



## Economics of Production and Marketing of Organic Large Cardamom in Panchthar District of Nepal

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### Abstract

Large cardamom is the most important export leading high value potential cash crop in Nepal. To assess the production and marketing aspects of organic large cardamom, a research was conducted in Ekteen and Sidin Village Development Committees of Panchthar district in 2017. Total 65 households were interviewed with pretested questionnaire. In addition, 15 processors were selected to find out processing techniques, cost and opportunities. Further, 10 traders and 3 exporters were selected purposively to study the marketing system, channel and export performance of large cardamom. Data entry and analysis were done by using Microsoft Excel, SPSS and Stata version 12.1. Socioeconomic and farm characteristics were described by using descriptive statistics. The primary occupation of majority of respondents (95.38%) were agriculture and 50.77% of respondents cultivated cardamom farming since the year range of 10 to 20. Benefit/cost ratio, gross margin per ha and gross margin per kg were found to be 3.66, Rs.244586 (\$ 2188.49) and Rs.1050 (\$ 9.40) respectively. The production and productivity of large cardamom were 0.12 MT and 0.23 MT/ha respectively. The 45.44% producer's share in domestic marketing channel indicated that middleman gained the larger share and thus lower the marketing efficiency. Total investment ( $p=0.318$ ), nutrient cost ( $p=0.253$ ), labor cost ( $p=0.000$ ) were contributing factors to the gross income from organic large cardamom production which were evaluated from Cobb-Douglas regression model. The market price of cardamom is fluctuating throughout the year. Majority of exporters (50%) believed that the Indian market was most responsible factor for price determination followed by the quality of cardamom (40%). Almost all processors used traditional smoking dryer to cure cardamom but they expressed the necessity of modern smokeless dryer. Traders and exporters performed post-harvest handling before the cardamom fetch market price. Production and market related problems were ranked with the use of index. To analyze the efficiency of organic large cardamom farming, SWOT analysis was carried out. The study pointed out that the cardamom farming could be a highly profitable and export-oriented enterprise in Panchthar district of Nepal.

**Keywords:** Large Cardamom; Economics; Problems; SWOT Analysis

### Introduction

Contributing to about 31.7% of national Gross Domestic Product [1], the agriculture sector of Nepal is the backbone of national economy. It has played the most important role for the livelihood of Nepalese people. Spice crops constitute an important fraction of the agricultural industry of Nepal, as represented by crops like cardamom and ginger, which have taken Nepal to global ranks in terms of production and export. Despite the deterioration of both the economy and environment of mountain areas in Nepal, the growing of cash crops is seen as one way to help farmers to improve their current situation. There are 109 spices growing worldwide, 70 spices in Asia and more than 20 in Nepal. Among them, cardamom is the lucrative, promising and viable agribusiness cash

crops of mid hills of Nepal. It is one of the important export leading agricultural commodities because of comparative advantage and competitive socio-economic aspect. Although it is introduced during 1865 from India, its commercial cultivation only started from 1953 in Ilam district of Nepal [2]. There after cardamom Development Centre was established in Pandam, Ilam district during 1975 for the extension of large cardamom growing areas. As per the NTIS [3] large cardamom is prioritized as high value low volume and export potential crop.

Large cardamom grows in the vicinity of mountain streams in swampy, cool and humid areas of altitudinal range from 700 to 2100 masl [4]. It utilizes marginal lands and is grown on the shade

of the forest trees, of which nitrogen-fixing trees are the most suitable shade trees. Large cardamom (*Amomum subulatum* Roxb.), a unique substitute for the true cardamom, is said to be one of the oldest spices indigenous to the Eastern Himalayan region, probably in Nepal and hence also known as Nepal Cardamom [5]. The area, production and productivity of large cardamom in Nepal in 2015/16 year were 12,120 ha, 6,439 MT and 0.53 MT/ha respectively [6]. The quantity and value of exported large cardamom from Nepal during 2016/17 were 3,429 MT and Rs.3.875 billion [7]. All the produced large cardamom was exported to India and third countries but the quantity of export was in fluctuation order. However, the value of cardamom is in increasing trend. Nepal cardamom has occupied the top position in the export of agricultural trade. Nepal leads in the production of large cardamom (68%), followed by India (22%) and Bhutan (9%). More than 84% of total national production comes from four districts (Taplejung, Panchthar, Ilam and Shankhuwasabha) of eastern Nepal.

Large cardamom also known as the “Queen of spices” is the most prominent cash crop attracting high revenues across the globe. Its cultivation contributes significantly in poverty alleviation of the people living in mid-hills areas by providing high economic returns to their investments as farmers do not apply much external input in cardamom plantation. Cardamom oil is widely used as a food preparation ingredient as well as in perfumes, health foods, medicines and beverages. There is no question of yield difference between small and big plantations. Besides this, cardamom is environmentally friendly and protects the environment by maintaining green cover and reducing soil erosion.

