed by sticks Rs. 1513.80 (7.13%) coconut strings Rs. 1415.96 (6.67%) and wire Rs. 1099.22 (5.18%). The expenditure on above-mentioned items across the villages was found very meagre. Thus, the total expenditure in construction of bareja for growing one hectare of betel vine leaves was estimated to be Rs. 21230.06 (100.00%). The village wise estimated expenditure in constructing bareja was found to be Rs. 21153.00 in village – I, Rs. 21326.00 in village – II, Rs. 20978.64 in village – III and Rs. 21442.28 in village – IV. The variation in cost was might be due to location of villages nearer or far away from the town or pucca road.

ii. Land Preparation

The cost incurred on different constituent items included in the preparation of land and planting vines has been presented in table 3.3

Table No. 3.3 Estimated Cost of Land Preparation (One year)

(Rs. /ha)

SN	Operations	Village I	Village II	Village III	Village IV	All Villages
1.	Ploughing of land	323.48	299.59	292.05	328.84	311.00
2.	Making of Pits	719.81	710.50	701.44	763.55	723.15
3.	Vines Planting	3264.69	2866.81	2720.05	2978.83	2960.03
4.	Use of Insecticides	214.24	190.01	192.21	202.76	199.64
5.	Labour Use in other application	207.16	281.35	254.63	212.22	242.67
	Total	**4729.38**	**4348.26**	**4160.38**	**4486.20**	**4436.50**

The above table shows that major items of costs in operation of land preparation and planting of vines included expenditures incurred on ploughing of land, pits making, vine cuttings, transplantation, insecticide used and labour used for controlling insects and pests, soil treatment, etc. Total cost incurred was Rs. 4436.50 on an average per hectare. Out of the total cost, the planting of vines alone-shared Rs. 2960.03 followed by pits making Rs. 723.15, ploughing of land Rs. 311, use of insecticides Rs. 199.64 and labour cost in other activities Rs. 242.67.

Village wise analysis indicated total expenditure in villages -I recorded at Rs. 4729.38 followed by village –IV Rs. 4486.20 village – II Rs. 4348.26 and village – III Rs. 4160.38. The analysis further indicated that lower costs were borne by village – III and higher cost by village – I. Significant variations in the cost were, thus, observed. Table further indicates that except vine planting across all the sampled villages, there were nominal variations in expenditure on other given items. In order to protect vines from diseases, these were treated with Bordeaux mixture. This mixture also treats soils before the planting of vines but only in some cases.

iii. Fertilizer Use in Betel vine Cultivation

The nutritional requirement of vines depends upon the variety, cultivation type, soil, climate, etc. It is very difficult to find out and record variety wise nutritional intakes in course of field survey. Therefore, data related to the use by growers only were taken in betel vine growing fields during the reference period of the study. The item-wise cost is presented under table –3.4.

Table No. 3.4: Cost of Various Fertilizers' use in the Sampled Villages.

(Rs. /ha)

SN	Use of Fertilizer	Village I	Village II	Village III	Village IV	All Villages
1.	Mustard Cake	4127.91	3891.88	4080.35	4261.12	4086.26 (79.37)
2.	Other Cake	212.32	193.52	210.78	230.24	212.11 (4.12)
3.	D A P	331.88	306.61	339.94	351.33	332.58 (6.46)
4.	Khali mixture	261.79	244.70	251.59	292.69	263.08 (5.11)
5.	Labour Use	219.02	237.89	283.66	294.88	254.34 (4.94)
	Total	**5153.45**	**4874.60**	**5166.32**	**5430.26**	**5148.37 (100.00)**

Table No. 3.4 reveals that on an average per hectare expenditure on fertilizer was estimated at Rs. 5148.37. Out of the total, major expenditures were on mustard cake Rs. 4086.26 (79.37%) followed by D.A.P. Rs. 332.58 (6.46%), khali mixture Rs. 263.08 (5.11%), labour use (4.94%) and other cake Rs. 212.11 (4.12%). The pattern of expenditure on these items of fertilizer was the same in the all four sampled villages. The total expenditure in village – IV was estimated to be Rs. 5430.26, which was higher than other three villages and in village – II, It was Rs. 4874.60 which was lower. The expenditure on use of fertilizer was found more or less the same. The highest expenditure was on mustard cake for all the sampled villages.

iv. Insecticides and Pesticides Used in Betel vine Cultivation

An attempt was made to work out different insecticides and pesticides used in the cultivation of betel vine. The information received from the sampled growers regarding demand and use of pesticides commonly practiced by them, have been presented here under:

Table No. 3.5: Cost of Different Insecticides

(Rs. /ha)

SN	Insecticides	Village I	Village II	Village III	Village IV	All Villages
1.	Dithan M-45	1565.97	1489.50	1641.45	1683.22	1591.60 (54.14)
2.	Blitox	672.61	627.69	698.33	716.91	677.62 (23.05)
3.	Roger	218.13	194.31	231.46	228.45	217.84 (7.41)
4.	Calcium	155.73	143.81	162.99	170.94	158.45 (5.39)
5.	Others	128.86	170.17	141.18	163.75	151.10 (5.14)
6.	Spraying	147.95	119.14	154.23	161.91	143.17 (4.87)
	Total	**2889.25**	**2744.62**	**3029.64**	**3125.18**	**2939.79 (100.00)**

The above table shows that the growers popularly used five different types of insecticides and pesticides. These were Dithane M-45, Blitox, Roger, Calcium and other like $ZnSo_4$, Na_2, etc. and calcium (chunna) was found used in the sampled areas. On an average per hectare expenditure on insecticides use was estimated at Rs. 2939.79 in which major expenditure was on Dithan M-45 (54.14%) followed by Blitox Rs. 677.62 (23.05%), Roger 217.84 (7.41%), calcium Rs. 158.45 (5.39%) and others Rs. 151.10 (5.14%). The spraying charge was Rs. 143.17 (4.87%). The pattern of expenditure on insecticides was found almost same in all sampled villages. The total expenditure in village – IV was estimated at Rs. 3125.18, which was highest among all the sampled villages followed by village – III Rs. 3029.64, village-I Rs. 2889.25 and village – II Rs. 2744.62. In all the sampled villages highest expenditure was observed in case of Dithan M-45 and Rs. 1683.22 in village – IV. The second most important pesticide, which was generally used by the betel vine growers, was Blitox and its expenditure ranged between Rs. 716.91 in village – IV to Rs. 627.69 in village – II. The overall expenditure per hectare was calculated to Rs. 677.62. Roger is also an important insecticide, which incurred on an average, Rs. 217.84 per hectare. Calcium (Chuna) was also found used in almost all the sampled villages area and expenditure on it was worked out to be Rs. 158.45 on an average. The village wise analysis indicates that village – IV was made highest expenditure of Rs. 170.94 followed by village – III Rs. 162.09, Village – I Rs. 155.73 and village – II

Rs. 143.81. The growers also use the other insecticides/pesticides like $Znso_4$, etc. which, were also found to have been used in all the sampled areas and on an average it was about Rs. 151.10 per hectare annually. The spraying of insecticides and pesticides were done manually or power operated machines, which was worked out on an average Rs. 143.17. The highest charges were borne by village – IV Rs. 161.91 and lowest by village – II Rs. 119.14. Above analysis, thus, concludes that there was little variation in insecticides used across the sampled villages.

v. Cost of Irrigation

Per hectare cost of irrigation was worked out and presented in table – 3.5. In both the sampled areas two most common methods of irrigation were found in practice. One was **pot method** and another was **power method.** The details of data analysis is presented hereunder:

Table No. 3.6: Cost of Irrigation.

(Rs. /ha)

SN	Sampled Villages	Pot Method Or Mannual	Power Method	Total
1.	Village – I	2140.32	5665.36	7805.68
2.	Village – II	804.86	6867.79	7672.65
3.	Village – III	1398.08	6062.32	7460.40
4.	Village – IV	1536.82	6389.02	7925.84
5.	All Villages	1458.24	6261.39	7719.63

The table – 3.6 showed that on an average per hectare irrigation cost was Rs. 7719.63. Out of the total per hectare cost power method of irrigation constituted a larger share of Rs. 6261.39 and pot (manual) method lower share Rs. 1458.24. Village wise analysis revealed that the highest expenditure was Rs. 7925.84 in case of village - IV followed by village – I Rs. 7805.68, village – II Rs. 7672.65 and village – III Rs. 7460.40. Higher expenditure was incurred in power method and lower expenditure on pot (manual) method. Due to larger dependence on diesel in power method of irrigation cost was very high, but it is interesting to note that the pot (manual) method of irrigation is also not cheaper because the high cost of labour and this method also takes more time in irrigation. Though, the pot (manual) method of irrigation was proved most effective technically but very few growers were found resorting to this method of irrigation. The growers in the sampled areas found irrigation, by power method, more popular and acceptable. Due to its ready availability and efficiency this method was commonly found used by the growers.

The growers have reported that due to high cost of labour and inconveniences in bringing water on heads from tank, ponds, wells, etc., this practice became uncommon in the present time.

3. EMPLOYMENT PATTERN IN BETEL VINE CULTIVATION

The analysis of employment pattern in betel vine cultivation forms an important part of the study in hand. It has been worked out with the objective to discuss the pattern of employment in cultivation of betel vine under following heads:

i. Operational Farm and Family Size of the Sampled Growers
ii. Utilization of Family and Hired Labour
iii. Sex-wise Labour Utilization
iv. Operation wise Labour Utilization.

i. Operational Farm and Family Size of the Sampled Growers

The village wise operational farm and size of family were worked out and presented in table 3.7:

Table 3.7: Operational Holding and Size of Family.

