A STUDY ON THE PRODUCTION OF CARDAMOM FARMING OF ILAM DISTRICT, NEPAL

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RECOMMENDATION LETTER

This thesis entitled **A Study on the Production of Cardamom Farming of Ilam District, Nepal** is submitted by Manisha Gadtaula under my supervision for partial fulfillment of the requirements for the degree of Master of Arts in Economics. I forward it with recommendation for approval.

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APPROVAL LETTER

This thesis entitled **A Study on the production of Cardamom Farming of Ilam District, Nepal** submitted by Manisha Gadtaula has been evaluated and accepted as partial fulfillment of the requirement for the MASTER OF ARTS in ECONOMICS by evaluation committee comprised of:

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/ACRONYMS

ADS	Agriculture Development Strategy
CBS	Central Bureau of Statistics
FNCCI	Federation of Nepal Chambers and Commerce and Industry
GoN	Government of Nepal
MoAD	Ministry of Agriculture Development
NARC	National Agriculture Research Council
UAE	United Arab Emirates
GDP	Gross Domestic Product
CRTS	Constant Returns to Scale
IRS	Increasing Returns to Scale
CES	Constant Elasticity of Substitution
Mm	Milimeter
C	Celcius
ADS	Agriculture Development Strategy
OLS	Ordinary Least Square
IRR	Internal Rate of Return
PBB	Payback Period
NPV	Net Present Value

CHAPTER I

INTRODUCTION

1.1 Background of the study

Cardamom, also referred to as "Queen of Spices" is one of the oldest spices in the world. It is one of the high priced and exotic spices in the world (Amma, Maheshwari, Sasitharan, & Venugopalan, 2010). It originated in southern India as the mention of cardamom was found in ancient Tamil literature in fourth century AD (Ajmera, Chauhan, Sharma, & Singh, 2018). The spice came into limelight during the eighth century and is now imported to all countries in the world. (Mishra, Mishra, & Mishra, 2018)

Cardamom is cultivated in an altitude range of 600 m and 2,000 m above sea level where annual rainfall is between 1,500 to 2,500 mm and the temperature varies from 8° C to 20° C. Its economic yield starts from third years onward after planting and its optimal yield period is 8-10 years. The total life span of Cardamom plants is about 20-25 years. Among the sixteen varieties of cardamom produced in the world, seven types of large cardamom are in farming practices across Nepal Ramsey, Golsey, Saunae, Chibeshai, Dammershai, Kayntidar, Salakpure/Varlangae, Jirmale (MoCS, 2017).

Nepali cardamom is used in meat dishes, and a wide range of beverages and sweets, flavoring curries, cake bread, confectioneries and disinfectants, stimulants and even as aphrodisiac. Nepalese spices flavor make them distinctly superior in terms of taste, color and fragrance due to its aroma.

Being a small hilly country situated between two giant economies India and China, Nepal is said to be an agricultural economy, however, just 65.7 percent of population is dependent on agriculture as main source of food, income and employment and that too with 20 percent of the land available 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).

Despite agricultural sector having such low level of productivity, large cardamom has emerged as one such product where Nepal could lead in the agro export market. Cardamom is one such product that is being exported to India and third countries like Saudi Arabia, UAE, India, Bangladesh and Singapore (MoAD, 2015).

Due to increased demand of Nepalese cardamom in the international markets in recent years and because of favorable climatic conditions, cardamom has become the major cash crop for the farmers in mid hills. More than 37 districts mainly, Ilam. Panchethar, Taplejung, Dhankuta, Terahthum, Sankhuwasabha and Bhojpur Districts cultivate cardamom (MoAD, 2015). Ilam is a hilly district lying in the hilly region of the eastern part of the nation in the Mechi zone. Geographically it lies in the hilly region which is mostly known as the Mahabharat range. The total population in Ilam is 2,90,254 (CBS, 2011). The main inhabitants of Ilam are Limbu, Rai, Yakkha, Lepcha, Newar, Magar, Tamang, Chettri, Brahmin, Sunuwar and Gurung. Being one of the prominent tourist destination in the country, the district is famous not just for the scenic beauty but especially for the orthodox tea production. However, in the recent days, beside tea production, cardamom production has also risen up in the district.

The history of cardamom farming goes back to 1865. It was introduced by Nepalese laborers who went to Sikkim for employment opportunities. However, the farming systematically started only after the establishment of Cardamom development Center at Fikkal, Ilam in 1975. (Shrestha, 2018).

The production, although initially limited within the eastern hilly region of Nepal, today has been spread throughout the hilly belt of Nepal and is currently cultivated in 36 districts, concentrated mostly in the eastern hill and mountain areas and gradually expanding to the western parts (Rijal, 2013). About 73 percent of total national production still comes from four districts (Taplejung, Panchthar, Ilam, Sankhuwasabha) (MoAD, 2015). Sankhuwasabha is one of the large cardamom cultivated area with the annual production of 949 Mt. Ton. India is the major importer of Nepalese cardamom accounting for more than 97 percent and other countries (Chapagain D. , 2011). A recent report shows 67,000 households engaged in cardamom farming across Nepal, which includes 25,000 households from Ilam, Taplejung, and Panchthar districts (K C & Upreti, 2017). Nepal has been identified as top producer for cardamom for many years (Chapagain , Pathak, & Rai, 2014). In

2009 alone, the export of cardamom reached 5200 MT (Stoep, Pokharel, Rajbhandari, & Shrestha, 2010). In 2012/2013, Nepal became the world's largest cardamom producer, with a total of 5,763 MT of cardamom, worth Rs. 2,528 million or about US$23.6 million, produced in 40 districts (MoAD, 2015). However, in the recent days, the production of the cardamom has not been as expected. Since 2006, direct exports of large cardamom from Nepal to markets like Singapore, Pakistan and the United Arab Emirates (UAE) reduced to less than 1 percent (MoCS, 2017). An explanation to the decreasing productivity could be the emerging issue of climate change. Some issues faced by the stakeholders and farmers could be reduced water supply, increase in temperature, diseases that have affected the productivity of cardamom (Rijal, 2013).

However, it is not only decrease in productivity that has caused reduction in the export of cardamom as there are other factors at play. One of the major reason behind this is emergence of new players in the market. Nations like China and Guatemala have been heavily influencing the market for cardamom seeing the returns being generated from this crop. Thus in recent years, incentivized by the high economic return from large cardamom, major producers of green cardamom – namely Guatemala, China and Viet Nam – began to export 'duplicate' large cardamom to Pakistan (MoCS, 2017). Such cardamom although looks similar but differ in terms of shape and smell and are mixed by Pakistani merchants with authentic Nepali large cardamom to reduce costs and gain larger profits. This practice has heavily decreased the export of cardamom of Nepal. Regarding price determination, it is determined by buyers in the Delhi Market and other traders in the central wholesale, district and village market centers.

1.2 Statement of the Problem

Nepal is world's top producer of large cardamom followed by India and Bhutan. Nepalese cardamom is preferred over Indian cardamom because of its quality. It provides unique taste that is especially demanded to enhance the taste of food. Because of unique taste it offers and increase in its demand, cardamom farming has turned out to be an attractive farming option to the farmers of Nepal. However, in the recent years, the production of cardamom has start to decrease. It has not been able to produce as it used to in the past years. Although the government has developed agriculture policy to develop agriculture sector, but the implementation of such

policies are minimal. 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. All these problems have led this researcher to raise some 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?

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 in Ilam district.

The specific objectives of the study are as follows.

- To analyze the trend of cardamom production in the year 2017 and 2018
- To analyze the major factors affecting the initial production of cardamom farming
- To explore the challenges of production and marketing of cardamom in the study 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. 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.

1.5 Limitations of the Study

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 five municipalities, 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 production of cardamom is done only from the production data of 2018 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 a hundred 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

REVIEW OF LITERATURE

This chapter deals with the theoretical and empirical concepts relating to production. Theoretical concepts deal with the production theories that we have taken as base on our study. Furthermore, empirical studies cover the study carried out on this topic of cardamom production at national and international scenario and policy analysis of national level. This chapter also deals with the research gap that exists on this study.

2.1 Theoretical Review

There are many factors that affect the production. From the time of classical economist to the present age there are several views on production and production function. We have discussed theories of production from classical and neo classical view point and also the production function.

Classical Theory of Production

Smith, (1776) has postulated that have kept production as the central focus of the theory. The theory has run on the assumption that a single production function represents the efficient or maximum techniques available to the firm. Smith has postulated three factors of production namely, Stock of Capital, Labor Force and Land. The author has emphasized labor to be the most crucial factor of production and land being the least important one. The theory has also postulated that the production function always depicts increasing returns to scale and has thus excluded the possibility of decreasing or neutral returns to scale. Smith argued that real cost of production shall decrease along with time, as a result the existence of internal and external economies occurring. Smith argues that technological development is necessary for increase in productivity which is only possible if sufficient capital is available. Similarly Ricardian Production Function has assumed the existence of three factors-land, labour and capital and it is subjected to the restriction of diminishing marginal productivity due to perfectly inelasticity of land. He believed economic development as the process of these factors of production. He postulated that the marginal productivity of land labor and capital declines with the increase in cultivation.

Neo- Classical Theory of Production.

The neo classical theory of production has postulated the characterization of the input demand and output supply functions based on a theory of profit maximization subject to a production function. The theory has presented two sets of constraints namely technical constraints and transactions of the firm takes place. The theory believes that technology is the crucial factor that increases labor productivity and increases the output capabilities of labor. The theory has postulated the production function to measure the growth and equilibrium of the economy and is written as Y = AF (K, L). Y denotes an economy's GDP, K represents its share of capital, L describes the amount of unskilled labor in an economy and A represents a determinant level of technology. The theory explains that if the three factors of neoclassical growth theory are not all equal, the returns of both unskilled labor and capital on an economy diminish, which implies that increases in these two inputs have exponentially decreasing returns.

Cobb & Douglas, (1928) considered that production is determined by the amount of labor involved and the amount of capital invested. The theory believes that, it is the mixture of these factor of production in which ratio are these factors of production are employed determines the production function. The postulated the production model as $Q= AK^{\alpha}L^{\beta}$, where,

Q is output.

A is efficiency parameter >0

K is capital, L is Labor

$\alpha, \beta > 0$ are output elasticities of labor and capital.

Output elasticity measures the responsiveness of output to a change in levels of either labor or capital used in production. The theory has also explained returns to scale as a technical property of production that examines changes in output subsequent to a proportional change in all inputs (where all inputs increase by a constant factor). If output increases by that same proportional change then there are constant returns to scale (CRTS), sometimes referred to simply as returns to scale. If output increases by less than that proportional change, there are decreasing returns to scale (DRS). If output increases by more than that proportion, there are increasing returns to scale

(IRS). The model has however failed to answer that why the coefficients α and β should be constant over time or be the same between sectors of the economy.

Leontief in the Leontiff Production Function assumes that production requires a fixed proportion of inputs and there is no substitutability among factors. The author has modeled the function as:

$$q = \min (z_1/a, Z_2/b)$$

Where, q = quantity of output produced

Z_1 = utilized quantity of input 1

Z_2 = utilized quantity of input 2

a and b = constants

The model explains that since inputs are used in fixed proportions, there is no input substitution among isoquants.

