

**PRICE FLUCTUATION OF LARGE CARDAMOM AND IT'S
IMPACT ON LIVELIHOOD:**

A Study of Phungling Municipality 11, Taplejung, Nepal

A Thesis

Submitted to the Tribhuvan University, Faculty of Humanities and Social Sciences

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By

THAKUR BHANDARI

Exam Roll No.10068

Reg No. 6-2-203-26-2012

Department of Rural Development

Mahendra Ratna Multiple Campus, Ilam

August, 2023

DECLARATION

I hereby heartily declare that this thesis entitled **Price Fluctuation of Large Cardamom and It's Impact on Livelihood: A Study of Phungling Municipality Ward No. 11, Taplejung, Nepal** Submitted to the department of Rural Development Mahendra Ratna Multiple Campus Ilam, is my original and empirical work. I truly want to state that I have borrowed all idea and information for different sources for the preparation of them. I made due acknowledgement to them it is also declared that the results of thesis have not been presented and submitted anywhere else for the award of any degree and for any other proposes, I want to assure that any part of the content of this thesis has not been published in any form before.

.....

Thakur Bhandari

Date : 23-08-2023

: 06-05-2080

Letter of Recommendations

This thesis entitled **Price Fluctuation of Large Cardamom and It's Impact on Livelihood: A Study of Phungling Municipality Ward No. 11 of Taplejung, Nepal** has been prepared by **Thakur Bhandari** under my guidance and for his partial fulfillment of the requirements for the Degree of Master of Arts in Rural Development. This is his own innovative work. I, therefore, recommend this thesis for its evaluation and approval.

.....

Chandika Parajuli

Lecture

(Supervisor)

Date : 27-08-2023

: 10-05-2080

Approval Letter

This thesis entitled **Price Fluctuation of Large Cardamom and It's Impact on Livelihood: A Study of Phungling Municipality Ward No. 11 of Taplejung, Nepal** submitted by **Thakur Bhandari** in partial fulfillment of the requirements for Master's Degree (M.A.) in Rural Development has been approved by the evaluation committee.

Evaluation committee

.....

Milan Chandra Sanyasi
(Head of the Department)

.....

Dil Nath Fuel, PhD.
Associate Professor
(External Examiner)

.....

Chandika Parajuli
(Supervisor)

Date :12/09/2023

:26/05/2080

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ABSTRACT

Nepali large cardamom (Amomum Subulatum Roxburgh.) – also known as ‘black gold’ or ‘black cardamom’ and locally called alainchi belongs to the botanical family called Zingiberaceae. Large cardamom was introduced to Nepal in the 19th century by Nepali laborers working in Sikkim, India, in the Ilam district and so on in other districts. Since 1953, commercial production has begun in Nepal, and it has gradually evolved into a new source of income for Nepalese farmers. It is currently a high-value cash crop with expanding market demand both domestically and internationally. Contrastingly there is a great scope of large cardamom cultivation in Nepal because of wide climatic variation to grow different varieties of cardamom and its market value and demand in foreign market. Similarly, there is a great scope to improve farmer’s living standard and to uplift national economy. The fluctuation in the market price directly affects the production of cardamom and livelihood. The general objective of the study is to know the production of the cardamom and its factors affecting productivity and investigate the price fluctuation of large cardamom and its impact on the livelihoods of farmers in Phungling Municipality ward no 11 of Taplejung district. The specific objectives of the study are find out the current status of cardamom production and examine the reason of pricing fluctuations from 2017 to the present. The descriptive and exploratory research designs were used in this study. This study were applied purposive sampling for area selection. The major finding and recommendation of the study is that though some constraints were associated with cardamom cultivation, from the socio-economic perspective, it was beneficial to the rural livelihoods but from the environmental aspect it has somehow affected biodiversity conservation thus leading to the demise of some species and creating monoculture in cultivation. Cardamom marketing system of Nepal should be made systematic. Nepalese cardamom market limited so it is necessary to search new market overseas. There is always fluctuation in the cardamom price. So government should be well prepared to interfere and fix price conducive to farmers.

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ABBREVIATIONS/ACRONYMS

ADS	Agriculture Development Strategy
C	Celsius
CDM	Cardamom Development Center
CBS	Central Bureau of Statistics
CES	Constant Elasticity of Substitution
CRTS	Constant Returns to Scale
FNCCI	Federation of Nepal Chambers and Commerce and Industry
GDP	Gross Domestic Product
GoN	Government of Nepal
IRR	Internal Rate of Return
IRS	Increasing Returns to Scale
Mm	Milimeter
MoAD	Ministry of Agriculture Development
NARC	National Agriculture Research Council
NPV	Net Present Value
NTFPs	Non Timber Forest Product
OLS	Ordinary Least Square
RM	Rural Municipality
UAE	United Arab Emirates

CHAPTER- I

INTRODUCTION

1.1 Background

Nepali large cardamom (*Amomum Subulatum* Roxburgh.) – also known as ‘black gold’ or ‘black cardamom’ and locally called *alainchi* belongs to the botanical family called Zingiberaceae. Large cardamom was introduced to Nepal in the 19th century by Nepali laborers working in Sikkim, India, in the Ilam district and so on in other districts. Since 1953, commercial production has begun in Nepal, and it has gradually evolved into a new source of income for Nepalese farmers. It is currently a high-value cash crop with expanding market demand both domestically and internationally. It is the second most important agricultural export commodity, behind lentils (29.6%), which account for 7% of overall agriculture exports Upreti, (2017). Furthermore, because the majority of huge cardamom is harvested in the eastern Himalayan countries, Nepal, northern India (Sikkim and Darjeeling), and Bhutan are the only major producers. The total production of large cardamom across the world is projected from these three countries, where Nepal accounts for 52 percent, followed by India at 37 percent and Bhutan at 11 percent (Singh & Pothula, 2013). A recent report shows that Nepal produced around 5,763 MT of large cardamom, which is worth around USD 23.6 million (MoAD, 2015). Moreover, at present time large cardamom is growing in 41 districts out of 77 districts of Nepal, where more than 67,000 household directly involves in its farming. Most of the eastern regions of the country produced large cardamom which comes about 84 percent of total production. Ilam, Taplejung and Panchthar are the major producers of the large cardamom Kc and Upreti, (2017).

Nepalese laborers who went to Sikkim India for seasonal work brought some cardamom seedlings/suckers when they were returned back to home and started to cultivate. Therefore, it is believed that Sikkim is the place of origin for cardamom Adhikari, (2016). After few years the cultivation and transaction of cardamom was rapidly disseminated to others districts due to its high market value. However, planned development of large cardamom in Nepal at a government level was started in 1975 after the establishment of Cardamom Development Center at Fikkal Ilam. In the same year government disseminated 4 lacks cardamom variety named Kopinge,

Rangbhang, Saune etc to the farmers of Ilam. In 1982, Ilam, Panchthar and Tehrathum districts were selected as cardamom development areas for the development of large cardamom in Nepal. Prime Minister Agriculture Modernization Project (PMAMP) project under the Ministry of Agriculture and Livestock Development. This is the only project of the Government of Nepal formulated by the internal vision, internal investment and internal institutional manpower. The project duration is of 10 years starting from FY 2073 to 2082. The project has four components; small commercial agriculture production center (pocket) development program, commercial agriculture production center (block) development program, commercial agriculture production and processing center (zone) development program and large commercial agriculture production and industrial center (super zone) development. Some pocket block and zone are also work for cardamom crop.

Nepal is a predominantly an agricultural country engaged in this sector. Agriculture has contributed to over 42% of the gross domestic product. Economic, Survey (2004). On the other hand, only 18% of the total land is cultivable of which major portion is concentrated in the Tarai region. Therefore, agriculture plays a vital role to maintain the livelihood of the rural people of Nepal. With this scenario as the backdrop, a rapid development of agriculture has become even more essential in order to expedite the process of development of Nepal. Agriculture is indeed a precondition for the development of Nepalese economy. Although, agriculture sector occupies a dominant place in the Nepalese economy there is very little divergence in the terms of sector importance. Economic, Survey (2004). Potatoes, broom plants, cardamom, fruits are grown and animal rearing is done in the hilly region maize, rice and oil seeds are the main crops of the Tarai region. Agriculture in the hilly and mountainous areas of Nepal is subsistence oriented. The primary objectives of this farming in the areas (it means, to sell agriculture product and buy necessary goods) are therefore, to meet family consumption requirements like salt, kerosene and clothes. This subsistent nature of agriculture system of the hill and mountain has given rise to the integrated systems such as livestock, horticulture and agro forestry and it constitutes the basic component or subsystem of the overall agriculture system of the area. Cash crop farming, which is considered a branch of agriculture, has been increasing over the years because of its brighter prospects in the forcing market. The cash crops such as jute, tea, tobacco, etc have already been introduced in our country. These crops have played a crucial role in the foreign trade of Nepal. But cardamom, on the

other hand, is one of the recently introduced cash crops in our country, which is particularly cultivated in the eastern part of Nepal. Therefore, cardamom is accepted as a major cash crop and an exportable crop of the country. Cardamom is a spice which belongs to the family of zingiberace and grows underground rhizome. The seed of cardamom has commercial value.

Large cardamom cultivation is increasing from eastern Nepal to all over Nepal Timsina & Poudel, (2016). In Nepal, over 21960 households in 51 districts are engaged in its farming. MoAD, (2017). Presently, Nepal is the largest producer of large cardamom in the market, followed by India and Bhutan . There are a lots of opportunities to grow cardamom in 40 districts of Nepal but eastern Nepal alone share 95% of area and production. In the recent years the area for production and involvement of farmers is increasing due to its continuous rise in market value and demand. Since 2003 large cardamom producers are facing a big problem of insects and diseases. Data of Ministry of Agriculture 2016/17 showed that large cardamom was cultivated in 17002 ha land with the production of 6521 metric ton. The current trend cardamom cultivation and production was increasing in Nepal but large cardamom gardens in eastern Nepal were suffered from Chirke, Furke and Rhizome rot diseases (ICIMOD, 2016). Contrastingly there is a great scope of large cardamom cultivation in Nepal because of wide climatic variation to grow different varieties of cardamom and its market value and demand in foreign market. Similarly, there is a great scope to improve farmer's living standard and to uplift national economy

Cardamom from Nepal is used to flavor meat meals, as well as a variety of beverages and desserts, as well as to flavor curries, cake bread, confectioneries, disinfectants, stimulants, and even as an aphrodisiac. Due to their perfume, Nepalese spices are significantly outstanding in terms of taste, color, and fragrance. Although Nepal is a small hilly country sandwiched between two major economies, India and China, it is classified as an agricultural economy. However, only 65.7 percent of the population relies on agriculture for food, income, and work, and only 20% of the land is suitable for cultivation (MoAD, 2015). A huge drawback to this is, agriculture still follows traditional farming methods rather than upgrading to modern techniques. A result of this can be seen as increasing agro imports in the economy. Nepal imported agricultural products worth \$1.298 billion in the year 2013/14 and exported products worth \$268.91 million. MoFA, (2015).

On the one hand where, production is decreasing and on the other hand government policies not coming into action, it is very important to identify what are the major factors that have been affecting the productivity of cardamom. It is thus important to identify whether it is just governmental inefficiency or other factors at work responsible for decrease in cardamom productivity and the major challenges that have obstructed the productivity.

Large cardamom as cash crop in Nepal ITC, (2017) says that Nepal and Bhutan are the main producers and exporters accounting 90% of the exported production. The annual production of large cardamom is about 5000 to 6000 tons. The average production is 25-40 kg/ropani. Nepal shipped large cardamom worth NRs. 3.3 billion during the period mid-July to mid-February, up from Rs 2.2 billion year-on-year ekantipur, (2018). Nearly 99 percent of the large cardamom grown in Nepal is exported to India. From India, spices are re-exported to Bangladesh, Pakistan, Gulf countries and other overseas destinations. The current average market price of large cardamom has gone up to NRs. 800 per kg. Taplejung, Panchthar, Ilam and Sankhuwasava are the major large cardamom producing districts producing over 80% of the total national production. Among these, Taplejung is the largest area of production of large cardamom with 4500 hectares under the huge cardamom plantation over 2400 tons. The eight most suitable and popular large cardamom species (cultivars) being planted and grown in Nepal are: Ramsai (1500-2000 meters above sea level (m asl), Golsai (1200-1600 m asl), Saune (700- 2000 m asl), Chibesai (700-1000 m asl), Dambersai (700-1200 m asl), Salakpure (1500- 2000 m asl), Varlangae (1500-2000 m asl), Jirmale (600-1200 m asl). Virus free large cardamom saplings are produced through the tissue culture techniques in the laboratory. In Nepal, the tissue culture laboratory at Agricultural Research Station, Pakhribas, Dhankuta produces around 10000 disease free large cardamom saplings annually and sell to the farmers.

Cardamom is an important cash crop in Nepal and is one of the major sources of income for farmers in the eastern hill districts of the country. Nepal is the largest producer of large cardamom. Despite the potential benefits of cardamom production, farmers faces several challenges, including price fluctuation, low productivity, lack of market information, and limited access to credit. Shrestha et al., (2020). Among these challenges, price fluctuation is a major concern for cardamom farmers. The price of cardamom is highly volatile and fluctuates widely over time, which can have a

significant impact on the income and livelihood. Price fluctuation in the cardamom market is influenced by various factors, including domestic and international demand and supply, weather conditions, market access, and policy changes. Paudel, (2020).

The impact of price fluctuation on livelihood can be significant, particularly for small-scale farmers who rely on cardamom cultivation as their primary source of income. Price fluctuation can lead to reduced income and uncertainty of farmers, affecting their ability to invest in their farms, access credit and meet their basic needs Lampiotti, (2015). Moreover, price fluctuations can affect the entire value chain, leading to reduced profitability and economic growth in the cardamom sector. Therefore, there is need for deeper understanding of the factors contributing to price fluctuation and its impact on the livelihood of cardamom farmers. The study aims to fill this gap by investigating the causes and consequences of price fluctuation in the cardamom.

