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RESEARCH ARTICLE

PRODUCTION AND MARKETING STATUS OF LARGE CARDAMOM IN TEHRATHUM, NEPAL

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ABSTRACT

The survey research entitled "Production and Marketing Status of Large Cardamom in Tehrathum, Nepal" was conducted in Myanglung Municipality, Laligurans Municipality and Menchhayem Rural Municipality with an objective to identify the current status of large cardamom production and marketing in Tehrathum district of Nepal. For the study, 60 households were selected using simple random sampling technique. The data were collected through household survey, key informants interview and direct observation. Data entry and analysis were done by using Microsoft Excel and SPSS. The average land under large cardamom cultivation was 0.64 ha with the average cardamom farming experience of about 12 years. The average production and productivity of large cardamom were 182.15 kg and 284.6kg/ha respectively. Overall, benefit and cost ratio was found to be 1.42. Attack of disease and pest and decreasing market price of cardamom were the major problem in production and marketing of large cardamom respectively. Almost all respondents used traditional smoking dryer (Bhatti) to cure cardamom that makes the dried capsules prone to quality degradation so they expressed the necessity of modern smokeless dryer.

KEYWORDS

Large Cardamom, Production, Marketing, Tehrathum.

1. INTRODUCTION

Large cardamom (*Amomum subulatum*, Roxb.) or 'Alainchi' in Nepali, known as' Queen of Spices' also called 'Grain of Paradise,' is a perennial herbaceous spice crop belonging to the family Zingiberaceae. After vanilla and saffron, large cardamom ranks third in terms of price in the globe (Khatiwoda, 2019). It is a shade loving plant and thrives well in a moist soil, which is maintained by water diverted from seasonal springs on the upper slopes (Singh, Patiram, & Bhutia, 1989).The plant has several tillers consisting of pseudo stems with leaves on the upper part and the inflorescence (spike) appears on the rhizome from the pseudo stem shoots (Sharma, Singh, Sharma, & Sharma, 2000).

Large cardamom is an important cash crop and livelihood option for people in Tehrathum. Most of the favorable condition for proper cultivation of cardamom can be found in Tehrathum and this district is one of the leading producer of large cardamom. Generally, cardamom cultivation is done in forest land and forest plays an important role to enhance environmental quality (Prasad & Kiran, 2016). In addition, the forest conserves biological resources as well as forest resources are an integral part of the livelihood support system in Nepal. This high value, minimally labor intensive and non-perishable crop cardamom is cultivated as an understory perennial crop in association with Utis *(Alnus nepalensis*) and other forest tree species that provides shade. By combination of both trees and cardamom in cultivation areas, farmers earn money and raise socio-economic status in their society. The productive area and productivity of Large Cardamom in Tehrathum is 625ha and 0.4 respectively (MoAD, 2020). This has been practiced commercially in this district since last 25 years.

In Tehrathum, cultivation, harvesting and processing of large cardamom are carried out in traditional ways which produces poor quality capsules and do not meet the market standard thus, lowering its value. The capsules are manually removed; scissors are used to remove capsule tail which is laborious. Inadequate marketing channels have also made it more difficult for farmers to get a higher price for their produce (Bhutia, Bhutia, Chatterjee, & Pariari, 2017). The main efficacies of the crop are its high price, use of marginal land in cultivation, use of manpower mostly during off- season of other farming, need of less capital and a common (familiar) crop (Bhhatarai, 2016).

2. MATERIALS AND METHODS

2.1 Study Area

Tehrathum is one of 14 districts of Koshi Province of Nepal. The district, with Myanglung as its district headquarters, covers an area of 679 km^2 and has a population of 88,731 with population density 130.7 /km^2 as of Census of Nepal 2021 (CBS, 2021). The geographical coordinates of this district are 27°7'41" North and 87°32'30" East. The climate conditions vary from subtropical to temperate climate with dry winter. The neighboring districts are Sankuwasabha, Taplejung, Dhankuta and Panchthar.

There are a total of 6 municipalities in Tehrathum in which 2 are urban and 4 are rural. The survey research was conducted in the command area of the Prime Minister Agriculture Modernization Project (PM-AMP), Project

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Implementation Unit (PIU), Cardamom Zone, Tehrathum i.e. Myanglung Municipality-6, Laligurans Municipality-9 and Menchhayem-6 Rural Municipality. These municipalities were selected for the study because these are the major cardamom growing areas within the district and had major contribution in total production of large cardamom in the district.