Arrow,Chenery,Minhas & Solow, (1961) in the CES production function have measured the percentage change in factor proportions due to a percentage change in the marginal rate of technical substitution. The authors have postulated the model to be $Q = A [aL^{-\beta} + (1-a) K^{-\beta}]^{-1/\beta}$ CES has the homogeneity degree of 1 that implies that output would be increased with the increase in inputs. The authors have also explained that with technological and/or organizational changes, the efficiency parameter leads to a shift in the production function, α (alpha) is the distribution parameter or capital intensity factor coefficient concerned with the relative factor shares in the total output, and β (beta) is the substitution parameter which determines the elasticity of substitution. The model has presented that CES function is homogenous of degree one. If we increase the inputs K and L in the CES function by n-fold, output Q will also increase by n-fold concluding that this model always presents constant returns to scale. The model also presents that, the parameter (beta) in the CES production function determines the elasticity of substitution. This shows that the elasticity of substitution is a constant whose magnitude depends on the value of the parameter β. If $\alpha = 0$, then a = 1. If $\beta = \infty$, then a =0. If $\beta = -0$, then $a = \infty$. This reveals that when a = 1, the CES production function becomes the Cobb-Douglas production function.

Subedi, (1982) has tried to analyze the factors affecting production of cardamom. The study is based on fieldwork conducted in 1979 in five Panchayat of Ilam district and has highlighted the causes that has lead to fluctuations in the production of cardamom. According to the research, productivity appears to decrease with an increase in farm size mostly because of lack of competition in farm size. In addition to this, climatic actors have also played a huge role in fluctuation in the productivity. The author has concluded that production in land with low economic return, lack of economic competition, climatic conditions are some of the causes for affecting the productivity of cardamom and has also stated that the farmers are deprived from the real value of the cardamom despite of the fact that the crop is highly sought after by the farmers.

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 onoing 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 or this is climate change and this issue needs detailed examination.

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.

K C & Upreti, (2017) have explored the issues of disease in production of large cardamom. This study investigated strategies used by farmers to cope up with the diseases in cardamom farming. The study was conducted in only Ilam district and focused only on attempts made to combat the disease. The research presented that large cardamom production has declined in recent decades due to viruses like mosaic streak (chirke), bushy dwarf (furkey) and fungi. In SNV's Study (as cited in KC and Upreti) The study also explained that Ilam was the first to face the severe loss in production because of the diseases. The study concluded that policies that strictly focus on developing strategies regarding combating cardamom diseases should be made in order to enhance cardamom farming in Nepal. Primary data was collected for the study. In-depth interviews, Key Informants Interview and Focus Group

Discussions were held in order to generate the data. Codes were generated from the findings using manual open coding.

Subba & Ghosh, (2017) have tried to assess the status of Large Cardamom among major crops in Sikkim. The study was measured based on area, production and productivity including cumulative annual exponential growth rate from 2003-2015.The study revealed positive growth rate of large cardamom crop. However, the production showed a negative growth rate which could be because some viral disease complex, nutritional deficiencies factors and inadequate management. The research has mentioned that despite of the issues of diseases, large cardamom still occupies the second position in the areas of Sikkim after the maize and influencing its economy. The research has thus concluded that policy intervention to the farmers as well as strengthening of extension services the cardamom growers which has the potentiality of providing double income to the farmers compared to other cash crops.

MoC, (2017) has postulated that Nepal's cardamom is largely exported to Indian and Pakistani market but as of recent times new players have entered and that has affected the supply of Nepali cardamom. The report also presents that the new competitors supply cheaper, lower quality black cardamom called duplicates due to which price and revenue for and from Nepali cardamoms are getting lower. The report believes that high dependence on the Indian markets has limited the development capabilities of the sector and that new distribution channels have to be identified so as to reach new markets and expand the sales. The report identified promoting Nepali Black Everest Cardamom's superior quality directly to Pakistani and Indian wholesalers and reaching out to Pakistani diaspora of different nations of Middle East, UK, The United States and Canada as a strategy to reach out to masses directly. The report has explained the causes behind the low productivity of cardamom in Nepal in recent years. Causes like, frequent attacks of pests and diseases; insufficient disease-free saplings production, and the lack of research on plant varieties suitable for specific soils, altitudes and climatic conditions could be some of the causes attributed to low production of the crop.

Bhutia, Bhutia, Chatterjee, & Pariari, (2017) has tried to analyze post harvest processing and marketing quality issues and their impacts on the value chain and trade patterns of large cardamom in India. It also focuses on the marketing aspects and

suggest approaches for future research and development that could make this crop more popular and sustainable. The paper too has expressed that declining productivity of cardamom in recent years have caused a negative impact in trade of India. The author has postulated that this decline in productivity has been caused mainly because of occurrence of viral diseases, and to some extent by improper post harvesting processing technologies. The author has mentioned that by reducing post harvest loss and adding value to the produce can compensate for the decreased production which can be achieved by adoption of advanced post harvesting methods such as pursuing curing system rather than traditional bhatti. The paper has thus concluded that focus should be diverted from whole product to value added products like oil and oleoresin as it fetches better price.

Giri, (2018) has postulated that production of large cardamom is in increasing trend till 2007to 2009 but declining thereafter. The causes attributed to this could be biotic factors and production declining in major districts (Taplejung, Ilam, Panchthar) which accumulating more than 3 quarter of total production. The research has also presented that Indian market is the major market for Nepalese cardamom as 90 percent of Nepalese cardamom is exported to India via Birtamode port and remaining is exported to other countries. The research believes that although Nepalese cardamom has high market in other nations like UAE, Pakistan, Ukraine, the UK that provides 0 percent tariff to Nepal, the market diversification of large cardamom is unsatisfactory. The research has also identified the problems faced by Nepalese cardamom farmers such as technology related, manpower, finance, government policy and private public sector related. The research has also focused on how system of innovations can be implemented in order to enhance the productivity of cardamom and has thus concluded that along with innovation other factors such as development, policies, governance should work hand in hand.

Negi, Joshi, & Pandey, (2018) have made an attempt to understand issues of farming communities along with corrective measures to address the various constraints impacting the cultivation and production of large cultivation. The paper has presented cost benefit analysis of large cardamom system, production and export, current market analysis of large cardamom farming. In fact, the paper has also presented economics of large cardamom. The paper has stated that agriculture system have

weakened with diminished ecosystem making them more vulnerable to disease and infections. The research have identified old plantations, diversification of agricultural systems, decline of pollinator abundance, reduced flowering, changing in climatic patterns, natural calamities as the factors causing decline in productivity of cardamom. The paper has concluded that due to continuous price inflation along with increasing domestic demand and excessive expending on import of large cardamom, its farming still holds the key to maintain the livelihood of small and marginal farmers in the mountainous region.

MoAD, (2014) has tried to present the overall strategy for Agriculture Development including a 10-year Action Plan and Roadmap and a rationale based on the assessment of the current and past performance of the agricultural sector. The strategy has been formulated taking into account the conceptual framework of agricultural transformation of Nepal from a society primarily based on agriculture to one that derives most of its income from services and industry. The report has examined the various aspects of agriculture such as current status, agriculture sector growth, labor productivity, agriculture trade deficit, poverty, food insecurity,climate change etc. The strategy has also identified the issues with policies in regard to agriculture sector of Nepal. The report has thus stated that in spite of numerous policies, often favorable to agriculture, having been drafted or approved, their implementation has been poor due to a combination of factors related to lack of resources, weak capacity, credibility of policies, lacking supporting legislation pointing out the core issues of policy implementaton in Nepal such as. The report thus concludes with the strategy for the next 20 years agricultural transformation of Nepal. The ADS has also provided a framework for the development of the agricultural sector that will need to be improved and updated several times during this period. It has focused on four aspects namely, i. Government commitment, ii. Policies and Regulations for ADS Implementation in place, iii. Consensus of key stakeholders and iv. Development partners support to embark on ADS Roadmap.

2.2 Empirical Review

Empirical review of Literature aims towards exploring the research objectives based on observed and measured phenomena and deriving conclusions from actual experience.

Partap, Sharma, Gurung, Chettri, & Sharma, (2014) revealed that large cardamom production have been declined in recent years. The research was carried out through secondary literature survey, and six study sites were pooled to estimate the large cardamom plantation area, production and productivity in Sikkim. The research carried out a multistage, stratified sampling technique to select the sample households in the 6 study sites and a total of 88 households had been selected for detailed study during 2011-2013. The households were surveyed using structured questionnaires. The total yield was converted into monetary value based on current market rates. The research applied analysis of variance and regression analysis to analyze the data. Linear regression modeling showed a positive correlation between cardamom-yielding area and year for 2007–2013. The study thus identified 6 diseases, 4 insect pets, and 6 mammalian pets had been damaging cardamom crops. The research thus concluded that causes such as rapid drying up of springs, spread of diseases, decreased number of pollinators (due to climate change impacts), long dry spells lasting until the flowering season, and lack of training in selection of disease-free planting material, lack of growth management of cardamom for increased productivity, lack of technical knowhow for disease management, and lack of irrigation facilities were reasons for crop decline.

Bhandari & Bhandari, (2018) has aimed to examine the current situation of large cardamom production and marketing channels in relation to various farm based socioeconomic variables. The survey was conducted in November 2015 in one of the pocket area of large cardamom production in Teharthum District. The parameters used were cardamom production area, type of manure used, drying facilities, technical skills of farmers, market channels and variable cost etc. 30 cardamom producers and stakeholders were purposively selected for interview pre-designed questionnaires and the study was conducted in 10 Village Development Committees of Terathum district. The research implied parameters such as descriptive and econometric analyses. to find out the current situation of large cardamom production and marketing, whereas regression model was used to determine the effect of socioeconomic variables on productivity of large cardamom. Likewise, a multiple regression analysis involving the use of Ordinary Least Square (OLS) estimation technique was used to determine the effect of socioeconomic variables on the productivity of cardamom. The value of

R^2 was 0.752, which indicated that 75.2% of the variations in the cardamom productivity were explained by the explanatory variables included in the model. The research thus concluded that The productivity of cardamom in the district is influenced mainly by number of active family members involved, farming period, area, intercultural operations, variable cost and depreciated fixed cost.

Shrestha, (2018) has tried to analyze cardamom production in Kavrepalanchok district of Nepal. The researcher has implied purposive method and snowball sampling technique to collect primary data and library method to collect secondary data. Sampling was taken about 10% of the total populations of the cardamom farmers. The research presented that the productivity of cardamom was increasing in the first, second and third years respectively. The research concluded that the potentiality of cardamom production in Kavrepalanchok is very high but the farmers were not motivated in cultivating this crop. The paper has thus suggested that investment on research and development is necessary in order to increase the productivity.

Roy & Shohe, (2018) in their paper have tried to examine the economics of large cardamom cultivation and production constraints of large cardamom. The paper studied the economics of cardamom cultivation using primary data collected from a sample of 80 large cardamom growers of Zunheboto district through personal interview method. To examine the economic feasibility of large cardamom, various economic viability measures, viz, Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR) and Payback Period (PBP) were calculated. The Garrett ranking technique was used for studying the opinions of the farmers regarding production. The paper found out the economic viability measures of large cardamom cultivation as IRR of 35%, Payback Period of 4.3 years, Net Present Value of Re. 98129.31. The research thus concluded that non availability of planting materials on time was the major constraint reported by growers in the study area affecting the growth of cardamom cultivation.

Shrestha & Shrestha, (2018) have tried to analyse the value chain of cardamom in Ilam district. The paper was conducted with 30 farmers, 10 input suppliers and 15 traders selected randomly. Field surey, literature rview were conducted along with expert consultation and Focus Group Discussion. The research presented that the area of large cardamom and its production were in decreasing trend as the area under

cultivation had decreased from 2785 ha in 2005/06 to 1132 in 2014/15. Likewise, the research also stated that the total production had also decreased from 1587 tons in 2005/06 to 520 tons in 2014/15. In addition to it, the research also presented the fiancial analysis of the cultivation with ROI 12.8%, IRR 64.1% and NPV 2545013 making the cultivation thus profitable. The research thus concluded that, although the farming is proitable and economically viable, but there existed a weak linkage along with the lack of horizontal and vertical integration.