### Research Methodology

Sidin and Ekteen VDCs of Panchthar district are selected as cardamom areas under PMAMP project of Nepal Government. The preliminary study was carried out to gather information regarding socioeconomic, demographic and topographical settings of the sites to prepare the questionnaire. Respondents include three categories namely farmers, processors and traders. The sample size of 65 farmers among which 35 households from Ekteen VDC and remaining 30 from Sidin VDC were selected randomly for this study. In total, 15 processors were selected randomly; 5 district traders and 3 large traders were selected purposively.

Primary methods were used to collect data, shared experiences and find out the real problems mostly faced by the cardamom farmers which were collected through questionnaire, key informant interview and focus group discussion. The target groups were asked a series of open and close-ended questions. All three such as structured, semi structured and unstructured questions were included in the interview schedule. Once prepared interview schedule was

pretested to the 10 farmers in Panchthar district to determine its effectiveness in gathering reliable and valid information, then final amelioration in the interview schedule was done to make it final to collect the information. Several observations were made on marketing system and different farm activities. In addition, visits were also performed in market areas and farmer areas to observe related different activities. Secondary data were obtained from DADO annual reports, bulletins, Department of Agriculture, MoAD, CBS, NSCDP and IFOAM etc. The survey was carried out up to 15 days in each VDC. Data entry and analysis were done by using Microsoft Excel, SPSS and Stata version 12.1. Both descriptive and analytical methods were used to analyze data. Results were also represented by appropriate graphical means like bar diagrams, pie charts and tables.

### Benefit cost analysis

Total cost of production and gross return from cardamom were used to analyze the benefit cost ratio. Therefore, the B/C ratio was calculated using the following formula:

$$B/C \text{ ratio} = \text{Gross return} / \text{Total cost}$$

Where, Gross return was calculated from the income of sold product.

The total cost of production was calculated by summing the variable cost and fixed cost items incurred in the production process.

### Gross margin analysis

Gross margin is also termed as gross profit or “returns over variable costs”. For the analysis of gross margin, only the variable costs were considered. The variable cost must be specific to the single enterprise and vary approximately in proportion to the size of the enterprise. Gross margin is the difference between total value product of the enterprise and variable cost attributed to it which is shown hereunder:

$$\text{Gross margin} = \text{Gross return} - \text{Total variable cost}$$

Where,

$$\text{Gross return (Rs.)} = \text{Price of cardamom (Rs. per kg)} \times \text{Total quantity produced (kg)}$$

$$\text{Total variable cost (Rs.)} = \text{Summation of cost incurred in all the variable items (Rs.)}$$

### Producer's share

Producer's share is the price received by the farmer (farm gate price) expressed as a percentage of the retail price, that is, the price paid by the consumers. An increase in the producer's share

is the indicator of increase in the efficiency of marketing system in the favor of producer and vice-verse. A decrease in producer’s share indicates that the middlemen are gaining the larger share. It was calculated by using following formula:

$$Ps = (Pf) / (Pr)$$

Where, Ps = Producer’s share (%)

Pf = Producer’s price (Rs.)

Pr = Retailer’s price (Rs.)

### Analysis of factor share to total income of large cardamom

Cobb-Douglas production function model was used to estimate the income from large cardamom production. The choice of the functional form was based on its theoretical fitness to agriculture and its computational manageability. Further most production studies in agricultural sector have used this function. The model specified and used was represented by:

$$Y = AL^b_1 I^b_2 P^b_3$$

Where, Y was dependent variable and L, I and P were explanatory variables. ‘A’ was constant and  $b_1$ ,  $b_2$  and  $b_3$  were production coefficients for L, I and P factors of production respectively. The production function was converted into logarithmic form; so that, it could be solved by least square method. i.e.:

$$\text{Log } Y = \text{Log } A + b_1 \text{Log } L + b_2 \text{Log } I + b_3 \text{Log } P + E$$

Where,

Y = Gross Return (Rs.)

L = Initial Investment (Rs.)

I = Nutrient Cost (Rs.)

P = Variable Labor Cost (Rs.)

E = Error Term

Cross sectional data in production function analysis sometimes may lead to the problems of multi-collinearity- the linear relationship between the variables. A thumb rule was applied to visualize the magnitude of multi-collinearity. The correlation coefficient between a pair of explanatory variables was considered serious if it was greater than 0.8 [8].