1.2 Statement of the Problem

Nepal leads the globe in huge cardamom production, followed by India and Bhutan. Because of its superior quality, Nepalese cardamom is chosen over Indian cardamom. It has a distinct flavor that is particularly sought after to improve the flavor of cuisine. Cardamom cultivation has proven to be an appealing farming choice for Nepalese farmers due to the unique flavor it provides and an increase in demand. However, in recent years, cardamom production has started to decline. It hasn't been able to generate at the same level as in previous years. Despite the fact that the government has developed agriculture policies to improve the industry, the execution of these four policies is minimal. On the one hand, where output is declining and government policies are failing to take effect, it is critical to determine what the primary variables are that are affecting cardamom productivity. It is also critical to determine if the drop in cardamom productivity is due to governmental inefficiency or other variables at work, as well as the primary obstacles that have hampered output. The price of large cardamom has been fluctuating in recent years, which has had a significant impact on farmer who rely on the crop for income. The fluctuation in price can be attributed to various factors such as climate change, market demand and supply chain management. All of these issues have prompted this researcher to pose the following questions:

- What is the trend of production of cardamom?
- What are the factors that affect initial production of cardamom farming?
- What are the challenges of cardamom farming?
- How does the price fluctuation of large cardamom impact the livelihoods of farmers?

1.3 Objectives of the Study

The general objective of the study is to know the production of the cardamom and its factors affecting productivity and investigate the price fluctuation of large cardamom and its impact on the livelihoods of farmers in Phungling Municipality ward no 11 of Taplejung district. The specific objectives of the study are as follows.

- To find out the current status of cardamom production.
- To examine the reason of pricing fluctuations from 2017 to the present.
- To investigate the issues of cardamom production and marketing in the research area.
- To find out the impact of cardamom price fluctuations on livelihood in research area.

1.4 Significance of the Study

Cardamom is the major export of Nepal in the recent years. Nepal is one of the largest producer and exporter of large cardamom in the world. The export of cardamom alone was worth 3.76 billion for the first eleven years. MoFA, (2015). Nepalese hills especially of eastern region have exceptionally suitable climate for the production of cardamom. In the highest production (27% of total output) was recorded in Taplejung district, followed by Sankhuwasava (21%), Panchathar (12%), Ilam (10%) and Khotang (8 %), with the remaining 22% from other districts. Because of its extreme usefulness, its demand has been increasing in the international market. Due to this reason, the farmers in the hilly areas are being attracted towards its farming. Due to this, the return from cardamom farming is also very attractive and high. However, despite of its high importance and value, the production of cardamom is not as expected by the farmers. So, there must be some factors affecting its production. This study is thus important to identify the major factors affecting its production. Similarly, the research also identifies major problems faced or challenges faced by the farmers and providing the solutions and policy measures to help improve the status of

cardamom. This study therefore helps in providing general and policy suggestions regarding cardamom farming expects to make additional contribution in the field of agriculture. This study lies in its potential to contribute to the understanding of the price fluctuation of large cardamom and its impact on the livelihoods of farmers. This study will generate insights into the challenges faced by farmers in this region and inform policymakers, stakeholders, and development agencies in the design and implementation of appropriate interventions to support farmers in coping with the fluctuation in price and improving their livelihoods. The study finding will also contribute to the existing literature on the price fluctuation of large cardamom. This will be particularly useful for researcher, academics, and policymakers interested in understanding the dynamics of agricultural markets and the impact of market volatility on farmers.

1.5 Limitation of the study

Every study had some limitations which are the conditions beyond the control of researchers that may be place restrictions on the conclusion of the study and their application to others. This study has put the following limitations in regard to the degree of general ability of validity and findings.

1. This research is based on primary data obtained from the questionnaire survey of 40 households, so the limitations of primary data exist.
2. The authenticity of data collected depends on the information provided by the respondents.
3. The analysis regarding factors affecting price fluctuation of cardamom is done only from the production data of 2017 AD only.
4. Since the production is totally labor oriented, labor is not included as a factors affecting productivity as labor is already an inevitable factor of production.
5. The unavailability of data regarding capital is the major reason for production function not being generated.
6. The sample size for the research is limited to forty respondents.

1.6 Organization of the Study

The study is divided into five chapters. The first chapter is introduction that consists of background of the study, statement of problem, objective of the study, significance of the study, limitations of the study and organization of the study. Second chapter is

related with the review of the literature which includes theoretical review of literature and empirical review of literature and policy analysis. It also includes research gap. Third chapter deals with the research methodology which comprises research design, sources of data, data analysis tools, data presentation, sampling procedure and sample size. Fourth chapter deals with conceptual framework, research design, study period, sampling procedure, sample size, data collection methods, sources of data, data analysis tools and data presentation. Fifth chapter deals with the summary, conclusion and recommendations provided by the research.

CHAPTER- II

LITERATURE REVIEW

2.1 Policy for Cardamom

Among various economic sectors, the government of Nepal has indicated that agriculture is one of the most important economic sectors. In fact, the government of Nepal also considers the agriculture sector as the lead sector for the economic development of the country and with this sector, it is aimed to reduce the percentage of poverty to 14 percent in the nation. Also, the government's agricultural plan (20 years) seeks to increase the amount of agricultural loans, and expand irrigation areas. Furthermore, agro-economic growth rate and food availability per person will be increased to 3 percent from 0.5 percent and to 426kg from 270 kg respectively. Both eighth and ninth plans have declared large cardamom as one of the major agro-commercials for the economic development of the Nation. Sharma, (1999) but it has not mentioned policies and programs specific to cardamom.

Although the market of large cardamom is relatively small and concentrated in India and Pakistan, it is a lucrative business for all value chain actors: it is a major cash crop for more than 67,000 farmers in the hilly regions. Government of Nepal have selected large cardamom as priority sector part of the Nepal Trade Integration Strategy NTIS (2016).

The draft of the large cardamom policy (2073) is being reviewed by MoAD. National economic plans, such as the 13th and 14th plans, which ended in July 2016, are expected to support the growth of large handheld cash crops such as tea, large cardamom and coffee. The 2015 Agriculture Perspective Plan (1995) was completed in (2015). However, its sustainability is planned by the Agriculture Development Strategy (ADS) 2015 and the large cardamom is one of the cash crops that prioritize the plans, strategies and programs for MoALD. Important programmes under the 14th Plan include:

- Trade promotion programmes

- Trade, information and private sector support programmes

- Nepal Trade Integration Strategy (NTIS) programme

- Trade infrastructure, logistics and procedural development

The Ministry of Commerce (MoC) launched NTIS (2010) and found large cardamom

that was included in one of 19 products exported from Nepal. The main priorities for a large cardamom were continued in NTIS (2016). The government recently implemented several programs to develop a large cardamom under NTIS. Key programs include programs aimed at using low-energy dryers for grass-roots farmers in the Panchatar, Sankhuwasava, Terhathum, Bhojpur and Taplejung areas. MoC's (2015). Trade Policy places export crops, including large cardamom, at the forefront. MoAD has regular cardamom development programmes including technical support to farmers, distribution of disease free saplings, etc. through the respective District Agriculture Development Offices (DADOs) at Fikkal. *Bima Samiti* has already developed insurance product for cardamom insurance. Nepal Agricultural Research Council (NARC) is conducting a routine research program in Pakhribas to develop varieties for large cardamom and to acquire agricultural skills. Prime Minister Agriculture Modernization Project (PMAMP) project under the Ministry of Agriculture and Livestock Development. This is the only project of the Government of Nepal formulated by the internal vision, internal investment and internal institutional manpower. The project duration is of 10 years starting from FY 2073 to (2082). The project has four components; small commercial agriculture production center (pocket) development program, commercial agriculture production center (block) development program, commercial agriculture production and processing center (zone) development program and large commercial agriculture production and industrial center (super zone) development. Some pocket block and zone are also work for cardamom crop.

2.2 Types of cardamom

According to ANSAB (2005). there are sixteen varieties of cardamom in the world. Among them five types of large cardamom are in farming practices across Nepal – Ramsey, Golesey, Sawney, Chibesey and Dammersey. Ansari et al (2055). states that Ramshahi, Golshahi, Dambarshahi and Saune are the types of large cardamom that have been found cultivating in Nepal. In Nepal, Ramshahi, Golshahi and Dambarshahi are the types of cardamom that is cultivated most by the farmers Krishi Suchanatatha Sancharkendra, (2062).

Limbu, (1996). proclaims that in Nepal from the early history of large cardamom, there have been mainly four cultivated types existed such as Ramsey, Golesey, Sawney and Ramla. He mentioned that these types of large cardamom are locally called by

different names in different places. According to Mandal (2063), though the farmers in the eastern part of Nepal have been cultivating cardamom for a long time now, they have not been able to identify the types of cardamom they need to be cultivating. In any event, Ramshahi, Golshahi, Saune and Dambarshahi are the types that are recommended to cultivate. However Manandhar, (2062). concluded that among different types of cardamom, Ramshahi, Golshahi, Dambarshahi, Saune, Chibae and Kantidar are the types that are being cultivated by farmers in Nepal.

Niraula, (2051). also mentions that though different types cardamom are found in Nepal, from a business point of view, Ramshahi, Golshahi, Chibeshahi, Saune types are mostly found to be cultivated. According to him, the same species of cardamom are known by different names in different places. Ojha, (2049) has noted 21 types of cardamom. Among the different types of cardamom Ramshahi, Golshahi, Dambarshahi, Saune, Chibe and Kantidar are the types that are frequently used for farming in Nepal. On the basis of their nature, the large cardamom cultivated so far, in Nepal have been four types namely Ramsey, Golsey, Saune and Ramla. These types are locally called by different names in different places. The common names used in Taplejung district are Ramshahi, Golshahi and Chibeshahi. Other varieties are Dambershahi and Kantidar. Sharma. (1999).

Farmers should consider below criteria while they are selecting the planting materials, a) the varieties should be high yielding (>500 kg dry capsules/ha), b) varieties that produce 2-4 spikes per tiller, c) varieties should have high number of capsules per spike, d) varieties should produce large capsules, more seeds (50–70 seeds/capsule), e) varieties should be disease and pest resistant/tolerant, f) cultivars should be adaptive to desired agro climatic conditions, g) variety that grows well in low soil moisture condition. Sharma et al., (2017).

The local varieties of large cardamom found in Himalayan regions are Ramsai, Golsai, Chibesai, Dambersai, Saune and Kantidar. Among them, Ramsai, Golsai and Chibesai are widely distributed in Nepal. Cultivars are more susceptible to viral diseases like *foorkey* and *chirke* especially if planted at lower altitudes due to high movement of vector (aphid). Scientists have identified some varieties of large cardamom, which seem to be significantly more tolerant to diseases than the other varieties. Rai, (2011) and research work is currently on progress. The description of common large cardamom varieties grown in Nepal are following;

a. Ramsai: This cultivar is well suited for higher altitudes, even above 1500 m. on

steep slopes. Grown up clumps of 8–10 years age group possesses 60–140 tillers. The tillers color is maroonish green to maroon. Second half of May is the peak flowering season. Capsules are small, the average being 2.27 cm in length with 2.5 cm diameter, with 30–35 capsules in a spike, each containing 16–30 seeds. The harvest is during October–November. Peak bearing of capsules is noticed in alternate years. This cultivar is more susceptible to viral diseases like *foorkey* and *chirke* especially if planted at lower altitudes. It occupies a major area under Large cardamom in Sikkim and Darjeeling district of West Bengal. Two strains of this cultivar viz., Koprige and Garadey from Darjeeling district having stripes on leaf sheath, are reported to be tolerant to *Chirke* virus.

- b. Golsai:** This cultivar is suitable to low altitude areas below 1300 masl especially in Dzongu area in North Sikkim. Plants are not robust like other cultivars, and consist of 20–50 straight tillers with erect leaves. Alternate, prominent veins are extended to the edges of leaves. Unlike *Ramsai* and *Saune*, tillers are green in color. Each productive tiller on an average produces two spikes. Flowers are bright yellow. On an average each spike is 5.3 cm long with 9.5 cm diameter and contains an average of seven capsules. Capsules are big and bold, 2.46 cm in length and 3.92 cm in diameter and contain about 60–62 seeds. This cultivar becomes ready for harvest in August–September. *Golsai* is tolerant to *chirke* and susceptible to *foorkey* and leaf streak diseases. The cultivar is known for its consistent performance though not a heavy yielder. Many local cultivars are known in different locations such as *Ramnag* from north Sikkim. *Ram* meaning ‘mother’ and *Nag* for black, which refers to its dark pink capsules. *Seto-Golsai* is from west district of Sikkim with robust leafy stems/tillers and green capsules. *Madhusai* with elliptic and pink colored capsules is having robust leafy stem and has sweet seeds compared to other cultivars
- c. Saune:** This cultivar got the name from *Sawan* in Nepali, corresponds to August by which month this becomes ready for harvest at low and mid altitudes. This cultivar is widely adaptable, especially suited for mid and high altitudes i.e. around 1300–1500m. It is robust in nature and consists of 60–90 tillers in each clump. Color of tillers is similar to *Ramsai*. Each productive tiller on an average produces two spikes. Average length and diameter of a spike is 6 and 11 cm. Flowers are longer (6.23 mm) and yellow in color with pink veins. Second

half of May is the peak flowering time. Capsules are bigger and bold and number of seeds in each capsule are more (35) than in *Ramsai*. Harvest begins in September–October and may extend up to November in high-altitude areas. This cultivar is susceptible to both *chirke* and *foorkey* viral diseases. Cultivars such as *Red Sawney* and *Green Sawney* derived their names from capsule color. *Mongney*, a strain found in south and west districts of Sikkim, is a non-robust type with its small round capsules resembling mostly that of *Ramsai*. Ravindran & Madhusoodanan, (2002).