2.3 Research Gap

Out of all the literature reviewed, although all of them had presented the issues faced during cardamom production, none of the literature has generated production function so far. The literature have only revolved around production trend whether increasing or decreasing but none of the literatures have generated whether the productivity of cardamom has either increasing returns to scale, decreasing returns to scale or neutral returns to scale. Thus, the research gap in literature review exists.

CHAPTER III

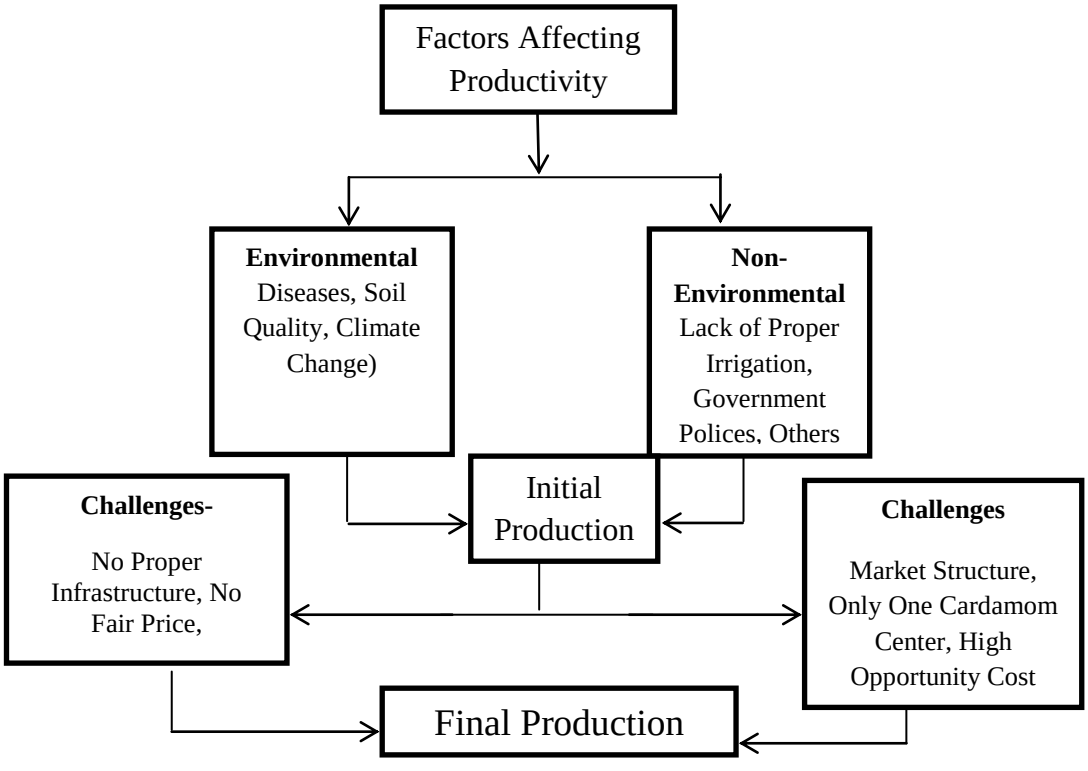
RESEARCH METHODOLOGY

This chapter deals with research design, sources of data and sampling design. Research design includes qualitative and quantitative techniques implemented for analyzing the data. Similarly, this chapter also explains the sources of data and sampling procedure for conducting primary research.

3.1 Conceptual Framework

Since this research aims at identifying major factors affecting productivity, the factors are classified into environmental and non-environmental factors. And it is the mix of these factors the productivity at initial level is affected. However, this productivity again aces various challenges in order to reach the final stage of production i.e. the phase when cardamom is sellable. Final production is affected by various challenges. Thus, there exists a gap between initial and final production. However, the research only aims at factors affecting productivity at initial level of production.

Fig.: 3.1 A Framework of Factors Affecting Productivity of Cardamom



Source: Researcher's own creativity based on previous literature reviewed

Diagram 3.1 has presented the framework for factors affecting productivity. Production has been categorized into two categories in the framework, i.e initial and secondary. This research has defined initial production as the production of cardamom at the end of third year and secondary production as the production that is ready for sales and consumption after having dried. There exists some time gap between the cardamom that is plucked out from the plant and cardamom ready for sales. The research deals with the factors affecting productivity at initial level. The research has thus identified these factors as environmental and non-environmental factors. Similarly, the framework has also presented the challenges that affect the production at initial level. It is because these challenges exist, not all that is produced is available for consumption and sales.

3.2 Research Design

The main objective of the thesis is to find the factors affecting the initial production of the cardamom. In order to achieve the given objective, a mixed method approach, both quantitative and qualitative techniques were applied. Under quantitative techniques, graphical and tabular method, trendline analysis, linear regression were applied. Likewise, qualitative research designwere implemented by using Key Informant Interview and Observation Methods. Thus, the research is both explorative and descriptive in nature.

3.3 Study Period

In order to identify the major factors affecting production, the study was conducted from 18 September 2018 to 9 October 2018. The particular time period was chosen for the study as this was the appropriate time period for picking cardamom and estimating initial productivity.

3.4 Sampling Procedure

The research has used non probability sampling method to interview the respondents. Since, the unavailability of data regarding population size of cardamom farmers in Ilam district existed, my sample size for this research is limited to a hundred. The respondents were selected from five municipalities namely: Ilam Municipality, Deumai Municipality, Rong Municipality, Sandakpur Municipality and Suryodaya

Municipality. Among these, Rong and Sandakpur are rural municipalities and Ilam, Deumai and Suryodaya are urban municipalities. A total of a hundred respondents were interviewed and the respondents were selected randomly.

3.5 Sample Size

A total of a hundred samples were taken in the researcher's sample size for the purpose of survey. The sampling procedure that was undertaken was non probability sampling.

Table 3.1: Sample Size in Different Municipalities

Municipalities	**Population**	**Sample Size**	**Percentage**
Ilam	48536	25	0.052
Deumai	32927	20	0.061
Rong	19135	20	0.104
Sandakpur	16065	15	0.093
Suryodaya	56691	20	0.035
Total	173354	100	0.057

Source: National Population Report, 2017

Out of the five municipalities under taken for research purpose, most of the respondents were taken from Rong Municipality (0.104 percent) and the least number of samples were taken from Suryodaya Municipality (0.035 percent). The major reason behind the existing discrepancy in sample size was because most of the farmers of Suryodaya Municipality had given up on cardamom farming because of high opportunity cost but farmers in the rural municipalities were still practicing cultivating cardamom.

3.6 Data Collection Methods

In this study, data were collected by using Structural Questionnaire, Direct Observation and Personnel Interview Method.

3.7 Sources of Data

In order to fulfill the objective of the research, primary data was collected.The reason to collect primary data was to obtain the first hand information about factors affecting productivity, issues and challenges faced by the farmers occurred in the study area. So for this purpose structured questionnaire survey was undertaken in the five municipalities of Ilam. Likewise, regarding Personnel Interview, two Key Informant Interview was also ensured. The informants chosen for the study were both farmers. Farmers were chosen as key informant as they have more knowledge of issues faced at work as compared to non-farmers. In addition to it, observation method was also implemented so as to understand the various aspects of farming such as management of unhealthy plants, drying of cardamom etc.

3.8 Data Analysis Tools

The research has undergone categorizing, coding, editing and tabulating. Data coding was done by categorizing data into different scales such as nominal, ordinal and scale variables depending upon theirs types. Simple statistical tools were used to estimate frequency, percentage from the collected data. The data were interpreted from the results, further assisted by qualitative and quantitative information available from primary sources. Trend line analysis and econometric analyses were carried out to find out the current situation of large cardamom production . A multivariable regression model was applied to analyse the major factors affecting productivity. The analysis was made through IBM SPSS Statistics 23.

3.9 Data Presentation

In order to present the data and its findings, the research has implemented graphical and tabular method.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

This chapter deals with presentation and analysis of data collected. This section has tried to get the answers of the objectives of the research. It has explained the trend of productivity of cardamom in 2017and 2018 AD, major factors affecting the productivity through regression analysis. Likewise, challenges have also been discussed in this chapter below and general and policy suggestions have also been presented.

4.1 Description of the Study Area

Ilam district is a hilly district located at Mechi zone in the Eastern Development region of Nepal. The district lies on 260 -40' to 270 08' north latitude and 870 -40' to 880 -10' east longitude in the global position. The district is bordered with India in east, Panchthar district in the north, Morang district in the west, Jhapa district in the South. Geographically, it lies in the Mahabharat range and its altitude ranges from 140 m to 3636 m from the mean sea level.

Most area of Ilam district is situated in the Mahabharat range and some part of the district belongs to the Siwalik. The word 'Ilam' comprises two words-'I' which means winding and 'Lam' denotes to the way. Thus, it is named Ilam (MoFALD, 2017). It is famous for five A's namely: Aduwa, Amliso, Olan, Akabare Khursani, Alaichi, beside Ilam tea and natural scenery. As per recent federal structure, the district is differentiated into 4 urban and 6 rural municipalities. Among these municiplaities, the research was conducted in 5 municipalities that included 2 rural and 3 urban municipalities. Ilam, Deumai and Suryodaya were the urban municipalities while Rong and Sandakpur were the rural municipalities.

Ilam municipality is sub-divided in 9 different wards, the major governmental and district office lie in ward number 1 and ward number 2. Ilam is also is a major hub for transportation and communication. Among the 9 wards, research was done in ward number 8, Chureghati, Inapa and ward number 4 Sankhejung, Inapa.

Deumai is a municipality in the eastern development region of Ilam District in the Mechi Zone of Nepal. The new municipality was formed by merging two existing

villages Mangalbare and Dhuseni on 02 Dec 2014. For the purpose of study, the research was conducted in ward number 4, Mangalbare and ward number 3 Panitar.

Suryodaya Nagarpalika is known as the municipality of the rising sun as the most scenic view of rising sun can be seen from here. In this municipality too, two wards were chosen for the purpose of study namely; Karfok- ward number 3 and Fikkal- ward number 6.

Similarly, two rural municipalities were also taken as sample study area. The research was also done in Sandakpur and Rong Gaupalika. Sandakpur is one of the rural municipalities of Ilam. It consists of 5 wards and its headquarter is situated in Maipokhari. For the purpose of study, two wards were selected namely, Ward No 3 Sulubung and Ward No 5 Jamuna. These wards were selected on the basis of cardamom farming done in those places as compared to other wards. Similarly, in case of Rong Gaupalika, Kolbung ward number 3 and Shantipur ward no 1 were chosen. These wards were chosen for two main reasons i.e. cardamom farming was growing in these areas in recent years and these areas had comparative ease of transportation from district headquarter.

4.2 Gender

The research surveyed a hundred of participants. The frequency of the respondents has been presented in the table below.

Table 4.1: Gender Distribution of Respondents

Respondents	**Frequency**
Male	90
Female	10
Total	100

Source: Field Survey, 2018

The research thus displayed that women participation in the survey was very less compared to that of male participation.

4.3 Age Group

The research categorized the age distribution of the respondents into 9 categories as presented in the table below.

Table 4.2: Age Group Distribution of Respondents

Age Group	Frequency	Cumulative Percent
20 – 25	1	1.0
31 – 36	2	3.0
37 – 42	7	10.0
43 – 48	25	35.0
49 – 53	25	60.0
54 – 59	22	82.0
60 – 65	12	94.0
66 – 70	3	97.0
71+	3	100.0
Total	100	

Source: Field Survey, 2018

The most common age group the respondents belonged was 43-48 and 49-53. It meant most of the farmers were middle aged farmers between 43 to 53 followed by the age group 54-59 with 22 people in this age group. Farmers who belonged to age group 20-25, 31-36, 66-70, and 71+ were found to be least involved in cardamom farming because, most of the people of age group 20-25 and 31-36 were the early young age group who either migrated to city areas or abroad for either study, or for job purpose, or started their own venture. Likewise, respondents who belonged to 71+ age group were the senior citizens who depended on their family for living and were unable to be involved in any activities that required huge effort.

