Examining the Economic Impact of Cardamom Farming on Household Resources

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Abstract

This study investigates the production economics and household contribution of cardamom farming, analyzing socio-economic characteristics, value chain, and issues in Likhu river corridor. Data from a mid-July 2022 survey of 100 households in Likhu-Pike Rural Municipality, Solukhumbu District, is supplemented by indirect interviews and secondary sources. For analysis and presentation, descriptive and inferential statistical tools are employed. Results reveal a significant 25.83% share of cardamom income in total household income, with wild animal crop destruction being a major problem. The study recommends expert training, identifying in-farm income sources, adopting a cooperative marketing approach, and improving grading and packaging practices for higher benefits. Top of Form

Keywords*: Cardamom Farming, Good Agricultural Practices, Minimum Selling Price, Gross Domestic Product, Global Value Chain Analysis*

1. Introduction

Agriculture is a crucial sector globally, contributing significantly to GDP and employment. In Nepal, it constitutes 25.8% of GDP and employs 60.4% of the labor force. While subsistence farming is prevalent, the cultivation of cash crops and spices is on the rise, offering commercial benefits and potential income and nutrition improvements. Critics raise food security concerns, but commercialization can boost income and nutrition, especially in the high-value spice crop sector, where global demand exceeds production capacity (World Bank, 2021; Ministry of Finance, 2021; Central Bureau of Statistics, 2018; Ministry of Agriculture and Land Development, 2022; Food and Agriculture Organization, 2020; Babu et al., 2009).

Nepal's shift from subsistence to cash crop farming raises food security debates; improved rural market access drives this transition, fostering livelihoods with rapid cash income, while major spice crops like cardamom and ginger offer substantial export opportunities (IFPRI, 2017; Thanichanon et al., 2018; K.C. & Upreti, 2017; Ministry of Industries Commerce and Supplies, 2019).

Nepal's shift to cash crop farming, notably large cardamom, holds global demand and export potential, serving as a major income source with exports valued at NRs. 49.15

billion in 2021; although it covers only 10 percent of spice crop volume, it contributes 86 percent of the total value (Stanley et al., 2014; Khatiwada et al., 2019; Acharya et al., 2020; MoF, 2021; Thapa & Dhimal, 2017).

Large cardamom is a significant cash crop in Nepal, second only to India and Bhutan in production (53 %); it's cultivated in 51 districts, mainly in the eastern hills, and is expanding westward, with value chain analysis and Global Value Chain Analysis (GVCA) playing essential roles in enhancing its commercialization (Jena & Kri, 2019; NARC, 2018; Bhusal et al., 2018; Chapagain et al., 2014; Chapagain, Pathak, & Rai, 2014).

Large cardamom farming in Nepal's eastern hills is highly profitable, surpassing traditional food crops, utilizing local resources and traditional knowledge, with key production districts contributing 84% of national production. However, there is a lack of socio-economic data for cardamom farmers in areas like Likhu Pike Rural Municipality, prompting a study to analyze production economics, household impact, and challenges faced (Sharma, 2006; Kattel et al., 2020; Bhattrai, 2016; Bimali, 2014; MoAD, 2013; Acharya, 2019).

2. Literature Review

Three studies on cardamom farming are reviewed: Varghese (2007) found cardamom cultivation profitable in Kerala, India, with positive Net Present Value, Benefit Cost Ratio, and Internal Rate of Return; Bhattrai (2016) analyzed cardamom farming in Ilam, Nepal, using SWOT analysis; Lamichhane (2016) discussed Allo value chain interventions in Nepal, emphasizing the role of women but noting the need for improved technologies and product diversification. However, socio-economic farmer characteristics and economic aspects of value addition were not fully addressed in these studies.

Numerous studies on agricultural practices have been conducted in various regions: Adhikari et al. (2017) found certified tea to yield higher prices in eastern hills; Shohe & Roy (2018) demonstrated the economic feasibility of large cardamom in Nagaland; Shrestha (2018) showed positive returns on investment for cardamom in certain Nepalese districts; Shrestha & Shrestha (2018) identified value addition opportunities and profitability in the cardamom value chain; Tangjang & Sharma (2018) recommended training and marketing improvements for large cardamom growers in India; Bania et al. (2019) suggested technical support and value addition in Nepal; Gadtaula (2019) explored cardamom production trends and challenges in India, highlighting the influence of soil quality and climate change.

Many studies have explored the profitability and impact of cash crops like cardamom in various regions: Jena & Kri (2019) found cardamom farming financially viable in India; Kalauni & Joshi (2019) emphasized its importance in household income in Nepal; Kandel (2019) highlighted the profitability of organic cardamom in Nepal; Bhusal et al. (2018) recommended value addition and collaboration; Bhosale et al. (2020) showed high profitability of turmeric in India; Kattel et al. (2020) discussed income disparities among

large cardamom farmers in Nepal; Rubhara et al. (2020) found cash crops positively influenced food security in Zimbabwe; Bhattrai et al. (2021) assessed the cost, return, and productivity of large cardamom in Nepal, identifying constraints like disease and marketing issues.