(per farm)

SN	Village	Betel vine Area Average (In ha)	Average Family Size (In Nos.)
1.	Village – I	0.13	4.65
2.	Village – II	0.15	5.15
3.	Village – III	0.12	4.25
4.	Village – IV	0.16	5.45
5.	All Villages	0.14	4.88

Table 3.7 indicates that size of farm holding on an average, was 0.14 ha. The village wise analysis indicates that the average size of holding was the largest in village – IV (0.16) ha, followed by village – II (0.15) ha, Village – I (0.13) ha and village – III (0.12) ha. It means across the sampled villages average size of betel vine holding, ranged between 0.12 ha to 0.16 ha which is very small in size.

The table further indicates that on an average, family size was 4.88. The family size among the four villages was found to be largest in village – IV (5.45), followed by village – II (5.15), village – I (4.65) and village – III (4.25) respectively.

The analysis indicates positive correlation between size of operational holdings and size of the corresponding family. In other words, as the size of holdings in betel vine cultivation increases, the family size of growers also increases. It is so because betel vine is capital as well as labour intensive crop. Consequently, betel vine farmers did prefer large family size so as to assure adequacy of labour supply.

ii. Utilization of Total Labour, Family Labour and Hired Labour

The analysis of family and hired labour utilization has been done and presented in table 3.8:

Table No. 3.8: Utilization of Family and Hired Labour in per hectare of Betel vine Cultivation.

(In Number)

SN	Sampled Villages	Total Human Labour Used	Family Labour	Hired Labour
1.	Village – I	817 (100.00)	495 (60.59)	322 (39.41)
2.	Village – II	832 (100.00)	518 (62.26)	314 (37.74)
3.	Village – III	836 (100.00)	518 (61.96)	318 (38.04)
4.	Village – IV	847 (100.00)	513 (60.57)	334 (39.43)
5.	All Villages	833 (100.00)	511 (61.35)	322 (38.65)

Table No. 3.8 indicates that on an average per hectare labour utilization in the cultivation of betel vine were 833 man-days. Out of the total labour utilization the share of family labour was 511 (61.35%) and hired labour was 322 (38.65%). The analysis of village wise utilization of labour shows that it is highest in village – IV (847) followed by village – III (836), village – II (832) and village – I (817). The utilization of family labour across the villages reveals that highest utilization of family labour was found in case of village – II, 518 (62.26%), followed by village – III 518 (61.96%), village – IV 513 ((60.57%) and village – I 495 (60.59%). In case of hired labour utilization, village – IV was found to have highest number of labour, i.e., 334 followed by village – I (322), villages – III (318) and – II (314). The analysis reveals that the share of family labour in total utilization of labour in the cultivation of betel vine was found much higher in almost all the sampled villages which might be due to the fact that growers mostly used own family labour in almost every activity of production and marketing. The hired labourers were easily available in the village as and when required by the growers. However, they preferred to work in the bareja.

III. Sex wise Labour Used in Cultivation

The sex wise utilization of labour in cultivation of betel vine has been worked out and presented in table 3.9:

Table No. 3.9: Sex wise Utilization of Labour in Betel vine Cultivation

(In No./ ha)

SN	Sampled Villages	Total Labour	Male Labour	Female Labour
1.	Village – I	817 (100.00)	801 (98.04)	16 (1.96)
2.	Village – II	832 (100.00)	820 (98.56)	12 (1.44)
3.	Village – III	836 (100.00)	603 (72.13)	233 (27.87)
4.	Village – IV	847 (100.00)	627 (74.03)	220 (25.97)
5.	All Villages	833 (100.00)	718 (86.19)	115 (13.81

Table 3.9 showed that on an average total labour days employed in cultivation of betel vine was 833 man days per hectare, in which male labour days accounted for 86.19 per cent and female labour days for 13.81 per cent only (i.e., 718 and 115 respectively). The village wise analysis indicates that in absolute terms male labour participation was higher in almost all the sampled villages, but the highest participation was recorded in village – I and village – II of Bhagalpur district, which were 801 and 820 i.e., 98.04 per cent and 98.56 per cent of the total labour engaged respectively. The main reason for this observation might be due to social prohibition of female to enter into the bareja. Similarly in case of Vaishali district, the percentages were worked out to be 72.13 and 74.03 in villages – III and – IV respectively. However, the participation of female in the cultivation of betel vine was higher in case of Vaishali district in comparison to that of Bhagalpur.

From the above analysis, it can be said that in betel vine cultivation male workers were employed in a large number in various operations as compared to female workers less for economic reasons and more for social reasons.

The lower percentage of female participation in cultivation of betel vine in the sample villages of Bhagalpur district is due to most interesting fact that the ‘place of betel vine cultivation, i.e., ‘bareja’ is considered to be a sacred place, where God resides. The entry of female inside bareja is strictly prohibited under the social system prevailing in ‘barai samaj’ (betel vine growers). It is so because there is a traditional belief that the entry of women in the bareja will erode the purity and betel vine leaves will be dried up. The blind belief about the impurity of women did also prevail in the

sampled villages of Vaishali district, but 'barai samaj' of the later district was not strongly opposed to women's entry in their 'bareja' as it was in the former district. The above fact is the main factor for low utilization of female labour in the study area.

iv. Operation wise Labour Utilisation in Sampled Villages

Operation wise labour utilization has been worked out and presented under table 3.10.

Table 3.10: Operation wise Employment Pattern Betel vine Cultivation (per hectare).

(Numbers)

SN	Operation (One Year)	Village I	Village II	Village III	Village IV	All Village
1.	Bareja Construction	112 (13.71)	107 (12.86)	113 (13.52)	111 (13.11)	111(13.33)
2.	Land Preparation	7 (0.86)	8 (0.96)	7 (0.84)	6 (0.71)	7 (0.84)
3.	Pits Making & Digging	12 (1.47)	13 (1.56)	15 (1.79)	14 (1.65)	13 (1.56)
4.	Vines Planting	4 (0.49)	5 (0.60)	6 (0.72)	6 (0.71)	5 (6.02)
5.	Fertilizer Application	5 (0.61)	6 (0.72)	6 (0.72)	7 (0.83)	6 (0.72)
6.	Irrigation	42 (5.14)	53 (6.37)	49 (5.86)	37 (4.37)	45 (5.40)
7.	Inter culturing	137	141	152	148	144
a.	Lowering of Vine	63 (7.71)	66 (7.93)	71 (8.49)	68 (8.03)	67 (8.04)
b.	Soil Addition	43 (5.26)	44 (5.29)	48 (5.74)	46 (5.43)	45 (5.40)
c.	Sticks for Vine Supporting	31 (3.79)	31 (3.73)	33 (3.95)	34 (4.01)	32 (3.84)
8.	Pesticides Use	3 (0.37)	5 (0.60)	6 (0.72)	5 (0.59)	5 (0.60)
9.	Harvesting, Packaging, Maintenance, etc.	495 (60.59)	494 (59.38)	482 (57.66)	513 (60.57)	496 (59.54)
10.	Total Labour Use	817 (100.00)	832 (100.00)	836 (100.00)	847 (100.00)	833 (100.00)

Table 3.10 shows that on an average, 833 labourers were utilized for the cultivation of betel vine per hectare. The breakup of labour utilization indicates that in construction of Bareja on an average 111 labour days were utilized which accounted for 13.33 per cent. The village wise analysis showed similar result in other sampled villages except village - II. The analysis also indicates that labour utilization in construction ranged from 107 man-days in village - II to 112 man-days in village – I in Bhagalpur district. However, it was comparatively higher in both the sampled villages of Vaishali district i.e., 113 and 111 respectively. The variation of labour use from village to village in the construction of Bareja was due to its shape, size, and strength. The life of bareja are about 4-5 years. After the construction of bareja, next step was preparation of land. On an average, 7 labourers were needed in this activity. After preparation of land, making and digging of pits were done and in this activity about 13 labourers were found utilized at overall level. The planting of vine takes 5 man-days (6.02%). The expected life of these operations were around 15 to 20 years. It is further indicated that on an average, 6 labour days were utilized in

fertilizer application, which accounted for 0.72 per cent. The table also showed that on an average 45 labourers were utilized in irrigation, which accounted for 5.40 per cent of total labour days utilized. The village wise picture shows that village – II utilized 53 labourers, which were highest amongst the village followed by village – 3 (49), villages – I (42) and village – IV (37) respectively. The variation of labour utilization was due to method of irrigation prominently based on human labour utilization. The power method takes lower number of labour in comparison to manual method. In the practices of inter-culturing on an average 144 labour days were utilized which accounted for 17.12 per cent of total labour days utilization in betel vine. On an average 67 labour days were utilized in lowering of vine, 45 man-days in spreading of soil and 32 man-days in vine supporting. The table again shows that on an average 5 labour days were utilized in pesticide application. The labour requirement per hectare in operation like harvesting, packing, maintenance, and marketing, etc. were on an average 496 labour days, which accounted for 59.54 per cent. The expected life of this operation is about 15 to 20 years. Village wise analysis revealed that in both the sampled villages of Bhagalpur district comparatively less labour days were used almost in all operation from bareja construction, land preparation to vine planting, etc. The operation wise variation in labour employment was more pronounced between two sampled areas in bareja construction, irrigation inter-culturing and harvesting, etc. It indicates no marked variation in number of labour days in villages – I, – II and – III where as in village – IV the number was higher.

v. Cost of Production and Income of Betel vine Crop

The cost of production of betel vine crop is the most important aspect of farm economy both for its growers, as well as from the national point of view. To the individual farmer it helps him to proper management of his scarce resources for getting maximum returns and from the national point of view it gives idea to the policy makers in formulating the policy, both for inputs as well as for the produce. This estimates of expenditure and income as worked out and findings have been presented hereunder in table – 3.11.

Table No 3.11: Total Expenditure and Production of Betel vine in the Sampled Villages.