2.2 Preliminary Study

Field visit was carried out to collect preliminary information of the study areas. The information regarding socio-economic, demographic and geographical condition and topographical setting of target areas were gathered. This information helped to make the effective questionnaire for the survey.

2.3 Sample and Sampling Technique

A list of Large Cardamom growers from each study/survey site was prepared separately, which was provided by Prime Minister Agriculture Modernization Project (PMAMP), Project Implementation Unit (PIU), Cardamom zone, Tehrathum. A total of 60 households were surveyed including 20 HH each from Myanglung-6, Laligurans-9 and Menchhayem-6 using simple random sampling technique. Sampling was taken about 10% of the total households (604) of the cardamom farmers.

2.4 Sources of Data

2.4.1 Primary data

Primary data were obtained through household survey, key informants interview and direct observation.

2.4.1.1 Household Survey

A total of 60 households were surveyed. Respondents were interviewed at their home and data were collected in accordance with the objective of study.

2.4.1.2 Key Informants Interview (KII)

Key informants interview were carried out with Senior Agriculture Development Officer, leader farmers, chairman of different farmers group and traders to assess additional information about large cardamom production and marketing.

2.4.1.3 Direct Observation

Several observations were made on different farm activities and marketing system. Additionally, field visits were also carried out in cardamom field and marketing areas to observe related activities.

2.4.2 Secondary Data

Secondary data were obtained from AKC (Agriculture Knowledge Centre) annual reports and bulletin, journal articles, departmental reports of Federation of Large Cardamom Entrepreneurs Nepal (FLCEN), National Spice Crop Development Programme (NSCDP), International Centre for Integrated Mountain Development (ICIMOD), Ministry of Agriculture Development (MOAD), books and websites etc.

2.5 Data Analysis

The data obtained from the field survey were coded and tabulated on Statistical Package for Social Science (SPSS) and Microsoft Excel. Then, analysis was done through SPSS and MS- Excel. Descriptive statistics such as frequencies, percentage etc. were calculated and represented in appropriate graphical means like tables, pie charts and bar diagram. Benefit cost analysis was estimated using total cost of production and gross return from large cardamom as shown in the formula below:

B/C ratio = Gross return/Total cost

Where, Gross return was calculated from income of sold product and the total cost of production was calculated by summing the variable cost and fixed cost items incurred in the production process.

3. Result and Discussion

3.1 Demographic and Socioeconomic Information

3.1.1 Gender Distribution of Population and Sex of Respondents

Out of 60 samples, 49 household heads were male and remaining 11 household heads were female. It indicates that the male population were dominating over female in decision making power and resource possession and male were more involved in cardamom farming and have more knowledge about cardamom farming.

Table 1: Distribution of respondents of sampled households by gender

Sex of respondent	Frequency	Percent
Male	49	81.7
Female	11	18.3
Total	**60**	**100**

Source: (Field Survey, 2020)

3.1.2 Distribution of Respondent by Age

The average age of the respondent was 43 years, minimum and maximum age was 27 and 65 years respectively.

3.1.3 Ethnicity Pattern of Household of The Study Area

Out of total sampled households, the majority of respondents were Janajati (40%) followed by Brahmin (35%), Chhetri (18%) and Dalit (7%).

Table 2: Distribution of respondent by age

Variable	Household	Minimum	Maximum	Mean
Age	60	27	65	43

Source: (Field Survey, 2020)

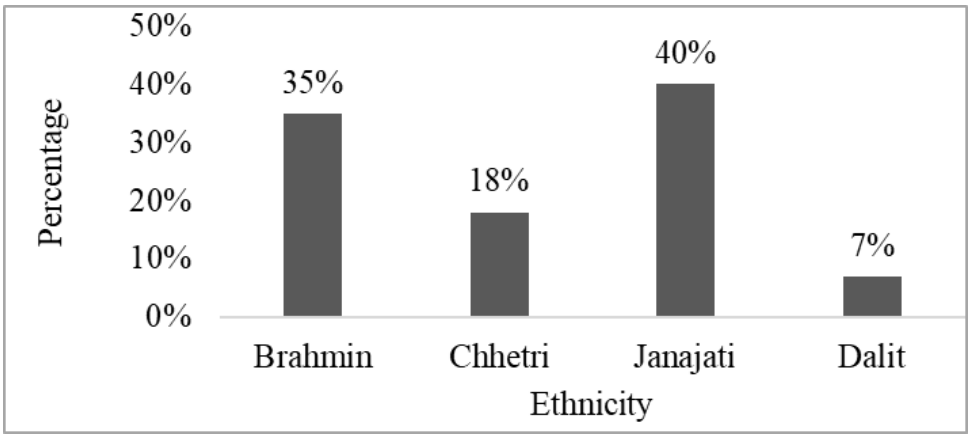

Figure 1: Distribution of respondent by ethnicity

3.1.4 Education Status of Respondent of Sampled Household

Education status was categorized into six categories: Illiterate, literate, primary, secondary, higher secondary and bachelor or above. The study showed that the education status of majority of the respondents were secondary (38.3%) followed by primary (20%), higher secondary (18.3%), literate (13.3%), bachelor or above (8.3%) and illiterate (1.7%).