Jamir (2021), Ayilla & Mbanasor (2022) emphasize the need for promoting organic cultivation, addressing challenges, and improving farming practices for enhanced productivity and profitability in large cardamom and turmeric cultivation, while a study in Solukhumbu, Nepal, explores the impact of cardamom income on household living standards, considering unique regional challenges.

The study's conceptual framework as shown in figure 1 analyzes the interplay between socio-economic traits of cardamom farmers, their farming practices, and the effects of cardamom cultivation on household income and expenditure. The formative relationship of socio-economic characteristics of the study area to cardamom farming variables are explained along with the reflective effects of cardamom farming to household income and expenditure.

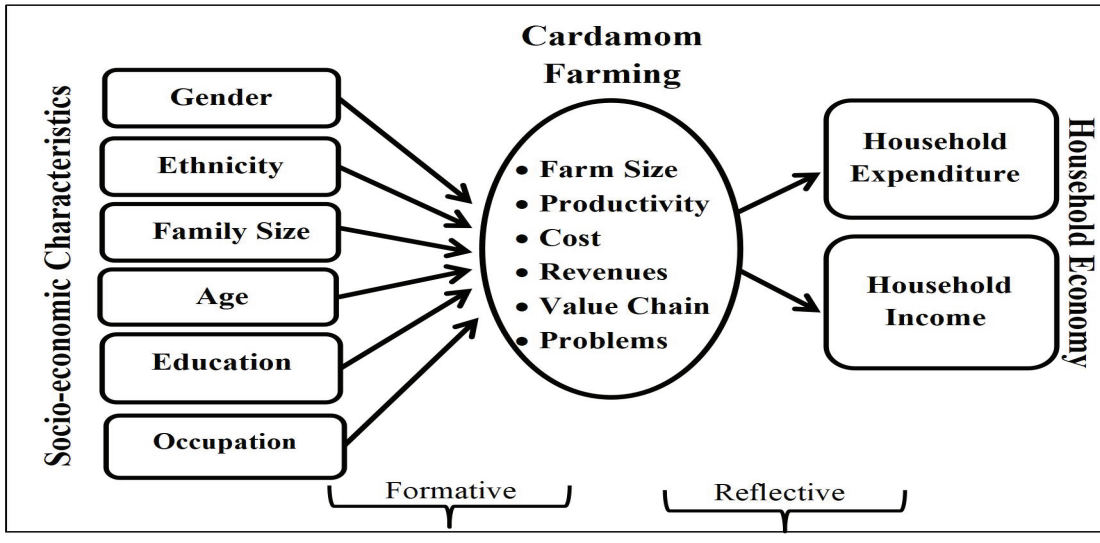


Figure 1: Conceptual Framework

3. Methodology

The study in the Likhu River region, Solukhumbu, Nepal, utilizes a qualitative approach, including structured surveys and interviews, alongside secondary data. Statistical methods, such as central tendency, correlation, and Chi-square tests, are employed using IBM SPSS. The study's objectives encompass analyzing the socio-economic attributes of cardamom farmers, their connection to cardamom farming, the influence of cardamom farming on household finances, and assessing the cardamom market value chain structure and farmer-related challenges.

4. Results and Discussion

4.1 Overview of Cardamom Production and Market

Global production and trade of large cardamom is challenging to track due to the shared HS code (090831) with green cardamom, which is more widely produced. Nepal accounts for over 55% of the world's output, followed by India and Bhutan. In FY 2021/22, Nepal exported 5367 MT of cardamom valued at 4.81 billion (MoF,2021). The global import value of cardamom, including green cardamom, was USD 953 million, and the market grew by 22% between 2017 and 2021 (International Trade Centre, 2022).

Table 1: National LC Export Quantity and Value (2015 - 2022)

Fiscal Year	Export Quantity (in Metric Ton)	Export Value (in billion NRs.)
2014/15	2930	3.84
2015/16	3415	4.6
2016/17	3453	3.91
2017/18	5396	4.84
2018/19	5240	4.28
2019/20	5103	4.02
2020/21	8843	7.01
2021/22	5367	4.81

Source: Department of Customs, MoF, Nepal Foreign Trade Statistics (2015; 2021)

The export data of large cardamom over the past 8 years indicates a rising trend in export quantity and values, making a significant contribution to Nepal's Balance of Payments (BoP) and GDP. However, as per MoALD (2022), the national production of large cardamom in 2021 was 8289 metric tons with a decreasing trend compared to the previous year.