(Rs. /ha)

SN	Item	Village I	Village II	Village III	Village IV	All Village Average
1.	Total Expenditure	96095.65	96175.16	96199.54	98281.57	96664.14
2.	Total Production of Betel leaves (Dholi) per ha (1 Dholi = 200 leaves)	11284.00	12080.00	12376.00	13940.00	12475.00
3.	Cost of Production per 10,000 leaves (50 Dholi)	428.88	401.54	393.26	356.80	391.30

The above table 3.11 shows that the total expenditure (both variable and fixed) incurred on an average was Rs. 96664.14 and total production of betel leaves per hectare and cost of production per 10,000 leaves, on an average, were 12475 per (dholi) and Rs. 391.30 respectively. The village wise data indicates that the total expenditure was found to be Rs. 98281.57 in village – IV higher than in all sampled villages where it was estimated to be Rs. 96199.54 in village – III, Rs. 96175.16 in village – II and Rs. 96095.65 in village – I. The analysis also showed that higher expenditure led to higher production of betel leaves. In village – IV the total production was 13940 dholi of betel leaves, which was higher than the all sampled villages. Average yield was in village – III, 12376.00 dholi, in village – II, 12080.00 dholi and in village I, 11284.00 dholi. The cost of production per 10,000 betel leaves was estimated higher in case of village – I (Rs. 428.88) followed by village – II (Rs. 401.54), in village – III (Rs. 396.26) and in village – IV (Rs. 356.80).

Year wise Cost Breakup

Table 3.12: Year wise Estimated Breakup of Cost Involved in Betel vine Cultivation (1 to 5 yrs)

(In Rupees / ha)

SN	Year	Total Expenditure	Total Income	Loss	Profit
1.	1st	73982.53 (51.56)	31560.90 (15.08)	42421.63	---
2.	2nd	13186.55 (9.19)	49957.47 (23.87)	---	36770.92
3.	3rd	20791.44 (14.49)	56466.38 (26.98)	---	35674.94
4.	4th	20406.26 (14.57)	41523.09 (19.84)	---	20616.83
5.	5th	14621.45 (10.19)	29901.51 (14.29)	---	15286.06
6.	All Avg.	143488.23 (100.00)	209415.35 (100.00)	42421.63	65927.75

Source: Data from a group of three farmers.
Note: Figures in parenthesis indicates percentage.

The table 3.11 reveals that out of the total expenditure about 51.56 per cent were spent during the 1st year and rest were spent in four consecutive years. Like wise the total income comes from the investment was only 15.08 per cent. Thus a loss

was occurred during the 1st year, which was Rs. 42421.63. The data further indicates that after the 1st year, the expenditure over income was lesser and the profit showed increasing year after year while in 5th year, the profit was more or less same like the 2nd year. This happened due to nearly full exploitation of the resources. The overall analysis indicates that in 5-year span of time, around Rs. 65927.75 were earned as a net profit from this venture. Thus, this is a viable enterprise for the producers.

vi. Economic Efficiency of Betel vine Production

In this part of analysis, a number of profit measures have been dealt in. These profit measures are net income, farm business income, and farm investment income, return on working capital, etc. has been worked out and presented into sub-heads.

i. Gross Income and Net Return

The gross income is the value of total output and net income is the value of differences between total revenue minus total cost. The calculated data has been presented under table – 3.12.

Table No. 3.12: Estimated Gross Income and Net Return per hectare.

(In Rupees)

SN	Village	Gross Income	Total Expenditure	Net Return
1.	Village – I	136197.88	96095.65	40102.23
2.	Village – II	146772.00	96175.16	50596.84
3.	Village – III	150863.44	96199.54	54663.90
4.	Village – IV	170486.20	98281.57	72204.63
5.	Average of all villages	151945.55	96664.14	55281.41

The table 3.12 indicates that per hectare gross income on all farms on average basis was estimated to be Rs. 15194.55. It varied from Rs. 170486.20 in village – IV to Rs. 136197.88 in village – I. The comparatively higher gross income was found in case of Vaishali district sampled villages than that of Bhagalpur district sampled villages. The main reason behind this was that Vaishali town is situated on the main road connecting Patna, the capital town of the state, thus, growers used to get good prices of their produce. The table further indicates that the total expenditure on all sampled village farms was found to be Rs. 96664.14 which varied from Rs. 98281.57 and Rs. 96095.65 in village – IV and village – I respectively. It may also be observed from the table that on all farms average per hectare net return amounted to Rs.

55281.41 which varied from Rs. 72204.63 and Rs. 40102.23 in village – IV and village – I respectively. The higher net return was observed in case of village – IV, where gross incomes, as well as, total expenditure, were also worked out to be higher. This is mainly due to better accessibility to market.

ii. Farm Business Income and Farm Investment

The per hectare family labour income, farm business income and farm investment income of all the sampled village farms were worked out and presented under table – 3.13.

Table No. 3.13: Estimated Family Labour Income Farm Business Income and Farm Investment Income per Hectare.

(In Rs)

SN	Village	Family Labour Income	Farm Business Income	Farm Investment Income
1.	Village – I	59208.03	74942.21	76636.46
2.	Village – II	70479.24	86206.46	88044.06
3.	Village – III	74243.40	89944.78	92085.28
4.	Village – IV	91529.31	107561.85	109792.17
5.	Average of all villages	74755.42	90552.76	92518.66

Note 1. Calculation of Family labour income has been worked out by measures of earning of the farmer and his family for their physical labour FLI = NI + Imputed value of family labour.

2. Farm business income is calculated by estimating earning of the farmers, his family labour and working capital investment F.B.I = FLI + interest on working capital and risk cost.

3. Farm investment income per hectare has been calculated by adding up farm business income and imputed value on interest on owned fixed capital F.I.1 = F.B.I + interest on owned fixed capital.

The above table reveals that the family labour income per hectare on an average was Rs. 74755.42 for all villages studied herein. The village wise analysis indicates that in village – IV family labour income (Rs. 91529.31) was highest followed by village – III (Rs. 74243.40), village – II (Rs. 70479.24) and village – I (Rs. 59208.03). The family labour income found higher in case of Vaishali district sampled villages with compared to Bhagalpur district sampled villages. The farm business income per hectare on an average was estimated at Rs. 74942.21 for village – I, Rs. 86206.46 for village – II, Rs. 89944.78 for village – III and Rs. 107561.85 for village – IV. The overall average was Rs. 90552.76. The higher farm business income per hectare was found in village – IV due to the reasons as already explained in the earlier section. It may further be observed that farm investment income on an average was

(Rs. 92518.66) which was highest again in village – IV (Rs. 109792.17) followed by village – III (Rs. 92085,28), village – II (Rs. 88044.06) and village – I (Rs. 76636.46).

The analysis concludes that the villages falling under Bhagalpur district have been at comparatively lower points in case of family labour income, farm business income and farm investment income in comparison to sampled villages of Vaishali district.

iii. Return on Working Capital

Return per hundred rupees investment on working capita is an important measure of farm profit specially when the crop under study is betel vine requiring higher working capital investment. This analysis helps to provide a guideline to the grower for reallocating the farm resources for maximizing the profit. Return on working capital is obtained by dividing the net income by working expenditure and expressed in percentage. The percentage return on working capital has been worked out and presented under table 3.14:

Table No. 3.14: Per hectare Percentage Return on Working Capital in Village under Study

SN	Village	Net Income (Rs)	Working Expenses	Percentage Return on Working Capital
1.	Village – I	40102.23	78670.97	50.09
2.	Village – II	50596.84	78636.14	63.28
3.	Village – III	54663.92	78506.96	68.18
4.	Village – IV	72204.91	80162.73	88.58
5.	Average of all villages	55281.41	78986.72	68.76

It may be observed from the table 3.14 that on an average, percentage return on working capital was Rs. 68.76. The village wise analysis indicates that in village – IV, it was Rs. 88.58, which was higher in terms of percentage return on working capital. It was followed by village – III (Rs. 68.18), village – II (Rs. 63.28) and lowest in village – I (Rs. 50.09). The higher percentage of return on working capital may be due to higher net income in the sampled village farms.

iv. Return per Labour Day

Labour is an important factor of production in Indian agriculture. Its importance is still more for betel vine crop being highly labour intensive. As such return per Labour Day is an important determinant of farm profit. The return per labour has been

worked out by dividing the net farm income by total human labour days used per hectare in cultivation of betel vine crop. It has been presented in table – 3.15.

Table No. 3.15: Return per Labour Day (per hectare) in Sampled Village Farms.

(In Rs.)

SN	Village	Net Farm Income	Total Human Labour Day	Return per Labour day
1.	Village – I	40102.23	817	49.08
2.	Village – II	50596.84	832	60.81
3.	Village – III	54663.90	836	65.38
4.	Village – IV	72204.63	847	85.24
5.	Average of all villages	55281.41	833	66.36

It may be seen from the table 3.15 that return per Labour Day on an average farm was observed at Rs. 66.36. It was also observed that the return per Labour Day varied from village to village. The higher return per Labour Day was found in case of village – IV (Rs. 85.24), followed by village – II (Rs. 60.81) and village – I (Rs. 49.08). The lowest net return obtained in villages is due to poor use of resources.

v. Capital Output Ratio

Capital output ratio shows the efficiency of investment on farm and the income thus obtained. The capital output ratio has been worked out by dividing gross income by total cost (both variable and fixed). The calculated result has been presented in table 3.16.

Table No. 3.16: Per hectare Capital Output Ratio

(In Rs.)

SN	Village	Gross Income	Total Cost	Capital Output Ratio
1.	Village – I	1361.97.88	96095.65	1:1.42
;	Village – II	146772.00	96175.16	1:1.52
3.	Village – III	150883.44	96199.50	1:1.57
4.	Village – IV	170486.20	98281.57	1:1.73
5.	All Village Average Farms	191945.50	96664.14	1:1.58

The table 3.16 shows that on an average capital output ratio was 1:1.58. The village wise results indicated that growers in village – IV obtained more income per unit of capital investment (1:1.73) followed by village – III (1:1.57), village – II (1:1.52) and village – I (1:1.40). The table also indicates that per unit of capital investment was higher in case of Vaishali district sampled village farms as compared to those of

Bhagalpur district. Thus, this analysis established a relationship that those villages whose per unit of capital investment is higher, their incomes were also found to be correspondingly higher.