- d. Bharlange:** This cultivar grows in low, medium and high altitude areas in South Regu (East Sikkim) and at high altitudes at Gotak (Kalimpong subdivision in Darjeeling district of West Bengal). Its yield performance is exceptionally high at higher altitude areas i.e. 1500 m and above. It is a robust type and total tillers may range from 60 to 150. Color of tillers is like that in *Ramsai* i.e. maroonish-green to maroon towards collar zone; girth of tillers is more than that of *Ramsai*. Each productive tiller on an average produces almost three spikes with an average of 20 capsules/spike. Size of capsules is bigger and bold with 50–65 seeds. Harvest begins in last week of October. This cultivar is also susceptible to *foorkey* and *chirke* diseases.
- e. Chibesai:** Farmers in mid altitudes (700–1,800 m) can select Chibesai, a local variety suited to these elevations. The production potential of this variety is very high. This variety possess short tillers, light green leaves, sword type leaves, less tillering ability and capsules in an inflorescence are more but small and contain less number of seeds. A single fruit-bearing tiller bears 2–4 spikes, each bearing around 10–12 capsules. This variety also has a very high market potential Adhikari, (2016).
- f. Jirmale:** This variety was first grown in Ilam, then disseminated to other places. This variety is suitable for water scarce areas. This variety is characterized by dwarf type plant, green pseudo stem and leaves, produce large number of suckers and white color flower. Jirmale can be grown up to 700-1000m altitude. Each capsule bears 25-37 capsules containing 56 seeds per capsule. It is found that this variety is not highly affected by disease. Harvesting of Jirmale completes in Shrawan 15-Bhadra 15. This variety is successfully grown in Jhapa inside the supari garden. Timsina & Poudel, (2016)

- g. Dambersai:** this variety is cultivated in the altitude ranging from 700-1200masl. It is believed that the cultivation of this variety was started 150 years before in Bhojpur district. This variety posse's dwarf and less tiller, leaver are short and erect the veins of leaves are seen easily. The pseudo stem possess light red with green. This variety ripens in August-September, having large capsules, more number of seeds. The fruits of this variety is comparatively sweet than other varieties. Adhikari, (2016).
- h. Ramala:** The plant is similar to Ramsai with the same height and vigour (Figure 6). The leaves are broad and slightly elongated. Tillers are similar to Ramsai. Capsules are dark pinkish in colour with around 30–40 seeds. Cultivation of this variety is restricted to a few high-altitude areas of Sikkim state, Kalimpong region of West Bengal state of India, and Taplejung district of Nepal. Flowering starts with the onset of monsoon and the capsules are ready for harvest in late October. Farmers are advised not to select this variety in the initial phase of revival. They can select this variety only if other varieties donot perform well in their farms.
- i. Madhusai:** This variety is not commercially cultivated in Nepal but cultivated in Kalimpong India. Flowering of this variety resembles to Turmeric flower that grows more from soil surface. Local scientists and farmers of India found this variety as little bit resistance to Chirke-Furke diseases. NCARP Pakhribas, dhankuta started research inMadhusai for its suitability in Nepal and for disease resistance capacity.
- j. Kantidar:** This variety is named as Kantidar due to its pin like capsule structure. Pseudostem of this variety is thin, small and red in color and narrow leaves. The capsule of this variety are small and elongated. Seed contain in each capsule is little in number. Kantidar variety can be grown up to 800-1300m altitude. Timsina & Poudel, (2016).
- k. Seremna:** This cultivar is grown in a small pocket at Hee-Gaon in west Sikkim at low altitude and is known for its high yield potential. Plant features are almost similar to *Dzongu Golsai* but the leaves are mostly drooping, hence named as *Sharmney*. Total tillers range from 30 to 49 and is not robust in nature. On an average 2–3 spikes emerge from each productive tiller with an average of 10.5 capsules per spike, each having 65–70seeds.

2.3 Planting of large cardamom

To grow well, large cardamom needs shadow. Its cultivation can be carried out at an altitude of 600 to 2000 meters above sea level. Large cardamom plants grow best at a temperature between 10-22° C and require 2000-4000 mm of annual precipitation. In addition, a large cardamom cannot grow in direct contact with the sun; planting of soil should be in the shade (Pratap et al., 2014). A large cardamom plant developed through seeds, and its planting begins with soil preparation, seed management and other related activities. In general, the plantation began in June, when the field gets enough rain. After planting seeds in the field, reaching mature cardamom plant takes 3 to 4 years, and then only begins to produce cardamom. In addition, it requires continuous irrigation during the dry season and 4 to 6 months after harvest. However, depending on the needs, other factors, such as fertilizers and plant protection measures, are required from time to time.

Intercultural practices

The large cardamom plantations require a regular schedule of intercultural operations in order to bear heavy yields. The operations include weeding, mulching and cleaning, packing and digging earthing up, besides manuring, irrigation and provision of shade and plant protection measures.

Management of shade in field

Large cardamom is a shade-loving plant that needs high humidity and is usually grown in areas where the average annual rainfall is between 1500 and 3500 mm. Large cardamom grows well in moist soil. Soil moisture is conserved from seasonal sources by reverse water on the upper slopes. The system is ideally suited for the conservation of soil, water and tree cover characteristics on the steep slopes of the area. Interestingly, in recent years farmers have raised large cardamom in the open fields of Bari or Khet land with shady or very rare trees. When grown in open conditions, farmers grow Titepati (*Artimesia vulgaris*), Bilaune (*Maesaindica*) or Masyamdal (*Vigna umbellata*). Exposure to direct sunlight during the day is very harmful for a large cardamom. It causes sunburn on leaves and significantly reduces the content of soil moisture. Proper management of the shade and related species is key to maintaining yield for optimum productivity.

About 30 important tree species are used to provide shadow to cardamom plants. Alder (*Alnus nepalensis*), nitrogen fixation and fast-growing tree, are usually planted with large cardamom cultivation. Rapidly decomposing leaves and twig litter of alder

supply nutrients flushing to large cardamom plants. According to a research report, approximately 155 kg of nitrogen is added to the soil by fixation with alder root nodules in a 15-year stand. Alder trees are also used for wood and timber. Cardamom can be used in various plant species to provide shade. Trees used to provide shade in the agro forestry system are also an important source of fuel, feed and timber.

Nursery management for large cardamom

Primary nursery

Cardamom seeds are generally sown in September-October. Farmers are advised to develop seedbeds of around 15-25 cm height and around 1 m width and of a convenient length in December (Sharma et al., 2017). Seed sowing should be carried out in February (Falgun) as soon as winter ends and the soil starts becoming warm. Seed beds should be prepared in the fertile field. Well-decomposed livestock manure is mixed with soil on the seed beds and the soil surface is made to fine tilt. Based on the length of the seed bed, seeds are sown in lines 5-10 cm apart across the bed. The seeds are then covered with a thin layer of soil. The seedbeds are covered with ferns, dry weeds, or rice straw or small twigs of siris tree. Siris leaves make the best mulching biomass as they decompose fast and supply nutrients such as nitrogen and phosphorus. Farmers should periodically water the seed bed to keep it moist. Sprouting begins by the month of June (Asar). In the second year of nursery establishment, once the new saplings attain the 3-4 leaf stage, they are transplanted to new seed beds at a spacing of 1 × 1 ft. The new seed beds are supplied with good quality manure and managed through regular irrigation during winter. From the third year, saplings can be sold or transplanted to establish new plantations. Some plants such as Titepati (*Artemisia vulgaris*), soybean or legumes are grown to provide partial shade to the saplings.

Secondary nursery

Farmers can also establish a secondary nursery which can be seed beds of considerable length depending upon the availability of the land. Well-decomposed manure is mixed with soil and the saplings supplied from the primary nursery are transplanted. Saplings are planted in a row at 1 × 1 m spacing in May. Sharma et al., (2017). By the second year of transplantation, the new saplings are ready for field planting.

Nursery should be established away from the old orchards to avoid the occurrence or transmission of pests and diseases. Farmers should grow a continuous tree

sapling in the shade and grow large cardamom in places where shades are covered and direct sunlight falls for at least a few hours during the day. Farmers should consistently raise a nursery of shade trees and plant in spots where the canopy cover is opening up and direct sunlight falls on the ground at least for a few hours a day but not throughout the day.

Propagation of large cardamom

Large cardamom can be propagated by 3 methods viz. seed, sucker and micro propagation. Propagation through seed enables the production of large number of seedlings. Viral diseases are not transmitted through seeds and therefore the seedlings are free from viral diseases if adequate care is taken to isolate and protect the nursery from fresh infection. Planting suckerson the other hand ensures, true to type and high productivity if they are collected from high yielding plants. Pathak, (2008).

2.4 Harvesting of large cardamom

The standard large cardamom collection time is from mid-August to the end of October, depending on the height and inclination of the field. The growths of crops at lower heights begin to mature faster compared to the higher heights. The effectiveness begins from the third year after sowing. For the production of high quality large cardamom pods, the harvests must be harvested at the appropriate maturity stage. The brown color in the seeds of the topmost capsule indicates the complete maturity of the capsule. When the topmost capsule is fully mature, shoots with shoots are cut at a height of 45 cm and left for another 10-15 days to ensure the maturity of all the capsules. Pathak, (2008). The spikes are collected using mechanical tools, for example, a knife. Kafle, (2013). The collected spikes are stored for 2-3 days after collection to easily separate the capsules. Board of Spices, (2001). The separation of the capsules is done by hand and until now no device has been used. The separate capsules are cleaned by hand before curing. Singh & Pothula, (2013) to remove other plant materials.

Curing and Segregating

Curing is important for obtaining the quality of a large cardamom. Curing is usually associated with the balance of color, humidity and maturity. Fresh large cardamom capsules contain about 70 to 80% of moisture (in wet basis) Mande et al., (1999), depending on the levels of capsule maturity at harvest. In order to achieve an optimal

level of hydration and another factor determining quality, spikes with mature capsules are collected and heaped (hardened) for 2-3 days. After the harvest, fresh cardamom needed to separate the roots. The root contains from 3 to 8 carton capsules according to their development. These capsules are pale pink, brownish-pink or dark pink, depending on the variety, which after drying becomes black.

Drying of large cardamom

Cardamom is dried below 10% (wet basis) moisture content for the safe storage level and marketing of cardamom. Mande et al., (1999). Drying of large cardamom is carried out in different bhatti.

Tails cutting and Packing

The cardamom capsule has a tail and capsules without the tail get a higher price. Generally, tails are removed with a scissor. This is final work for farmer before selling the final product to the local collectors. Tails are particularly clearly visible that attached with cardamom capsule after taking out from the Bhatti. The outer layer of capsule need to remove and this process called tails cutting. Normally, the tails are manually cut by scissors. Moreover, tail cutting and without tail cutting also graded when it comes to check quality of large cardamom. Singh & Pothula, (2013).

Packing of large cardamom begins after removing tails from the cardamom capsules. It looks black and brown and light in weight and moisture contains 10 - 12 percent which only considers as an A class of cardamom. Timsina et al., (2012). Polytheneline jute bags are normally using to pack cardamom capsules that should seal and store in dry place. To avoid the moisture absorption, farmers are using wooden platforms to store cardamom's capsules. There is little bit weight loss and damages were reported during the storage. Singh & Pothula, (2013). At this moment cardamoms are ready for sale and as per the price conditions farmer sold the cardamom to local collectors.

2.5 Uses of cardamom

Cardamom oil is a precious ingredient in food preparations, perfumery, health foods, medicines and beverages. Cardamom seeds serve as an astringent, tonic, appetizer and diuretic (ANSAB, 2005).

Buckingham (2004) mentions that cardamom has a market in Northern Vietnam and Southern China for its culinary and medicinal use. It contains a number of aromatic and active ingredients.

Cardamom is mainly used as spices. It is also used in Ayurvedic preparation and is used as symbol of invitation to neighbors and relatives in any marriage or religious functions. It has medicinal values for different diseases. Its seeds are useful even in scorpion sting and snakebites Limbu (1996). Mandal, (2063). mentions that cardamom is used in religious rituals and for Ayurvedic medicine preparation. It is used in medicine like *dashamularista birendramodak* and *chawanprash*. It is also used in cake, biscuits, coffee and meat to add flavor.

Maitra, (2007). believes that cardamom is a very versatile spice having a wide range of culinary and therapeutic uses. It is an indispensable part of daily cooking rightly called the “queen of spices”. Niraula, (2051). opines that cardamom is not only used in the form of spices but it is also popular for its medicinal value. Carbohydrate, protein and minerals are found in it. Besides, it contains a significant amount of volatile oil.

Ojha, (2049). states that large cardamom has a great value in Ayurvedic medicine preparation. He mentions that thirty different types of Ayurvedic medicines can be prepared by using large cardamom. According to him, large cardamom is also used in preparing different medicines for different diseases like Kamalapitta, Bath, Damkhoki etc. Similarly, it can be used for preparing energy producing and blood purifying medicines.

However, cardamom is more commonly used as spices. Because of its attractive scent, it is used in tea, coffee, bakeries, meat, and drinks for flavoring. It can be used for Ayurvedic preparation. It can be the good medicine for diseases like Asthma. Some people use it as a symbol of invitation in religious functions. Sharma, (1999).

Sharma, (2006), states that the capsules (fruit) of cardamom produced are used widely as a spice condiment and contain about three percent of essential oil rich in cineole. This plant also possesses the medicinal value. Sangraula, (1989). states that at the beginning, cardamom was used by people only as the spices and goods for puja but now it is valued as an important exportable cash crops.

According to Thapa et al. (2003), the large cardamom is a spice and condiment that has a global market value. It is a low volume, high value, non – perishable and non-nutrient exhaustive crop. The large cardamom agro forestry also provides much needed fodder and fuel to mountain households.

Nayar, (1987). has tried to analyze the problems and prospects of marketing Indian Cardamom at home and abroad. He has presented that the uncertainty of getting

remunerative prices for the product and unpredictability of the weather conditions have lead to decrease in interest towards cardamom farming in the country. He also believes that, no further progress is visible until this aspect of cardamom farming is reduced. The research has also explained that the most crucial factor that influences productivity of cardamom is weather and beside this, elevation, land and angle of sunshine, frost, wind and hail, nature of soil, shade and nature of shade trees, number of plants per hectare or density of plant population, varieties of plants used depending upon the elevation and climatic requirements, maneuvering patterns, pests and disease control, harvesting patterns, and above all, the management practices are key factors in its production. The author has thus concluded that an organization that could regulate its price and act as an agency to organize research, market promotion etc. in order to enhance and smoothen productive and distributive aspect of cardamom could be proven useful in future for cardamom farming. Sharma, Sharma & Singh, (2000). have tried to analyze the impediments of farming of large cardamom. The article has explained that the cultivation of cardamom is an example of how a local mountain niche can be exploited sustainably. The article has mentioned that many new large cardamom plantations are done on terraced fields that were previously used for cultivation of paddy and other crops which explains the attractiveness for cardamom amongst the farmers. The authors have also presented the causes regarding decreasing yield of cardamom, such as occurrence of diseases namely Chirkey and Foorkey. The article has thus concluded that, identification and proper cultivation of cash crop such as cardamom could turn out to be a boon for mountainous region. Chapagain, (2011). has attempted to explore the current status of large cardamom production and major climate induced hazards that are impacting the production of the crop in eastern hills of Nepal. The research has analyzed the productivity trend and factors affecting the productivity of large cardamom and also the vulnerability of farmers and proposed respective adoptive measures. The paper presents that the productivity of this crop has been decreasing in recent years. The factors behind this decrease could be drought, disease, old plant, landslide, soil fertility, hail, frost and snow, lack of knowledge etc. The study was conducted in Sankhuwasabha district. Primary and Secondary data were collected for the research. Structured questionnaire and key Informant Interview was used to collect primary data. Whereas, secondary information were collected from various authorized and reliable sources. The data was analyzed by using regression analysis.