### Indexing

Production and market related problems were ranked with the use of index. Scaling techniques, which provides the direction and extremity attitude of the respondent towards any preposition was

used to construct index. The intensity of production and marketing problems being faced by the cardamom producers and traders, respectively were identified by using five-point scaling technique comparing most serious, serious, moderate and least serious at all using scores of 1.00, 0.75, 0.50 and 0.25 respectively. The formula given below was used to find the index for the intensity of production and marketing problems faced by producers and traders respectively.

$$I \text{ prob} = \Sigma(Sifi/N)$$

Where,

I prob = Index value for an intensity of problem

$\Sigma$  = Index value for an intensity of problem

Si = Scale value of ith intensity

fi = Frequency of ith response

N = Total number of respondents

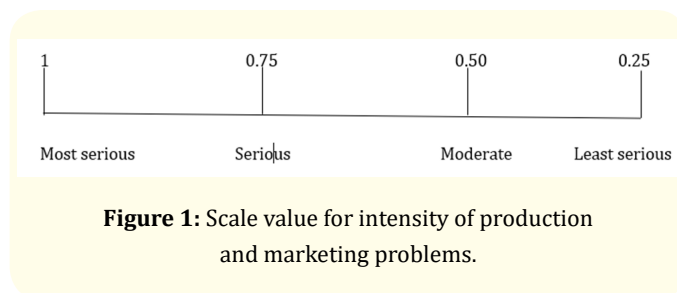


Figure 1: Scale value for intensity of production and marketing problems.

### SWOT analysis

SWOT analysis is the powerful tool in economic analysis of agricultural products. The strengths, weaknesses, opportunities and threats related to large cardamom commodity in the study area were analyzed from the focus group discussion, interview and key informants survey. All the information obtained was thus studied in SWOT analysis.

### Results and Discussion

Panchthar district is a beautiful hill district bordered by West Bengal and Sikkim in the east, Dhankuta and Tehrathum in the west, Taplejung in the north and Ilam in the south. It has 30 VDCs and one municipality. The district covers 479 sq. meters. Panchthar is divided into five climatic zones with elevation range and percent of area covered. It is also popularly known as the Pallo Kirat. In past, this place was ruled by Limbu and till today majority of population of this district are from Rai and Limbu community. Panchthar district accommodates Rai, Tamang, Magar, Bhote Sherpa, Newar, Bhramin, Chhetri etc. The place offers majestic views of snow white

as well as lush green mountains and is rich in terms of culture and natural resources. A beautiful district in the eastern part of Nepal, Panchthar, would have been a popular tourist destination.

**Socio-demographic and economic information**

**Gender distribution of population and sex of the respondents**

Out of total 65 samples, 10 household heads were female and remaining 55 households were male headed. It indicated that males are dominating female in resource possession and decision making power at household level and male are more involved in cardamom farming than female. They have more knowledge about cardamom and actively involved in the activities of cardamom cultivation than female. In large cardamom farming, 5.5 times more households were headed by males than females.

Sex of respondent	Frequency
Female	10(15.38)
Male	55(84.62)
Sex ratio	5.5

**Table 1:** Distribution of respondent of sampled households by gender.

Figures in parentheses indicate percent

Source: Field Survey, 2017

**Age of respondents**

The mean and standard deviation of the age of the respondents in the surveyed area were found to be 40 and 12 years respectively. The age of respondents was categorized into three categories. They are <28 years, 28-52 years and >52 years. The study has revealed that majority of respondents in study area were the age group between 28-52 years with 70.77%, followed by >52 years (16.92%) and <28 years.

Study site	Minimum	Maximum	Average	S.D.
Panchthar	22	70	40	12

**Table 2:** Age of the respondents across the Sidin and Ekteen VDCs.

Source: Field Survey, 2017

**Occupational wise categorization of the respondent household in the study area**

Nepal is agriculture dependent country and most of Nepalese do agriculture for living. Likewise, almost all of the households in

study area had agriculture (95.38%) as a major primary occupation. It revealed that farming is their source of income and especially cardamom farming fulfilled their needs and desire.

Primary occupation	Frequency
Agriculture	62(95.38)
Government job	1(1.54)
Abroad	1(1.54)
Non-government job	1(1.54)
Total	65(100.00)

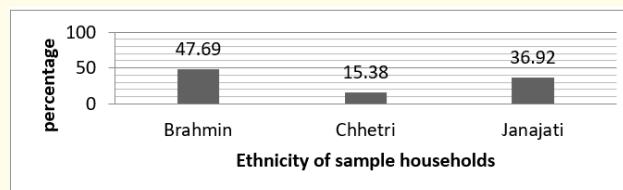
**Table 3:** Primary occupation of respondents in the study area.

Figures in parenthesis indicate percent

Source: Field Survey, 2017

**Ethnicity pattern of household of the survey area**

In ethnicity, out of total sample households, Bhramin were 47.69%, followed by Janajati 36.92% and remaining 38.15% were Chhetri.



**Figure 2:** Distribution of ethnicity of sample households.

**Education status of respondent of sampled household**

Education status is categorized into six categories: illiterate (can't read and write, having no formal schooling as well as informal education), literate (can read and write but don't have any school education except informal education), primary (having school education up to grade 8), secondary (having school education up to 10), higher secondary (school education up to 12) and bachelors and above. From the survey, education status of majority of the respondents was secondary (32.31%) followed by primary (26.15%) and read & write (24.62%). Higher secondary education status of respondent was 10.77% followed by bachelors and above (4.62%). It predicted that the major portion of the cardamom farmers are educated and very few proportions hasn't taken official education.