The above analysis concludes that in betel vine production gross income is a function of various input factors such as land, labour, vine cutting, fertilizers, plant protection and irrigation. Variations in the level of these inputs directly affect the gross income. Each sampled grower individually decide how to use and how much to use these inputs. Thus, the cost and return vary with the variations of farms. In vine production, it was found that irrigation; plant protection, fertilizer and labour were most important factors of production, which influence betel vine production in the project districts. It was also found that the farmers lacked awareness and knowledge with respect to technique of utilizing various inputs in appropriate combination and at appropriate time. Inadequacy of capital on the part of the farmers also acts as a serious inhibiting factor in the way of optimum utilization of resources.

CHAPTER – IV

MARKETING OF BETEL VINE

Marketing is an essential part of production process. Any production does not become economic until it reaches to the consumers and the producers get their share out of consumer's rupee worth the utility of his product. In this chapter, an attempt has been made to analyse the existing marketing system of betel vine product, producer's share in consumer's rupee and marketing margins of various agencies involved in different marketing channels, price spread, marketing costs, margins of different intermediaries, etc. The analysis is based on the information collected from the sampled respondents.

Marketing Costs and Margins

Marketing costs and margins the most important aspects in production of cash crop, which are mainly produced for the market. The study of price spread in marketing of cash crops is important for various reasons. In order to produce more; farmers are required to invest more on inputs, which largely depend on the gain to the farming community. The main reason for comparatively lower price obtained by the growers on the one hand and higher prices paid by the consumers, on the other hand, are due to the existence of a large number of market intermediaries resulting into higher amount of gross marketing margins. The gross marketing margin refers to the difference between the price paid by the ultimate consumers and the price received by the producers. The gross marketing margin consists of margin of various intermediaries engaged in moving the produce from the point of production to the ultimate consumers and also the marketing cost involved in the scrutiny, packaging, grading, processing, transportation, spoilage, processing as practiced in few cases and other handling activities.

The term marketing margins refers to difference in price received and price paid for a commodity at different stages of the marketing system. The high normal marketing margin is an indicator of the efficiency of the marketing system. The large value of marketing margins is indicative of an in efficient marketing system. On the other

hand, if the produce moves from the producer to the ultimate consumer at the minimum cost, the marketing system is said to be more efficient.

The high normal marketing margin is an indicator of efficiency of the marketing system. Such margin refers to the practice of enhancing quality of the product by suitable processing method or causing increase in demand for their product through advertisement and demonstration. Even if the demand increases consequent upon rise in consumers' income or favourable change in consumption pattern, causing increase in marketing margin; such increase will be considered as normal marketing margin.

Contrary to this, in case the intermediary tax advantage of low holding capacity of poor cultivators, their ignorance, lack of appropriate processing facility and financial assistance extended to them during pre-harvesting period, etc; causing increase in marketing margin, such margin will be termed as abnormal or exploitative marketing margin, which is mostly prevalent in areas of study in both the districts.

As such high normal marketing margin reflex the efficiency of marketing system, whereas low marketing margin speaks contrary to the above dictum. Abnormally high marketing margin is indicator of degree of exploitation of the poor peasants by the intermediaries.

For calculation of the price spread, concurrent margin method was used for the purpose. The marketing margin varies on the length and type of channels through which the produce passes on its way to the final consumer. The important marketing channels were therefore, identified and price spread has been calculated for the major identified channels of betel vine marketing in the study area.

Marketing Channels

The Important Channels of Betel vine Marketing are given below:

1. Grower/Producer → Local Trader → Wholesaler→ Retailer → Consumer
2. Grower/Producer → Wholesaler → Retailer → Consumer
3. Grower/Producer → Retailer → Consumer

As per the information collected from the sampled growers during field survey it was observed that in both the sampled districts, growers were found using above mentioned three important channels through which they dispose off their produce. The proportion of the produce marketed channel wise has been presented in table 4.1

Table No. 4.1: Disposal Pattern of Betel vine by Growers Channel wise

(In %age)

SN	Village	C H A N N E L S		
		1	2	3
1.	Village – I	70.88	7.43	21.69
2.	Village – II	74.28	8.09	17.63
3.	Village – III	77.39	12.48	10.13
4.	Village – IV	80.47	14.03	5.50
5.	All Village Average	76.63	10.37	13.00

The table 4.1 reveals that at overall level about 76.63 per cent of the betel vine produced (leaf) by the sampled growers were sold to local traders through channel - 1. It means channel – I was identified as the most important channel through which bulk of the produce passed. Village wise break up indicated that village – IV (80.47 %) made the highest disposal through this channel followed by village – III (77.39 %), village – II (74.28 %) by village – I (70.88%). It was observed that in sampled villages of Bhagalpur, betel vine growers were using comparatively less of this channel than that of Vaishali sampled village growers. It might be due to various unexplained reasons like, distance of market, nature of and interest rates on loan facilities provided by the intermediaries, etc. The table also reveals that the second important channel was channel – 3 as through this channel, on an average, 13.00 per cent of produce passed. The village wise analysis finds that the sampled villages of Bhagalpur were using comparatively less of this channel than that of Vaishali sampled village. It may be due to various unexplained reasons like, distance of market, loan facilities provided by the intermediaries, etc. Study area under Bhagalpur district was using more of this channel. As its is apparent from the table, it was about 21.69 per cent in case of village – I and about 17.63 per cent in case of village – II. In Vaishali district, sampled villages were using channel – 3 at low scale in comparison to Bhagalpur district. It was only 10.13 per cent in case of village – III and 5.50 per cent in village – IV. This may be due to the fact that Bhagalpur district sampled villages were more distant from the pan mandi and majority of growers took

assistance in cash or kind through the local traders. They mostly sell their produce to local traders who also act as retailers in these areas. This type of situation is not significantly observed in the sampled villages of Vaishali district.

The second channel is also an important channel in both the sampled areas. Through this channel on an average 10.37 per cent of the produce was sold. Across the sampled village highest share was observed in the case of village – IV (40.03%) followed by village – II (12.48 %), village – I (8.09 %) and village – I (7.43 %). It means Vaishali district sampled villages were using this channel at higher scale than that of Bhagalpur district. The above analysis concludes that the highest disposal of the produce through channel – I might be due to various reasons but obligatory factor was the most important for this.

Price Spread of Betel vine

In the marketing of commodities, the difference between the price paid by consumer and the price received by the producer for an equivalent quantity of farm produce is known as price spread. It is also termed as marketing margin. The price spread of the produce marketed through different channels in the selected villages is presented in table – 4.2.

Table No. 4.2: Price Spread per 10,000 Leaves (50 Dholi) of Betel vine through various Marketing Channels.

(In Rs.)

SN		Particulars	Channel - 1	Channel - 2	Channel - 3
1.		Price received by Growers or Local Traders/Retailers purchase price	670.99 (55.09)	719.59 (59.08)	640.18 (52.56)
2.		Marketing Costs incurred by Growers/Local Trader/retailer	48.96 (4.02)	48.96 (4.02)	58.95 (4.84)
	a.	Packing Charge	33.00 (2.71)	33.00 (2.71)	33.00 (2.71)
	b.	Loading and Unloading Charge	3.53 (0.29)	3.53 (0.29)	3.53 (0.29)
	c.	Transportation Charge	12.42 (1.02)	12.42 (1.02)	12.42 (1.02)
3.		Local Trader's Profit Margin	48.61 (3.99)	---	---
4.		Local Trader Selling Price/Wholesalers Purchase Price	768.55 (63.10)	768.55 (63.10)	---
5.		Expenses Incurred by Wholesaler	100.24 (8.23)	100.24 (8.23)	---
	a.	Market fee	13.15 (1.09)	13.15 (1.09)	---
	b.	Labour Charge	13.28 (1.08)	13.28 (1.08)	---
	c.	Grading and Packing	19.85 (163)	19.85 (1.63)	---
	d.	Storage Charge	16.69 (1.37)	16.69 (1.37)	---
	e.	Spoilage Charge	25.21 (2.07)	25.21 (2.07)	---
6.		Wholesalers Profit Margin	72.35 (5.94)	72.35 (5.94)	---
7.		Wholesalers Selling Price/Retailers Purchase Price	941.15 (77.27)	941.15 (77.27)	---
8.		Expenses incurred by Retailer	124.48 (10.22)	124.48 (10.22)	144.21 (11.84)
	a.	Loading and Unloading Charge	2.80 (0.23)	2.80 (0.23)	---
	b.	Transportation Charge	6.94 (0.57)	6.94 (0.57)	---
	c.	Grading and Packing Charge	64.43 (5.29)	64.43 (5.29)	64.43 (5.29)
	d.	Spoilage Charge	38.24 (3.14)	38.24 (3.14)	66.74 (5.48)
9.		Retailers Margin Profit	152.37 (12.51)	152.37 (12.51)	374.66 (30.76)
10.		Retailers Selling Price/Consumer Purchase Price	1218 (100.00)	1218 (100.00)	1218 (100.00)

Source: Figures in parenthesis indicate percentage of consumer's rupees.

Table 4.2 reveals that price received by the grower farmers per 10,000 of betel vine was higher in channel – II (59.08 %). It was higher than both the channels. The situation may be due to producers acted as producer sellers themselves and sold their produce in the market and received higher profit margin. In channel – 1 and channel – 3 the producer's share in consumer's rupee was 55.09 per cent and 52.56

per cent respectively. In these channels the producer's share in consumer's rupee was also greater than 50.00, which might be due to the fact that in both channels- 1 and 3, the produce was disposed of at the village level itself.

Table further indicates that the retailer's margin of profit was higher at 30.76 per cent in case of channel – III. In this channel higher retailer's margin of profit was because retailers had directly purchased the produce from the growers. In channel – I and II, the retailers margins of profit was found to be 12.51 per cent. In both the channels the retailer's margin was less because they purchased the produce after a long chain of price spread and thus profit margin gets lower down.