Rijal, (2013). has tried to analyze the impact of climate change on large cardamom livelihoods in Panchthar district of Nepal. The paper has stated that production of large cardamom contributes much on people's livelihoods as it is the main source of household income and provides seasonal employment to thousands of people from farm to the market. It has presented that, farmers have been able to increase household income by at least three times by cultivating large cardamom compared to traditional crops. However, in recent years, production of large cardamom has been declining as a result of climate change induced factors. The author has presented that, production of large cardamom in Panchthar district has been declining in recent years because of increase in diseases (both viral and the fungal diseases) and insects/pests, changes in amount and pattern of precipitation with increase in temperature and environmental change. The research has identified Chhirke (mosaic streak) and Foorkey (bushy dwarf) as the common disease incurred in the farming. Similarly, reduced water supply, increased temperature and increased incidence of diseases/pests are common issues raised by different stakeholders, farmers, governmental and non-governmental agencies regarding cardamom production. He has concluded that if such scenario persists and effective measures are not taken immediately then not only the livelihood of the people get worsen but also the national economy will get affected.

MoAD, (2014). has presented that 43 major agricultural products account for more than 95 percent of Agricultural Gross Domestic Product and 60 percent of agricultural products out of which cardamom occupies 7 percent. It has also presented the fact that Nepal has comparative advantages in cardamom market, and special programs for cardamom has also been included in the some of the ongoing programs of MoAD that also includes virus free plant production for cardamom. Although the report has mentioned that there exists a bias for studying and supporting few favored products or commodities namely tea, cardamom and ginger but less attention is paid to improving quality and marketing issues. The report thus presents that, changes in cropping pattern is experienced and the major cause of this is climate change and this issue needs detailed examination.

2.6 Agro-Climate requirements for cardamom cultivation

ANSAB. (2009), states that Cardamom is cultivated in an altitude range of 600m to 2000m above sea level where annual rainfall is between 1,500 mm to 2,500 mm and

temperature varies from 80c to 200c. According to (Ansari et al 2055B.S), shady areas are appropriate for cardamom cultivation. Temperatures between (15-25)0c and annual rainfall of (2000-2500)mm is required. Trees should be planted in the cardamom cultivation area since they protects the plant from extreme sunlight and fog.

Niraula, (2051). mentions that moist and shady areas are appropriate for its cultivation. Its cultivation is done in the sloppy areas. Even though its cultivation can be done at the altitude between 1800 to 6700 feet, from a business point of view, it is appropriate to cultivate this crop at the altitude between 3000 to 5000 feet.

Cardamom requires cool shade and abundant moisture in the soil but it does not tolerate water logging. Ranjit et al, (1975).

Sharma, (1999). states that elevation, moisture and shade are the fundamental factors for successful cultivation of cardamom. Hence, the cardamom area mainly lies in the higher elevations of the eastern mountains of Nepal.

Sharma, (2006). mentions that the large cardamom is a perennial cash crop grown beneath the forest cover on marginal lands. It is widely cultivated under the nitrogen-fixing Himalayan alder (*Alnus nepalensis*), a practice modified by people to maintain soil fertility and increase productivity.

Sharma et al, (2000). mentions that Large Cardamom, A plant native to Sikkim Himalaya has been a boon to the mountain people of the area. It is a perennial cash crop grown beneath the forest cover on marginal lands.

2.7 Economic benefits of cardamom cultivation

Cardamom cultivation requires no external inputs. A high-value, low volume crop, which can be stored for sometime, is comparatively easy for slope land farmers to market and its cultivation is contributing to the upliftment of socio-economic status of the farmers. FFTC, (1998-2007).

Jimee, (2053). has concluded that cardamom cultivation is flourishing especially in eastern part of Nepal and the living standard of the cardamom farmers have been gradually rising.

Limbu, (1996). believes that farmers are found to distribute their incomes from cardamom to the various sectors such as education, medicine, food, clothing, and in religious matters in Morang VDC .

Niraula, (2051). believed that cardamom farming could be a major source of getting foreign currency into the country. It has great value in Ayurvedic medicine preparation. All the hilly districts are more or less conducive to cardamom farming. Besides, cardamom cultivation has increased employment opportunities while it restricts the migration from hill areas to Terai.

Ranjit et al, (1975). in their field document have reported that cardamom cultivation has increased the economic status of the cardamom farmers. Cardamom is a very important cash crop because of its demand and high market value it commands. According to Sharma, (1999). large cardamom cultivation has played a vital role in the economy of eastern hilly regions such that it is a purely exporting commodity for earning foreign currency.

Sangraula, (1989). believes that cardamom farming can be a major source of getting foreign currency into the country. He states that hilly districts are more or less possible for cardamom farming. It restricts the migration from hill to Terai. Similarly Sharma, (2006). has also mentioned that the net income from large cardamom is higher than from other cash crops throughout the period. The income from the large cardamom has been substantially higher than for other livelihood options. It has been the boon to the people of Sikkim for a very long time.

2.8 Role of cardamom cultivation in biodiversity conservation

Buckingham. (2004), Cardamom requires partial shade and cool temperature so for these reasons farmers utilize forests for its cultivation. According to the University of Edinburgh. (2005), cardamom cultivation requires that the farmers select a suitable forest patch, clear the lower levels of vegetation and replace them with cardamom plants. Once the cardamom plants are fully grown, the farmers must continue to weed the area, removing all other competing vegetation, preventing any natural reproduction of the forests. 23

Fernando, (2003). says that the correlation between cardamom and the lush green forest is ironic. Cardamom is undergrowth, which needs the shade of forest canopy for its survival. However, the cultivation necessitates clearing of the shrubs and undergrowth, which prevents the growth of saplings of the large canopy trees. Again, the fuel wood for kilns used for cardamom's processing is another contributory factor to the forest.

MoAD, (2015). has presented the trade flow analysis of large cardamom in eastern Nepal. The research has been conducted in five districts of eastern Nepal namely: Ilam, Panchthar and Taplejung. The research has production situation, cost benefit analysis, marketing situation of cardamom in those five districts. Similarly, it has also explained export and import analysis and cardamom price and price trends. The research has presented that highest productivity was found in Taplejung among the three sample districts. The study also revealed that diseases and pests were the most prioritized problems by the farmers. The research has concluded that lack of cardamom policy has currently caused misunderstanding and thus signals towards cardamom policy development. More specifically, the research has directed towards Indian border laboratory, uniform state taxation and insurance systems to be addressed by policy. Bhattarai, (2016). explains the effectiveness and obstructions faced during the farming of cardamom. He believes that the main efficacies of the crop were 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. The drawbacks of the crop included diseases, lack of disease free saplings and seedlings, price fluctuations, drying of water sources for irrigation, and lack of government support in its cultivation and marketing. However, the paper has postulated that suitable climate, rainfall, temperature range, export performance, tariff advantages, and availability of varieties were the impediments of the crop. The author has mentioned that, use of marginal land is the main strength of the crop which would have gone useless or else and that the crop has negligible opportunity cost of land. The paper has thus concluded that the crop could do better if efforts were made by the stakeholders in overcoming the obstacles especially by the government regarding disease prevention.

Gautam, Bhattarai, Khanal, & Oli, (2016) have explored the chemistry, technology and bioactive properties of the cardamom. The paper has stated that Nepal is the top producer of cardamom and that eastern region of Nepal accounts for 97 percent of the total national production. The paper also manages to state that although accounting for most of the production, cardamom also suffers from diseases most of which are of viral and fungal origin. The paper has presented that the diseases occur mainly because of radical change in climate, inadequate rain in dry months and absence of good agricultural practices by the farmers. The paper also has presented various uses of the product and various phases of packaging as well. The paper has concluded that

development of commercial and advance process for the treatment and production systems and their possible allopathic and industrial applications are some of the major challenging issues faced in cardamom farming. The paper has also suggested that agro-economic perspectives must be focused on market expansion and market values during large cardamom research and development.

2.9 Marketing

Marketing on the other hand, plays a very important role to determined foreign export from Nepal. Marketing of cardamom was not suitable of Nepal since the very beginning because it was directly affected by the Indian market. APROSC conducted a study 1987 in Ilam district has remarked that of existing system of cardamom marketing is not in favour of the producers. Local money lenders are the one who harvest the benefits, producers and compelled to sell the crop at predetermined price immediately after the harvest because of the advances they receive from the lenders. Due to the inadequate storage facilities, small producers cannot with hold the produce for long for a better price, since the crop in poor and unscientific storage could be damage by the insects (APROSC 1987). Furthermore, the report has mentioned market prospect and price in the crop has limited domestic market but has encouraging market in overseas countries and much of the product has been exported in recent years. Similarly, production of cardamom in Nepal is not so large compared to productions of the same quality cardamom grown in Indian and other countries and it is thought that increases in cardamom production in Nepal could have a negligible effects on price of the cardamom in the international market.

Export promotion centre also added that utility of cardamom and ginger both are kept in spices. Spices are dried aromatic vegetable product used for seasoning and flavouring matters. Due to the presence of essential oil, they consist of properties of aroma, preservative and antiseptic. It can be used for liqueurs medicines and also in perfume. Among the spices of Nepal cardamom and ginger are the most important spices which are exported to overseas countries.

The international trade centre has mentioned (1992) about the different spices of the world and their production in terms of consumptions and its price. These spices include cardamom turmeric, chilies, pepper, ginger etc. The report noted that spices are traded in a variety of forms. It is estimated that over 90% is treated internationally as the whole form of the ground paprika, spices, mixture and curry

powder. The survey further added that the importance of spices differs from the importing to another. Moreover the survey conducted as providing mentioned Nepal, Bhutan, Sikkim, about 1000 tons each.

Along with international trade centre has referred in terms of import. Kuwait is one of the largest importer of spices in the world. Annual import average 1850 tonne of which some 33% consist of cardamom. Not only cardamom other spices are imported i.e. pepper, cassia, ginger, turmeric spices seeds being relatively prominent with annual imports from varying 50-150 tonnes each.

Cardamom has an agreeable aromatic dour and is largely used for flavouring and medical purposes. In the eastern countries it is chewed with betel leaves in northern Europe particularly in Sweden, Norway, Germany and the former USSR. The cardamom seeds are powdered and widely used for flavouring cakes and pastries and for the culinary purposes.

2.10 Diseases and their management in large cardamom

a. Rhizome Rot

Rhizome rot is caused by fungus *Pythium vexans*, *Rhizoctonia solani*, *Fusarium spp.* Cardamom clumps have often been found to suffer from a disease which results in gradual decline in vigor of the plants. A number of fungi appear to be involved in the rhizomes and root-rot of cardamom. The infection starts from the joint part of Pseudostem and Rhizome. After infection leaves turned to yellow color and soon dried. Pseudostem of infected bush cracked and produced thick tillers. These tillers unable to grow and starts to rot from the tip. Bright sunlight after a heavy rain stimulates to rot in a faster rate.

b. Chirkey and Furkey Disease

Chirke and Furke both are viral disease of large cardamom but shows dissimilar symptoms in plants. Chirke shows the symptoms on leaves and pseudo stem but Furke shows the symptoms on upcoming new pseudostems/suckers. These diseases can be differentiated by their symptoms on cardamom plants.

Chirke: The symptom of chirke disease are delineate by streak. Mosaic on the tender leaves with dark green streaks in the light green background of the lamina. In the rigorously affected plant the mosaic streaks coalesce and the leaf gradually turns brown and dries up subsequently. The affected clumps produce less number of flowers and cause serious yield loss. The loss was found up to 80-85%.

Furke: Pronounced stunting and formation at numerous minute tillers which fail to form inflorescence. The tillers do not grow beyond a few inches in height and appeared bushy. Yield loss found up to 94%. Furke disease do not affect other plants and limited to cardamom only.

2.11 Major problems in large cardamom farming in Nepal

Constraints declination in the production of large cardamom in the recent years has caused a negative impact on the trade in India. Sharma et al., (2009). Improved curing methods need to be popularized because of their better quality capsules however, the constraint lies in their high installment cost for the growers. Improper grading due to lack of grading machines has also caused farmers to obtain lesser price in the market. Unorganized Marketing channel for selling quality capsules have also become a limitation. MoAC, 2008; Sharma et al., (2009).

As per the MoAD report 2015, in last 15 years only the production area and the number of the farmer has been increasing in Nepalese cardamom farming. But compared to that, production remains fluctuating in fact it is in decreasing trend from last 3 years. Consequently, production yield which measures the total production quantity per hectare has gone down from 0.61 to 0.45 (KC & Upreti, 2017). The selling price of large cardamom has gone down from NRs 2,750 per kg to NRs 1,350 per kg in last year. Kathmandu post, (2016). Apart from price and quantity, there are numerous problems which are indirectly faced by Nepalese cardamom farmers and these are the causes which lead to the declination in Price and Quantity of large cardamom in Nepal.

Furthermore, farmers have very limited access to the information related to cardamom farming. Such as price, quality, technologies, facilities, grants and so on. Moreover, communication between districts traders and farmers is also lacking. Therefore, sometimes local collectors are taking benefits over it. Less attention has been shown from the government side even though it has exciting and bright future which is also the other de-motivating factors for the farmers.

2.12 Drying technology of large cardamom

Traditional Dryers (Local Bhatti)

This curing system is constructed using mud and bricks. Raw cardamom capsules are spread over the drying platforms. Hot smokes from firewood are passed through the

capsules. The Bhatti operates with very poor operating thermal efficiency of the order of 5-15% resulting in wastage of huge quantities of fuel wood. The specific fuel consumption is in the range of 1-2.5 kg fuel wood per kg fresh cardamom. The drying is no uniform and produced poor quality, charred and smoky capsules. Constant attention is needed during drying for managing fire, maintaining low flame preventing fire hazards, and turning over the beds of capsules. Mande et al., (1999). There is also loss in the volatile oil content of the capsules by this method.