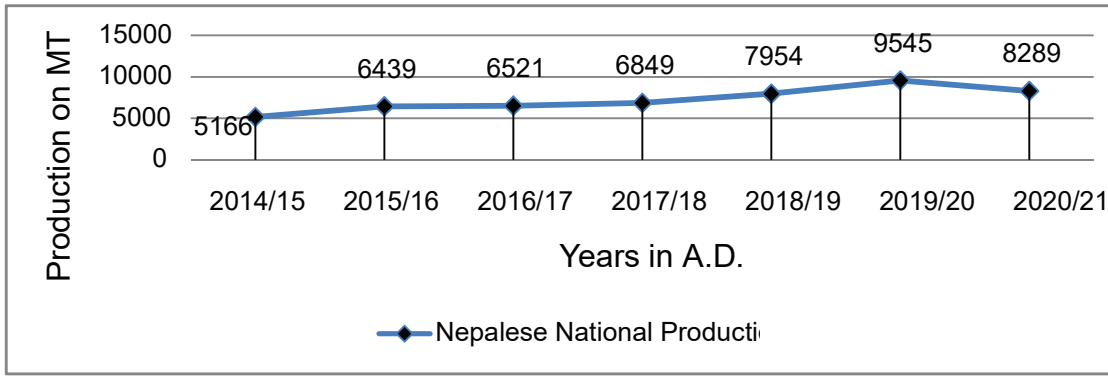


Figure 2: National Large Cardamom Production Trend (2015-2021)

Source: MoALD, Statistical Information on Nepalese Agriculture (2015; 2021)

Province 1 is a leading region in cardamom cultivation and production, producing 7474 MT in 2021 with an average productivity of 0.53 MT per ha, consistently contributing around or even more than 90 percent of the national production since the inception of cardamom cultivation.

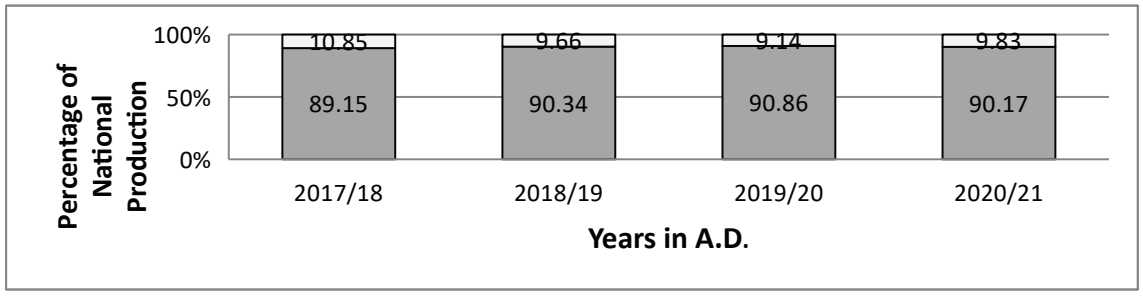


Figure 3: Proportion of Province 1 on National Production (2018-2021)

Source: MoALD. Statistical Information on Nepalese Agriculture (2018; 2021)

The cardamom output in Solukhumbu district, according to MoALD (2021), is 86 MT with a higher productivity of 0.53 MT/Ha, although it constitutes only 1 percent of the national production; however, the district has consistently exhibited higher productivity than the national average, as shown in Figure 3, with a rising trend since 2016/17.

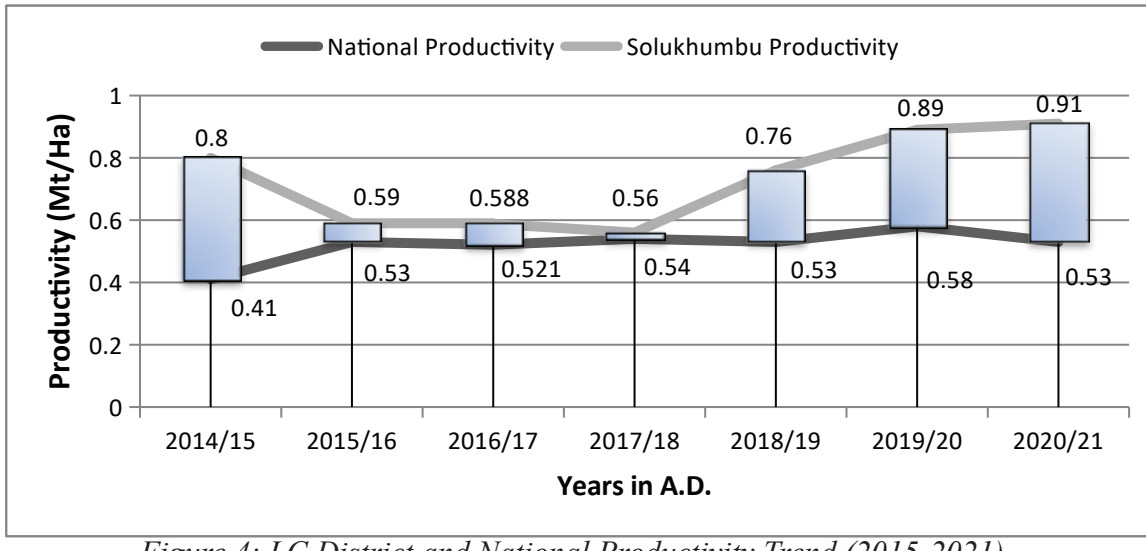


Figure 4: LC District and National Productivity Trend (2015-2021)

Source: MoALD (2015; 2021)

4.2 Socio-economic Characteristics of Cardamom Growers

Under this presents a comprehensive analysis and orderly presentation of the socio-economic profile of households and household heads, including aspects such as gender, caste, family size, education, age, occupation, housing, facilities, and land ownership.