It is also apparent from the table that the price per 10,000 leaves (50 dholi) of betel vine received by the producer was Rs. 670.99 in channel- 1; Rs. 719.59 in channel – 2 and Rs. 640.18 in channel – 3. The marketing costs incurred by the growers/local traders/retailers were Rs. 58.95 in channel – III and Rs. 48.96 in channel – I & II. The profit margin of local trader was Rs. 48.61 in channel – I. The selling price of local traders/wholesalers was Rs. 768.55 in channel I & II respectively. The expense incurred by wholesaler was Rs. 100.24 in both the channel – I & II. The profit margin of wholesalers in both the channels was the same at Rs. 72.35. The retailers purchase price/wholesalers selling price was Rs. 941.15 in both the identified channels. The expense incurred by retailers was Rs. 144.21 in case of channel – III and Rs. 124.48 in channel I & II. The retailers profit margin were found higher in channel – III i.e., Rs. 374.66 whereas in channel – II & I; it was observed only at Rs. 152.37 only. The producers share in consumer rupee was found minimum in channel – II where only 40.92 per cent of the consumer rupees distributed among various intermediaries of market which is less than that of channel I & III. One thing is worth noting here that in channel – III, the retailers' profit margin was found higher than channel – I & II. It is due to the fact that retailers in this channel purchase produce directly from the producers. Therefore, the margin of profit was not distributed to other intermediaries involved in the process of marketing.

Marketing Cost

During the marketing, market functionaries move the commodities from the producer to consumer and every function involves cost. The estimated cost of marketing has been worked out and presented in table 4.3.

Table 4.3: Marketing Cost on Various Marketing Functions in Marketing of per 10,000 (50 dholi) Betel leaves in as per marketing Channels.

SN	Particulars	Channel – I	Channel – II	Channel - III
1.	Transportation Cost	19.36 (8.43)	19.36 (8.43)	12.42 (6.89)
2.	Grading and Packing Charge	97.43 (42.42)	97.43 (42.42)	97.43 (54.09)
3.	Labour Cost	13.15 (5.72)	13.15 (5.72)	---
4.	Market Fee	13.28 (5.78)	13.28 (5.78)	---
5.	Storage Charge	16.69 (7.26)	16.69 (7.26)	---
6.	Spoilage Charge	63.45 (27.69)	63.45 (27.69)	66.74 (37.06)
7.	Loading and Unloading Charge	6.33 (2.77)	6.33 (2.77)	3.53 (1.96)
8.	Total Cost of Marketing	229.69 (100.00)	229.69 (100.00)	180.17 (100.00)

Note: Costs were worked out on the basis of assumed estimated data.

Table 3.4 indicated that in channel – I & II total marketing cost, cost on transportation, grading and packing and labour charge estimated to Rs. 229.69, Rs. 19.36, Rs. 97.43, Rs. 13.15, Rs. 13.28, Rs. 16.69, Rs. 63.45 and Rs. 6.33 respectively. The same cost incurred in both the channels may be due to the marketing procedures being the same. The table further showed that total marketing cost in channel – I & II was higher (Rs. 229.69) than total marketing cost incurred in channel – II (Rs. 180.12). The variation in marketing cost may be due to involvement of intermediaries and product sent to other places through transport as compared to channel – III in which there was no involvement of intermediaries. It may also be observed from the table that out of the total marketing cost in channel – I & II, transportation cost constituted 8.43 per cent and 6.89 per cent in channel – III. The cost on grading and packing was 42.42 per cent in channel I & II and 54.09 per cent in channel – III. The cost on grading and packing was very high, because it is perishable in nature, charges on grading and packing was found comparatively higher in channel – III because retailers involved in this channel took more time to dispose off their produce. The cost incurred on labour was 5.72 per cent in channel I & II. However, there was no such cost incurred in channel – III. Market fee was found to be 5.78 per cent in channel – I & II. However, there was no such cost incurred in channel – III because retailers in channel – III purchased the produce directly from the growers at village level and the quantity of products purchased by them was very low and sold in local market, where no marketing fee was involved.

Storage charge was found to be 7.26 per cent in channel I & II. However, there was no such cost incurred in channel – III because retailers in channel – III purchased and sold everyday in the market. There was no need for storage. Charge due to spoilage was estimated at 27.69 per cent in channel – I & II and 37.06 per cent in channel III. Charges due to spoilage was observed comparatively high in channel – III because retailers involved in this channel required more time to dispose off their produce to the ultimate consumers.

Marketing Margins

On the basis of data collected from the field survey, the total marketing margins and margins of profit were worked out and presented in table 4.4.

Table 4.4: Estimated Marketing Margins and Margins of Intermediaries per 10,000 (50 dholi) betel leaves through various Marketing Channels

SN	Particulars	Channel – I	Channel – II	Channel - III
1.	Local Trader's Margin	48.61 (17.78)	---	---
2.	Wholesaler's Margin	72.35 (26.47)	72.35 (29.56)	---
3.	Retailer's Margin	152.37 (55.75)	152.37 (70.44)	374.66 (100.00)
4.	Total Marketing Margin	273.33 (100.00)	244.72 (100.00)	374.66 (100.00)

Table 4.4 revealed that retailer's margin was very high in all the identified channels and it constituted 55.75 per cent, 70.44 and 100.00 per cent of total marketing margins in channel – I, II & III respectively. The wholesaler's margin constituted only 26.47 per cent and 29.56 per cent in channel – I & II respectively. The retailer's margin in all the identified channels was observed comparatively high due to very lower disposal of the produce at the retailer's level, but wholesalers were found to dispose the produce faster even with lower rate of margin of profit received by them.

Producer's Share in Consumer Rupee

An effort has been made to analyze the producer's share in consumer rupee in identified channels. The analyzed data have been presented in table 4.5.

Table 4.5 Price Received by Growers, Marketing Cost and Margin per 10,000 leaves of betel vine through various Marketing Channels.

SN	Particulars	Channel – I	Channel – II	Channel - III
1.	Price Received by Growers	670.99 (55.09)	719.59 (59.08)	640.18 (52.56)
2.	Total Marketing Costs	229.69 (18.86)	229.69 (18.86)	180.12 (14.79)
3.	Total Marketing Margins	273.33 (26.05)	244.72 (22.06)	374.66 (32.65)
4.	Price Paid by Consumers	1218.00 (100.00)	1218.00 (100.00)	1218.00 (100.00)

The table 4.5 indicated that grower's share in consumer's rupee was comparatively high by 59.08 per cent in Channel – II and low by 52.56 per cent in Channel – III. Whereas in channel – I, it was 55.09 per cent. The higher percentage was in channel – II because in this channel the producers sold their produce in the market directly to the wholesaler, while in channel – III & I, most of the growers sold their produce at the village level. Thus, the analysis concludes that the marketing channel – II is more profitable for growers in comparison to other two channels – III & I in the sampled areas.

Functional Approach

In case of betel vine, it is identified that there were three district categories of buyers. There were buyers, who purchased betel leaves for consumption, the second category of buyers were the intermediaries, i.e., between the producer and the wholesaler, and the third category was the wholesaler, who demanded the crop for mostly interstate trade, like Banaras, Lucknow, Kolkata, Dhanbad, etc. The channels of direct marketing were acceptable to both the producers and the consumers i.e., no middlemen or market functionaries were involved in between.

It is true that an efficient marketing system is of crucial importance for encouraging the growers who are involved in betel vine production. The commercial production of betel vine calls for the development of marketing system with efficient handling and storage. The organized market functionaries and marketing channels are considered useful in developing a clear understanding of the relationship between different market functionaries. It is also a fact that marketing of betel leaves were complicated because of its deteriorating characteristics. In case of this crop, the

prices rise steeply during the period of their short supply and fall sharply during the period of excess supply.

It was observed that by and large, the markets of betel vine in Bihar had been encompassed in a vicious circle of trading practices. The fact is that the traders control and regulate the business of this crop. The traders were wealthy and took the growers in their grip and compelled to sell their produce at a price fixed by the traders, which generally used to be much lower than the market prices, and the growers were, thus, deprived of fair return. Such unhealthy market practices were the root cause of poor economic condition of the betel vine growers.

In case of price spread, it was observed that there were wide variations of price received by the growers and price paid by the final consumers. This is mainly due to the margin enjoyed by the market functionaries, middlemen and the costs involved in secondary activities like grading, packing, transportation, storage, handling and labour changes, market charge, etc. Various costs involved at different levels of market functionaries and commission of the traders had, in fact, inflated the consumer's price. Thus, a major share of consumer's rupee is cornered by different market functionaries and a considerable part was found involved in the form of various service charger and marketing costs.

For reducing marketing margin by eliminating middlemen, it could be suggested that the growers were, in general, unorganized and they did not make any group in the form of self-help so it is desired that SHGs of betel vine growers play a crucial role in ensuring better returns to the producer and also for protecting the interests of the growers.

In nutshell, marketing system must be improved in the sampled areas to encourage the betel vine growers for higher production by undertaking larger areas under betel vine crop.

CHAPTER – V

CONSTRAINTS FACED BY BETEL VINE GROWERS

This section of the study analyses the constraints faced by the betel vine growers. The selected growers were asked to indicate the constraints through a suitably designed schedule. The information collected by interviewing the selected 74 growers was tabulated to identify the most important constraints of betel vine production in the sampled areas. These were categorized into two broad categories i.e., Agro-biological constraints and economic constraints. The agro-biological constraints included severity of diseases, rain, pests, and winds, non-availability of improved vine cuttings technique of highly perishable betel leaves. The economic constraints included inadequacy of capital, high cost of bareja, high cost of labour, high irrigation cost, high cost of vine cutting, high fertilizer and insecticide cost, inadequate market facilities and adverse price fluctuation.