4.4 Income Source

In order to identify the major source of income of the district, the research has categorized the income sources into five categories. The frequency represented the number of people whose income was earned from that particular source.

Table 4.3: Income Source Distribution of Respondents

Income Source	**Frequency**
Agriculture	84
Service	3
Business	2
Foreign remittance	10
Any other	1
Total	100

Source: Field Survey, 2018

Most of the people interviewed were involved in agriculture making agriculture a major profession in Ilam district with majority of respondents involved in agriculture. After agriculture, foreign remittance was the major source of income. Beside these, service, business, and other professions are major source of income.

This data showed that, the income of the household was backed mainly by agriculture and foreign remittance. If any one of these sources get disrupted in Ilam then many families will have their income sources and living standard affected. Thus, it is high time that the government should focus on strengthening agricultural programs as it is the first an major source of income for many families.

4.5 Major Crops Cultivated

Ilam is particular famous for its production of orthodox tea. However, in the recent years, it is also famous for 5 As (Aduwa, Amliso, Akabare,Khorsani, Olen, Alaichi). Beside these, other crops like paddy, corn, mushroom are also cultivated. The table below presents the percentage of sample involved in major crops farming.

Table 4.4: Percentage of Respondents Involved in Various Crops Farming

Crop	**Number of Respondents (out of 100)**	**Percentage Involved**
Cardamom	99	95.2
Tea	38	36.5
Ginger	7	6.7
Vegetable	33	31.7
Paddy	32	30.8
Amliso	16	15.4
Corn	39	37.5
Redchilli	5	4.8
Mushroom	1	1.0

Source: Field Survey, 2018

Majority of the respondents have grown cardamom in Ilam district . After cardamom, farmers were involved in corn farming i.e 37.5 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.

4.6 Attractive Factors to Cultivate Cardamom

Outs of various crops cultivated, majority of the population was found to be attracted in cardamom farming. There are various reasons behind this attraction. The research has identified four reasons as the driving force behind cardamom farming.

Table 4.5: Attracting Factors to Cultivate Cardamom

Attracting Factors	**Frequency**
Suitable Climate	31
Attractive Return	99
Higher Price	92
Usage of Land	15

Source: Field Survey, 2018

Table 4.5 has presented that almost all of the respondents were involved in cardamom cultivation mainly because of the attractive returns it yielded. Likewise, majority of farmers were involved because of higher price. Only fifteen farmers were involved because the land could be used for productive works rather than keeping it unused thus avoiding the opportunity cost. Hence, the research could say that, farmers were involved in the farming for two main purpose i.e. the attractive returns it yielded over the years after the production and higher price although price has been decreasing in the recent days.

4.7 Cardamom in Ilam District

The farming of large cardamom started in Ilam from in 1865 by Nepalese workers who went to Sikkim for works. The initiation was done by Lepcha Kaji importing it from Sikkim. Its commercial cultivation started around 1953 AD. However, the planned development for cardamom was started from 1975 with the establishment of Cardamom Development Centre, at Fikkal, Ilam in 1975 (K C & Upreti, 2017). Similarly, in 1982, the government declared four districts (Panchthar, Ilam, Bhojpur and Taplejung) as large cardamom zone. Although the initial years showed some promising signs, but later on productivity started decreasing. It was then, the farmers diversified towards other crops such as Tea, Amliso and Akabare Khursani. However, with the increase in demand of cardamom in international market particularly India and simultaneous increase in price along with it, farmers again started cultivating the crops. The government also started developing strategies for enhancement of cardamom. The farmers apart from Dumbar Sai and Golsai also cultivate other types of saplings such as Bharlangey and Salakpure.

Cardamom is undoubtedly a multipurpose crop that has huge medicinal and commercial purpose all over the world. However, despite of its usefulness, the production of cardamom has not been satisfactory. Presence of various constraints has made cardamom farming not reach its full potential. This issue is present in almost all of the districts where cardamom is cultivated. Although the market and scope for cardamom is huge but the constraints have remain as obstruction in its development. Although the production and women's participation are highly encouraging, the farmers are reluctant to invest and produce cardamom at large scale. The study has found that the farmers need the entrepreneurship training, support and empowerment

for mass production of cardamom (Shrestha K. , 2018). Although in some places, productivity has increased, but the increase has been slight. Mostly farmers were grown the three types of large cardamom in their orchards namely Ramsahi, Golsahi and Chibesahi. The average productivity of all three types of cardamom was more or less equal with slightly higher productivity of Ramsahi (235.8 kg/ha) than Golsahi (196.5 kg/ha) and Chibesahi (225.97 kg/ha) (Bhandari & Bhandari, 2018).

The research presented that majority of the respondents were involved in cardamom farming. After cardamom, corn was cultivated by most of the farmers i.e. 37.5 percent of the farmers have cultivated corn. Likewise, tea, vegetable and paddy are the other crops cultivated by the farmers respectively. The reason behind cardamom being the highest cultivated crop is because if the increasing demands of Nepali cardamom in international market and attractive return farmers get i.e. high price although it has been reducing recently. 67.3 percent of farmers had cardamom as their major crop cultivated and most of them had been engaged in cardamom farming for 4 years. More than half were involved in cardamom farming because of the attractive return they get from cardamom farming i.e. high price, increased productivity, uses etc. Among them 87.6 percent were interested only because it yielded higher price initially. However, only 14.3 percent were interested for the sole purpose of usage of land. This suggests that, higher price and return in terms of increased living standard, increased productivity can be the cause behind farmer's growing interest in cardamom farming in Ilam..

4.8 Production Process of Cardamom

According to the survey, it was found out that the production starts taking place at the end of 3 years but the cultivation starts from the month of January. From January to April since the weather is dry so irrigation in order to make the soil fertile or production. From May/June formal cultivation starts. After three years, the production starts and the product is picked up in the month of August/September. It is then taken at the dryer for drying up. After all this process the product finally reaches market. But despite of all these issues, it can not be said that the production has been rising up as per the expectation of the farmers. Although there were few exceptions during the research who had the production going up very high, but in the overall, the

situation turned out to be not satisfactory. And as a result, the overall productivity showed the decreasing trend.

4.9 Post Harvesting Activities.

The product is not immediately taken for sales. It is first dried and then only prepared for sales. The process of drying usually takes place at locally built drier. Since, modern drier is not available in most of the places and local driers are easy to build, farmers build up the driers at their own cost. Only after the cardamom is fully dried, then it is ready for sales and consumption.

4.10 Packaging and Storage of Cardamom

Cardamom is generally produced from the third years from its plantation. The first year includes sampling, labor for land preparation and transplanting, and irrigation. Second and third year also includes irrigation. Third year includes irrigation and harvesting. Generally, preparation for harvesting starts from January- February. The harvesting is continued During May- June. The product is collected during the month of September-October. The product is then dried at the modern or local drier depending upon the availability and accessibility of and to the drier.

4.11 Marketing Channel of Cardamom

Regarding the marketing channel of the product, the product's major market is India. It is sold to India through large traders and middlemen. Local buyers purchase cardamom produced which is then sold to district level traders who again sell it to traders of Birtamod, who again sell it at Jogbani/ Biratnagar. However, in case of Ilam district, the dominance of middlemen was largely felt. The marketing channel of cardamom includes producer, collector and district level traders up to wholesaler of located at Dharan and Birtamod (Bhandari & Bhandari, 2018).

4.12 Demand and Supply of Cardamom

The product has the same HS code that of green cardamom i.e 090831 which is similar to large cardamom. In absence of a distinct HS code, it is difficult to accurately capture the trade flow of large cardamom However, despite of this issue, the trade pattern of large cardamom can be known because of data availability of

India and Pakistan which are two major countries of spice consumption and production. Both these countries specify large cardamom under their national tariff line and record the majority of trade flow. However, in context of large cardamom, Nepal and Bhutan are the major producers and exporter of large cardamom. In context of Nepal, India and China are the major buyer. Nepal exported 3968 kg large cardamom to India and 995 kg to China in 2015/16. Likewise, 2473 and 720 kg of crushed cardamom was exported to India and China respectively in 2015/16 (MoF, 2016).

4.13 Top 10 Importers of Nepal's Cardamom Worldwide

The major importer of Nepal's cardamom is India. It is through India that, Nepal's cardamom is consumed in other parts of the world. The first ten importers of cardamom in the world are as follow.

Table 4.6: Importers of Nepal's Cardamom Worldwide

Importers	**Imported Value (in Thousand USD)**
India	34090
Bangladesh	15753
Singapore	10033
Egypt	9767
Pakistan	9349
Viet Nam	9317
Kuwait	9313
United States of America	7887

Source: MoAD, 2015

The data above shows that consumption of cardamom is more in Middle East , Asia, South East Asia, Africa and North America respectively. If only Nepal could directly supply cardamom in Middle East, then it would be a huge milestone for the export industry, particularly, agro products export. In fact, this would also increase as it would open gateway or other products to be exported as well.

4.14 National Production

Large cardamom is grown in 40 districts, which occupy 14847 hector with productive area of 11,501 hectors and produces 5,225 MT with productivity of 0.45 Mt per hector. Development region wise, central development region has highest productivity of 0.61 MT/Ha followed by Eastern Region which possesses productivity of 0.45 MT/ Ha. In case of total production, Eastern Region produces 4,907 MT which is 93.91 percent of total production. (MoAD, 2015)

The table below shows the status of cardamom production from the year 2000 to 2012.

Table 4.7: Total National Production of Cardamom

Year	**Area (hector)**	**Production (ton)**	**Productivity**
2000/01	10668	6080	0.57
2001/02	10840	6179	0.57
2002/03	11095	5880	0.53
2003/04	11220	5983	0.53
2004/05	11347	6086	0.54
2005/06	11498	6647	0.58
2006/07	11712	6950	0.59
2007/08	12015	7087	0.59
2008/09	11849	7037	0.59
2009/10	11766	5232	0.44
2010/11	12584	5517	0.44
2011/12	11665	6026	0.52
2012/13	11434	5753	0.50

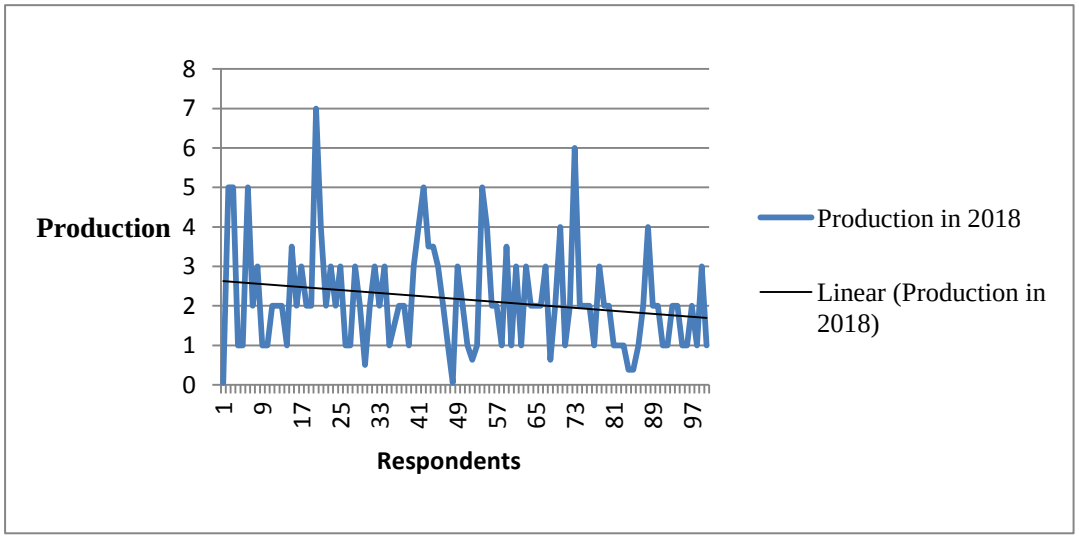
Source: NARC, 2015

The data above shows the fluctuation in the productivity of cardamom in the past years. The report explained the reason behind such fluctuation could be because of biotic factors and heavy decline in large cardamom orchards in Ilam district. (NARC, 2015)