4.2.1 Gender Composition of the Respondents

The study included 621 individuals from 100 households, with 311 males and 310 females, resulting in a sex ratio of 100.3 males per 100 females, higher than the national sex ratio of 95.91 males per 100 females (census 2021). In the studied cluster, the sex ratio was 94.52 males per 100 females (census 2011). However, 92 household heads are males, indicating the patriarchal nature of society. Table 4.2 presents the cross-tabulation of the gender of household heads with the Annual Variable Cost of Cardamom farming in 2021.

Table 2: Role of Gender of HH Head on LC Variable Cost per Kg

HH Head		Variable Cost per Kg (in NRs.)					Total
0 to 200		200 - 400	400 - 600	600 - 800	800 - 1000		
Gender	Male	62	26	2	1	1	92
	Female	7	1	0	0	0	8
Total		69	27	2	1	1	100

Source: Household Survey, 2022.

The study found that female-led households in the study area had the least variable cost per kilogram in 2021, with 7 out of 8 households exhibiting this trend, indicating a potential cost minimization due to decisions made by females in the family and supporting the alternative hypothesis regarding the relationship between socio-economic characteristics (gender) and cardamom farming.

4.2.2 Ethnicity Composition of the Respondents

The study reveals that the Chettri community constitutes the majority of the households (78.1%) in the study area, indicating its significant socio-cultural influence, while other ethnicities like Dalit, Bhujel, Khatri, Brahmin, and Magar are also represented, showcasing the diverse socio-cultural fabric of the region (CBS, 2013).

Table 3: Relation of Ethnicity on LC Productivity per Kg in 2021

		Productivity (Kg / Ha)					Total
0 - 500		500 -1000	1000 - 1500	1500 - 2000	2000 - 2500		
Caste / Ethnicity	Brahmin	2	1	0	0	0	3
	Chhetri	25	44	5	0	1	75
	Dalit	4	5	1	1	1	12
	Bhujel/Gharti	0	5	0	0	0	5
	Khatri Chhetri	0	3	0	0	0	3
	Magar	0	2	0	0	0	2
Total		31	60	6	1	2	100

Source: Household Survey, 2022.

The analysis of cardamom productivity based on ethnicity in the study area reveals that households from Dalit, Bhujel, and Khatri communities have higher cardamom productivity compared to the majority Chhetri households, suggesting their diligent efforts and skills positively impacting productivity (Table 3, data from the study). This supports the rejection of the null hypothesis, indicating the influence of ethnicity on cardamom farming.

4.2.3 Family Size of the Respondents

The family size is a significant demographic characteristic in the study area, influencing household income and expenditure, with data presented in Table 4

Table 4: Family Size of the Respondents

Number of Members	Frequency
Total (N)	100
Range	2 – 10
Mean	6.1
Standard Deviation	1.691
Variance	2.859

Source: Household Survey, 2022 and Author's computation.

The family size in the study area varies from 2 to 10 members, with a mean size of 6 members, standard deviation of 1.691, and variance of 2.859 for the 100 households (data not referenced). Compared to the 2011 census data for the cluster (4.66) and the national average (4.33 in 2021 census), the family sizes in the study area are higher.

Table 5: Cross-Tabulation of Family Size with LC Variable Cost per Ha

0 - 50000		Total Variable Cost per Ha (in NRs.)					Total
		50000 - 100000	100000 - 150000	150000 - 200000	200000 - 250000		
No of Family Numbers	0 - 3	0	2	0	0	0	2
	6-Mar	3	16	12	3	0	34
	9-Jun	11	37	8	0	1	57
	12-Sep	3	3	0	1	0	7
Total		17	58	20	4	1	100

Source: Household Survey, 2022.

The data in Table 5 reveals that the cost is higher for families with the least number of members, while the lowest variable cost is observed for families with 6 to 9 members, suggesting that the use of imputed labor during harvesting and post-harvest practices reduces the cash cost of cultivation, and family members' support in annual regular harvesting and post-harvest activities can contribute to cost reduction. This supports the alternative hypothesis regarding the relation of socio-economic characteristic (age) on cardamom farming.

4.2.4 Age-Group Classification of the Respondents

The frequency distribution in Figure 4 indicates that youth constitute 53.79% of the population, with 32.4% being teenagers, while the number of dependents (age 0-5 and above 60) is comparatively lower.