The collected data were analyzed and average rank of all the identified constraints was determined and presented in table 5.1. From the table it may be observed that under biological constraint growers reported higher percentage in case of severity of disease, which is the major problem in the production of betel vine as reported by 77.02 per cent growers. In both the sampled areas almost cent per cent growers were using their own traditional planting material since long. Most of the growers are growing the crop with their indigenous knowledge, skill and their past experiences. They have no any awareness regarding the improved method of cultivation, etc.

The table further indicates that the second most important constraints reported by the sampled growers were severity of pests in betel vine crop. Majority of growers reported that they did not know the specific pests and pesticides. On the recommendations of the local pesticides/insecticides sellers they were using these materials on their field, which was generally not so effective.

The third important constraints reported by growers were high perishability of the leaves (41.89 %). Farmers complained that due to non-availability of leaf treatment and scientific packaging facilities at the village level a good percentage of their produce was wasted. The other important constraints like wind severity and cold waves, non-availability of good planting materials and rain severity were reported by 40.54 per cent, 25.67 per cent and 37.89 per cent respectively by the growers. It is worth noting that due to use of indigenous cutting methods practiced majority of the growers, the yield level of different growers does not differ significantly.

Table No. 5.1: Constraints in the Production of Betel vine.

SN	Constraints	Growers Response *(In percentage)*	Rank of Constraints
A.	**Agro-Biological**		
1.	Disease Severity	57 (77.02)	I
2.	Pests Severity	36 (48.65)	II
3.	Rains Severity	28 (37.84)	V
4.	Winds Severity	30 (40.54)	IV
5.	Non-availability of Good Planting Materials	19 (25.67)	VI
6.	High Perishability	31 (41.89)	III
B.	**Costs of Inputs and Related Aspects**		
1.	Lack of Capital	52 (70.27)	II
2.	High Cost of Labour	41 (55.41)	V
3.	High Cost of Bareja Construction	43 (58.11)	IV
4.	High Irrigation Cost	47 (63.51)	III
5.	High Fertilizer Cost	32 (43.24)	VII
6.	High Insecticide Cost	23 (31.08)	VIII
7.	Inadequate Marketing Facilities	53 (71.62)	I
8.	Fluctuations in of Price	36 (48.65)	VI

The table again shows that among the economic constraints, the inadequate marketing facilities to growers was recorded as most important constraint in the sampled areas, specially in Bhagalpur district where there was no organised market within 25 km from the sampled farms. 71.62 percent of the growers in sampled areas reported that involvement of middlemen causes low sales proceeds of betel vine growers due to price spread and increase in market margin. After this, the second most important constraint faced by the sampled growers, was the lack of capital as reported by 70.27 per cent of the sampled growers in the area. Crop required heavy capital investment. During the course of investigation, **it was reported that in both the sampled areas not a single sample grower obtained crop loan from the institutional agencies for cultivation of this crop.** Majority of the sampled growers reported that they take loan for cultivating this crop from non-institutional

agencies, like traders, middlemen, neighbour, friends and others who exploit them by charging high interests or offering low prices of their products after harvest. Middlemen/traders, who purveys loan to the growers against the advance sale of their products, usually offer a price much below the prevalent market price. Such practice is detrimental to their economic interest. The betel vine is an irrigation based crop. Irrigation in newly planted crop is required daily two to three times for 3 to 4 months, in particular, but in general during summer season irrigation is done at weekly interval. Thus, more than 63.00 per cent of the growers reported that the cost of irrigation is very high. It is an important constraint in the areas. Another economic constraint was the high cost of bareja construction. The betel vine crop entirely depended on construction of bareja. The labour cost in the sampled areas was found to be much high and 55.41 percent of the sampled growers reported this constraint. Fluctuations in prices, high fertilizer cost, and high insecticide cost, etc., were other prominent constraints observed during the study.

Constraints in the Marketing of Betel vine

It is well known that betel leaf is a highly perishable commodity and does not last long. As such, it has very low endurance against adverse weather. At the same time, even a little damage caused to leaves of betel vine makes it defective leading to reduction in its demand. Consequently its price declines sharply. Hence, it causes marketing problem at alarming scale. The marketing constraints faced in the sampled areas have been shown below:

Table No. 5.2: Constraints Faced by Betel vine Growers during Marketing.

SN	Constraints	Growers Response	Rank of Constraints
1.	Lack of Varietal improvement	61 (82.43)	VII
2.	Lack of Procurement Centre at Village Level	67 (90.54)	IV
3.	Lack of Storage Facilities in the Market of betel vine	33 (44.59)	X
4.	Lack of Institutional Finance	62 (83.78)	VI
5.	Lack of Technical Know-how	58 (78.38)	IX
6.	Far Away Market	59 (79.73)	VIII
7.	Lack of Market Information	70 (94.59)	III
8.	Lack of Pharmaceutical Industry	63 (85.13)	V
9.	Lack of SHGs for Betel Vine Production	72 (97.29)	II
10.	Lack of Unity amongst the Growers	74 (100.00)	I

Note: Figure in brackets indicates in percentage.

The table 5.2 reveals that in the sampled areas, the most serious constraints are the fluctuations in prices of betel vine as reported by cent per cent sampled growers.

The table further indicates that the second most important marketing stage constraints as reported by the sampled growers was lack of organized marketing (97.29 %), lack of procurement centre at village level (90.54 %), lack of transport infrastructure reported by (85.13 %), lack of financial assistance reported by (83.78 %), bumper harvest reduces the market price reported by (82.43 %) distantly located market reported by (79.73 %) lack of proper packaging facilities (78.38 %) and lack of storage facilities in the market (44.59 %).

Interface

Some vital constraints regarding production and marketing of betel vine came to our knowledge as reported by Mr. Jai Hind Mandal of Pirpainti (who is a betel vine grower and commission agent too), Arbind Mandal, Siyaram Mandal, Bimal Mandal, Secretary, Pan Bazar Samiti, Vaishali and others. Their opinions have been enlisted below:

i. In getting Kisan Credit Card (KCC) issued to a grower had to make an expenditure of about Rs. 1200/- which included the expenditure incurred in obtaining no dues certificates from four banks (Rs. 150 x 4 = Rs. 600/-). Rupees 300/- are required for bond paper. Village revenue worker has to be paid Rs. 100/- for getting the receipt out in the name of beneficiaries other expenses in visiting the offices/bank, to VRW, etc. Cost Rs. 200/- in this way, a total of Rs 1200/- was the expenditure for obtaining (KCC). On the other hand, at the time of repayment of loan, Rs. 800/- in addition to the actual amount of interest had to be paid in the name of computer processing, maintenance of registers, etc.

   Before the year 2005, the facility of KCC was not provided to the betel vine grower in the study area of Bhagalpur. However, due to natural calamities in the year 2003, the betel vine crop was destroyed (fully burnt) on a large scale and it necessitated for providing KCC for the betel vine growers.

ii. A good number of growers reported that the expected returns could not be derived from the cultivation of betel vine due to the reasons of natural

calamities among others. So, the areas under the crop were found to have shifted to other more remunerative cash crop like sugarcane, oilseeds, etc.

One of the reasons behind low remunerative price received by the growers and the retailers could be the presence of other competitive products like: Gutkha, Tobacco, Pan Parag, etc., malpractices by middlemen, lack of developed storage and transportation facilities, poor advertisement highlighting the health benefits and medicinal values of betel vine crops, etc.

iii. Earlier, it had been the primary occupation for the traditional betel vine growers, who whole-heartedly undertook the cultivation of this crop, but nowadays it has become secondary occupation. So, they did not fully concentrate upon the cultivation of this crop as reported by a good number of growers in the study area.

iv. It is to be noted that despite being highly risk prone crop, there is no provision of insurance facility for the crop.

v. There is visibly no change (increase) in the selling prices of betel leaves since one decade whereas the cost of inputs involved in its cultivation and marketing has been gradually rising over the years. But as there is no alternative, so traditional betel vine growers have been continuing in the cultivation of this crop.

The overall analysis concludes that marketing is the most vital constraint for the growers in the study area. Due to lack of organized market, middlemen generally fix the prices and this causes adverse and uneconomic prices from the point of view of growers. During field study, it was observed that presence of intelligence was absent everywhere. The growers have to depend on the information given by the traders in the sample areas. In respect of packaging and packing, traditional materials and methods are followed resulting in damage in betel vine leaves in course of transportation. It was also observed that during peak seasons of harvesting in general and also in case of good harvesting free from vagaries of nature and diseases, when the supply of betel vine exceeds its demand, downward fluctuation in its price seizes the benefits of better crop to be accrued to growers. Absence of

modern preservation techniques is responsible for such situations, which discourages the growers from adopting improved farm techniques to raise their production. The commission agents, living away from the production farms play an important role and control the market to the disadvantage of the producers. It was also recorded that the price variation between assembling and consuming in the market is very high and the prices tend to increase with the distance.

Thus, on the basis of above discussion, it is advisable that if proper grading of leaves, improvement in packing method, establishment of cold storage linkages between growers and buyers and farmer's co-operatives are ensured, these will provide better remunerative prices to the growers resulting in incentive for adopting improved method of plant cultivation.

Development Possibilities of Betel vine Cultivation

On the basis of field investigation in the sampled areas of Bhagalpur and Vaishali districts of Bihar state, it was observed that there are development possibilities of betel vine cultivation. Some of the important efforts required in this direction are presented hereunder:

1 In both the sampled areas, there is an urgent need for varietal improvement in betel vine. It was also felt that there is need for supplying package of improved practices to the betel growers like use of fertilizer, pesticides, irrigation, etc.

2 In the sampled area generally bareja construction constitutes a major portion of cost during the production. Therefore, in the study area it needs to develop low cost techniques of bareja construction. As per availability of locally available raw materials change in traditional techniques is to be effected to the benefit of growers by reducing the cost of bareja construction.

3 The growers should be trained keeping in view the optimum use of the available resources and way for reducing the cost on inputs.

4 Study finds that in the sampled areas mostly marketing was done through private machinery. This situation necessitates the need of government interference and encouragement of people participation for formation of co-operative marketing societies.