3.1.5 Occupation Level of The Respondent in The Study Area

Out of total sampled households, forty-five (70%) households depend only in agriculture, ten (16.7%) households depend on agriculture and services, four (6.7%) households depend on agriculture and business and remaining four (6.7%) households depends on government service to sustain their livelihood.

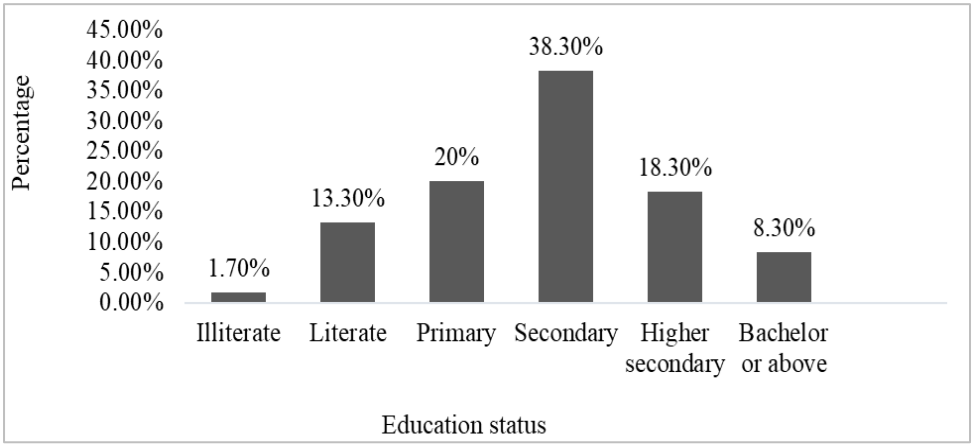

Figure 2: Distribution of respondent by education status

Table 3: Distribution of respondents by occupation

Occupation	Frequency	Percent
Agriculture	45	70
Agriculture+ Service	10	16.7
Agriculture+ Business	4	6.7
Government Service	4	6.7
Total	**60**	**100**

Source: (Field Survey, 2020)

3.2 Large Cardamom Cultivation

3.2.1 Land holding

Based on field survey, the average land under large cardamom cultivation was 0.64 ha. Minimum and maximum land holding was 0.15ha and 3.75 ha respectively. Farmers had decreased large cardamom cultivation area recent days due to disease and pest infestation. Beside large cardamom, farmers generally grow rice, maize, vegetables, potato etc. in their field.

3.2.2 Years of Experience in Cardamom Farming

Among the respondent, the average number of years of experience in cardamom farming was 11.48 years whereas minimum experience among sampled HHs was 1 year and maximum was 40 years.

3.2.3 Source of Seedling (Input supply)

Seedlings brought from other places are prone to transmission of disease and pest with them. So, source of seedling became important aspects of healthy orchard establishment (Kalauni & Joshi, 2020).

Most of the respondents (86.7%) in the study area reported that village nursery (other farmers field) was major source of large cardamom seedling. Only 6.7% has their own nursery and remaining 6.7% purchased the seedling from CDC, Ilam.

Table 4: Large cardamom land holding in the study area

Variable	Observation	Mean	Min	Max
Area (hectare)	60	0.64	0.15	3.75

Source: (Field Survey, 2020)

Table 5: Years of experience in cardamom farming

Experience	Observations	Mean	Min	Max
Year	60	11.48	1	40

Source: (Field Survey, 2020)