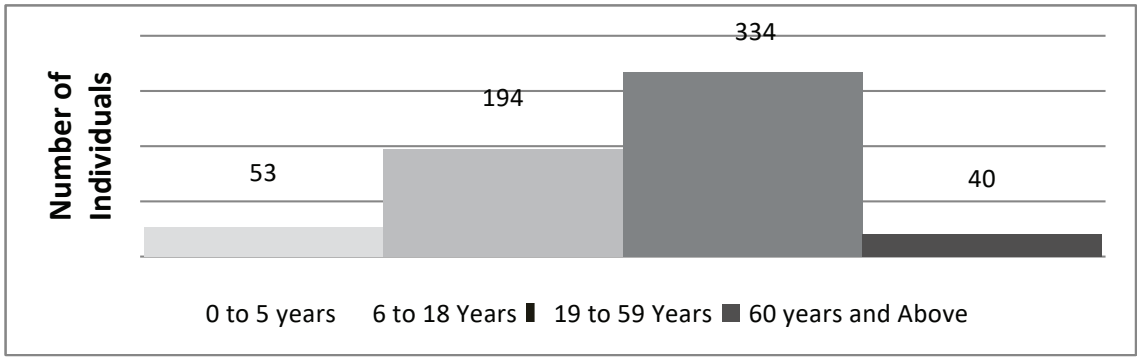


Figure 5: Age-Group Classification of the Respondents

Source: Household Survey, 2022.

Table 6 presents the ratio of mean adult population to total family population in the households of the study area, with 60.4 percent representing adult members, indicating a high potentiality of human resources.

Table 6: Ratio Statistics for Adult Population to Total Population of HH

Mean	Coefficient of Dispersion
0.604	0.259

Source: Authors' Computation.

Table 7 illustrates a Cross-Tabulation indicating that households with heads in the active population age group of 19 to 59 years exhibit higher productivity, suggesting that this age group can contribute more effectively to cardamom farming compared to older age groups

Table 7: Cross-Tab of Active Population with LC Variable Cost per Ha

0 -500		Productivity (Kg / Ha)					Total
Age Group of HH Head (in Years)		500 -1000	1000 - 1500	1500 - 2000	2000 - 2500		
	Active (19 -59)	27	45	6	1	2	81
	Old (60 and above)	4	15	0	0	0	19
Total		31	60	6	1	2	100

Source: Household Survey, 2022.

The study establishes that the socio-economic characteristic of age among household members has a significant impact on cardamom farming variables, particularly productivity, supporting the first objective

4.2.5 Educational Classification of the Respondents

The study area exhibits a relatively high literacy rate of 78.69%, with most household heads being literate, although 22.71% of the total population is still illiterate, and only 1.27% have obtained a qualification of master's level and above

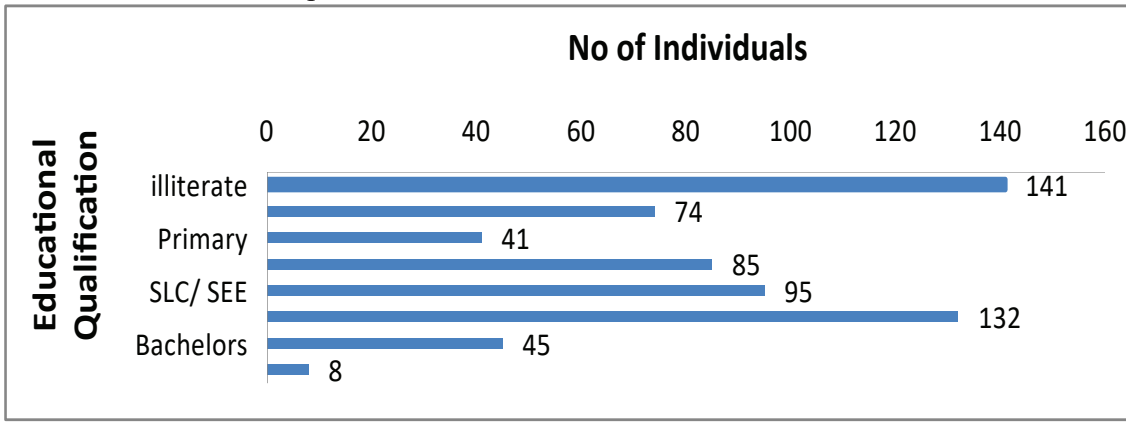


Figure 6: Educational Classification of the Households
Source: Household Survey, 2022.

The cross-table in Table 8 indicates that while higher productivity is observed among literate household heads, there is no clear influence of higher education levels on cardamom productivity, suggesting a lack of proper agriculture-related productive education at higher levels.

Table 8: Cross-Tab of Educational Level of HH Head and LC Productivity

0 –500		Productivity (Kg / Ha)					Total
		500-1000	1000 - 1500	1500 - 2000	2000 - 2500		
Educational Level of HH Head	Illiterate	7	22	2	1	1	33
	Literate	18	32	3	0	1	54
	SLC/ SEE	2	2	0	0	0	4
	Intermediate/ +2	2	1	1	0	0	4
	Bachelors and Above	2	3	0	0	0	5
Total		31	60	6	1	2	100

Source: Household Survey, 2022.

The correlation between the educational level of HH Head (classified as illiterate and literate) and the variable cost per hectare of cardamom farming households is computed, and the results are presented in Table 9

Table 9: Correlation of LC Variable Cost to Literacy of HH Head

	Literacy	
	Pearson Correlation	Significance (2 tailed)
Regular Cost per Hectare	-0.203*	0. 043
*. Correlation is significant at the 0.05 level (2-tailed).		