5 During the course of field study it was assessed that practically no grower had taken loan from the institutional sources. Therefore, the betel growers should be provided institutional finance both for production and marketing. SHGs along with micro credit system at the village level may do a lot in the field of betel vine cultivation.

6 It was also observed that there were no linkages between the research institutes and growers. This affects the transfer of technology. Therefore, for smooth transfer of production technology from the institutions to the farm level is needed.

7 Better quality of betel vine crop needs to be developed.

8 In view of medicinal value of betel vine, agro based appropriate pharmaceutical industries are to be opened near the study area.

9 Organization and popularization of Self Help Groups (SHGs) along with micro credit system will go a long way in solving the numerous problems of the growers effectively and thus creating better growth opportunities for the betel vine cultivation in the sampled areas and the state of Bihar.

CHAPTER – VI

SUMMARY AND CONCLUSIONS

1. Introduction

The betel vine *(Piper betle L.)* is a perennial climber, cultivated for its leaf. It is an important commercial crop of India, Bangladesh, Srilanka, Malaysia, Singapore, Thailand and Philippines, etc. In India, betel vine (Pan) is extensively cultivated in about 20 states. Karnataka, Orissa, Tamil Nadu, West Bengal and Bihar are the most important pan growing states in the country. The annual turnover of betel vine is estimated at Rs. 10,000 million. It is grown over an area of 50,000 hectare providing livelihoods to several lakhs of families engaged in its cultivation and trade. Besides, betel leaf is one of the grandmother's remedies, prescribed as traditional medicine, by experienced elders of the family. This is also a foreign exchange earner crop and the country earns every year about Rs. 700 crores ($ 250 million USA) through export of this leaf.

In the state of Bihar it has been cultivated on an area of around 4,000 hectare. It is the least land intensive crop and cultivated in **bareja.** About 15 decimal of betel vine cultivated land considered as an economically viable and it can provide livelihood for a family of five members over 15 years. In the state, two major varieties of betel vine are grown, namely: 'Deshi' and 'Magahi.' Deshi variety was generally grown in Vaishali, Saran, Motihari, Muzaffarpur, Sheikhpura, Khagaria, Munger, Bhagalpur, Katihar, Kishanganj, Araria, Banka, Sitamarhi and Madhubani. The other variety Magahi is grown in Nalanda, Nawada, Gaya and Aurangabad. Besides, these two varieties and other varieties like: Hara patta, Pila patta, Mitha patta were also grown in the state, but the scales of cultivation were quite low. Betel vine is considered as highly labour intensive providing employment throughout the year both in the production and marketing. The estimated annual net income in the state is above 50,000 rupees per hectare. In the state, the annual turn over from this crop was estimated to be about Rs. 100 crores, and more than15 lakh people were engaged in farming and as labourer and traders.

It is worth mentioning that the cultivation of betel vine is a highly labour intensive crop but at the same time, it requires substantial capital investment. Therefore to judge the worthiness of the project, the cost and returns from investment needs to be analysed with great caution as any wrong decision can affect the economy of farmers. The present study is an attempt in this direction. The study has been undertaken under the guidelines of the evaluating Centre AER Centre, Jabalpur (Madhya Pradesh) and the Ministry of Agriculture, Government of India too.

2. Objectives

The broad objectives of the study are:

i. *To assess the input-output relation of betel vine.*

ii. *To study the pattern of employment in betel vine cultivation.*

iii. *To study the marketing of betel vine with particular reference to marketing channels and price spread, and;*

iv. *To identify constraints in betel vine production and explore its developmental possibilities.*

3. Methodology

For the purpose of the study, two districts, namely: Bhagalpur and Vaishali in the state of Bihar were selected purposively because these occupy larger area under betel vine cultivation amongst major growing districts of the state. On the same criteria two blocks having highest area under betel vine cultivation from each sampled district were selected purposively. The blocks, namely; Kahalgaon and Pirpainti from Bhagalpur and Hajipur and Bidupur from Vaishali district were selected. One village from each block having substantial area under betel vine cultivation was selected randomly. The selected villages are Bhawanipur (Kahalgaon), Tarwa (Pirpainti), Choti Yusufpur (Hazipur) and Daudnagar (Bidupur). A complete list of betel vine growers in the selected villages was obtained. On the probability proportion method, 15 per cent of the growers in the sampled village were selected for in depth study. Thus, a total number of 74 growers form the sample villages formed the sample size. Number of sampled growers village wise were 19 in Bhawanipur, 20 in Tarawa, 17 in Choti Yusufpur and 18 in Daudnagar.

In order to examine the price spread of betel vine marketing in both the districts a sample of 5 local traders, 5 retailers and 2 wholesalers from each sampled district were selected for investigation. The reference year of the data collection was July 2003 to June 2004. The survey method was adopted in the collection of field data. The tabular analysis was done through averages and percentages. Farm size wise study could not be conducted since the area under this crop was very less ranging 0.05 to 0.30 hectare as reported by all the betel vine growers under both the study areas.

4. Main Findings

i. Status of Betel vine Crop in Bihar

In the state of Bihar, betel vine is grown creating an artificial favourable condition by making special pan orchard known as BAREH; somewhere it is also called as **BAREJA.** An area of 4000 hectares was reported to be under this crop. The major betel vine growing district of Bihar is Bhagalpur, Purnea, Samstipur, Vaishali, East Champaran, Darbhanga and Madhubani. Out of the total acreage under betel vine cultivation in the state the above mentioned districts constituted about 60.00 per cent of the total area. Betel vine cultivation provides livelihoods to about 15 lakh people, who were engaged in cultivation as (farmer and labourer) and trade (traders) in the state. The trade of this crop has been estimated at Rs. 100 crore annually.

In the state, two varieties of betel vine were extensively grown. The commonly grown varieties were 'Deshi leaf' and 'Magahi leaf.' The Deshi variety has been extensively grown in North East Bihar, while in the Central Bihar Magahi variety were prominently grown. The other variety, found to have been grown were Pila patta, Mitha Patta, Hara patta, etc. It was observed that in the state of Bihar, the size of betel leaves is too small, so the retailers preferred to import betel leaves from the neighbouring states, of West Bengal and Orissa as in these states the size of betel leaves are much larger than that of the state of Bihar. The leaf size of betel vine in the state was the main factor that restricts its demand not only in the state but also in neighbouring state,

like: Uttar Pradesh, Assam, Jharkhand and Orissa. It is worth mentioning that demand for Bengal pan was very high in the above noted states including Bihar. However, it could have commanded some demand due to its good taste, flavours and eye-catching shape and colour.

ii. Demographic Features of the Sampled Areas

a. Bhagalpur District

In the sampled village of Bhawanipur, the total population was 1870. Out of the total population, the percentages of male and female population were 50.91 and 49.09 respectively. The literacy percentage was 33.85 only. The SC population percentage was 17.22 and ST was 0.97 per cent. In Tarawa, sampled village as per the latest census, total population was 2510. Percentages of male and female in the total population were 52.07 and 47.93 respectively. Out of the total population, around 30.28 percent was literate. Out of the total population, 3.49 per cent was SC and 4.11 per cent was ST population.

b. Vaishali District

In the sampled village of Choti Yusufpur, the total population was 3530. Out of it 51.87 per cent was male and 48.13 per cent was female. The literacy percentage of village was 40.49. Around 17.62 per cent were SC and no ST population was found in the village. 3064 persons inhabited Daudnagar village. Out of the total population, percentages of male and female were 52.65 and 47.35 respectively. The literacy percentage was 43.61. The SC population was found to the extent of 18.81 per cent. This village too had no ST population. In both the sampled villages, percentage of literacy was below the national average.

iii. Land Classification

a. Bhagalpur District

In sampled villages of Bhawanipur and Tarawa of the district, the total reported geographical areas were 503.00 hectare and 418.00 hectare respectively. Out of the total area, net sown area was 393.25 hectare (78.18%) and 321.15 hectare (76.83%) respectively. Out of the total net sown area, about 248.73 ha (63.25%) and 220.83 ha (68.76%) of land were irrigated. The gross cropped areas of both the villages were 658.66 ha and 582.57 ha showing crop intensities at 1.67 and 1.81 respectively. The per capita cultivated land was 0.21 ha in Bhawanipur and 0.13 ha in Tarawa village.

b. Vaishali District

In both sampled villages, namely: Choti Yusufpur and Daudnagar, the total geographical area was 538.00 ha and 329.00 ha respectively. Out of the total geographical area, net sown areas were 419.81 ha (78.03%) and 255.87 ha (77.77%) respectively. In the total net sown area, net irrigated area was 340.05 ha (81.00%) and 190.22 ha (74.34%) respectively. The gross cropped areas of the villages were 803.14 ha and 499.10 ha in Choti Yusufpur and Daudnagar villages respectively. The per capita cultivated land in the selected villages was 0.12 ha and 0.09 ha respectively.

iv. Cropping Pattern

In all the sampled villages cereals occupied main place in the cropping pattern. The next important crop in the village was betel vine. Vegetables also occupied a good percentage in the crop planning in all sampled villages farms. Pulses, oilseeds, cash crops and fruits are also grown at a significant scale in the sampled areas.

v. Economics of Betel vine Production

Analysis reveals that cost of cultivation per hectare on an average was estimated at Rs. 96664.14. It was highest in village – IV of Vaishali district (Rs. 98281.57) and lowest in village – I of Bhagalpur district (Rs. 96095.65). Amongst the various cost heads, expenditure on construction of Bareja was found highest (21.96%) followed by inter culturing (15.96%), harvesting (15.22%), irrigation (7.98%), fertilizer (5.33%), land preparation (4.59%), pesticide (3.04%), marketing and maintenance (5.50%) and repair (2.11%). The total variable cost at overall level was estimated at Rs. 78,986.68 (81.69% of the total cost). The variable cost varied between the villages. It was found highest in village – IV (Rs. 80197.73) and lowest in the village – III Rs. 78506.98. The total fixed cost at overall level was estimated at Rs. 17678.46, which was 18.31 per cent of the total cost. Thus, this crop is a highly capital intensive crop. The overall analysis of costs incurred in the cultivation of betel vine could establish a relationship between cost and family size i.e., cost of cultivation increased with decrease of family size.