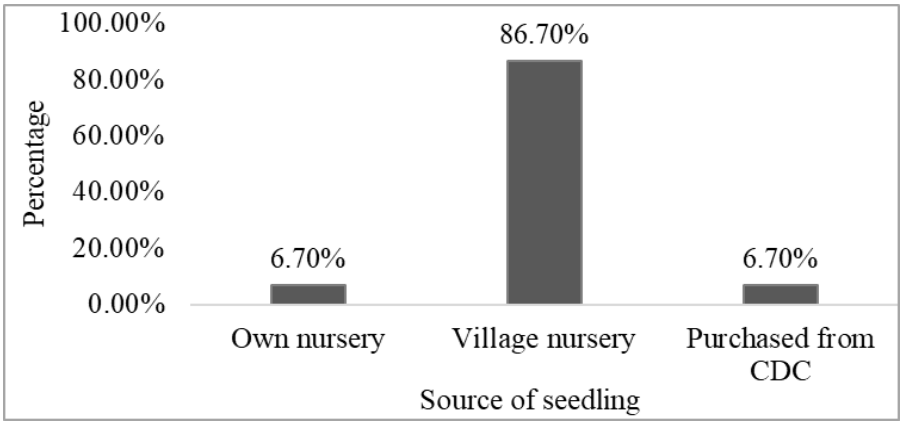

Figure 3: Source of seedling in study area

3.2.4 Varieties of Cardamom Grown in Study Area

Most of the varieties of large cardamom were cultivated in the study area were Ramsai, Golsai, Chibesai, Dambersai, Jirmale, Bharlangey. Most of the household in study area were cultivating the combination of more than one variety. 46.7% of survey household were found growing the combination of Ramsai and Golsai varieties followed by the combination of Ramsai and Chibesai (16.7%). And 8.3% of survey household had cultivated only Ramsai variety. The least grown varieties were Chibesai, Jirmale, Dambersai and Bharlangey.

Table 6: Varieties of cardamom grown in study area

Varieties	Frequency	Percent
Ramsai	5	8.3
Golsai	2	3.3
Chibesai	2	3.3
Ramsai,+ Golsai	28	46.7
Ramsai + Chibesai	10	16.7
Ramsai,+ Jirmale	2	3.3
Ramsai+ Golsai+Chibesai	4	6.7
Ramsai+Dambersai	3	5.0
Ramsai+Golsai+Chibesai+Bharlangey	2	3.3
Ramsai+Golsai+Dembersai+Bharlangey	2	3.3
Total	**60**	**100**

Source: (Field Survey, 2020)

3.2.5 Irrigation Times in Cardamom Field

For better growth and development of cardamom, availability of water during dry seasons is very necessary. Among 60 households, 45% households irrigate more than five times, 28.3% households irrigate five times and 26.7% households irrigate four times annually in their cardamom field.

3.2.6 Irrigation System Adopted by Farmers In Study Area

In the study area, 60% households used both sprinkle and canal irrigation system for Large Cardamom production. Whereas, 25% households used only canal irrigation and 13% households used only sprinkle irrigation. And only 2% households used sprinkle and drip irrigation system to irrigate their cardamom field.

Table 7: Irrigation time in cardamom field (per year)

Times of irrigation (per year)	Frequency	Percent
Four times	16	26.7
Five times	17	28.3
More than five times	27	45
Total	60	100

Source: (Field Survey, 2020)

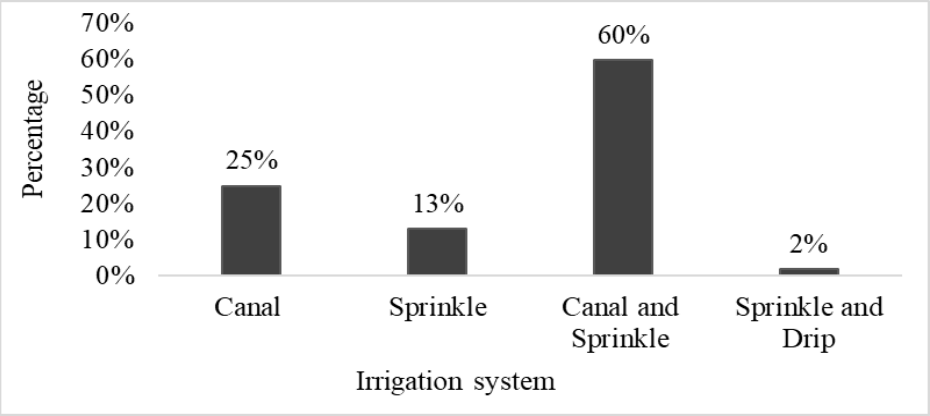

Figure 4: Irrigation system adopted by farmers

3.2.7 Weeding Times in Study Area

In the sampled households, 50% of households weed their large cardamom field two times. 36.6% households weed three times and 13.3% households weed their field four times.