Source: Author's Computation.

The results obtained at a good significance level indicate a negative relationship between literacy and regular cost of cardamom farming per hectare, suggesting that education has a cost-saving impact on variable cost per hectare; thus, rejecting the null hypothesis of no relation between the socio-economic characteristic (education) and cardamom farming.

4.2.6 Occupational Classification of the Respondents

The occupational classification of respondents illustrates the various jobs undertaken for income generation, as depicted in Figure 6

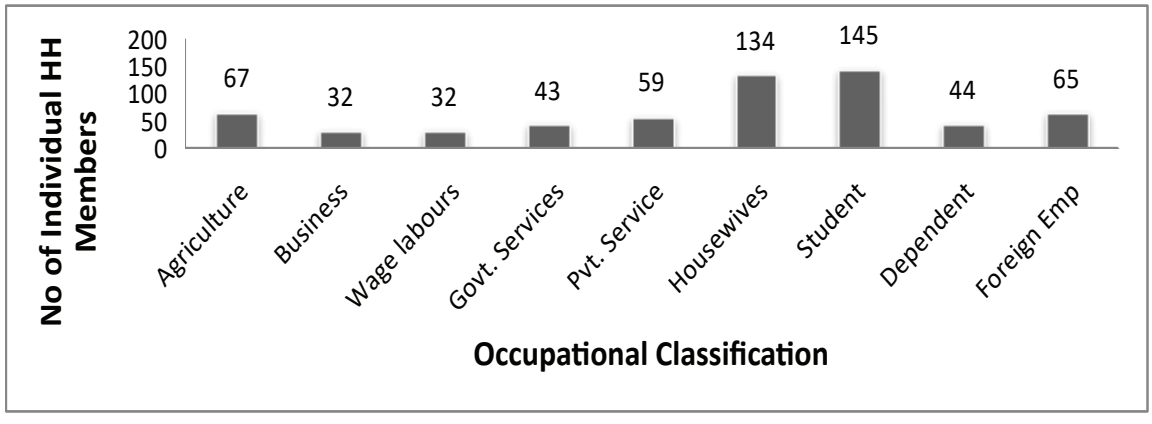


Figure 7: Occupational Classification of the Household Members

Source: Household Survey, 2022.

The majority of people in the area are engaged in agriculture, with 50 percent of household heads relying on agriculture as their main source of income. In 2021, higher productivity was observed among households whose heads were involved in agriculture or wage labor as their primary occupation, indicating the impact of their dedication and efforts on productive outcomes. However, the overall percentage of people engaged in agriculture has been decreasing

Table 10: Cross-Tabulation of Occupation of HH Head and LC Productivity

0 - 500		Productivity (Kg / Ha)					Total
		500 -1000	1000 - 1500	1500 - 2000	2000 - 2500		
Main Occupation of HH Head	Agriculture	15	33	3	1	1	53
	Business	7	11	0	0	0	18
	Wage Earners	6	13	0	0	1	20
	Service	3	3	3	0	0	9
Total		31	60	6	1	2	100

Source: Household Survey, 2022.

4.2.7 Group and Cooperatives Involvement of Households

Table 11 reveals that 93 out of 100 households are members of Aama Samuha, contributing NRs. 10 per household member monthly, and actively participating in social service activities

Table 11: Group Membership and Saving Status of HH

Response on	Yes	No
Group Membership (N)	93	7
Group Type	Aama Samuha *(Mother's Group)*	
Regular Saving (in NRs.)	10 per member	

Source: Household Survey, 2022.

Table 12 indicates that 98 households are members of a cooperative, with 77 of them regularly saving an average of NRs. 150 per month

Table 12: Cooperative Membership and Saving of HH

Responses on	Yes	No
Cooperative Membership (No.)	98	2
Regular Saving (No.)	77	23
Minimum Saving (in NRs.)	100	
Maximum Saving (in NRs.)	600	
Mean Saving (in NRs.)	150	
Standard Deviation (in NRs.)	99.340	

Source: Household Survey, 2022 and Author's Computation.

4.2.8 Banking and Insurance Facilities in the Study Area

The study area has access to banking facilities from Century Bank Ltd and Sunrise Bank Ltd, both of which are located within a two-hour walking distance

Table 13: Bank Accounts in a HH in 2021

Statistics	
N (No. of HH)	100
Mean (No. of Bank Accounts)	2.59
Median (No. of Bank Accounts)	2.00
Mode (No. of Bank Accounts)	2
Minimum (No. of Bank Accounts)	1
Maximum (No. of Bank Accounts)	6

Source: Household Survey, 2022 and Author's Computation.