Analysis reveals that on an average, 833 labour days per hectare were created in the cultivation of betel vine. The share of family labour (at overall level), in the cultivation of betel vine, was observed to be higher 511 (61.35%) as compared to hired labour 322 (38.65%). On the whole, the cultivation of betel vine has been generating larger employment and this suggests high potential of farm employment in the case of these crops in the state. It was also observed that at overall level, out of the total of human labour engaged about 86.19 per cent were male and 13.81 per cent female. *The low participation of the women labour in this venture has been attributed to the religious and social belief that the access of the women in the bareja breaks the purity of the same. Women are also not considered religiously pure in the social system of 'barai samaj.' This concept has been strongly prevailing in Bhagalpur district whereas the restriction for women to enter the bareja in Vaishali district was not so strong.*

The operation wise analysis for human labour indicates that about 59.54 per cent were employed in harvesting, packaging and maintenance.

The analysis of per ha cost of production of betel vine reveals that on an average, the cost of production per 10,000 leaves (50 dholi) was estimated at Rs. 391.30, which varied across the sampled villages from Rs. 356.80 to Rs. 428.88 between village – IV and Village – I.

The calculated data of gross income and net returns indicate that at overall level, gross income per hectare was estimated at Rs. 1,51,945.55 and net income to be Rs. 55,281.41.

The estimated per ha 'farm business income' and 'farm investment income' reveal that, at overall level, these were Rs. 90,552.76 and Rs. 92,518.66 respectively. The overall analysis indicates that the villages under Bhagalpur district were found at comparatively lower level than that of sampled villages of Vaishali district.

On an average, estimated working expenses per hectare and percentage return on working capital were calculated at Rs. 78986.72 and 68.76 per cent respectively. Higher return on working capital might be due to higher net income in the selected farms of villages.

Per hectare return per Labour Day in sampled villages at overall level was calculated at Rs. 66.36. The highest and lowest returns per labour were observed in village – IV at Rs. 85.24 and in village – I Rs. 49.08 respectively.

The low return was due to no proper use of available resources in the sampled villages.

At overall level, capital output ratio was estimated at 1:1.58, and this established a relationship that sample villages with higher per unit of capital investment incurred higher corresponding incomes.

Thus, above analysis established the fact that due to lack of knowledge, betel vine growers were not able to make optimal use of labour resources in their farms.

As per the information collected from the sample growers it was identified that growers were using three important channels through which they used to dispose off their produce. These channels are:

1. *Grower/Producer → Local Trader → Wholesaler → Retailer → Consumer*
2. *Grower/Producer → Wholesaler → Retailer → Consumer*
3. *Grower/Producer → Retailer → Consumer*

The analysis indicated that at overall level about 76.63 per cent of produce was marketed through channel – I followed by 13.00 per cent by channel – III and 10.37 per cent by channel – II. The price received by the growers was highest in channel – II (59.08 %) followed by channel – III (52.26 %) and channel – I (55.09 %). The analysis finds that the retailers margin of profit was the highest at 30.76 per cent in case of channel – III followed by channel – II and channel – I, 12.51 per cent each, which specify the margin of profit per channel was the lowest in channel - II.

The analysis observed that the price per 10,000 leaves (50 dholi) of betel vine received by the producer was Rs. 670.99 in channel – I followed by Rs. 719.59 in channel – II and Rs. 640.18 in channel – III, whereas in all the channels retailers selling price and consumer purchase price was Rs. 1218.00 per 50 dholi of betel leaves.

In betel vine important components of marketing cost were labour used in picking, assembling, grading, packaging, materials, transportation and market charges and taxes, etc. Out of the total marketing cost involved in betel vine crop, i.e., Rs. 229.69 in channel – I and channel – II, and Rs. 180.17 in channel – III, grading and packaging accounted for more than 40 per cent, labour cost more than 5 per cent, transportation cost cornered more than 8 per cent, spoilage cost more than 27 per cent. These marketing costs were meant for 10,000 betel leaves at overall level.

The estimated marketing margins per 10,000 betel leaves were found higher in case of channel – III (Rs. 374.66) followed by channel – I (Rs. 273.33) and in channel – II (244.72). The retailers margin of total marketing margin was found cent per cent in channel – II and 55.75 per cent in channel – I.

Observation during the course of survey related to marketing aspect revealed that systematic marketing of betel vine did not prevail in the area. So the growers had to exercise much for the sale of their produce. It will be rather appropriate to say that they are being dictated by the terms and conditions of commission agents. Thus, they are forced to face exploitation in the form of non-remunerative prices. Besides, its competitive products like Gutkha, Pan parag, etc, adversely affect the marketing of this crop. Yet another serious matter of concern is that no effective institutional efforts have been undertaken for the promotion of the crop.

The study also identifies the growth possibilities of betel vine cultivation. The major efforts required in this regard are improvement in varietal cutting, development of low cost technique in bareja construction; optimum use of available resources; government intervention in marketing, timely and early availability of institutional finance at suitable terms and conditions, linkages between research institutes and growers, creation of preservation facility for betel leaves and provision of transportation as well as bringing about improvement in processing technique of betel vines. The high incidence of diseases needed sincere efforts on the part of Horticultural Scientists and State Horticulture Department for taking measures to control diseases. Sincere efforts are also required to train the betel vine growers about the latest know-how in the field of the production technology, etc. for value addition.

The study also identified the major constraints faced by the growers in the production of betel vine. The constraints were categorized in two sections: (1) Agro-Biological, i.e., disease, pests, rains, winds, good planting material and perishability; and (2) Economic constraints, i.e., lack of capital, high costs of labour, bareja, irrigation, fertilizer, insecticides, lack of developed marketing facilities and price fluctuations were taken in to account. In case of Agro-Biological constraints, about 77.02 per cent growers reported that disease severity was the main constraint. In economic constraints, inadequate marketing facility ranked first catching 71.62 per cent of the

growers' concern. Besides, almost all the selected growers reported the problems of poor conditions of roads. Most of the kucha roads remained hardly motorable during pick harvesting season and it leads to reduction in quality of betel leaves.

Suggestions and Policy Implications

On the basis of the findings of the study following suggestions emerged for necessary actions:

1. The study finds that in both the sample areas there is need for supplying package of practices to the growers of betel vine on the one hand and demonstration to be conducted on it, on the other hand. ***(Attn: The Department of Horticulture, Government of Bihar)***
2. In the sample areas, the construction cost of bareja constituted a major portion of the total expenditure on production. There is need to develop low cost technique for its construction. ***(Attn: State Agricultural University, Government of Bihar).***
3. From the survey, it was observed that the entire marketing system is under the control of private persons (commission agents) having full absence of government machinery (organized marketing). Thus, the Government facilities in this regard may be provided for removing malpractices in the marketing system run by the private traders. ***(Attn: Agricultural Produce Marketing Board, Government of Bihar).***
4. Formation of Betel vine Growers' Co-operative Societies will go a long way in solving their problems on all fronts. ***(Attn: The Registrar, Co-operative Societies, Government of Bihar)***
5. It was observed that the production of betel vine requires high capital expenditure. Majority of the growers are economically very poor. Thus, special facilities are to be provided by public sector banks and other institutions in the field for easy flow of loan for the purpose. ***(Attn: NABARD, Regional Office, Patna, Bihar)***
6. It was observed that there were no linkages between the growers and researchers for transfer of betel vine production technology, which affect the production of betel vine in respect of return. Attempt is to be taken to

establish this linkage at the earliest. ***(Attn: Department of Horticulture, Government of Bihar).***

7. No help is better than self-help. Hence, organization and strengthening of Self Help Groups (SHGs) will be highly effective to solve their problems. ***(Attn: The Co-operative Department, Government of Bihar)***

8. It was observed that in both the sampled districts, there were no efforts having taken by any agency regarding latest technical know-how. It is suggested that suitable measures in this regard should urgently be taken. ***(Attn: Agricultural Department, Government of Bihar).***

9. Awareness among users and consumers has to be created on large scale regarding health benefits and medicinal value of betel vine crop. ***(Attn: Directorate of Extension, Government of Bihar).***

10. High qualitative characteristics of specific varieties of betel vine grown in Bihar, has to be propagated in neighbouring states, so that its demand can be enhanced many fold on national level. ***(Attn: National Botanical Research Institute, Lucknow).***

11. Efforts need to be made in searching the industrial use of betel vine leaves in drug industries. ***(Attn: National Botanical Research Institute, Lucknow).***

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Annexure – I

Comments on the Draft Report

No. AERC/Comment/2006-07/327 Dated: 06/12/2006

To

Dr. R P Singh,
Hon. Director,
Agro-Economic Research Centre for Bihar & Jharkand,
T M Bhagalpur University,
Bhagalpur – 812 007,

Sub: Request for sending comment on study entitled **"ECONOMICS OF PRODUCTION AND MARKETING OF BETEL VINE IN BIHAR"** --- regarding.

Ref: Your letter No. AERC/118/2006-07 dated 24/11/2006.

Sir,

Please find enclosed herewith the copy of the report. The comments and correction needed are marked with the pencil in the report itself.

With warm regards and Happy New Year.

(P K Mishra)
Prof. & Head
Director In-charge
AER Centre For M P & C G
JNK Krishi Vishwa Vidyalaya
Jabalpur – 482 004
(M P)

Annexure - II

Action Taken Report

Action Taken Report on the Comments of Draft Report:

All the comments were taken into consideration while finalizing the report. These comments have been incorporated, wherever necessary in the relevant chapters.

(B K Jha)
(Hon. Director)
AER Centre for B & J
T M Bhagalpur University
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(BIHAR)

(Amalendu Kumar)
Project Leader)