4.15 Trend and Pattern of Productivity in Municipalities

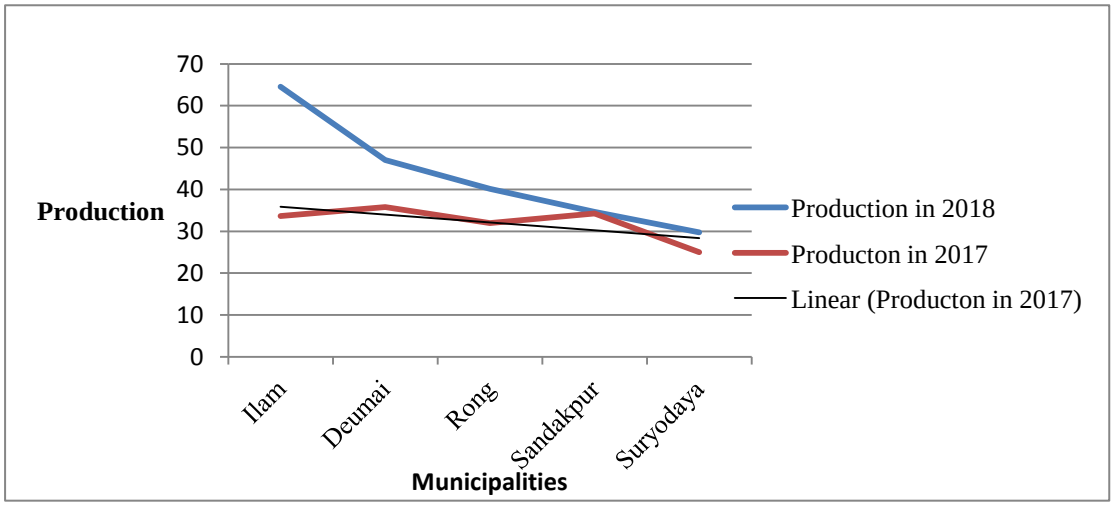
In order to identify the trend of cardamom productivity in the year 2018 and in municipality level, trendline analysis has been undertaken. The research has identified the trend of production in the year 2018 to be decreasing. Similarly, the productivity in different municipalities in 2018 has increased nominally, but the trend is decreasing. Both these trend line analysis show that the productivity has started showing decreasing patterns. While figure 4.1 has shown the product trend of individual respondents in 2018, figure 4.2 has shown the comparative production trend of municipalities in the year 2017 and 2018 respectively.

Fig 4.1: Production Trend of Respondents



The fig.4.1 has presented that the production trend in 2018 has been decreasing. The productivity has shown decreasing trend and fluctuation in the productivity has existed. While there had been exceeding increase in productivity in some cases but in overall the trend has been decreasing.

Fig 4.2: Comparative Production Trend in Municipalities



Source: Field Survey, 2018

Fig. 4.2 has presented comparative trend of production trend in municipalities. As seen in the figure the trend has been seen decreasing. Although, Ilam municipality has comparatively higher productivity and Suryodaya municipality with the least productivity. A common factor between these two municipalities were they both were urban municiaplities which had better access to transportation, cardamom center, experts etc. however, despite these factors, Suryodaya municipality has still shown least productivity as farmers in this municipality have started diversifying their cultivation choices from cardamom to amliso, corn etc.

Fig. 4.1 and 4.2 show that cardamom production has been showing decreasing trend. This decrease has been caused mainly because of external and internal diseconomies in production. Internal diseconomies can be defined as all those factors which raise the cost of production of a particular firm when its output increases beyond a certain limit. In this research, internal diseconomies referred to animal issue, and high labor cost faced by the farmers (Rs.500 per labor per day). Likewise, external diseconomies refer to those economies which are not suffered by a single firm but by the firms operating in the industry. In this case, lack of proper government policies to address the needs of farmers, spread of viral diseases, absence of experts on the issue, climate change were the major external diseconomies.

The production has been decreased in 2018, and an overall trend has been decreasing as well. The major reasons behind this decrease were, spread of viral disease with 95.2 percent of the respondents giving it as the main reason of the downfall of production. Since, there is no any expert and medical solution regarding controlling such diseases, diseases kept infecting the plants and thus, production kept decreasing. The most common disease that has spread is Jujure and Daduwa. This issue remains crucial since neither government has taken any initiatives regarding providing medical solutions to the farmers nor it has given any other alternative. After implementing all the local level preventive measures such as spraying of cow urine, ashes etc, the only remaining alternative remains to be destroying the plants completely. This does not only reduces the investment made in cardamom farming but also increases the opportunity cost of the farmers resulting to low interest in cardamom farming in recent days.

The other reason according to the research was lack of government policies regarding cardamom. Although cardamom is regarded as black gold, the government till date has neither shown any interest nor has it developed any special policy similar to that of tea production.

Likewise, the third reason for decrease in production was climate change. High temperature, rainfall, hailstorm, and drought remained as main issues faced by the farmers. Temperature, rainfall has been increasing with the years passing by. This has affected the farming to a great extent as cardamom requires appropriate or balanced climatic condition i.e. neither too hot nor too cold and not too much rainfall as well. In absence of this, productivity starts getting affected. This is the issue happening at Ilam at present context.

Thus, it can be deduced that the decrease in production is mainly because of external and internal diseconomies.

4.16 General Area and Production Situation in Different Municipalities

In order to identify productivity in different municipalities, productivity per area is calculated. This calculation helps in identifying the productivity rate in different municipalities and generating appropriate policies for the required municipalities.

Table 4.8: Productivity in Different Municipalities

S. No	Municipalites	Year	Production (Mann)	Total Area (Ropani)	Productivity (Mann/Ropani)	Increase/Decrease
1	Ilam	2018	64.55	131	0.493	0.236
		2017	33.68	Ropani	0.257	
2	Deumai	2018	47	113	0.416	0.1
		2017	35.75		0.316	
3	Suryodaya	2018	29.76	85	0.350	0.056
		2017	25		0.2941	
4	Rong	2018	40.18	114	0.352	0.072
		2017	31.93		0.280	
5	Sandakpur	2018	34.63	88	0.394	0.0037
		2017	34.35		0.3903	

Source: Field Survey, 2018

Total Average Production in 2017 = (0.257+0.316+0.2941+0.280+0.3903)

= 1.5374

Total Average Production in 2018 = (0.493+0.416+0.350+0.352+0.394)

= 2.005

Change in productivity: (2.005-1.5374)Mann = 0.4676Mann per Ropani

Table 4.8 has presented productivity per ropani of cardamom. It presented that productivity of cardamom is highest in Ilam municipality and least in Sandakpur. This was because of geographical location of the district as the headquarter of the district lies in this municipality only. This makes it easier for farmers to visit the district agriculture office, meet the agriculture officers and seek for suggestions. The major decrease has been in the Sandakpur Municipality which happened to be a rural municipality. The main reason behind this could be Sandakpur being a rural municipality, access to cardamom center that lies in Fikkal of Suryodaya municipality was not easier for farmers along with limited transportation facilities available. The farmers could not visit the center as per their necessity and seek suggestions. This caused loss of interest on one hand and high opportunity cost on the other. Geographical location thus being the major hindrance in productivity within the district resulted in fall in the cardamom production in 2018 in these municipalities.

Likewise, the calculation in 4.1 has presented that, production of cardamom in 2018 has increased by only 0.46 Mann per ropani. This presents the fact that a crop which is regarded as black gold, although has increased its production in 2018, but the increase is way too low not even reaching 0.5 mann per ropani. The farming did not even yield 1 Mann in 1 ropani even when farmers have invested most of their time and investment.

4.17 Increase In Productivity Per Municipality

The research found out that, Ilam Municipality had the highest increase in cardamom productivity in 2018, whereas, Rong and Suryodaya had the lowest increase in 2018. It is important to identify these areas so as to develop appropriate policies for the the particular municipalities.

Fig. 4.3: Increase in Productivity In Municipalities

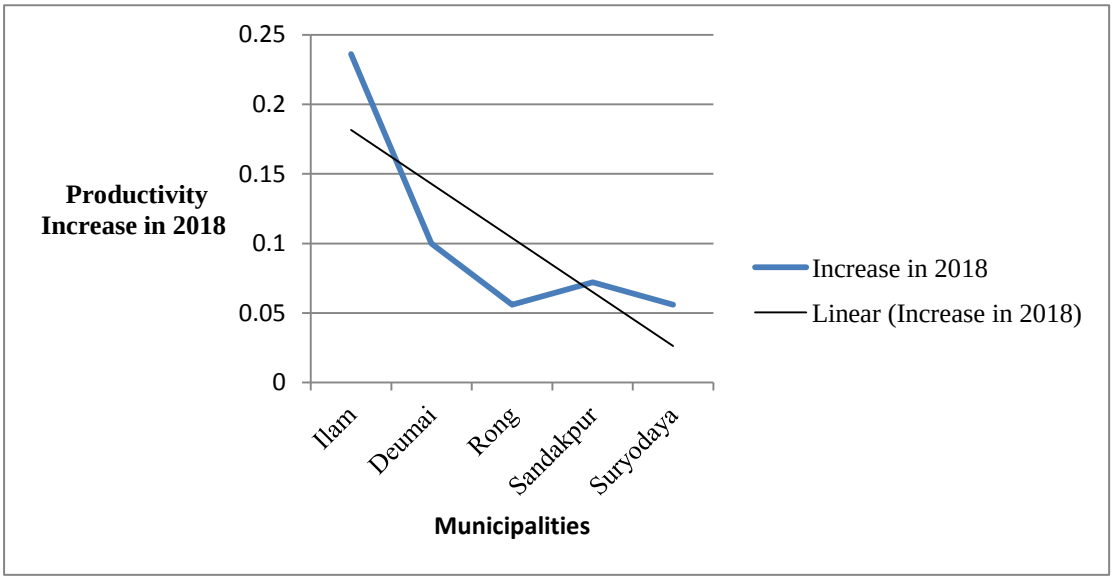


Fig. 4.3 presents the increase in productivity in 2018. Although the productivity in 2018 had been increasing but the increase has been in decreasing rate per ropani along with the municipalities. Only Ilam municipality had the highest productivity per ropani and Rong and Suryodaya had the least. Thus, the research could conclude that, although the production had increased in 2018, nominally, but it was increasing at decreasing rate. The reason behind Ilam municipality being the highest producer of cardamom is its easy access to district agriculture offices which was not the case of Rong municipality.

However, in context of Suryodaya municipality, during the research it was found out that most of the farmers had already diversified from cardamom farming to other crops because of its negative returns. Returns here can be understood in terms of low price, high opportunity cost and low returns from sales etc.