3.2.8 Manure and Pesticide Used by Respondent

The study revealed that, 30% households used manure whereas, 70% households didn't used manure in cardamom field. Similarly, only 5% households used insecticide or fungicide and 95% households didn't used any insecticide or fungicide in cardamom field.

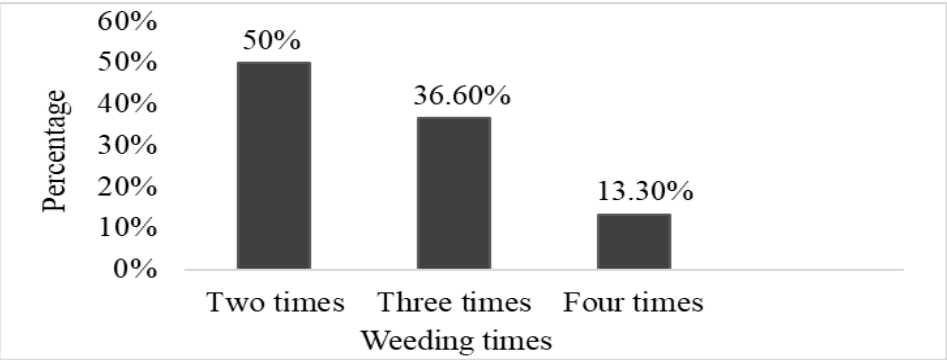

Figure 5: Times of weeding done by respondents in the study area

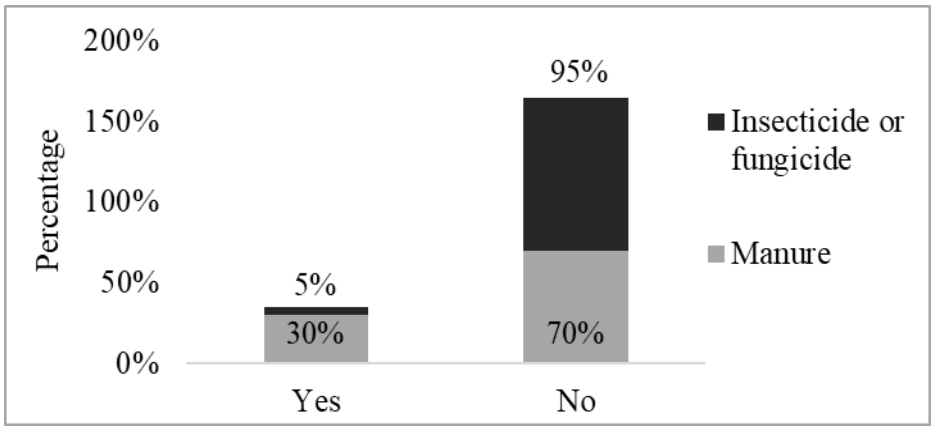

Figure 6: Manure and insecticide or fungicide used by respondent in the study area

3.2.9 Trees Used for Shading

In the study area, majority of respondents (63.3%) were found growing Alder or Utis *(Alnus nepalensis)* as a shade tree. About 3.3% of the respondents were found growing large cardamom in open field without any shade tree. Similarly, other trees such as Chilaune, Siris, Baas were also found grown with Utis.

3.2.10 Type of Dryer Used

In the study area, almost all of the farmers were using traditional dryer due to unavailability of modern dryer

Table 8: Different types of shade trees grown in cardamom field in the study site

Different type of shade tree	Frequency	Percent
Open field condition (without shade tree)	2	3.3
Utis	38	63.3
Otis, Chilaune	11	18.3
Utis, Siris	8	13.3
Utis, Baas	1	1.7
Total	**60**	**100**

Source: (Field Survey, 2020)

Table 9: Type of dryer used for curing of cardamom in the study area

Type of dryer used	Frequency	Percent
Traditional	60	100
Modern dryer	0	0
Total	**60**	**100**

Source: (Field Survey, 2020)

3.2.11 Membership in Social Organization

In the study site, almost all respondents had membership in different social organization through which they got a chance to participate in various training, workshop and seminar that helped to enhance their skill and knowledge of farming. Out of 60 sampled households, 30% were member in farmers group, 41.7% were member in cooperatives and remaining 28.3% were member in both farmers group and cooperatives.