4.2.9 Land Ownership of the Households

Figure 7 presents the distribution of land ownership in the study area, ranging from 0.2544 to 4.3243 hectares with a mean of 1.0874 hectares out of the total 108.7425 hectares. The majority of the population owns land in the range of 0.5 to 1 hectare, and the mean ownership is higher than the national average of 0.35 hectares as per the census of 2011

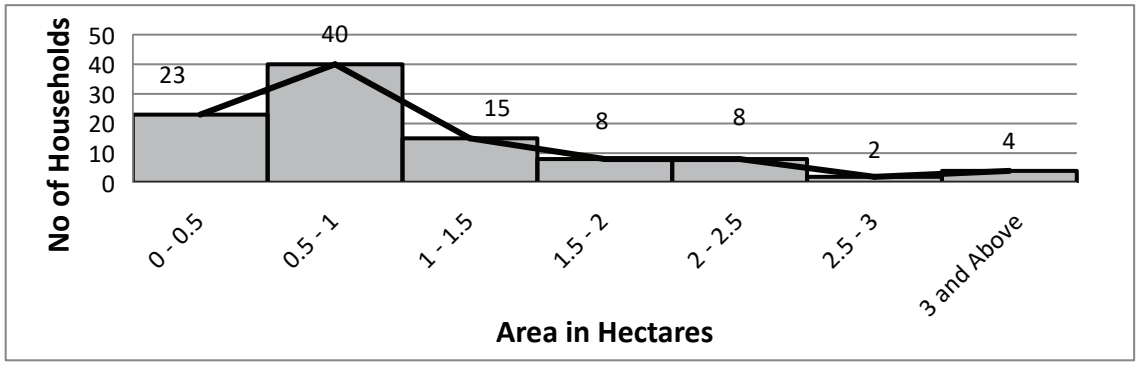


Figure 8: Land Ownership Status of HH

Source: Household Survey, 2022.

As observed, 84 percent of the land owned (91.42 hectares) in the study area is irrigated, and only a small portion of 12.6167 hectares is owned by females, with a mean area of 0.9012 hectares from 14 percent of households.

4.2.10 Food Crops and Vegetables Farming Revenue

The study reveals that 71 households cultivate food crops in a total of 20.96 hectares of land with a mean area of 0.29251 hectares, while only five households generate income from sales of food crops with an average sales value of NRs. 6,600, and the rest use it

for household consumption. Additionally, the Likhu-1 hydroelectricity project has created a good market for vegetables production, with an average sales value of NRs. 10,701 generated by 57 households. Furthermore, 55 households own 6.791 hectares of grassland for domestic animals, and among them, 23 households generate an average income of NRs. 12,696 from sales of grass.

Table14: Food Crops, Vegetables and Grassland Income in 2021

	N	Min	Max	Mean	Std. Deviation
Food Crops Area (in Ha)	71	0.0509	1.0175	0.2952	0.2278
Food Crops Sales Value (in NRs.)	5	4000	12000	6600	3210
Vegetable Sales Value Last Year. (in NRs.)	57	3000	47000	10702	6930
Grass Land Area (in Ha)	55	0.0509	0.7631	0.1235	0.1155
Grass Sales Value last year (in NRs.)	23	3000	40000	12696	8401

Source: Household Survey, 2022 and Author's Computation.

Table 15 shows a cross-tabulation presentation of large cardamom productivity in relation to households involved exclusively in cardamom farming and those engaged in food crop farming. The results indicate that households engaged in food crop farming have better productivity than those exclusively using their cultivable land for cardamom, suggesting that year-round involvement of farmers in their fields supports better care and productivity from cardamom farms.

Table 15: Cross-Tab of HH in Food Crops Farming with LC Productivity

0 -500		Productivity (Kg / Ha)					Total
		500 - 1000	1000-1500	1500 - 2000	2000 - 2500		
Households involved in	Only Cardamom Farming	10	17	2	0	0	29
	Food Crops Farming also	21	43	4	1	2	71
Total		31	60	6	1	2	100

Source: Household Survey, 2022

4.3 Cardamom Farming of Household

The section presents the primary subject matter of the study, focusing on cardamom-related information and variables necessary to achieve the research objectives

4.3.1 Area of Cardamom Cultivation of Households

The majority of farmers in the study area have small cardamom farms, with farm sizes less

than 0.5 hectares, accounting for 53 percent of the sampled households. The cultivated area for cardamom ranges from 0.0763 hectares to 3.0524 hectares, with a total area of 68.6286 hectares (Table 16).

Table 16: Cardamom Cultivation Area of Respondents

Area in Hectare	Frequency	Percent	Cumulative Percent
Less than 0.5	53	53.0	53.0
0.5 – 1	26	26.0	79.0
1 - 1.5	9	9.0	88.0
1.5 – 2	7	7.0	95.0
2 - 2.5	2	2.0	97.0
2.5 – 3	1	1.0	
Above 3	2	2.0	
Total (N)	100	100.0	
Range		0.0763 – 3.0524	
Sum		68.6286	
Mean		0.6862	
Standard Deviation		0.6521	

Source: Household Survey, 2022 and Author's Computation.

Table 17 provides information about the initial farm size of the farmers in the study area, showing that most of them started farming with an average area of approximately 0.0509 hectares (equivalent to 1 Ropani in local measurement).