Drying of capsules in Local Bhatti: Local bhatties are the wood-fired dryers, which are built in the orchard. However, this traditional processing method causes blackening of the capsules and gives smoky flavor. Cardamom capsules are spread uniformly in a thick layer of 25-30cm on a bamboo mat placed over the frames of wood firing pit. Capsules are then dried by the combined effect of heat and smoke generated by the burning of wood. Drying process takes about 24 to 28 hours and frequent racking is made to get uniform drying. After uniform drying, the capsules are rubbed against the rough surface in order to remove the tail. The quality of cardamom capsules dried in traditional bhattis is poor and they have a dark brown color with a smoky flavor. There is a production of large quantity of burned, cracked capsules having less volatile oil in traditionally dried capsules. However, no scientific knowledge is required to build this kind of traditional bhattis. In the villages of producing areas, building, operation and management cost of bhattis is cheap and they are mostly constructed from locally available materials.

Improved Dryers

This is Flue pipe curing house. This system is developed by Indian Cardamom Research Institute, Gantok. This is an indirect system of drying and smoke does not come in contact with the produce at any stage. Flue pipe is connected to a fire place with an exit provided outside the building. The capsules are spread over the floor/shelves. When the firewood is burnt, hot air passes through flue pipes and capsules gets dried by the heat generated. Proper ventilation is provided to control temperature inside the room. Since smoke does not come in contact with capsules, its original maroon colour is retained fetching better price in the market. The capacity of this system varies from 200 to 400 kg of fresh capsules. Drying time is reported as 17-24 hours, volatile oil content of 2-2.4 percent. A cost of one unit is US\$ 102 (Deka et al., 2003). Few farmers in Arunachal Pradesh are using this system. Spices Board of India introduced it in Sikkim, but farmers are hesitating to utilize it due to high

installment cost.

Drying of large cardamom in improved bhatties: In this bhatties, there is use of heat in the absence of smoke in improved dryers, they give more natural color and better-quality product than traditional method. Department of food technology and quality control (DFTQC), Nepal has developed six drum dryers containing two sections-firing and drying sections for more efficient and effective drying of cardamom capsules. These sections are enclosed in a wall made of stone and mud and the whole assembly is kept under the enclosed covered structure. The capacity of this dryer varies from 360 kg to 400 kg of fresh cardamom and the drying time is reported to have 24 hr reported that in the improved method, cured capsules are dried into two stages, at 60°C and 55°C respectively to get the desired moisture content (approx. 10-12%). The content is then cooled, cleaned, tails are removed and capsules are graded according to their size. Those capsules are packed in jute bags (waterproof lined with polythene) and stored in dry places.

Solar dryer

This system was designed at College of Agricultural Engineering and Postharvest Technology, Central Agricultural University, Ranipool, Sikkim. On an average 55.7 percent of higher temperature was obtained in the solar dryer over the ambient temperature. It takes 24 hours (3 sunny days) for curing of capsules than open sun drying which takes 48 hours to obtain the same level of moisture contents resulting in a net saving of about 50 percent of drying time for the solar dryer in comparison to the open sun drying (Gatea, 2011). This solar drier would definitely help to prevent the deforestation by saving the precious forest wood for drying of large cardamom in comparison to the traditional drying of large cardamom in the “traditional furnace” in India. Seveda & Jhalaria, (2012).

Electric dryer

Electric dryer contains mechanical trolley system operated by diesel or electricity. This curing system consisting of a blower, a heating unit, and a multi-tray curing chamber which is similar to a mechanical cabinet tray dryer. This system works effectively and produces high-quality dried capsules. Its capacity is 600 kg and curing time is 12 hrs.

Low cost modern dryers for large cardamom

A major component of this modern cardamom dryer is the wood combustor, which generates clean and hot gas for direct heating and drying of large cardamom raw

capsules in cardamom growing areas. The combustor burns firewood completely in a smoke-free environment and reduces wood consumption by 75% as well as shortening the curing period, thereby improving the quality of the dried cardamom. A roughly 45% increase in the essential oil content of cardamom dried this way is observed over cardamom dried using traditional methods. The dryer can also be used for drying of other spices such as chilli, ginger, garlic, etc.

CHAPTER-III

RESEARCH METHODOLOGY

3.1 Research Design

The descriptive and exploratory research designs were used in this study to accomplish the study's aims. It was used to attract people to the study area using an exploratory approach. The data were gathered by a field survey, which is the primary source. The information were evaluated in both a descriptive and analytic manner. A case study will also be conducted for the household survey.

3.2 Sampling Procedure

This study were applied purposive sampling for area selection, where as sample population of the study were selected on the following basis. The selected area of Phungling Municipality Ward No. 11 was the universe of the Study. There are four hundred twenty households and one hundred ninety households are engage in Cardamom Farming among them forty households are respondents were selected for the Study using sample random basis. Focus group discussion was held on entrepreneurs.

3.3 Source of Data Collection

This study draws to explore the cardamom cultivation activities in the study area. To get its accurate result, primary sources from the area and secondary sources from the related books, reports journals and websites documents and scholarly published and unpublished articles were the sources of data

3.4 Data Collection Sources and Tools

3.4.1 Household Survey

To generate the actual data firstly, the study area questionnaire tools were applied to sample household. It was both opened and closed questions according to the capacity of respondents. Similarly structured questionnaire was prepared to generate the realistic and accurate data from the respondents. The respondents were requested to fill up if they could and if they could not their answers were filled up by researcher.

3.4.2 Field Visit and Observation

Each household and respondent selected on the sampling were visited and observed frequently during the study, field visit and observation was conducted participative and unconstructive to the local people. The researchers were also visited to the study area.

3.4.3 Key Informant Interview

Since this study is based on the exploratory in nature key informant interview were held to those people who were informed with this site and activities. The key informants of this study were cardamom farmer .

3.4.4 Focal Group Discussion

To accumulate more information for the study, group interactions on the topic was collected by (Group Discussion) G.D. The main objective of discussion was to obtain more detailed information about the activity of cardamom in Phungling area.

CHAPTER- IV

DATA ANALYSIS AND PRESENTATION

4.1 General Information of the Study Area

Formerly Taplejung Municipality is a new municipality formed on 25th Baisakh 2071 according to the decision of the Government of Nepal. Currently Taplejung Municipality has changed its name to Phungling Municipality. It is the only municipality in Taplejung District. Phungling Municipality is located in Taplejung District in the Koshi province Nepal.

4.2 Occupation and Source of Income

Main occupation of the people is agriculture and hence most of them are peasants. Major source of income source is agro products. They are self depended on their agriculture based society. But now a days they are changing their profession and occupation through employments, business and so on.

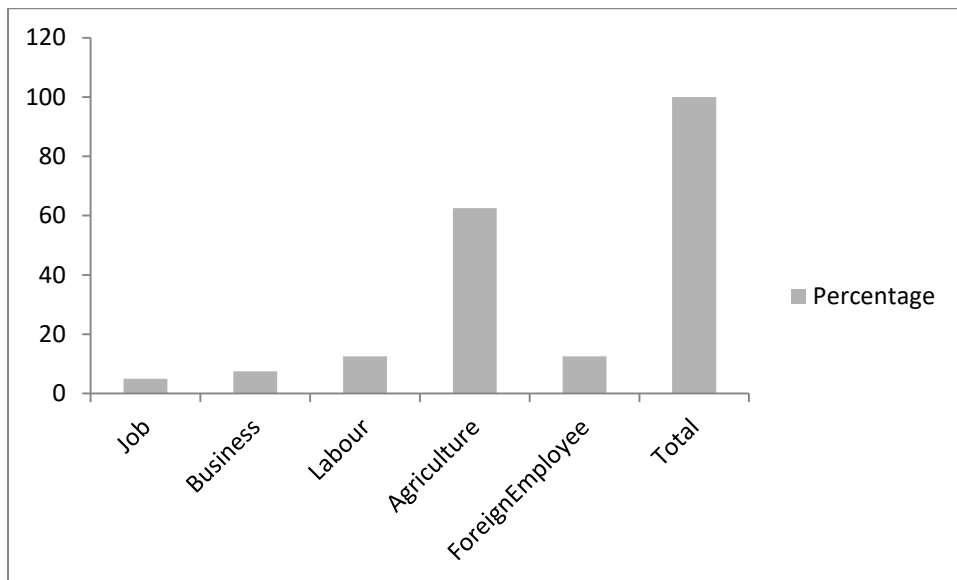
Table No. 4.1 Occupation and Source of Income

Occupation	No. of Respondents	Percentage
Job	2	5
Business	3	7.5
Labour	5	12.5
Agriculture	25	62.5
Foreign Employee	5	12.5
Total	40	100

Source: Field Survey, 2023

The table no. 4.1 shows that the most of the people interviewed were involved in agriculture making agriculture a major profession in Phungling 11 with majority of respondents involved in agriculture. After agriculture, foreign remittance and labour was the major source of income. And, business, and job professions are major source of income.

Fig. No. 4.1 Occupation and Source of Income



4.3 Land Ownership

As agriculture is the main occupation of Nepalese. But the cultivation pattern a little bit different as found in nationwide cultivation pattern, that is, several studies have shown that farmers do not get their own land for cultivation rather landlords occupies most of the land and farmers get land in rent. But in this study area, cultivation pattern in land is done by own landowner.

Table No. 4.2 Land Ownership of the Study Area

Ownership	Respondents	Percentage
Cultivated by Own	35	87.5
Rented	5	12.5
Total	40	100

Source: Field Survey, 2023

Table no 4.2 demonstrate that among the sampled households, 87.5 percent of household cultivate their own land, 12.5 percent of sampled household cultivate land taking in rent.

4.4 Average Annual Production of Cardamom

Table No. 4.3 below shows the data about the annual average production of Cardamom in the sampled wards.

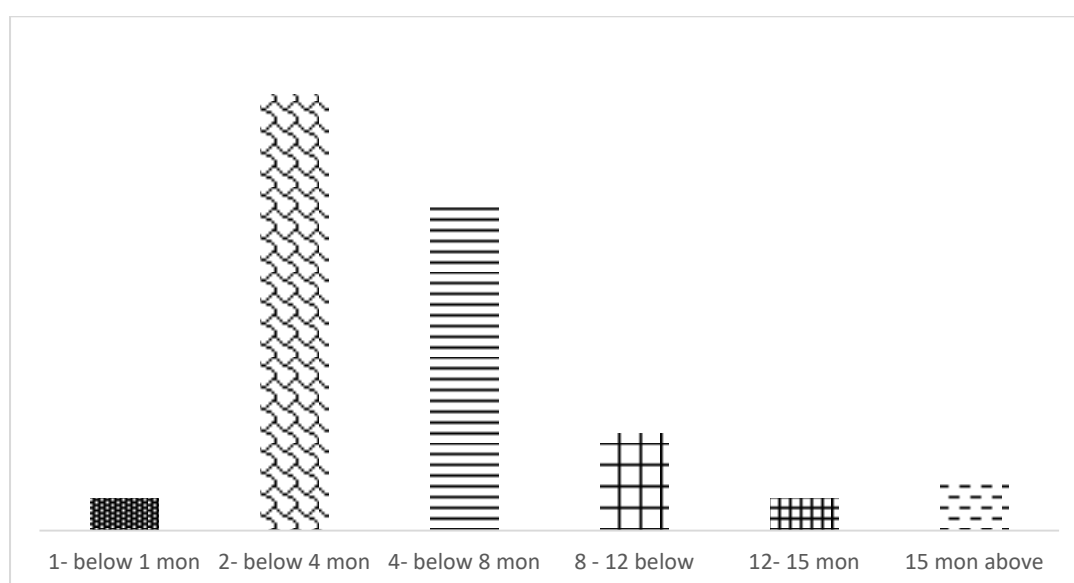
Table No. 4.3 Average Annual Production

Production	No. of Respondents	Percentage
1- below 1 mon	2	5
2- below 4 mon	15	37.5
4- below 8 mon	12	30
8 - 12 below	6	15
12- 15 mon	3	7.5
15 mon above	2	5
Total	40	100

Source: Field Survey, 2023

The table no. 4.3 shows that the annual production of cardamom according to the respondents of the study area is 2 - 4 mon ie is 37.5 percent, likewise 4 - 8 mon is 30 percent, 8 - 12 mon is 15 percent, avove 15 mon is 7.5 percent , 12-15 mon is 5 percent and 1-1 mon is 5 percent.

Table no. 4.2 Average Annual Production



4.5 Training Received for Cardamom Cultivation

Earlier, there were few farmers who received training, now the numbers of farmers who receive training related to cardamom cultivation is gradually increasing.

Table no. 4.4 Training received for Cardamom Cultivation

Response	Yes	55%
	No	45%

Source: Field Survey, 2023

Table no. 4.4 reveals that the 55% of respondents were getting any sorts of training through government project of Nepal or NGOs and rest of them 45% were not getting.

4.6 Land type and holding

The land available at the research site was categorized into two categories based on their use namely khet land, pakho land. Khet land denotes the low land which has the irrigation facility and rice is transplanted; the upland where rice cultivation is not possible is categorized as pakho land where finger millet, rainy season maize, coffee and other plantation crops like Guava, Papaya are the main crop.

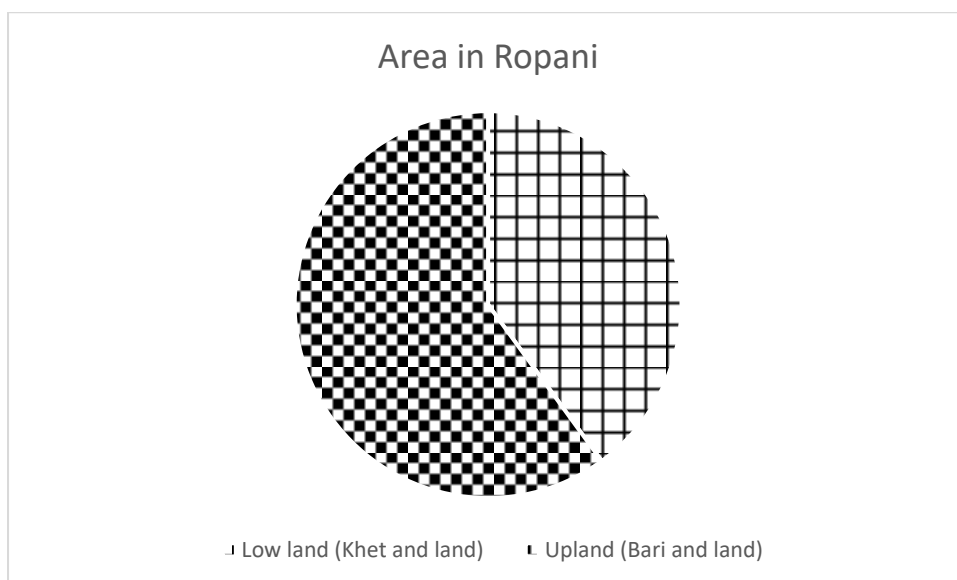
Table no. 4.5 Land type and holding

Land type	percent
Low land (Khet land)	40
Upland (pakho land)	60
Total land	100

Source: Field Survey, 2023

The table no 4.5 shows that the 60 of the land is bari type, all the farmers prefer bari land to plant the coffee. Most of the farmers finished land by planting coffee. They are thinking to plant coffee in community forests in group, for that they need permission from government. In low land or khet type, no one plants the coffee. They thought it is only for rice because khet is irrigated and productive land.