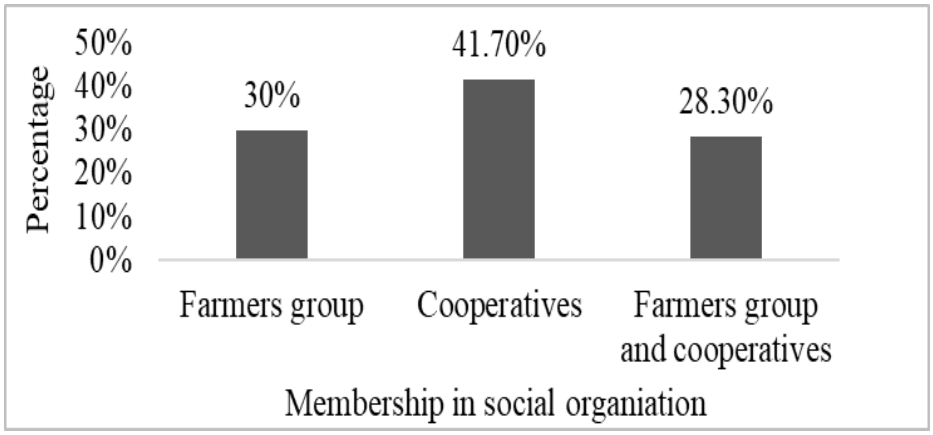

Figure 7: Membership of sample households in social organization

3.2.12 Support and Services

In overall, results showed that, 28.3% of the households has received cardamom related training while remaining 71.7% hasn't received any training related to cardamom. Similarly, the study revealed that the 21.7% of the households have access to different services and remaining 78.3% hasn't received any services.

3.2.13 Production and Productivity of Cardamom

In the study area, average production and productivity of large cardamom were 182.15 kg and 284.6 kg/ha respectively.

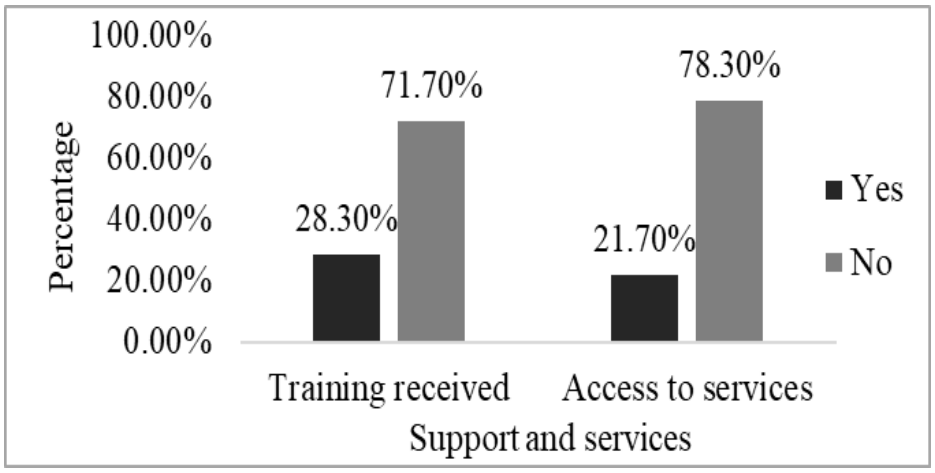

Figure 8: Access to different social services among the household in the study area

Table 10: Average production and productivity of cardamom in the study area		
Fiscal year	**Average production (kg)**	**Productivity (kg/ha)**
2019/20	182.15	284.6

Source: (Field Survey, 2020)

3.3 Market and Infrastructure

3.3.1 Activities Performed After Harvesting

Out of 60 sampled households, all of them did processing after harvesting of large cardamom. Majority of respondents (40%) did storage along with processing and 36.7% of respondents did only processing of cardamom. Other activities like storage grading and packaging along with processing were also done by the farmers before they sold it.

3.3.2 Cardamom Sold by Respondent

In the study site, most of the respondents (36.6%) sold cardamom to village collector and 33.3% respondent sold cardamom to the trader nearby market. Similarly, 30% respondent sold cardamom the trader at nearby market

Table 11: Activities performed after harvesting of large cardamom in the study area		
Activities performed after harvest	**Frequency**	**Percentage**
Processing	22	36.7
Storage	11	18.3
Processing, Storage	24	40
Processing, Grading	1	1.7
Processing, Storage and Packaging	2	3.3
Total	**60**	**100**

Source: (Field Survey, 2020)

Table 12: Cardamom sold by respondent		
To whom cardamom sold	**Frequency**	**Percent**
Village collector	22	36.6
Trader at nearby collection center	20	33.3
Trader at nearby market	18	30
Total	**60**	**100**

Source: (Field Survey, 2020)

3.3.3 Transport of Product to Market

In the study site, majority of respondents (65%) transport the product to market through human labour. Similarly, 25% and 10% respondents transport cardamom to market through tractor and bus along with human labour respectively.