4.18 Major factors Affecting Initial Level of Cardamom Productivity

Production can be understood as the process of turning input into valuable outputs through land, labor, capital and organization. In context of cardamom production, in order to analyze the major factors affecting productivity of cardamom, the research has identified six major variables affecting productivity namely: Viral Diseases, Soil Quality, Climate Change, Lack of irrigation facilties, Government Policies and

Others. Diseases refer to the infections occurred to the plants. These diseases are generally unpredictable regarding their spread and their solution is not available

Likewise, soil quality can be defined as the fitness of a specific kind of soil, to function within its capacity and within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation (Laishram, Saxena, Maikhuri, & Rao, 2012). Absence of aspects such as fitness of soil, function within its capacity, and capability to sustain plants and animals can be understood as poor soil quality. In simple words, when natural quality of soil deteriorates because of various issues such as use of pesticides, plastics in fields, use of chemical fertilizers, natural calamities etc. and the soil cannot function as per its capability, it is understood as poor soil quality.

Similarly, continuous changes seen in climatic condition that affects all the living organisms of the earth can be understood as climate change in the most basic form. It can be defined as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (Rahman, 2012).

Irrigation can be understood as artificially supplying & systematically dividing of water for agriculture and horticulture in order to obtain higher or better production. In context of Ilam district, it was found out that, farmers were highly dependent upon rain water and not many respondents had access to irrigation activities.

Government Policies on the other hands are the plans and strategies developed by the government. In case of cardamom farming, although the government has developed Agriculture Development Strategy and National Agriculture Policy, but these policies seem to be limited within the paper thus, non-existent. Because of these issues, development of new trade trade policies with other countries apart from India (regarding cardamom) can be developed.

Finally, the remaining factor can be understood as other factors that affect the productivity at initial level. The research basically pertains to animals destroying crops during night time as other factors as majority of the respondents listed the issue as other actors affecting productivity.

4.19 Factors Affecting Productivity

Cardamom farming has been affected by a plethora of actors and issues. However, the research identified five major factors affecting its productivity. These factors have been presented in the figure 4.4

Fig. 4.4: Factors Affecting Productivity (In Percentage)

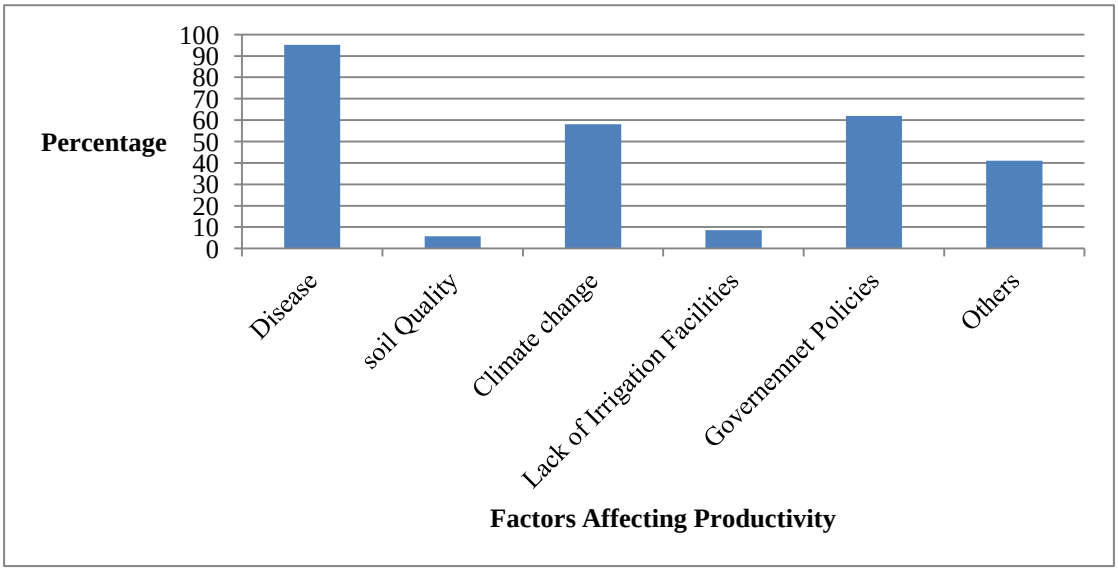


Fig. 4.4 identified diseases as the major factors affecting productivity followed by government policies and climate change respectively. Almost all of the respondents stated diseases as the major factors affecting their farms. Likewise, climate change and government policies also turned out to be affecting the productivity.

4.20 General Area and Factors Affecting Productivity

The research has identified five factors as issues affecting productivity of cardamom. These factors are sub categorized according to the municipalities.

Table 4.9: Factors Affecting Productivity in Different Municipalities

S. No	Municipalities	Diseases	Soil Quality	Climate Change	Lack of Proper Irrigation	Government Policies	Others
1	Ilam	25	0	12	6	15	7
2	Deumai	20	3	15	2	15	11
3	Rong	20	1	15	1	9	12
4	Sandakpur	15	1	9	0	13	6
5	Suryodaya	20	1	10	0	13	7

Source: Field Survey, 2018.

Table 4.9 has presented the factors affecting productivity in different municipalities. According to the table, the diseases remained to be the major factors affecting productivity as all the respondents interviewed stated it as their major factor affecting productivity of cardamom. Similarly, climate change, government policies and other factors also stated to be the major factors in determining productivity in Ilam district.

4.21 Environmental and Non Environmental Factors Affecting Productivity

This research has defined environmental factors as those factors born because of degradation in the environment (water, air, soil, and climate) such as use of pesticides, deforestation, mixing of pollutants in water sources, climate change etc. All other factors not pertaining to these criterias have been classified as non environmental factors. The research has identified 3 factors i. e. diseases, soil quality and climate change as environmental factors and lack of proper irrigation facilities, government policies and other factors as non-environmental factors.

Table 4.10: Environmental and Non- Environmental Factors

Environmental Factors	Frequency	Non. Environmental Factors	Frequency
Diseases	100	Lack of Proper Irrigation	9
Soil Quality	6	Government Policies	65
Climate Change	61	Others	43

Source: Field Survey, 2018

As seen in table 4.10, the major factors affecting productivity are the mixture of environmental and non-environmental factors.

During the survey, it was found that most of the farmers have had their farm affected with various diseases. The most common diseases that were faced were Jurjure and Daduwa. Beside these, others diseases like Syangle, Furke and Dumse have also affected the farming. Jurjure was the most prominent disease spread in the farm. Among the interviewed respondents, 95.2 percent have stated their fields are infected with diseases. There were no medical solutions available for these diseases, so, the farmers had no other options but to destroy the plants. Out of a hundred respondents, 74.3 percent of the farmers stated that their farms have been affected by Jurjure. Likewise, 32.4 percent stated that their farms have been affected by Daduwa. Here, the interesting fact was, the farmer whose land was affected by Jurjure was also affected by Daduwa. Multiple diseases had affected a single farm even if only one plant from each disease had affected. Likewise, 16.2 percent of the farmers stated that the farming has also been affected by Syangle as well. In case of Jurjure, new organs start developing from the roots of the plants that stopped the plant from further growing up and giving fruits. Likewise, in case of Daduwa, the plants get burned and become worthless. Out of the respondents interviewed, 74.8 percent stated that their farm has been infected from Jurjure while 32.4 percent blamed Daduwa for the destruction of plant. Likewise 16.2 percent of the respondents stated Syangle also affected the farm and 3.8 percent have stated their farm had been infected from Furke and Dumse respectively. Since, diseases spread has been increased and new diseases have emerged in the farming, lack of medicines have made the situation even more worse.

The reason behind diseases being the major factor that affects productivity was because there was no medical solution regarding these diseases. While it was difficult to understand what caused these diseases, but most of the respondents believed that it was the change in climatic conditions that caused these diseases to be able to survive.

Likewise, the other reason remained Climate Change. Cardamom is a special kind of plant that requires appropriate weather condition for it to flourish properly. By adequate it meant neither very hot nor very cold and not heavy rainfall but rather a balanced weather. If any one of these dimension got altered, the farming get affected.

However, in the past two years, farmers have experienced exceptional increase in temperature despite of being a hilly region; Ilam has started being hotter with each day passing by. Similarly, it was not just temperature that had been rising up but rainfall had also started to increase. This had extremely affected the farming in the recent years as compared to the past.

Soil quality was taken as other factor as because of use of pesticides turned out to be a major reason behind decreasing fertility of land and productivity simultaneously. Likewise, lack of irrigations facilities and other issues (animal issues) have also contributed in decreasing productivity. 4 percent respondents said that animals risk(snakes, taskar- a small animal that looks like dog comes at night and destroys the plant, and monkeys) destroyed the plants and fruits affecting and decreasing the productivity at initial level at the same time.

4.22 Econometric Analysis on Production of Cardamom

The research has identified viral disease, climate change, lack of government policies, soil quality, and lack of proper irrigation and others as factors affecting initial productivity of cardamom. However, the research identified that diseases, government policies and lack of proper irrigation facilities are within the reach of government and assumed to be solved by the government. And thus, these factors were not included as the variables of factors that affected the productivity and so, the research has taken climate change, soil quality and other factors as variables in determining how these variables affected the productivity apart from diseases. Thus, in order to identify how these factors affected the productivity, a regression analysis has been conducted with production of cardamom in 2018 as dependent "Y" variable. Dependent variables could be defined as a variable being tested in a scientific experiment whose value depends upon other variables. It is the variable that is being measured. It is denoted by "Y"

Independent variables could be defined as a variable that has been manipulated to determine the value of dependent variable. Soil Quality, Climate Change and Other Factors as independent X variables i.e X_1, X_2, and X_3 respectively.

Summary	
Regression Statistics	
Multiple Regression	0.121504
R Square (R^2)	0.014763
Adjusted R Square (R^2_{adj})	-0.01603
Standard Error (σ)	1.33443
Observations	100

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	2.14816	0.5977	3.59406	0.00052	0.96174	3.33458	0.96174	3.33458
Soil Quality	0.19516	0.56732	0.34401	0.73159	-0.931	1.32128	-0.931	1.32128
Climate change	-0.2515	0.27923	-0.9006	0.37004	-0.8057	0.30278	-0.8057	0.30278
Others	-0.1269	0.27716	-0.4579	0.64807	-0.6771	0.42325	-0.6771	0.42325

$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$

Productivity = α + 0.19516* Soil Quality -0.2515*Climate Change – 0.1269*Others + e

Thus, the required regression equation is;

$Y = 2.14816 + 0.19516*\beta_1 - 0.2515*X_2 - 0.1269*X_3 + e$

Where, e is stochastic error.

The model is multivariable linear regression model with stochastic error present. The model does not determine the value of productivity in a given year. Thus, the model is not deterministic in nature. In addition to it, the variables used in the analysis are discrete random variables that do not take specific values. Since, the value of R^2 is 0.014763, 99.98 percent variation in the model cannot be explained because of the stochastic error present in the model

The equation thus presented that, soil quality had positive correlation with productivity and climate change and other factors have negative correlation. As soil quality increased, productivity increased with the coefficient of 0.19516. Likewise, as change in climatic condition increased, productivity decreased with the slope of .2515 and with change in other factors behind these, productivity decreases long with the slope of 0.1269 with e representing stochastic error.

.While the r-squared is 0.014763, and adjusted r-square is -0.01603, in general it could be said that the model does not fit the data well. However, in some cases, a high value r square does not necessarily reflect the true fit of the data and provide true result. In statistics, there exists a common misperception of higher the value of r-squared, better the model. But, r values do not alone represent the true fit of the data. The major reason behind r-squared not being the true reflector is, its value can fluctuate with the addition of variable. While it does make the data perfectly fit into the model, but in reality, the variables rarely affect the dependent variables. Therefore, there is every temptation to play the game of "maximizing the $R^{2"}$ by simply adding more variables to the model. Of course, adding more variables to the model may increase R^2 but it may also increase the variance of forecast error (Gujarati, Porter, & Gunasekar, 2012).

Thus, it can be concluded that productivity of cardamom in 2018 has been affected by environmental factor and non-environmental factor in both positive and negative manner and until and unless significant work is carried on to improve soil fertility, ensure climate change and tackle other factors, particularly, animals issues, the productivity of cardamom is not going to be increased.