Fig. no. 4.3 Land Type and Holding



4.7 Types of Diseases Cardamom Farming

One of the main reasons behind reduced production of cardamom in the study area might be due to the problem caused by the diseases in cardamom plants. Diseases like Chhirke, Furke, Jhusilkira, Ganokuhine and Dadhuwa were found to be affecting cardamom plants in the study area.

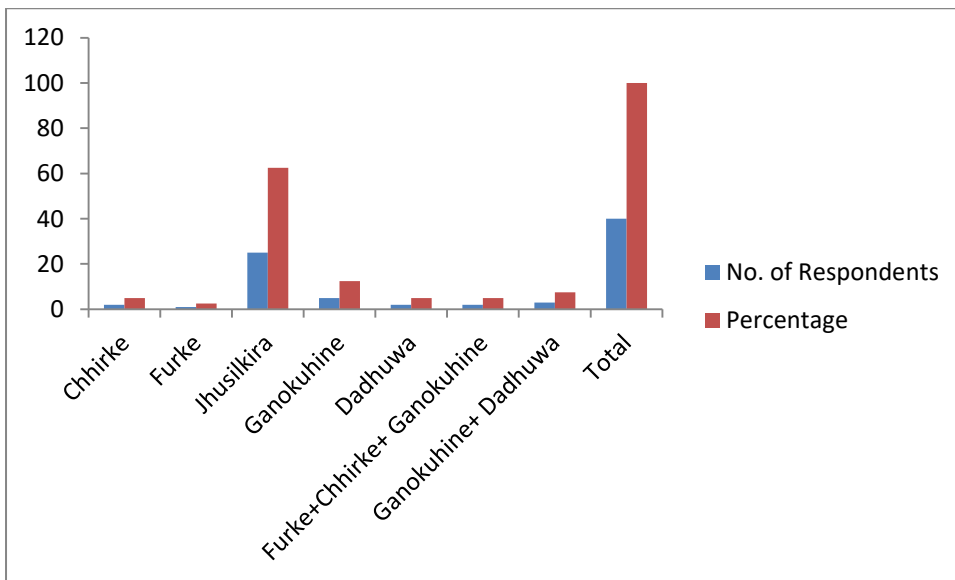
Table no. 4.6 Diseases Existed in Cardamom Farming

Name of the Disease	No. of Respondents	Percentage
Chhirke	2	5
Furke	1	2.5
Jhusilkira	25	62.5
Ganokuhine	5	12.5
Dadhuwa	2	5
Furke+Chhirke+ Ganokuhine	2	5
Ganokuhine+ Dadhuwa	3	7.5
Total	40	100

Source: Field Survey 2023

The table no, 4.6 shows that the 62.5 percent diseases in Jhusilkira, 12.5 percent Ganokuhine, 5 percent in Furke+Chirke+Ganokhine, 7.5 Ganokhine+Dhduwa, 2.5 percent Furke, 5 Dhaduwa and 5 percent Chhirke are found as a main diseases.

Fig. no. 4.4 Diseases existed in Cardamom Farming



4.8 Education Status of the Respondents

Education is the process of facilitating learning, or the acquisition of knowledge, skills, values, beliefs, and habits. Educational methods include storytelling, discussion, teaching, training, and directed research.

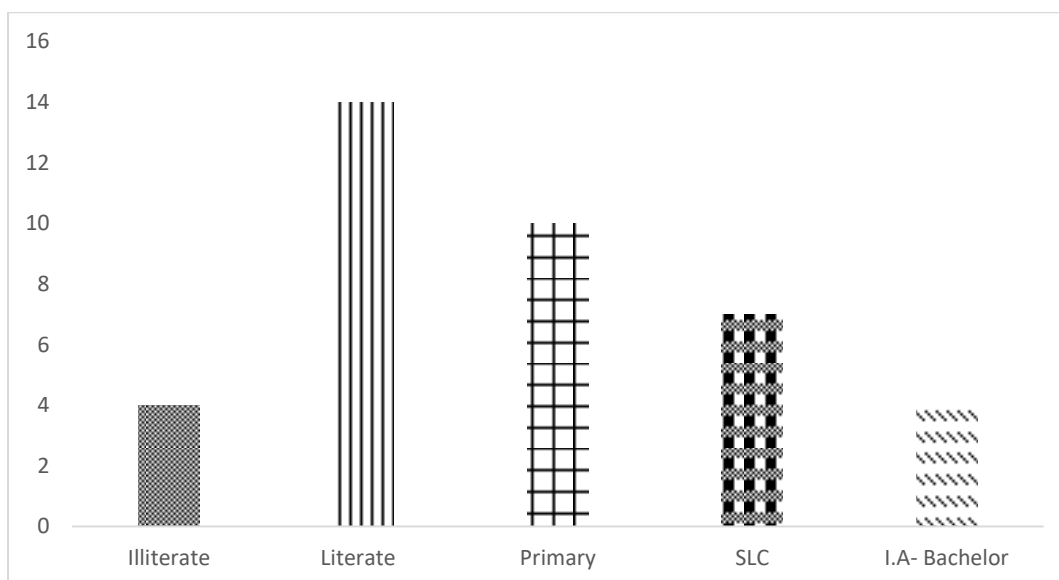
Table no. 4.7 The Education Status of the People.

Level	No. of Respondents	Percentage
Illiterate	4	10
Literate	15	35
Primary	10	25
SLC	7	17.5
I.A- Bachelor	4	10
Total	40	100

Source: Field Survey 2023

The table no 4.7 shows that the 10 percent are illiterate, literate are 35 percent, primary 25 percent, 10 to SLC Level 17.5 percent, Bachelor Level 10 percent. The education status of the people is varies in different level but the literacy rate is overall more in the study area. All the people of the study area are belonging different level of study area.

Fig. no. 4.5 The education status of the people.



4.9 Earnings

Earlier it was branded as the business of rich people who owns cardamom plantations in hundreds of acres. But nowadays many farmers with small area of agricultural land are also doing cardamom farming.

Table no. 4.8 Annual Income of the Respondents.

Level	No. of Respondents	Percentage
100000- below 200000	6	15
200000- below 400000	6	15
400000 - below 600000	10	20
600000- below 800000	5	12.5
800000 - below 1000000	4	10
1000000- below 1200000	4	10
1200000- below 1400000	3	7.5
1400000- above	2	5
Total	40	100

Source: Field Survey 2023

The table no. 4.8 shows that the 10,000 to 200000 lakhs respondents are earning to 10 percent, 20000 to 400000 lakhs 5 percent, 400000 to 600000 lakhs 20 percent 600000 to 800000 12.5 percent, 800000 to 100000 lakhs 10 percent 100000 to

1200000 10 percent, 1200000 to 1400000 lakhs 7.5 percent and above 1400000 are 5 percent.

4.10 Communication Facilities

Weaknesses are also seen in marketing and trade as lacking of Auction

Table no. 4.9 Communication Facilities of the Respondents.

Marketers	No. of Respondents	Percentage
Local market	30	75
Wholesaler	4	10
Money lender of village	2	5
Others	4	10
Total	40	100

Field Source: Field Survey 2023

The table no. 4.9 shows that the 75 percent people are purchased the big cardamom in the local market, money lender of village and otehrs. Farmers received credit from local businessmen and moneylenders of the village before the period of harvesting to fulfill their necessities, the farmers were compelled to sell the cardamom to the local market at a pre-fixed rate.

4.11 Drying Method (Bhatti)

Table no. 4.10 Darying Status of the Respondents.

Modern Bhatti	Traditional Bhatti
30%	70 %

Source: Field Survey 2023

Seventy percent of households used traditional dryer (bhatti) for drying cardamom. This technique consumes much more firewood than the modern dryer, and the quality of the cardamom also degrades when the traditional dryer is used. Under this system, the cardamom comes in direct contact with the smoke and turns the capsule to a dark brown black color with a smoky smell. Thirty percent of households use modern bhatti they started to use modern bhatti to subsidy of Prime Minister Agriculture Modernization Project.

4.12 Species of Cardamom

The type of large cardamom cultivated in Fungling of Taplejung District of Ward no.11 3 varieties were cultivated in small scale. Ramshahi and Chibesai was found to be the most popular species among farmers in these ward as it was supposed to give little more production compared to other varieties. Topography and climatic conditions are the factor that determines the species of cardamom to be cultivated and in these Municipality the climatic condition and topography favored the cultivation of Ramshahi and Chibesai species.

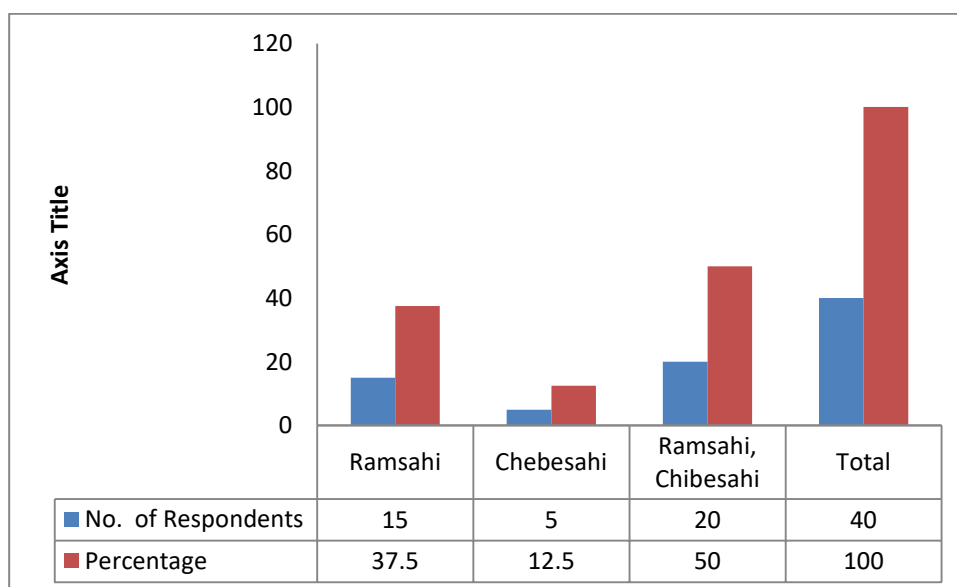
Table no. 4.11 Species of Cardamom

Species	No. of Respondents	Percentage
Ramsahi	15	37.5
Chbesahi	5	12.5
Ramsahi, Chibesahi	20	50
Total	40	100

Source: Field Survey 2023

The table no. 4.11 shows that the 37.5 percent respondents said that Ramshahi, 12.5 percent are said to be the Chebesahi, 50 percent are Ramsahi, Chibesahi Generally Two species of cardamom were cultivated, which were Ramshahi and Chebesai.

Fig. No. 4.6 Cultivated Species of Cardamom



4.13 Major Crops Cultivated Besides than Cardamom

The table below presents the percentage of sample involved in major crops farming.

Table 4.12 Respondents Involved in Various Crops Farming

Crop	No. of Respondents	Percentage
Cardamom	8	20
Tea	2	5
Ginger	3	7.5
Vegetable	6	15
Paddy	4	10
Amliso	6	5
Corn	5	12.5
Redchilli	4	10
Mushroom	2	5
Total	40	100

Source: Field Survey, 2023

The table no, 4.12 shows that the majority of the respondents have grown cardamom in Taplejung district . After cardamom, farmers were involved in corn farming i.e 12.5 percent of the farmers. Likewise, tea, vegetable and paddy were the other crops cultivated by the farmers respectively. The reason behind cardamom being the first choice for farmers is because of the increasing demand of nepali cardamom in international market and attractive return farmers get, although, the price has been decreasing as of recently.

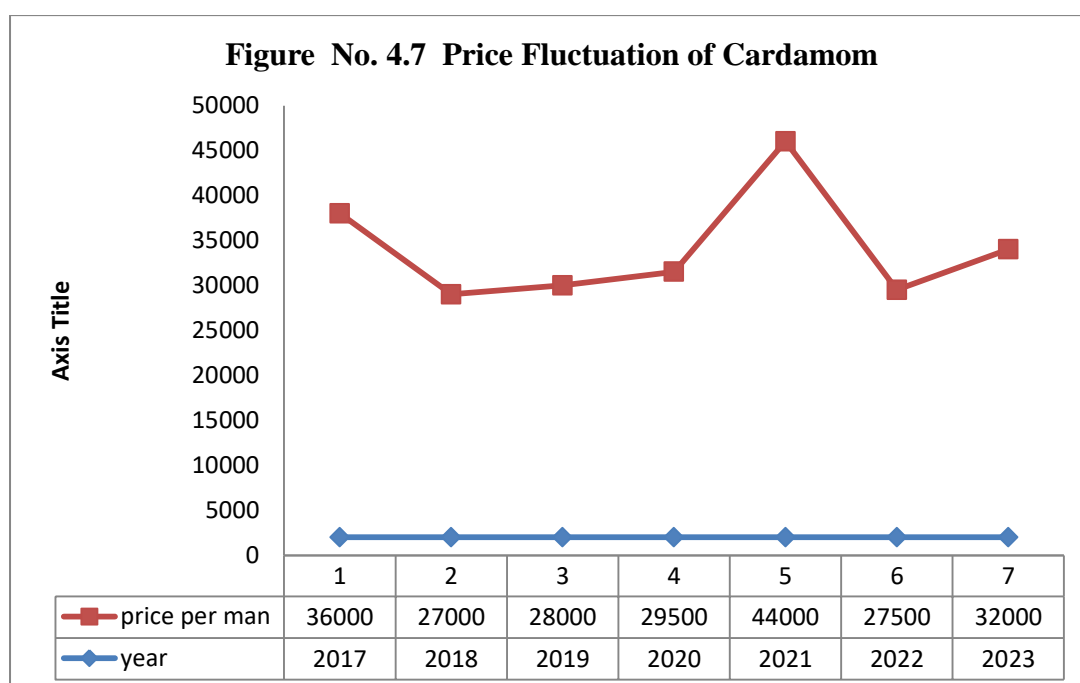
4.14 Average price of Cardamom from 2017

Table no. 4.13 Agerage price of Cardamom from 2017

Year	Average Price Per mon
2017	36000
2018	27000
2019	28000
2020	29500
2021	44000
2022	32000

Source: Field Survey, 2023

The table no 4.13 shows that the price fluctuation of cardamom per man over the years 2017 to 2022. In 2017, the price of cardamom per mon was 36,000, which dropped significantly to 27,000, in 2018. However, in 2019, the price increased to 28,000. In 2020 there was a further increase in the price of cardamom, which reached 29500 per mon. The year 2021 saw a significant spike in the price of cardamom, which reached 44,000 per mon. This was a sharp increase from the previous year. In 2022, the price of of cardamom dropped again in 32,000 per mon, which is still higher than the prices in 2018 and 2019 and 2020 but lower than the prices in 2017 and 2021. Overall, the table shows that the price of card highly volatile.