Table 13: Means to transport the product to market in the study area		
Means of transport	**Frequency**	**Percent**
Human labour	39	65
Human labour. Tractor	15	25
Human labour, Bus	6	10
Total	**60**	**100**

Source: (Field Survey, 2020)

3.3.4 Marketing Channel Used by Large Cardamom Growers

From the survey it was found that, mostly farmers sold their product to the village based collector or in local market. They also sold cardamom directly to district traders or wholesaler at Birtamod. Even some of the farmers sold cured cardamom directly to exporter also. Cardamom were exported to India from Birtamod, Jhapa and from India it was re-exported to China, Bangladesh, Pakistan, UAE and other overseas destinations. Only few amount of cardamom were consumed locally. The local market of Myanglung-6, Laligurans-9 and Menchhayem-6 were Jirikhimti, Lasune and Morahang respectively.

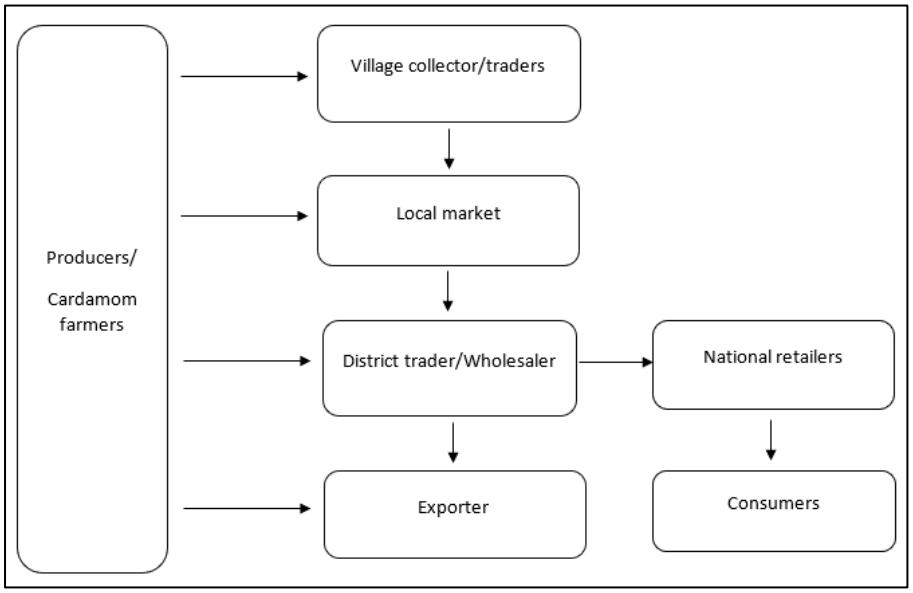

Figure 9: Marketing channel used by cardamom growers in the study area

3.3.5 Average Price of Large Cardamom

From the household survey, average price for large cardamom per mon was found to be Rs. 26,033.33 whereas minimum price for cardamom was Rs. 20,000 and maximum price was Rs. 1,00,000.

3.3.6 Average Annual Income from Large Cardamom

In the study site, average annual income of households through large cardamom was found to be Rs. 110466.67 whereas minimum and maximum income were Rs. 15,000 and Rs. 3,10,000 respectively.

Table 14: Price of large cardamom per mon in the study area

Variable	Observation	Mean	Minimum	Maximum
	60	26033.33	20000	100000

Source: (Field Survey, 2020)

Table 15: Average annual income of farmers from large cardamom in the study area

Variable	Observation	Minimum	Maximum	Mean
Average annual income from large cardamom	60	15000	310000	110466.67

Source: (Field Survey, 2020)

3.4 Problem Faced by Large Cardamom Farmers in The Study Area

3.4.1 Problems in Production of large Cardamom

Ranking of different types of problems faced by the respondents in the study area showed that attack of pest and disease was the most severe problem (ranked first) followed by lack of technical manpower, unavailability of quality seedling, lack of knowledge on improved cardamom cultivation practice and poor irrigation facility with index value 0.99, 0.73, 0.48, 0.46 and 0.34 respectively as shown in Table 16.

3.4.2 Disease of Large Cardamom

Rhizome rot was the major disease occurred in the study area and was ranked first with index value of 0.96. Similarly, leaf blight was ranked second and Chirkey, Foorkey were the other diseases found in the study site. There was also occurrence of other diseases which were not identified by the sampled households.