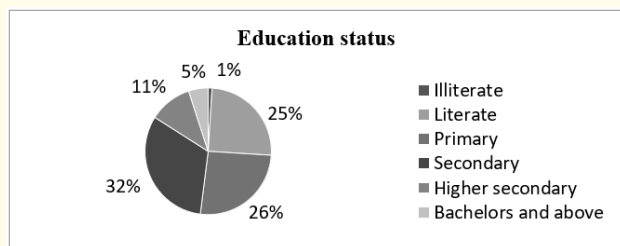


Figure 3: Education status of respondents of sampled households.

### Family size

Family size determines the supply of labor force to the farm operations. The maximum average family size was found to be of 11 and minimum of 7 in surveyed area. Economically active member in a family means group of members who are actively involved in agriculture especially activities related to cardamom cultivation. The maximum of 7 and minimum of 1 were recorded as economically active member in a family. The dependency ratio (number of dependents/ numbers of economically active member) was found to be 0.51.

Family size	Average	Maximum	Minimum	Total
Total	4.42	11	3	287
Economically active member	2.92	7	1	190
Number of dependents	1.5			
Dependency ratio	0.51			

Table 4. Family size and economically active members in sampled households

Source: Field Survey, 2017

### Years of cardamom farming

Cardamom farming in the study area was done since many years. Majority of the respondents has done cardamom farming in the past 10-20 years, followed by 20-30 years (23.08%) and 1-10 years (15.38%). It revealed that the cardamom farming in study area was taken as major farming practices and is transferring from one generation to another.

### Land holding, land category and livestock holding Area under cardamom

In the study sites, land was categorized into khet (lowland), bari (upland) and pakha. The result showed that the average land under

Years of cardamom farming	Frequency
1-10	10(15.38)
10-20	33(50.77)
20-30	15(23.08)
30-40	5(7.69)
40-50	2(3.08)
Total	65 (100)

Table 5. Distribution of years of cardamom farming done by sample households.

Figures in parentheses indicate percent

Source: Field Survey, 2017

cardamom cultivation was 0.74 ha ranging from 0.05 to 3.81 ha. Land was also categorized into unirrigated and irrigated land on the basis of availability of irrigation facility. Irrigated land occupied 76.29% of the total cardamom cultivated area.

Land type	Average	Maximum	Minimum	Total	S.D.
Khet	0.08	1.27	0	5.42	0.198
Bari	0.05	0.76	0	3.46	0.133
Pakha	0.60	3.81	0	39.089	0.700
Total area	0.74	3.81	0.05	47.96	0.711

Table 6. Land type of sampled households in Ekteen and Sidin VDCs (ha)

Source: Field Survey, 2017

### Livestock holding and livestock category of respondent households in a study area

Livestock provides manure to the organic cardamom farming and played most important role to increase its production. The study revealed that out of 65 sample households, poultry occupied the higher average population with 6.75 and goat with 6.62. The average population of cow, buffalo, swine and sheep were 2.20, 0.58, 0.43 and 0.43 respectively.

For the study of total livestock holding, common unit Livestock Unit (LSU) was used converting all the livestock species in a single unit. The aggregated LSU was calculated as explained by Adhikari [9].

$$LSU = 1.5 (\text{number of buffalo}) + 1 (\text{number of cow/bull}) + 0.6 (\text{number of swine/pig}) + 0.4 (\text{number of sheep/goat}) + 0.2 (\text{number of poultry})$$

The study revealed that average livestock holding in LSU in Ekteen and Sidin VDCs was found to be 7.50. More LSU unit in these study sites was obtained because all households reared livestock and taken them as a source of farm yard manure for organic large cardamom production.

Livestock type	Average population
Cow	2.20
Buffalo	0.58
Goat	6.62
Swine	0.43
Poultry	6.75
Sheep	0.43

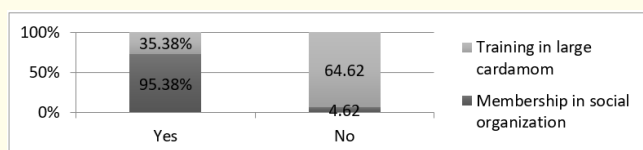
**Table 7.** Livestock holding of sampled households in the study area.

Source: Field Survey, 2017

### Household access to various services

Farmer’s involvement in related organization or group increases their bargaining capacity for better marketing and production facilities and other rights. The study represented that 95.38% of the households were found to be the members of any various social organization related to agriculture.

Training is also an important determinant of the household member’s knowledge to farming and other activities which aid an individual in behavioral change. In the country like ours, training plays an important role because it is understood that trained farmers are more efficient in livelihood related activities. The study revealed that about 35.38% of the household has received cardamom related training while remaining 64.62% hasn’t received any training related to cardamom.