4.23 Problems Faced During Cardamom Farming

Farmers have faced a number of problems while cultivating cardamom. These problems range from sick plants to no specific government policies. Farmers have not been able to get the medicines to diseases. In order to identify what promote these diseases respondents were asked with the very same questions. 34 percent of the respondents answered climate change as the causal factor promoting diseases. Although 7 percent believed it was pesticides but majority of them believed it was climate change because in the past no such diseases were spread even though pesticides were used.

Diseases affected the production at initial level. Lack of experts was also one of the major problems faced by the farmers. As there were no experts available at the local level, producers lack knowledge regarding disease prevention, proper growth of plant etc.

In addition to these, there were other problems faced by the farmers during the final phase of production as well. In other words, these problems prohibit the cardamom to be produced at final level. Lack of proper infrastructure, limited market access, market structure etc are some of the problems faced by the producers during the final stage of production.

The unavailability of modern dryer in the villages compelled the producers to dry the cardamom produced at initial level at locally built dryer. Because of this very reason, not all the cardamom produced was ready for consumption and sales but rather got rejected. This has caused a huge loss to the producers. The research found that 1percent of the population regarded lack of infrastructure as challenge in cardamom farming. Likewise, Nepali cardamom has limited market access. Producers were compelled to sell their products only to India because Nepal has no other cardamom market access at current other than India and the product is thus exported to India leaving no other options available for producers. If for some reason, they were not able to sell it to Indian middlemen, the production goes unused and unsold, thus, resulting to a huge amount of loss. While surveyed, 8.6 percent of the respondents stated limited market structure as one of the problem. However, this issue of limited market was not easy to cope up with. It is because, even if Nepal increased its market access, it cannot be said that India's monopsony would end making this issue extremely critical to deal with and solve.

At current, India is the only market for Nepal or in other words India is the only buyer of Nepal cardamom at the supply chain thus making it a monopsony market where buyer controls a large proportion of the market and thus drives price down. Because of this, Nepali cardamom has to first meet the obligations of Indian buyers. If the buyers do not buy the product for reasons such as high price from the producers, the producers have either two options i. e. either do not sell at all or sell at a low price. In both options, it's the producers that are at loss. If only Nepal could open other markets for sale of cardamom farmers would also get a fair price and the product could reach to a wider arena of the world. The research resulted that 3.8 percent of the respondents stating market structure as another challenge faced by the cardamom producers.

CHAPTER V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents the summary of the research, the conclusions it has come upto after the research has been made an recommendations based on the data analysis of chapter four.

5.1 Summary

On the basis of the field survey conducted in five municipalites of Ilam district, the research found out that the most common problem faced by the farmers was diseases. The research also aimed to identify the reasons behind what caused these diseases. 32.4 percent of the respondents believed that it was climate change that had caused uproar of diseases in cardamom farming. One of the reason could be, the plants had not been able to adapt in a changing weather. And since their adaptability was affected, it became easy for diseases to attack the plants. Similarly, 6.7 percent of the farmers believed that it was pesticides that are responsible for the diseases. Likewise, 1.9 percent believed in chemical fertilizers that had affected the productive capacity of the plants. Although productivity increased initially, but gradually started decreasing.

Beside diseases, lack of experts was also another problems faced by the farmers. 68.6 percent of the farmers believed that having no experts regarding cardamom farming was also one of the major problem faced by the farmers as they did not know whom should they ask to when their farms are affected with diseases, or if they want any suggestions regarding increasing the productivity and so on.

Ina addition to this, 29.5 percent of the respondents also stated climate change as the major problem faced by the farmers. During the survey, it was found out that, in the current year of farming the temperature was in extremes i.e the temperature and rainfall both were increasing and this climatic scenario is unsuitable for cardamom as it requires appropriate balance of humidity for giving its product. It was found out that, every respondent had experienced change or deviation in weather parameters over the past ten years. Among the interviewed, 95.2 percent stated that they had experienced increase in temperature. Similarly, 69.5 percent experienced increase in

rainfall. Likewise, 21.9 percent experienced increase in drought, 8.6 percent experienced increase in floods and 31.4 percent experienced increase in hailstorm. This data clearly showed that, climate change is indeed happening and people have started identifying its issues. But unfortunately, it has affected the major earning source i.e. agriculture.. If this continued, not only agriculture sector would get affected but, a major income source of a district could be in the risk to get swept away.

Among the respondents surveyed, all the respondents had experienced changes in climatic conditions. While all of them experienced increase in temperature, 69.5percent experienced increase in rainfall, 21.9 percent experienced increase in drought. Likewise, 8.6 percent of respondents had experienced increase in flood in the recent years, 31.4 percent felt increase in hailstorm and 5.7 experienced increase in snow. This data presented that, while temperature and rainfall was increasing, rainfall and hailstorm was also increasing simultaneously. This explained that, the temperature and rainfall has been growing together. However, despite of the fact that everyone has experienced the perks of climate change, more than half of the respondents i.e. 53.3 percent have not taken any steps towards it. Only 38.1percent have done afforestation in their respective villages. This presented that, the respondents despite of knowing that climate change have affected their farming, have not taken any initiatives from their level. They would rather plant some other crops that would not cost them their investment and time. This fact brings a huge danger in agriculture sector of Nepal in coming days

5.2 Solutions to the Issue

The research found out many issues regarding cardamom farming in Ilam district. These issues can be solved if government increased its interest in cardamom farming. The biggest issue is spread of diseases. The only solution to this issue is to provide medicinal help to producers as soon as possible. Or else, there exists a threat of complete wipe away of cardamom from the district just because of the diseases. Likewise, awareness campaigns about the issues about climate change, its impact and effect in agriculture should be made at local level. Trainings to farmers regarding disease prevention, increased agricultural production should be included by government in its programs regarding agriculture enhancement. Likewise, building

modern dryer at local level, cardamom center at each municipality, improved transportation facilities so that farmers of rural municipalities can easily sell their products are some of the solutions for the issues of cardamom farmings.

5.3 Conclusions

As already mentioned, cardamom is regarded as black gold. The reason behind this is the multiple uses of cardamom that ranges from flavor enhancer to medicinal purpose. Because of its uses, cardamom has huge demand in international market, particularly Nepali cardamom. Nepali cardamom sets aside from other cardamom produced in the world because of its shape, size, fragnance and taste. The major market of Nepali cardamom is India. India is the sole buyer of Nepali cardamom and thus it has solo buying power over Nepali cardamom making it a monopsony market. Since, farmers can only sell their products to India, it is India's market that drives the price of Nepali cardamom. Although the price of cardamom was very attractive past 4-5 years, but recently, the price of cardamom has been going down. In 2018 and 2017, the price of cardamom was Rs.30,000 /mann which got reduced from whopping 1,25,000/mann in 2013/14. The main cause for this decrease was new competitors have emerged in the supply chain of cardamom that supply cheaper, lower quality black cardamom called duplicates due to which price and revenue for and from Nepali cardamoms are getting lower and the market structure for cardamom is also responsible for decrease in price.

Agriculture being the major income source of people of Ilam district where 80.8 percent of people are involved in agriculture with 95.2 percent are involved in cardamom farming. Among this 95.2 percent, 67.3 percent have cardamom as their major crop cultivated. However, the production has not been satisfactory in the recent years. But with the change in productivity of 0.4676mann/ropani approximately in 2018 accompanied with overall decreasing trend of productivity, it could be deduced that the production of cardamom has been decreasing. Even though 2017 showed some positive signs, but the result was not satisfactory at all. The reason behind cardamom showing decreasing trend in 2018 was because of internal and external diseconomies. However, the research found out that the major factors that have affected this crop in the eastern hilly district are climate change, soil quality and other issues.

While soil quality positively affected the productivity, climate change and other factors negatively affected it. Beside these, diseases also had a huge contribution in decreasing productivity. Diseases have spread all over the district and since no medicinal solutions were available, the farmers were compelled to destroy the plants completely. Although some of them use locally made solutions, but such solutions provide relief for the short run.

Beside these, lack of government is clearly seen in this crop as government has not taken any initiatives regarding strengthing the production of cardamom. The major diseases that have spread like wildfire in cardamom is Jurjure. Thus, the result concluded that in order to increase the productivity of cardamom only controlling diseases, providing medicinal solutions and increasing interest towards it will not be enough. If Nepal wants to establish itself as a niche market for cardamom, it has to emphasize also on climate change, increasing soil fertility primarily. Beside these, it should also focus on addressing other issues like ending monopsony power of Indian buyers, providing proper infrastructures at local level etc. Because of these issues, the excitement of farmers in cardamom farming has started to decrease.

In addition to it, with agriculture as the major source of income in the district and that too 67.3 percent have undertaken cardamom farming as their major crop cultivated, and when this sector does not get fair price and yield much revenue, chances are that, the families cultivating cardamom will be at loss and hence the district may suffer from economic crisis. Their major source of income will be highly affected. Thus, the research concludes that duplicate cardamom and monopsony power of Indian buyers as the cause of decreasing price of Nepali cardamom. The mixture of environmental and non environmental factors (Soil fertility, climate change, animals issue) have caused the decrease in productivity of Nepali cardamom. And in addition to it, issues like no infrastructure, no help from government, irrigation issues, limited market access, lack of infrastructure have decreased the excitement of farmers in recent days regarding cardamom farming.

5.4 Recommendations

With the decreasing productivity experienced in the year 2018 which was affected through various environmental and non environmental factors, the productivity of cardamom has a number of issues to overcome that ranges from local to national level. This research thus presents some recommendations which could be implemented in order to overcome the issues faced in cardamom farming which could help enhance its productivity in the days to come.

- Lack of interest of government is clearly visible in the cardamom sector. The government has neither provided any medicinal support nor any experts regarding the issue are available for farmers at local level. This issue has caused the decrease in enthusiasm of farmers regarding cardamom farming. Thus, the government should start developing an interest towards this crop so as to strengthen the sector. This can be done by establishing cardamom center in each municipalities at initial sector and developing policies regarding efficient selling of cardamom by establishing cardamom selling point in each municipalities and providing it with the similar attention that has been provided to the tea estate.
- Since India has higher hands regarding sales of cardamom, the farmers are highly affected by it. Farmers are paid by middlemen who pay them less but sell the same product at high price at spot market in India. This situation is prevalent because the government till date has not opened any other market for Nepali cardamom. The only solution to it is, the government should not limit the market share of Nepali cardamom just to India but to other countries like Bangladesh and Pakistan. Since both of these nations are near to Nepal and Bangladesh showing growing economic growth rate in the recent years, if Nepal could supply its product to these countries then the farmers would not have to rely on Indian market for sales and Nepal's product can have even greater market share.
- One of the major factor affecting productivity is climate change. In the recent years, the effects of climate change has been even more evident with high temperature and high rainfall experienced by the farmers.

Although, Nepal is not responsible for this issue but it is one the victims of climate change. The impact of climate change ranges from melting of glaciers in the Himalayas to decrease in production in the Terai region. Cardamom production is also not untouched by it. Thus, as a result, a major factor affecting productivity came out to be climate change. Thus, in order to preserve the balance in environment, afforestation programs at local level must be implemented as early as possible. Programs like, community forest reservation, one house one tree can be developed in order to maintain the balance of nature and climatic condition.

- Lack of proper infrastructure is also one of the problems faced by the farmers. The cardamom has to be well dried before getting sold as the final product. However, since only a few number of modern dryers are available, the farmers dry up the cardamom at locally built dryer. The cardamom that are dried up in the local dryer have high chance of being rejected as they do not meet the criteria set by the buyers. This causes a loss of investment to the farmers and a decrease of excitement as well. Thus, the government must take initiatives to built modern dryers in every municipalities and provide the farmers with adequate infrastructure.
- 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 no where to be seen. Thus, rather than deriving new policies, implementation of existing policies should be given due importance.