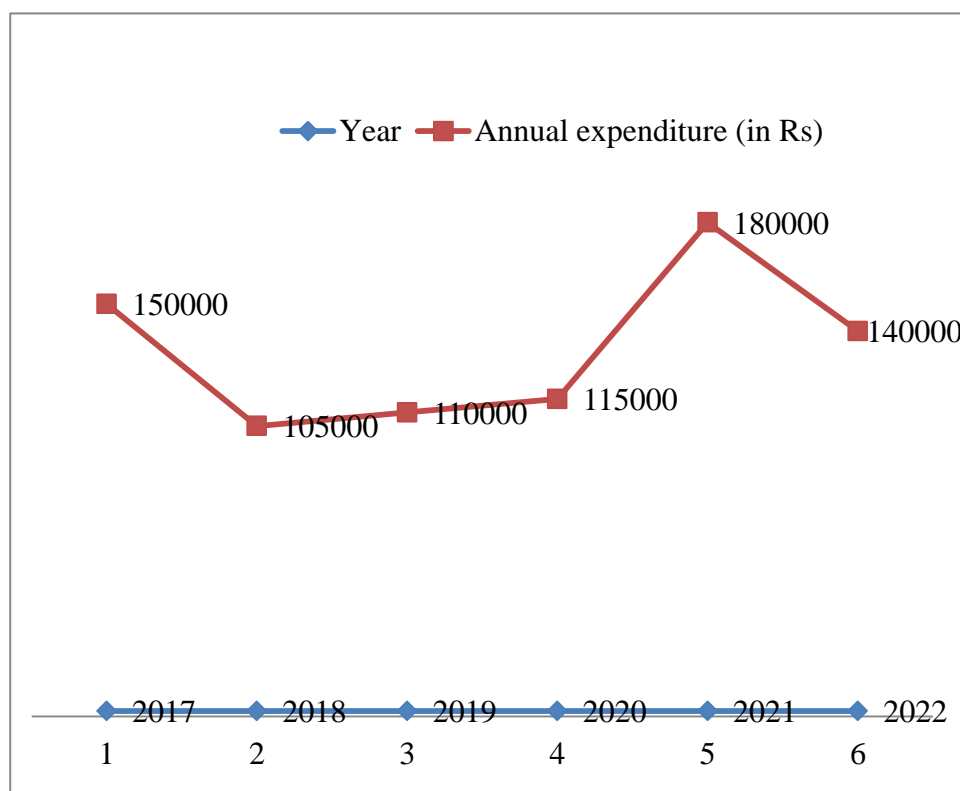
4.15 Households Average Annual Expenditure on Foodstuff

Table no. 4.14 Households Average Annual Expenditure of Foodstuff

Year	Annual expenditure (in Rs)
2017	150000
2018	105000
2019	110000
2020	115000
2021	180000
2022	140000

Source: Field Survey, 2023

Figure No. 4.8 Households Average Annual Expenditure on Foodstuff.



The table no 4.14 shows the average annual expenditure of households on foodstuff over the years 2017 to 2022. In 2017, the households spent an average of 150000 on foodstuff. In 2018, the expenditure dropped significantly to 105000, in 2019 increase 110000, in 2020 increase 115000. In 2021, there was a sharp increase in the average annual expenditure on foodstuff, which reached 180000. This was a significant increase from previous year. In 2022, Expenditure the expenditure dropped again to 140000.

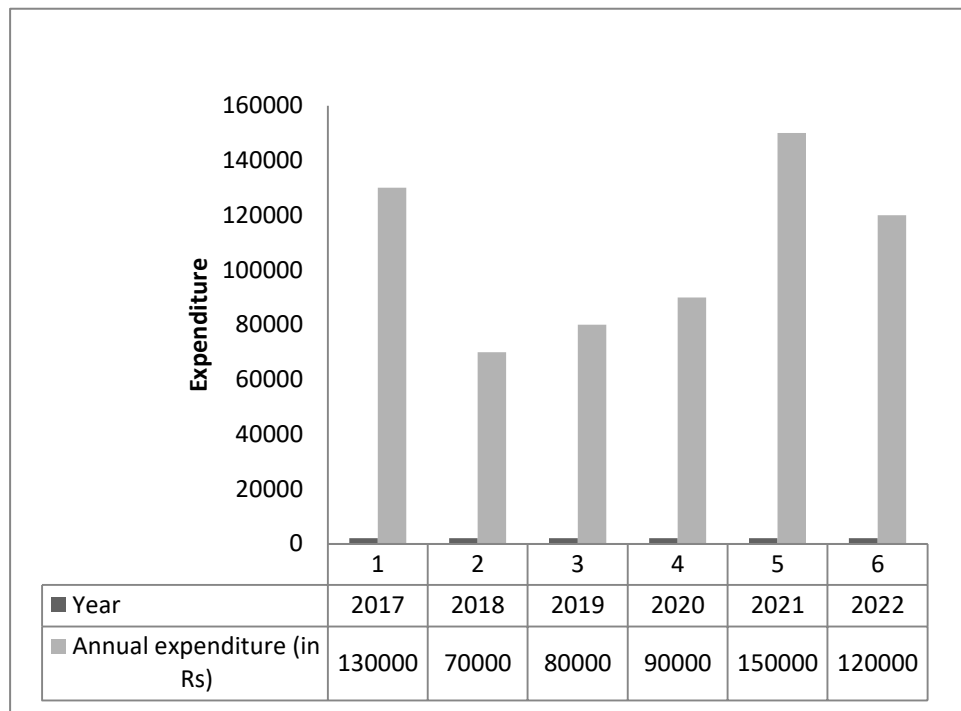
4.16 Annual Average Expenditure by Family on Education

Table no. 4.15 Annual Average Expenditure by Family on Education

Year	Annual expenditure (in Rs)
2017	130000
2018	70000
2019	80000
2020	90000
2021	150000
2022	120000

Source: Field Survey, 2023

Figure No. 4.9 Annual Average Expenditure by Family on Education



The table no 4.15 shows in 2017 families spent an average of rs.130000 on education which dropped to 70000 in 2018. In 2019 the expenditure increased to 80000 and further increased to 90000 in 2020. In 2021 there was a significant increase in the average annual expenditure on education, which reached 150000. This was sharp increase from the previous year. In 2022 the expenditure decrease to Rs 120000 per year.

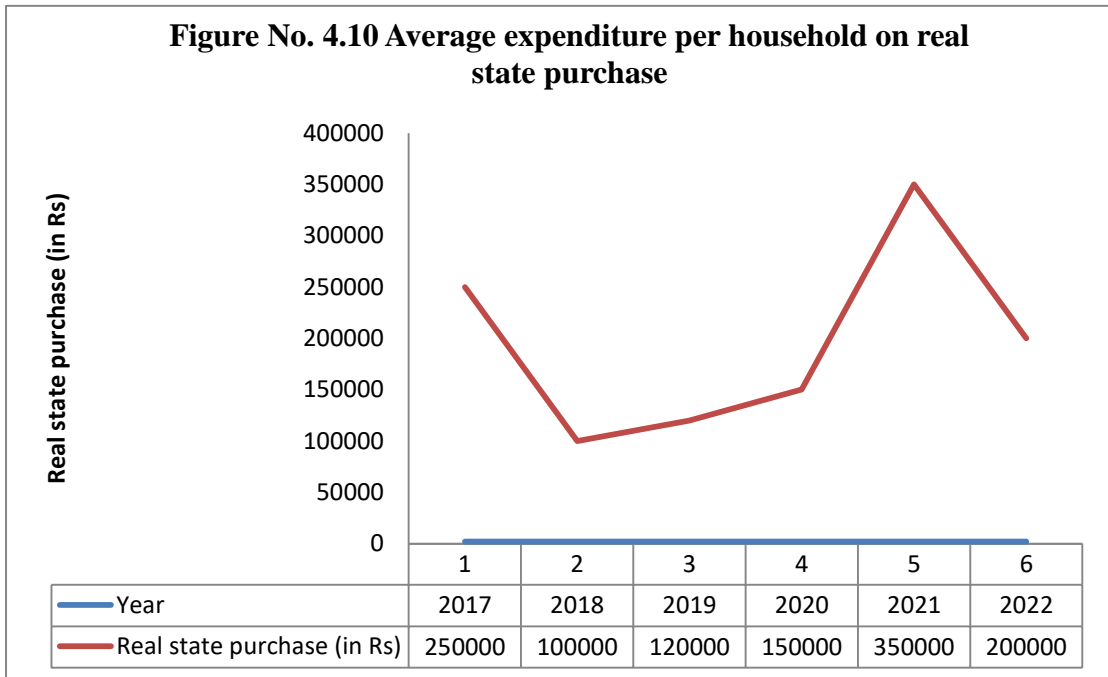
4.17 Average Expenditure per Household on Real State Purchase

Table no.4.16 Average Expenditure per Household on Real State Purchase

Year	Real state purchase (in Rs)
2017	250000
2018	100000
2019	120000
2020	150000
2021	350000
2022	200000

Source: Field Survey, 2023

Figure No. 4.10 Average expenditure per household on real state purchase



The table no 4.16 provided the average annual expenditure of households on real state purchase over the years 2017 to 2022. In 2017 the average expenditure per household on real estate purchase was 2,50,000, which decreased significantly to 1,00,000 in 2018. In 2019, the expenditure increased to 120000 and remained relatively stable at 1,15,000 in 2020. In 2021 there was significant increase in the average expenditure per household on real state purchase, which reached 350000. This was the sharp increase from the previous year. In 2022 the expenditure decreased to 2,00,000.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATION

5.1 Summary

Large cardamom, one of the important cash crops grown in Taplejung district, has a significant role on local livelihoods as it provides employment to thousands of people from farm to the market, direct contribution to household income, and poverty reduction. Cultivation of large cardamom has many indirect implications too as it is proved beneficial in reducing soil erosion and landslides, increasing biodiversity and carbon stock. Production of large cardamom has been declining in recent years because of different factors associated directly or indirectly to climate change. The decline in production of large cardamom not only affects producers' livelihoods but also the livelihoods of workers and traders as well. The adverse impact of climate change is clearly visible in some parts of the district with the decline in production of large cardamom. If this scenario continues and effective preventive measures are not taken, not only the livelihoods of people in Taplejung district become vulnerable and will have an adverse impact on the national economy. Identification and implementation of efficient diseases/pest control measures can help overcome the problems and help the sustainability of people's livelihoods based on large cardamom.

Nepalese laborers who went to Sikkim India for seasonal work brought some cardamom seedlings/suckers when they were returned back to home and started to cultivate. Therefore, it is believed that Sikkim is the place of origin for cardamom Adhikari, (2016). In the initial days, growing of cardamom is limited to some villages of Taplejung such as Phungling bazar. After few years the cultivation and transaction of cardamom was rapidly disseminated to others districts due to its high market value. However, planned development of large cardamom in Nepal at a government level was started in 1975 after the establishment of Cardamom Development Center at Fikkal Ilam. In the same year government disseminated 4 lacks cardamom variety named Kopinge, Rangbhang, Saune etc to the farmers of Ilam. In 1982, Taplejung Ilam, Panchthar and Terhathum districts were selected as cardamom development areas for the development of large cardamom in Nepal.

Taplejung District Fungling Municipality Ward No. 11, From the case study done there has been a fluctuation in the price of cardamom. Cardamom cultivation is the main occupation of people in the study area. From 2017 to 2022, the price has fluctuated. The fluctuations in the price of cardamom have affected the purchase of food, education and real state property of families in this area. When the price of cardamom is high, the expenditure on food and education has increased and the purchase of real state property has increased, while when the price is low, the expenditure on food and education has decreased and the purchase of real state property has also decreased. Cardamom cultivation area has increased with the help of government agencies. Fluctuations in prices in this area have a direct impact on people's lives. Buying luxury items when prices rise, due to the low price of cardamom, it has become difficult to meet the basic needs.

There is adverse relationship between cardamom price & productions. Cardamom producers are always exploited by cardamom buyers. The fluctuation in the market price directly affects the production of cardamom other hand there are various channels of cardamom collection in our country such as, the producer's local businessmen, dealers, wholesaler & exporters etc.

The benefits brought by cardamom cultivation dominate economic environment and social fronts. With regard to income, its position is placed in first. The economic return is always vacillating. Fluctuation is a result of production and price of cardamom. Cardamom brings forth not only income but also supplies other necessary materials such as fire wood, fodder, timber; pillar etc. more than 60% of fire wood is fulfilled from cardamom cultivation.

The cardamom of Nepal is still considered of interior quality, than of other countries because of unscientific method of drying system. Systematic and modernized drying system is concentrated in Taplejung as well as other district. The Nepalese cardamom is considered superior in volatile oil content. Nepal has to increase agricultural cash crops like cardamom to meet the rapid rate of growth of population, growing features industrialization, unfavorable balance of trade. The cardamom of Nepal is still considered of interior quality, than of other countries, because of unscientific method of drying system. Systematic and modernized drying system is concentrated in Ilam

as well as other district. The Nepalese cardamom is considered superior in volatile oil content. Nepal has to increase agricultural cash crops like cardamom to meet the rapid rate of growth of population, growing features of industrialization, unfavorable balance of trade which demand for the rapid growth rate of capital formation increasing awareness in economic growth. Therefore, the agriculture economy as such Nepal should a vital part in initial phase of economic development.