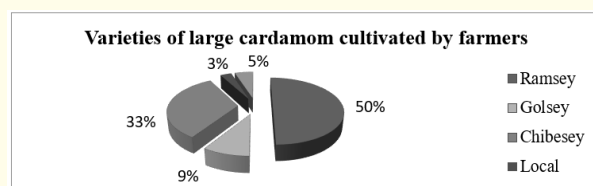


**Figure 4:** Access to different social services among the respondent household in the study area.

### Varieties of cardamom grown in study area

The type of large cardamom cultivated in Panchthar district (Ekteen and Sidin) was Ramsey while other varieties were also

cultivated in small scale. Topography and climatic conditions are the major factors determining the varieties of cardamom to be cultivated which favored the cultivation of Ramsey variety. And this variety was supposed to give little more production compared to other varieties. Ramsey variety of cardamom was cultivated by 49.57% of survey households followed by Chibesey (33.33%), Golsey (9.40%) and very few farmers cultivated Seremna and local varieties of cardamom. Among cardamom cultivating together with more than one variety, Ramsey and Golsey combination of cardamom cultivation had occupied larger followed by combination of Ramsey, Golsey and Chibesey cardamom cultivation and then of Ramsey, Chibesey and Seremna cardamom cultivation.



**Figure 5:** Varieties of large cardamom cultivated by farmers.

### Economics of cardamom production

#### Production and productivity of cardamom

The average production and productivity of cardamom were 0.12 MT and 0.23 MT/ha respectively in the study area which was lower than the national productivity of cardamom (0.51 MT/ha) and productivity of cardamom in Panchthar (0.42 MT/ha). In recent years, productivity of cardamom in Panchthar district was decreased because the cardamom farmers did not apply recommended amount of manure and fertilizer to the cardamom orchard which degrade fertile soil. In addition, Utis of above 10 years on cardamom orchard hampers cardamom by withdrawing nutrients from soil of orchard and decreased the production of cardamom. Therefore, it is better to cut Utis of age above 10 years. Furthermore, the incidence of Cardamom Stem Borer, Rhizome rot, viral diseases such as Chirkey (Mosaic streak) and Foorkey (Bushy dwarf) also seems to have effect on yield reduction. Besides this, climate change, poor management of cultivation area, unavailability of suitable variety according to the altitude etc. are other reasons behind the decline of cardamom production in Panchthar district [10].

Due to all above reasons of lower productivity, farmers in Panchthar district destroying the cardamom orchard and reestablishing the orchard of cardamom.

Fiscal area	Average production (MT)	Productivity (MT/ha)
2016/17	0.12	0.23

**Table 8.** Production and productivity of cardamom in Ekteen and Sidin VDCs.

Source: Field Survey, 2017

### Average cost of production and return

It is the most important factor in the cultivation of agricultural crops, which influences the profitability of the produce and also the input use efficiency of the farmers. Cultivation of cardamom includes various types of cost, since it uses various kinds of inputs in terms of labor, manure, fertilizer, cardamom plantings, irrigation, pipe, sprinkler, equipment, wood etc. The result showed that average variable cost of production and average returns were Rs.65413 and Rs.309999 respectively. The return from shade tree in 10th year was found to be Rs.315428.

The benefit cost analysis showed that the cardamom cultivation was profitable with B/C ratio greater than 1 i.e. 3.66.

Item	Amount (Rs. per ha)
Average return	309999
Total cost	84594
B/C ratio	3.66

**Table 9:** B/C ratio obtained from large cardamom production in the study site.

Source: Field Survey, 2017

### Gross margin analysis (in terms of per unit of ha)

Gross margin was analyzed in terms of per unit of area i.e. ha. The detail about gross margin has been presented in Table 11. Gross margin per ha was Rs.244586 and gross margin per kg was Rs.1050.

Study site	Total revenue	Variable cost	Gross margin per ha (Rs.)	Gross margin (Rs. /kg)
Panchthar	309999	65413	244586	1050

**Table 10.** Gross margin per ha and per kg evaluated from cardamom production.

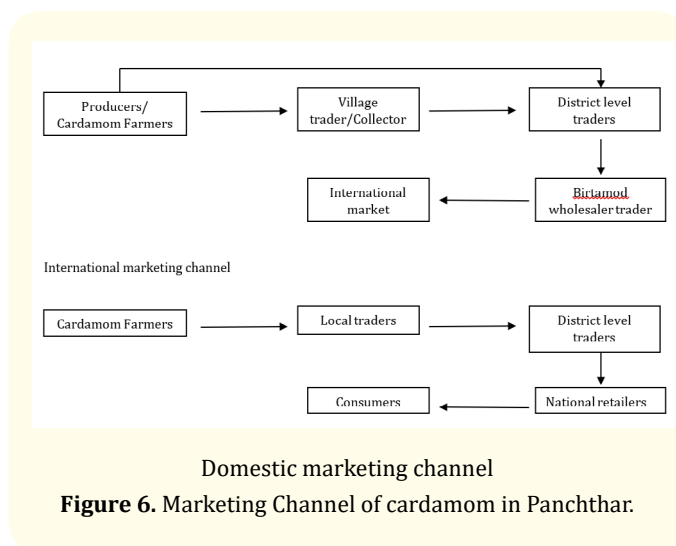
Source: Field Survey, 2017

### Marketing system

Cardamom marketing includes all business activities involved in moving dried cardamom from widely scattered producers to the export market and ultimately to consumer. In marketing system, producers, traders, wholesalers and consumers are main agents involved in production consumption chain.