- Since the research identified climate change, soil quality and animals issue as major factors affecting productivity, governmental activities should be now focused upon these areas. The government should start generating plans on mitigating the effect of climate change, improving soil fertility and addressing animals issue. It can do so by working hand in hand with the experts of the respective fields such as environment expert, zoologist, climate change resource person etc.
- Countries belonging to the Middle East are found to consume cardamom comparatively more than other nations. Thus, the government has the opportunity to make a trade deal with those nations where its consumption is the most and supply best quality cardamom directly from Nepal without the involvement of middlemen.
- Regarding export of cardamom, Nepal has to compete with the growing economic power India and European and South East Asian nations, it is very difficult for Nepal to establish itself as a major exporter of cardamom in the world. Thus, in order to develop a niche marketing for cardamom, the government must be able to supply the best quality cardamom. For this, it has to increase state investment in cardamom or provide subsidies in plants and organic fertilizers to the farmers. The model of Public private Partnership can be implemented in this case so as to ensure efficient and smooth production of cardamom.
- Since Rong and Suryodaya municipality are the municipalities with the least increase in 2018, especial attention should be given to these areas. These help may range from provision of medical supplies to provision of experts depending upon the severity of the situation.

Annex 1

Field Survey

A Study on the Production of Cardamom

Study Area: Ilam, Nepal

General Information

Date	
Name of Respondent	
Sex	1 ☐ Male 2 ☐ Female
Age	
Religion	
District	
Province No	
Nagarpalika	
Ward No	

- **What are the major income sources of your family**?
  - 1 ☐ Agriculture
  - 2 ☐ Service
  - 3 ☐ Business
  - 4 ☐ Labor
  - 5 ☐ Foreign remittance
  - 6 ☐ Government Job
  - 7 ☐ Any other (Please specify) ……

- **Is agriculture one of the major sources of income for your family?**
  - 1 ☐ Yes
  - 2 ☐ No

- **If yes, which crop do you cultivate?**
  - 1 ☐ Large cardamom
  - 2 ☐ Tea
  - 3 ☐ Ginger
  - 4 ☐ Vegetable
  - 5 ☐ Any other (Please specify)……

- **Which crop covers the largest portion of your income? (Rank :- 1 for the largest 4 for the smallest)**

  Large cardamom _____

  Ginger _____

  Vegetable _____

  Any Other _____

- **Is Large Cardamom one of the major crops for your family?**

  1.Yes ☐ 2.No ☐

- **If Yes, how long it has been you are engaged in cardamom farming?**

  _____

- **What is the annual income from large cardamom?**

  1 0 ☐ Below 50,000 2 . ☐ 50,000 -1,00,000

  3 ☐ 1,00,000 – 1,50,000 4 ☐ 1,50,000 – 2,00,000

  5. ☐ Above 2,00,000

Productivity of large cardamom

YEAR	PRODUCTION (MANN)	CULTIVATED AREA (ROPANI)	PRODUCTIVITY (Increasing, Decreasing, Unchanged)

Variables Used In Production

1 Labor ☐ 2. Machineries ☐ 3. Both ☐

Proportion of variables

No of people employed	**Machineries Used**	**Land**
	Capital	

Factors Affecting Productivity

- **What is your observation regarding large cardamom production in the last 5 years?**

  1 Increasing ☐ 2 Decreasing ☐

  3 Stable/Not Changed ☐ 4 Don't know ☐

- **Strength of Large Cardamom Farming**

  1. reduce unemployment ☐ 2. income generation ☐

  3. use barren land ☐ 4. environment protection ☐

  5. others ☐

- **What has attracted you towards cardamom farming?**

  1. Suitable Climate ☐ 2. Attractive Return ☐

  3. Higher Price ☐ 4. Usage of Land ☐

- **What are the major factors affecting cardamom farming?**

  1. Viral Diseases ☐
  2. Soil Quality ☐
  3. Climate Change ☐
  4. Lack of irrigation facilities ☐
  5. Government Policies ☐
  6. Others_____

- **What are the major problems faced in large cardamom farming? And how is it affecting?**

S.NO	Problems	Impact	Comment

- **What are the solutions you have undertaken to solve these issues?**

S.NO	Risk	Solutions	Effect

- **What solutions do you expect from government agencies?**

_____

_____

_____

- **Is your farm infected with any kind of disease?**

1. Yes ☐ 2. No ☐ 3. Don't know ☐

If yes,

Disease	Symptoms	Impact	Preventive Measures

- **What are the factors that promote these diseases?**

_____

_____

_____

- **Have you experienced any change or deviation in weather parameters (such as precipitation, temperature, wind, hail, snow and so on) over the past 10 years?**

1. Yes ☐ 2. No ☐ 3. Don't know ☐

If yes, what have you experienced?

Weather Changes	1. Increase	2. Decrease	3. Unchanged	4. Don't Know
Temperature				
Rainfall				
Drought				
Flood				
Landslide				
Hailstrom				
Snow				

- **What preventive measures have you taken to lessen the damages made by these issues?**

  _____

  _____

  _____

Thank you for your time and effort!

Researcher: Manisha Gadtaula

Annex 2

Key Informant Interview

KII 1

Name:

Occupation:

How has the production of cardamom been in the past years?

_____

_____

_____

_____

From your knowledge and experience in the community, what are some of the most common issues in cardamom production?

_____

_____

_____

_____

According to you, what could be the solutions that could ensure growth in productivity?

_____

_____

_____

_____

Do you expect any sort of support from government agencies regarding cardamom production?

_____

_____

_____

_____

_____

Thank you for your effort!

Researcher: Manisha Gadtaula.

Annex 2

KII 1

Name: Narendra Khanal

Occupation: Farmer

How has the production of cardamom been in the past years?

The production has been decreasing since the past few years. Initailly it used to be very good. The pricing was high, productivity was also increasing but since the last four years, it has been decreasing. Although it has increased this year, but the increase is not significant.

From your knowledge and experience in the community, what are some of the most common issues in cardamom production?

Viral diseases like Jurjure and Daduwa is the most common issues faced by farmers in cardamom production. Beside this, no medicinal help from government, no experts to rely on are some of the most common issues faced. All in all, lack of government interest is the main root cause of these issues. If the government provides interest to cardamom like it has provided to tea estae then most of the problems faced by the farmers would reduced to a great extent.

According to you, what could be the solutions that could ensure growth in productivity?

Providing medicinal help and experts could be the major solutions to ensure growth. These are the most basic solutions as well.

Do you expect any sort of support from government agencies regarding cardamom production?

This sector requires a lot of support from government but the most basic is of course the medicines. If only medicines were available then farmer's investement would not have been wasted**.**

Thank you for your effort!

Researcher Manisha Gadtaula.

Annex 2

KII 2

Name: Meghnath Subedi

Occupation: Farmer

How has the production of cardamom been in the past years?

It has been decreasing in the past years.

From your knowledge and experience in the community, what are some of the most common issues in cardamom production?

Diseases, Lack of medicines, no experts to rely on, low price to farmers, animals issues are some of the issues faced by majority of the farmers.

According to you, what could be the solutions that could ensure growth in productivity?

If government provides any sort of help especially medical help for the diseases that would be a big help. But since, the government shows no interest in this issue, the least it can do is providing cardamom expert surveillance at least one a month and reward policy to the highest producer in the district could motivate farmers. This surveillance would not only motivate farmers but also help farmers to get suggestions regarding increasing productivity.

Do you expect any sort of support from government agencies regarding cardamom production?

Government could provide medicinal help, provide experts at local level, help increase market access so that the sellers can bid against many buyers rather than one could be the

Thank you for your effort!

Researcher Manisha Gadtaula

Annex 3

Table

Table 1: Largest Portion Covered By Cardamom

Chronology	**Frequency**
Largest Portion	68
2nd Choice	24
3rd Choice	5
Last Choice	1
Total	100

Source: Field Survey, 2018

Table 2: Problems Faced By the Farmers

Problems Faced	**Percentage**
Diseases	82.9
No Medicines	56.2
No Experts	68.6
Irrigation Issues	6.7
Climate Change	29.5
Decreasing Price	20.0
Limited Market	8.6
No Interest from Government	25.7
Animals Issue	16.2
Waste of Investment	4.8
Market Structure	3.8
Only One Cardamom Center	2.9
No Trainings	5.7
High Labor Cost	1.9
No Fair Price	14.3
No Proper Infrastructure	1.0

Source: Field Survey, 2018

Table 3: Climate Change Pattern and Preventive Actions

Patterns	**Percentage**	**Preventive Actions**	**Percentage**
Increase in Temperature	100	Afforestation	38.1
Rainfall	69.5	Irrigation facilities	3.8
Drought	21.9	No measures taken	53.3
Flood	8.6		
Landslide	3.8		
Hailstrom	31.4		

Source: Field Survey, 2018

Table 4: Production in 2018

S.No	Production in 2018 (In Mann)	Soil Quality 0 = Affected 1 = Not Affected	Climate Change 0 = Affected 1 = Not affected	Others 0 = Affected 1 = Not Affected
1	0.05	1	1	1
2	5	1	1	1
3	5	1	1	0
4	1	1	1	1
5	1	1	1	1
6	5	1	0	1
7	2	1	0	1
8	3	1	1	1
9	1	1	0	0
10	1	1	1	1
11	2	1	1	1
12	2	1	0	1
13	2	1	1	0
14	1	1	0	1
15	3.5	1	0	0
16	2	1	0	0
17	3	1	0	0
18	2	1	0	0

19	2	1	1	1
20	7	1	0	1
21	4	1	1	1
22	2	1	0	1
23	3	1	1	1
24	2	1	0	1
25	3	1	1	1
26	1	0	0	1
27	1	1	0	1
28	3	1	0	1
29	2	0	1	1
30	0.5	1	1	0
31	2	1	0	0
32	3	1	0	1
33	2	1	1	1
34	3	1	0	0
35	1	1	0	0
36	1.5	1	0	0
37	2	1	0	0
38	2	1	0	0
39	1	1	1	0
40	3	1	0	0
41	4	1	0	0
42	5	1	0	0
43	3.5	1	0	1
44	3.5	0	0	1
45	3	1	1	1
46	2	0	1	0
47	1	1	0	0
48	0.05	1	0	0
49	3	1	0	0
50	2	1	0	1

51	1	1	0	1
52	0.63	1	1	1
53	1	1	1	0
54	5	1	1	0
55	4	1	0	1
56	2	1	1	0
57	2	1	0	0
58	1	1	0	0
59	3.5	1	0	1
60	1	1	0	1
61	3	1	0	1
62	1	1	0	1
63	3	1	0	0
64	2	1	0	0
65	2	1	0	0
66	2	1	0	0
67	3	1	1	1
68	0.63	1	1	1
69	2	1	0	0
70	4	1	1	0
71	1	1	1	1
72	2	1	0	0
73	6	1	0	0
74	2	1	0	0
75	2	1	0	1
76	2	0	1	1
77	1	1	1	1
78	3	1	0	1
79	2	1	0	1
80	2	1	0	1
81	1	1	1	1
82	1	1	0	1

83	1	0	0	1
84	0.38	1	1	1
85	0.38	1	1	1
86	1	1	0	1
87	2	1	0	0
88	4	1	1	1
89	2	1	1	1
90	2	1	0	0
91	1	1	1	0
92	1	1	0	0
93	2	1	1	0
94	2	1	0	1
95	1	1	1	1
96	1	1	0	1
97	2	1	1	1
98	1	1	0	1
99	3	1	0	0
100	1	1	1	0

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