5.2 Conclusion

The study shows that the area under cardamom cultivation is increasing continuously the cardamom occupies higher position in terms of income than other agricultural crops. Cardamom growers of the study area are still suffering from many problems such as shortage of irrigation, lack of modern techniques and technicians, lack of sufficient loan facilities to the farmers, lack of improved seeds and chemical fertilizers and price fluctuation and unequal exchange to cardamom producers and cardamom buyers.

The general recommendation for minimizing the gaps in between, within and outside the practice and knowledge are listed as below, meantime social in order to minimize the social gaps, it entirely depends upon the society and the behavior pattern of the people living in the society. So, the recommendations are more focused for enhancing the practice and the knowledge and minimizing the gaps;

- This chapter provides a conclusion of the results of this study, and provides recommendations for the stakeholders concerned. This conclusion section also attempts to synthesize the results of specific objectives. The recommendations section consist of some fundamental recommendations to the stakeholders.
- Large cardamom (*Ammonum Sublatum Roxb*) is a major cash crop for Nepal. Its cultivation
- It has expanded to 39 Districts among which Taplejung district is one of the leading district in production of cardamom where 3,259 Hectare of land is occupied by cardamom farming. Cardamom has been in demand for both its aromatic and medicinal purpose.
- Monthly mean temperature of 300C in June, July to about 6 0C in December to January accompanied by constant relative humidity is very good for the

crop. Elevation, moisture and shade are the fundamental factors for successful cardamom cultivation. The limit of elevation for productive cultivation is from 3,000 to 6,500 feet.

- Among different species of cardamom, Ramshahi was popular in the study areas. 51.9% of the sampled households had cultivated Ramshahi as well as Chibesai while other varieties were cultivated in small scale. Plantation, intercultural operation, marketing and drying were the major areas of expenses for cardamom cultivation.
- The study shows that the annual income from cardamom respondents are earning to 100000 to 200000 lakhs 10 percent, 20000 to 400000 lakhs 5 percent, 400000 to 600000 lakhs 20 percent 600000 to 800000 12.5 percent, 800000 to 1000000 lakhs 10 percent 100000 to 1200000 10 percent, 1200000 to 1400000 lakhs 7.5 percent and above 1400000 are 5 percent.
- One of the main reasons behind reduced production of cardamom in the study area might be due to the problem caused by the diseases in cardamom plants. Diseases like Chhirke, Furke, Jhusilkira, Ganokuhine and Dadhuwa were found to be affecting cardamom plants in the study area.
- The type of large cardamom cultivated in Funling of Taplejung District of Ward no.11 3 varieties were cultivated in small scale. Ramshahi and Chibesai was found to be the most popular species among farmers in these ward as it was supposed to give little more production compared to other varieties. Topography and climatic conditions are the factor that determines the species of cardamom to be cultivated and in these Municipality the climatic condition and topography favored the cultivation of Ramshahi and Chibesai species.
- the price fluctuation of cardamom per man over the years 2017 to 2022. In 2017, the price of cardamom per mon was 36,000, which dropped significantly to 27,000, in 2018. However, in 2019, the price increased to 28,000. In 2020 there was a further increase in the price of cardamom, which reached 29500 per mon. The year 2021 saw a significant spike in the price of cardamom, which reached 44,000 per mon. This was a sharp increase from the previous year. In 2022, the price of of cardamom dropped again in 32,000 per mon,

which is still higher than the prices in 2018 and 2019 and 2020 but lower than the prices in 2017 and 2021. Overall, the price of cardamom highly volatile.

- There is a proportional relationship between the price of cardamom and the purchase of real state, expenditure on foodstuff and education the study shows in 2017 families spent an average of rs.130000 on education which dropped to 70000 in 2018. In 2019 the expenditure increased to 80000 and further increased to 90000 in 2020. In 2021 there was a significant increase in the average annual expenditure on education, which reached 150000. This was sharp increase from the previous year. In 2022 the expenditure decrease to Rs 120000 per year.
- More of the sampled household's cardamom farming was affected by diseases and due to the lack of knowledge to use pesticides they were unable to combat with these problems.
- Seventy percent of households used traditional dryer (bhatti) for drying cardamom. This technique consumes much more firewood than the modern dryer, and the quality of the cardamom also degrades when the traditional dryer is used. Under this system, the cardamom comes in direct contact with the smoke and turns the capsule to a dark brown black color with a smoky smell. Thirty percent of households use modern bhatti they started to use modern bhatti to subsidy of Prime Minister Agriculture Modernization Project. Compared to traditional crops, the income from cardamom was three to four times higher. An increase in income has enabled rural households to send their children to school who in the past had to work for household income needs but now they are in position to install solar electricity, bring piped water in addition to providing income opportunities to women and the landless during the harvesting season. However, despite the advantages, the farmers were not been able to reap the benefits due to some major obstacles like low quality cardamom due to the use of inappropriate drying techniques, narrow market base, disease and lack of capacity of the producers and traders to access, understand and capture overseas market which is further complicated by the lack of support from the policy makers and planners at the higher level.

- The cultivation of cardamom requires shade and cool temperature and for these reason it is cultivated in forest areas. Both community and private forest in Taplejung District is being used for its cultivation. Uttis in combination with other small trees to shade their cardamom plants and many other plant species like Sisnu (*Urtica dioca*), Chiraeto (*Swertia chiraiti*), Saplings, Banmara, Katus, Amliso (*Thysanolaena maxima*) and Unue were removed. Similarly wild animals and birds like Tiger, Bear, Deer and Jackle, Eurasian Tree Sparrow, Red-Jungle fowl, Barred Cuckoo Dove and Jungle Myna were also reduced by cardamom cultivation.
- Cardamom cultivation has also affected the numbers of livestocks as its leaves were harmful for animals and by reducing the grazing area.
- Finally, it can be concluded that though some constraints were associated with cardamom cultivation, from the socio-economic perspective, it was beneficial to the rural livelihoods but from the environmental aspect it has somehow affected biodiversity conservation thus leading to the demise of some species and creating monoculture in cultivation.

5.3 Recommendations

The following recommendations are presented to improve and expand cardamom cultivation in the study area.

Different kinds of research and study should be undertaken on cardamom cultivation. With the help of research it would be easy to find our problems and ways of solution for them

- Cardamom marketing system of Nepal should be made systematic. Nepalese cardamom market limited so it is necessary to search new market overseas. There is always fluctuation in the cardamom price. So government should be well prepared to interfere and fix price conducive to farmers.
- The fluctuation in the price of cardamom has had a major impact on the small farmers, it is difficult for the small farmers to buy the daily necessities when the price is low. The government should fix the minimum price and provide assurance.
- Due to the lack of industry, total cardamom production is export to foreign country and actual price cannot obtained by the farmers because of the several hands involved in this business. Therefore, it is necessary to established

industry using cardamom as raw material. Consequently farmers can get actual price and there will be possible to encourage employment services.

- Government should provide loan at a minimum rate of interest to improve cardamom plantation for farmers. Loan borrowing and paying system should be made easy.
- The improved Bhatties are to be set up for maintaining quality in cardamom.
- Many forest related Acts, rules and regulations like NBSIP (2006-2010), Forest Act 1993 and Regulation 1995, Herbs and NTFP Development policy 2004 have not specific provision for cardamom cultivation in Nepal. Therefore, national policies should develop policies for cardamom cultivation in Nepal. More skill development programs on cardamom farming should be focused and implemented regularly basis. An appropriate government policy, giving priority to cardamom farming addressing the issue related, financial support during the conversion period, creating linkages among the farmers, processor and traders, inspection and certification as currently farmer depends upon only one organization. Government should produce and/or trained technical manpower for the delivery of extension services for the production, processing and quality control in the farmer's level. The local government and provincial government should be responsible for the availability of disease free saplings to the grower farmers and emphasis should be given to the tissue culture.
- The emphasis should go on the improvement of the market facilities. Provision of the appropriate storage and information systems may earn communities greater benefits.
- When the cardamom producers are not fully aware of who the potential buyers are, they are paid much less price as compare to what an informed producer may be able to fetch. Thus an appropriate system is recommended to overcome the losses faced by the local producers. Government support to the farmers in terms of marketing their products is suggested because this can work as an incentive for the farmers to produce more.
- Lack of agriculture fund was another problem in the RM. Although loan and credit were provided by ADB\N it was not sufficient. The farmers were compelled to take credit from the moneylenders, which have exploited the

farmers. For this, both short term and long term loans need to be provided by the ADB\N. For this sufficient loan should be allocated in this sector.

- The existing diseases and pests have reduced the amount of production. Plantations were done by cutting rhizome, which is affected more by different diseases than planting. Addressing this requires strong technical support so the government should provide the facility for treatment otherwise, cardamom farming will be on the decline.
- The farming method was traditional in the R.M. Neither the farmers were educated nor were they assisted by J.T.A s. New techniques were not introduced to the farmers. The District agriculture development offices should arrange the trainings, seminars or workshops to train the Farmers.
- Processing of large cardamom and its storage should be modernized. Farmers dry the cardamom in local dryer, which doesn't prepare qualitative product. Thus drying, grading, packing, storing should be done using modern techniques and technical tools. Attention may be required by Government to find suitable ways to support farmers in ensuring biodiversity maintenance in the forest areas, which is now being used for cardamom cultivation. Government should provide an effective basis for collaborative management of forest resources between cardamom user groups and district authorities that supports local livelihoods and maintenance of forest biodiversity. Although government has made various provisions regarding cardamom in agriculture developing strategy and National Agriculture Policy, the provisions seem to be limited only in the paper. Its implementation is yet to be done. Provisions such as establishment of a survey/surveillance system shall be established and activated in order to assess (the impact) of excessive rains, droughts, diseases, insects and other natural calamities, and mobilize agricultural reliefs, and special emphasis to be laid on the farmer's training programs in order to improve the efficiency of farmers at the local level are enlisted in the agriculture policy of Nepal but in case of cardamom, these policies are nowhere to be seen. Thus, rather than deriving new policies, implementation of existing policies should be given due importance. Establishment of infrastructure like collection shed at local level and Auction market and Warehouse at main trading hub like Birtamod.

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Appendix -i

Questionnaire

This Questionnaire has been designed to explore the informative for purely academic purpose. This is to enable the researcher Thakur Bhandari. This thesis on the topic Price Fluctuation of Large Cardamom and it's Impact on Livelihood: A Study of Phungling Municipality Ward No. 11, Taplejung, Nepal in pursuance of Master of Arts in Rural Development.

Respondent Number:

Household Survey

Name of the respondent: _____

Cardamom owner: _____

Name of Municipality _____

Name of Village: _____

Tole: _____

Ward No: _____

1. Did you migrate to this place?

Yes () No ()

2. If yes, from which place, when and why?

3. Since when you started to cultivate cardamom?

Year _____

4. Which is the major season for cardamom cultivation?

5. Which is the major areas for cardamom cultivation?

6. Do you find any diseases in your cardamom farming?

Yes () No ()

7. If yes, what are those diseases? Name them

8. Do you use any pesticides\ insecticides to control diseases and pest in cardamom farming?

Yes () No ()

9. What are the types of cardamom that you are cultivating?

10. Are you receive training for cardamom cultivation?

11. What is the main occupation and source of income?

12. Are you cultivate cardamom in your own land?

13. How much did you spend foodstuff every year from 2017?

14. How much did you spend real state purchase every year from 2017?

15. how much did you spend education every year from 2017?

16. Which type of Bhatti do you use for cardamom drying?

I) Traditional () II) Modern ()

17. If traditional, why don't you use modern Bhatti?

- a) Lack of idea () b) Lack of money ()
- c) Transportation () d) Storing ()
- e) Others ()

18. Where do you sell the produced cardamom?

- a) Local market b) money lenders of village
- c) Wholesalers e) Others

19. What are other marketing centers for cardamom beside local market?

20. What is the cost of transportation to supply cardamom in a major trading center?

21. Who fixes the price of cardamom?

- I) Cardamom producer II) Broker
- III) Business community IV) others

22. How much do you earn from cardamom selling?

- I) Amount of produced dried cardamom

II) Rate of dried cardamom

III) Total

23. Could you estimate your annual income from cardamom cultivation? From 2017
.....Rs\ year

24. What is your land holding size used for cardamom farming?
.....ropani\ hectare

25. Are you getting sufficient manpower and land for production and processing of
cardamom?

I) Yes ()

II) No ()

26. What are the major organizations involved in cardamom cultivation promotion in
your areas\ Districts?

27. What are the challenges and potentials of cardamom cultivation in this area?

28. What are the major crops cultivated besides then cardamom?

Appendix ii

Photograph



Asking questionnaire with respondents



Cardamom Cultivated Area



Making Modern Cardamom Drayer



Planting Cardam



फुडलिङ नगरपालिका
११ नं. वडा कार्यालय

फावाखोला ताप्लेजुङ
२०७५

पत्र संख्या :- २०७१/०८०

सलानी नं. :- ५१६

(११ नं. वडा कार्यालय)

दिनांक - २०८०/०३/१२

विषय:- सिफारिस गरिएको सम्बन्धमा
यो जो सँग सम्बन्धीत छ।

प्रस्तुत विषयमा जिल्ला ताप्लेजुङ फुडलिङ नगरपालिका वडा ११ स्थित यस कार्यालयमा श्री ठाकुर भण्डारीले दिएको माग निवेदन अनुसार निजले फुडलिङ नगरपालिका वडा नं ११ मा Price Fluctuation of Large Cardamom and its impact on Livelihood विषयमा शोध-पत्र(थेसिस) को प्रयोजनको लागि स्थलगत रुपमा टोल बस्तिमा गई स्थानिय वासीहरुसँग फलफल, अन्तरवार्ता एवम अवलोकन गरि यो शोध-पत्र(थेसिस) तयार पारेको व्योहोरा सिफारिस गरिएको व्योहोरा अनुरोध छ।


०८०७१२

युवराज भट्टराई

(वडा अध्यक्ष)
युवराज भट्टराई
वडा अध्यक्ष