### Marketing system in Panchthar

Producers and traders were the main actors of marketing system. All the farmers in Ekteen and Sidin VDCs sold their produce to village traders/ collectors in Bhadra- Magh. The price of cardamom is fluctuating and changes within a week. Farmers sold cardamom on an average price of Rs.1227 per kg in 2016. The collected cardamom of village traders sold the cardamom to district traders while some farmers sold cardamom directly to the district traders in Phidim then to Birtamod wholesaler traders and finally exported to India. In domestic marketing channel, cardamom was sold to national retailers situated at different regions of Nepal and finally to consumers.



**Figure 6.** Marketing Channel of cardamom in Panchthar.

### Producer’s share, marketing margin and marketing efficiency

Lower marketing margin and higher producers’ share on retail price ensure efficiency of marketing system. Marketing cost included cost for weighing, packing and loading of cardamom, DDC tax and other associated tax. Rs.1 per kg was incurred for weighing, packing and loading of large cardamom, Rs.40 per kg for DDC tax, Rs.2 per kg for transportation cost and Rs.2 per kg for other associated costs. This marketing cost was found in export marketing channel. Domestic marketing channel included higher transporta-

tion cost because cardamom was transported from Panchthar to different national retailers, spread all over the country.

Because of several hindrances like lack of transportation facility, lack of nearby market for the export, lack of exact price information, farmers could not sell their produce directly to the exporter. They had to pass through different market intermediaries to sell their produce. Producer’s share was higher (74.36%) in export marketing channel which may be due to the absence of intermediaries. The index of marketing efficiency of this channel was found to be 2.90. And this channel revealed that farmers did not have adequate knowledge on pricing mechanism of cardamom at medium and export level and did not perform post handling activities like tail cutting, grading etc.

Producer’s share and index of marketing efficiency in a domestic marketing channel were found to be 45.44% and 0.83 respectively. This producer’s share indicated that the middleman gained the larger share and lower the marketing efficiency.

Particulars (per kg of cardamom)	Marketing channel	
	Export	Domestic
Net price received by farmer	1227	1227
Total marketing cost	45	50
Total marketing margins	378	1423
Retailer’s sale price	1650*	2700
Value added	423	1473
Producer’s share (%)	74.36	45.44
Index of marketing efficiency	2.90	0.83

**Table 11.** Producer’s share on cardamom consumers in Panchthar district.

Note: \* indicates the price at Birtamod which is the world’s one of the export port for cardamom

So, this price was taken as the final price to reach the other countries

Source: Field Survey, 2017

### Factors share to the income from cardamom cultivation

The result of Cobb Douglas production function showed that the overall regression model taken to define the impact of various independent variables on per hectare income of cardamom was found to be highly significant witnessed by the zero probability value of the F test. Further, the adjusted R<sup>2</sup> value was 0.33 which indicated the 33% of the variation in the total income from carda-

mom production was governed by the independent variables taken in the regression equation.

Among the independent variables considered in the regression equation below table shows that the per hectare cost of labor for cardamom production has significant positive effect on the annual income from cardamom production. The result shows that a percentage increase in the cost of labor will increase the income from cardamom by 0.87 and the result was significant at 1% level of significance. Similarly, an increase in the cost of nutrient by 1% increased the income from cardamom by 0.04% but the effect was non-significant. The initial investment for cardamom production is negative and a percentage increase in the initial investment for cardamom production decreases the income by 0.31%. It may be the fact due to the perennial nature of the crop and once the crop is transplanted it requires 3 to 4 years to take the harvest and the harvest reaches its peak by 6 years onward. This table also shows that increasing inputs like initial investment, nutrient cost and labor cost by 100% increased the income by 60%.

Variables	Coefficients	Standard error	t- value	P> t
Initial investment	-0.31	0.310	-1.01	0.318
Nutrient cost	0.04	0.036	1.16	0.253
Labor cost	0.87*	0.149	5.84	0.000
Constant	6.13	3.849	1.59	0.116
Number of observations	65			
F value	11.72			
Probability > F	0.00			
R <sup>2</sup>	0.36			
Adjusted R <sup>2</sup>	0.33			
Return to scale	0.60			

**Table 12.** Cobb-Douglas production function showing the impact of different variables on gross income.

Note: \* refers to a significant at 0.01 level of significance

Source: Field Survey, 2017

### Price fluctuation and price information

Due to the non-existence of any central marketing facility or an auction market in the country, the price of the commodity was dictated by the terminal markets in India. In case of large cardamom, price fluctuation is very high within a short period of time and its’



price depend on demand and supply at Birtamod, Jhapa. As the price information was concerned, the majority (60%) of traders responded that they got information on price of cardamom from exporters and traders on Birtamod. None of them got information on price from radio, television. Very few traders got information from magazines and government offices. This study revealed that the actual market price of cardamom was manipulated by traders and exporters of large cardamom at Birtamod. Therefore, farmers could not sell large cardamom on actual price.