Table 16: Major problems in production of large cardamom in the study area

Production problem	Level of problem					Index	Rank
	P1 (1)	P2 (0.8)	P3 (0.6)	P4 (0.4)	P5 (0.2)		
Attack of pest and disease	57	3	0	0	0	0.99	I
Lack of technical manpower	0	45	9	5	1	0.73	II
Unavailability of quality seedling	2	5	20	21	12	0.48	III
Low level of knowledge on improved cardamom cultivation practice	0	2	23	28	7	0.46	IV
Poor of irrigation facility	1	5	8	7	39	0.34	V

Source: (Field Survey, 2020)
Note: Figures in the parentheses indicates the scale used and 'P' stands for priority (Ex: P1= Priority one and so on)

Table 17: Major disease of large cardamom in the study area

Disease	Level of problem					Index	Rank
	P1 (1)	P2 (0.8)	P3 (0.6)	P4 (0.4)	P5 (0.2)		
Rhizome rot	52	6	1	1	0	0.96	I
Leaf blight	5	54	0	1	0	0.81	II
Chirkey	1	0	43	10	6	0.53	III
Foorkey	0	1	13	45	1	0.44	IV
Others	0	0	3	4	53	0.23	V

Source: (Field Survey, 2020)
Note: Figures in the parentheses indicates the scale used and 'P' stands for priority (Ex: P1= Priority one and so on)

3.4.3 Insects of Large Cardamom

Out of many insects, bore is the major devastating insects occurred in cardamom field of farmers in study area and it was ranked first. Likewise, leaf eating caterpillar, white grub, aphid and other insects were raked second, third, fourth and fifth respectively.

Table 18: Major insects of large cardamom in the study area

Insects	Level of problem					Index	Rank
	P1 (1)	P2 (0.8)	P3 (0.6)	P4 (0.4)	P5 (0.2)		
Borer	32	22	3	3	0	0.87	I
Leaf eating caterpillar	26	28	5	1	0	0.86	II
White grub	2	9	19	22	8	0.52	III
Aphid	0	1	30	21	8	0.48	IV
Other insects	0	0	4	13	43	0.27	V

Source: (Field Survey, 2020)
Note: Figures in the parentheses indicates the scale used and 'P' stands for priority (Ex: P1= Priority one and so on).

3.4.4 Problems in Marketing of Large Cardamom

Ranking of the different problems related to marketing of large cardamom in the study area showed that, decreasing market price was the major problem followed by lack of good storage facilities after processing, poor transportation facilities, large number of middleman and poor knowledge about marketing as shown in Table 19.

3.5 Benefit Cost Analysis

The result showed that average benefit and average cost of production were Rs. 110466.67 per household and Rs. 89068.33 per household respectively. The benefit cost analysis showed that the cardamom cultivation was profitable with B:C ratio 1.42.

Table 19: Marketing problems faced by large cardamom farmers in the study area

Marketing problems	Level of problem					Index	Rank
	P1 (1)	P2 (0.8)	P3 (0.6)	P4 (0.4)	P5 (0.2)		
Decreasing market price	59	1	0	0	0	0.99	I
Lack of good storage facilities after processing	0	47	11	2	0	0.75	II
Poor transportation facilities	0	6	30	22	2	0.53	III
Large number of middleman	1	5	19	34	1	0.50	IV
Poor knowledge about marketing	0	0	0	3	57	0.21	V

Source: (Field Survey, 2020)
Note: Figures in the parentheses indicates the scale used and 'P' stands for priority (Ex: P1= Priority one and so on).

Table 20: Benefit cost analysis

Description	Minimum	Maximum	Mean
Total Benefit (NRs)	15000	310000	110466.67
Total Cost (NRs.)	8800	243000	89068.33
B:C ratio	0	8	1.42

Source: (Field Survey, 2020)

4. Conclusion

Tehrathum district has become prosperous and rich due to cardamom cultivation. Cardamom cultivation is a major source of income in Tehrathum district but farmers not getting as much benefit as they used to get before. It has a significant role to improve the socioeconomic status that fosters increment in income level of farmers as well as contributes in national economy. Its cultivation had changed their income level and also made them economically strong. Thus, farmers were interested in cultivating cash crops rather than traditional crops due to the much more benefits incurred by cash crop cultivation. Poor knowledge and incidence of disease pest has played major role in reduction of production of large cardamom and poor market price information makes farmers to get lesser price of their product in Tehrathum district.

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