Source of price information	Percent
Exporters and traders at Birtamod	60
Magazine	20
Government office	20
Radio/Television	0
Total	100

**Table 13.** Sources of price information across the study area.

Source: Field Survey, 2017

#### Factors affecting the export price of large cardamom

The large traders and exporters at Birtamod responded about the factors affecting on export price of large cardamom. Majority (50%) of respondents revealed that the price of cardamom was affected by demand of cardamom in Indian market. Quality of cardamom also affected the price of cardamom responded by 40 percent of exporters.

Factors	Percent
Demand of cardamom in an Indian market	50
Quality of cardamom	40
Production	10
Total	100

**Table 14.** Factors responsible for export price of cardamom in Birtamod market.

Source: Field Survey, 2017

#### Post-harvest handling of cardamom

##### Drying and processing of large cardamom in Ekteen and Sidin VDCs

After harvesting, large cardamom was collected and transported to curing units and prepared for storage. Freshly harvested large cardamom contains around 70-80% moisture content which must be reduced to 10% (maximum) in order to store it properly with-

out rotting. The produce is dried either in locally made dryer or modified dryer. Almost all of the farmers were using local driers in the study areas. The modified dryer (double drum dryer) dried large cardamom at 50°C without heating cardamom directly. Double drum dryer wasn't suited on cardamom farmers. Therefore, modern smokeless improved dryer was launched by NARC, Pakhribas. It is better than double drum dryer as it dried 400kg large cardamom in 4 hours, maintains the color and quality of cardamom as well as consumes lesser amount of wood and reduced the problems of traditional dryer such as labor and time consuming. There were several problems faced by the cardamom processor while cardamom was processed through traditional dryer. Among the respondents, all said that the solution of those problems was the need of modern smokeless improved dryer.

The colors of cardamom before and after processing were reddish brown and light black respectively. Once the cardamom was fully dried with the moisture content of about 10-12 percent, it was taken out of the dryer, cooled by spreading on a dry floor and then graded, stored in dry and well-ventilated rooms. However, almost all farmers have not followed grading and scientific packaging practices. The reasons for that put forward by farmers were most farmers did not have the knowledge of grading and it was labor intensive and time consuming. Traders and exporters at Birtamod were found to have performed tail cutting, sizing of the dried cardamom and packing.

Type of a dryer used	Frequency
Traditional	15(100)
Improved double drum	0(0)
Total	15(100)

**Table 15.** Type of dryer used for curing of cardamom across Ekteen and Sidin VDCs.

Figures in parentheses indicates percent

Source: Field Survey, 2017.

#### Tail cutting

Tail cutting is one of the most important operations to be performed before taken onto market. Large cardamom with tail cutting got more price/kg as compared with cardamom without tail cut. Grading of large cardamom was performed on the basis of size of cardamom, tail cutting and cardamom free from dust. Dried cardamom was graded into small, medium and large according to size. All the farmers did not perform any tail cutting, sizing and packag-

ing operations. But traders and exporters did those activities before selling on the market. Cardamom was packed in jute sacks of 50 kg capacity.

Cardamom actors	Without a tail cut	Tail cutting	Sizing	Packaging
Farmers	65(100)	0(00)	0(00)	0(00)
Traders	0(00)	5(100)	5(100)	5(100)
Exporters	0(00)	3(100)	3(100)	3(100)

**Table 16.** Response of farmers, traders and exporters on tail cutting and sizing of cardamom.

Source: Field Survey, 2017

### Problems on production and marketing

The respondents were asked to identify, choose and prioritize the various categories of problems they had been facing on cardamom farming since a long time period. Problem analysis was done by conducting focus group discussion with key informants at community level. The severity of problems was identified by ranking with appropriate score. The problems faced by the farmers from the period of cultivation to marketing were categorized as:

- Problems in production
- Problems in marketing
- Trader's problems

### Problems in production of large cardamom

Diseases and pests were the major problems and all farmers ranked them on the first position. *Chirkey*, *Foorkey* and rhizome rots were the major diseases occurred in cardamom farming. Lack of irrigation on cardamom forest and lack of labor for intercultural operation and harvesting were second and third problems faced by farmers respectively. Traditional way of curing was the fourth problem occurred on the cardamom farming.

Problems	Index	Rank
Diseases and pests	1.00	I
Lack of irrigation	0.62	II
Lack of labor	0.52	III
Traditional way of curing	0.38	IV

**Table 17.** Problems in production of large cardamom area.

Source: Field Survey, 2017

### Marketing problems

The price of cardamom was decreasing and farmers found the frequent price fluctuation of cardamom as a major problem in marketing. After processing of cardamom, storage problem was found to be second and monopoly of traders regarding price fixation and transportation problems were third and fourth problems faced by cardamom farmers in marketing.

Problems	Index	Rank
Frequent price fluctuation, decreasing a market price of cardamom	1.00	I
Storage problem after processing	0.58	II
Monopoly of traders regarding price fixation	0.56	III
Transportation problem	0.37	IV

**Table 18.** Marketing problems faced by farmers in Ekteen and Sidin VDCs.

Source: Field Survey, 2017

### Trader's problems

Rapid price fluctuation of cardamom was most serious problem faced by small and large traders and the monopoly of exporter on price fixation was another one as the traders completely depend on the price determined by exporters at Birtamod. Another problem was various transit taxes to be paid to local agencies of government and illegal taxes to various political and armed organizations. The decline quality of cardamom processed from traditional dryer as compared to cardamom processed from improved smokeless dryer was also another serious problem. All above mentioned four problems are serious problems and affected to traders badly.

Problems	Index	Rank
Rapid fluctuation in a price of cardamom	0.90	I
Monopoly of the exporter on price fixation	0.70	II
Monopoly taxing and transit tax	0.55	III
Decline in a quality of dried cardamom	0.50	IV

**Table 19.** Trader's problems during marketing of large cardamom.

Source: Field Survey, 2017

### SWOT analysis of organic large cardamom production

SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis was used to analyze the efficiency of organic large cardamom farming which are discussed below:

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Suitable climatic condition and geographical setting of mid-hills for cardamom farming.</li> <li>• History of organic farming by default (through minimal chemical inputs) for cultivation resulting in a maintenance of rich soil nutrients especially carbon.</li> <li>• Large cardamom is a high value cash crop having higher export potential.</li> <li>• It can be cultivated successfully on steep marginal land.</li> <li>• Cardamom produced from eastern areas have a specialty in quality.</li> <li>• Cardamom farming is labor intensive. So, it generates the employment opportunities to women and low-income people.</li> </ul>	<ul style="list-style-type: none"> <li>• Traditional cultivation of large cardamom</li> <li>• Lack of use of a recommended amount of fertilizer</li> <li>• Price fluctuation</li> <li>• Lack of improved smokeless dryer</li> <li>• Dependency on an Indian market for the export of large cardamom</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• There is an increased a scope to expand area and productivity.</li> <li>• Farmers show willingness towards organic cardamom cultivation. Farmers are much attracted to the organic cardamom produce of Sikkim.</li> <li>• There is higher demand and price of organic large cardamom.</li> <li>• Traditional way of processing of large cardamom couldn't produce quality cardamom. Therefore, there is scope of adoption of improved technology like smokeless dryer.</li> <li>• Increasing international demand for organic cardamom</li> </ul>	<ul style="list-style-type: none"> <li>• There is an uncertainty on price fixation.</li> <li>• Fatal diseases and pests are reappeared.</li> <li>• Domestic market of cardamom is poor. Less than 2% of total produced cardamom is consumed in Nepal.</li> <li>• Decline an amount of nitrogen, phosphorous and potassium in soil</li> </ul>

Table 20

## Conclusions

Higher benefit cost ratio along with higher gross margin indicates that the crop appears to be highly profitable and remunerative enterprise in the Panchthar district of Nepal. The crop contributes significantly to the total household economy which can be the better option for uplifting the socio-economic status of the cardamom farmers. Reoccurrence of disease and pest and the lack of price information are major problems faced by farmers. Likewise, monopoly of traders on price fixation and rapid price fluctuation are the major problems for traders. However, the commodity is highly export oriented cash crop in eastern hills of Nepal and its' value is increasing. We could increase its production in a large extent and improve the economy of farmers as well as nation too.

## Suggestions

Based on the findings of research, some suggestions are made for farmers, processors, traders and exporters to make the cardamom enterprise more profitable. Farmers should be encouraged to use inputs like irrigation, good quality seedlings and recommend-

ed amount of manures. Strengthening of market extension to link farmers with markets is necessary.

Processors need to perform tail cutting, appropriate grading and packaging practices as well as adopt improved technology for value addition. For traders, market study needs to be conducted to overcome the distorted, disorganized market and exploitation of traders over producer's share. For exporters, trade relation with overseas should be expanded and marketing channel should be made systematic. There should be search of activities to avoid the monopoly of Siliguri market on price of cardamom.

Cardamom policy need to be executed from the government side. Government intervention is necessary to make pricing system more transparent. Effective coordination among various government agencies like DDC, DADO, other NGOs and INGOs should built so that all the technical support could be easily available for farmers. Government need to certify the organic large cardamom of Nepal. Efforts should be taken to create brand image for Nepal large cardamom. There is a need for search of alternative market of large

cardamom and work on the control of devastating viral diseases such as *Chhirkey*, *Furkey* and Rhizome rot etc.

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