Table17: Initial Area of Cardamom Cultivation of Households

Statistics	
N	100
Mean (in Ha)	0.0677
Median (in Ha)	0.0509
Mode (in Ha)	0.0509
Std. Deviation (in Ha)	0.0395
Minimum (in Ha)	0.0254
Maximum (in Ha)	0.2544

Source: Author's Computation.

Table 18 presents a cross-tabulation study of household farm size and the productivity of large cardamom, revealing that smaller farms (less than 1 hectare) tend to have higher productivity compared to larger farms.

Table 18: Cross-Tab of HH LC Farm Size with LC Productivity

		Productivity (Kg / Ha)					
0 -500		500 -1000	1000 - 1500	1500 - 2000	2000 - 2500		Total
Farm Size	Small Farms (less than 1 Ha)	26	45	6	1	1	79
	Large Farms (more than 1 Ha)	5	15	0	0	1	21
Total		31	60	6	1	2	100

Source: Household Survey, 2022

4.3.2 Years of Cultivation of Respondents

Table 19 shows that a majority of cardamom farms (49 households) in the study area are between 15 to 20 years old, followed by farms aged above 20 years, owned by 37 households, indicating that 86 percent of households own farms that are at least 15 years old.

Table 19: Relation of HH LC Years of Cultivation with LC Productivity

0 - 500		Productivity (Kg / Ha)					Total
		500 -1000	1000 - 1500	1500 - 2000	2000 - 2500		
Years of Cultivation	5 -10	0	2	0	1	0	3
	10 – 15	4	4	3	0	0	11
	15 – 20	15	32	0	0	2	49
	Above 20	12	22	3	0	0	37
Total		31	60	6	1	2	100

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	48.443[a]	12	.000
Likelihood Ratio	24.182	12	.019
Linear-by-Linear Association	2.330	1	.127
N of Valid Cases	100		
a. 15 cells (75.0%) have expected count less than 5. The minimum expected count is .03.			

Source: Household Survey, 2022 and Author's Computation.

As shown in Table 19, the cross-tabulation of household years of production with large cardamom productivity suggests that farmers' experience gained from farming may lead to better productivity of their cardamom farms, and the chi-square test values (x2=48.443, df = 12, p = 0.000) indicate a significant association between years of cultivation and productivity of large cardamom.

4.3.3 Cardamom Crop Calendar in the Study Area

The crop cycle of large cardamom in the study area, as presented in Table 20, shows that there are no year-round jobs for cardamom growers, as the crop has a long productivity span for decades, requiring no annual replantation, with weeding and trimming performed once or twice a year depending on the area and procedures.

Table 20 : Cardamom Crop Calendar in the Study Area

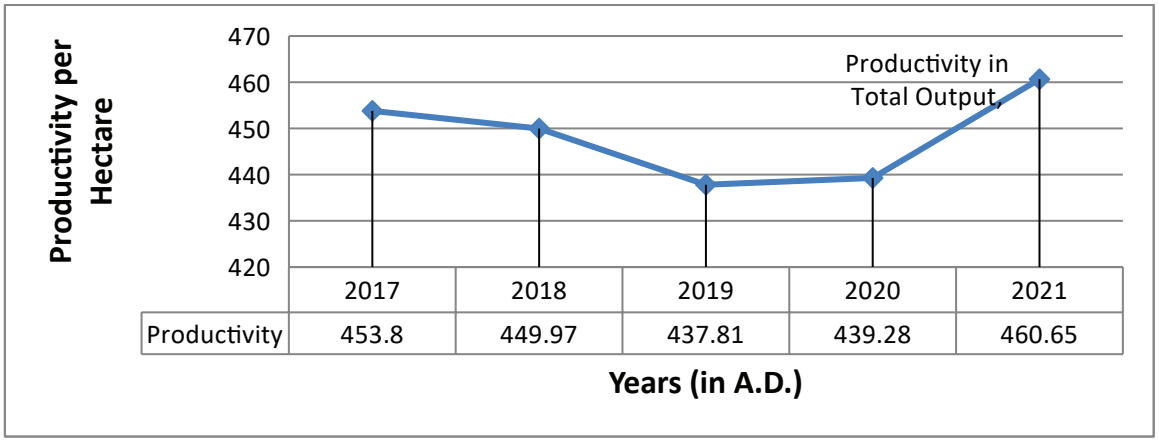
Months	Jobs	Frequency
Jestha (May/ June)	Plantation and Replantation	Once (In the year of plantation)
Ashad (June/July)		
Shrawan (July/ August)	Weeding	Once (Plantation year)
Bhadra (August/ September)	• Trimming • Weeding • Harvesting • Post Harvesting	Annually
Ashwin (September/ October)		
Kartik (October/ November)		
Mangsir (November/ December)		
Poush (December/ January)		
Magh (January/ February)		
Falgun (February/ March)	Irrigation	Annually
Chaitra (March/April)		
Baishak (April/May)		

Source: Household Survey, 2022

The cardamom farming process in the study area involves plantation during the monsoon season from mid-May to mid-July, weeding and shade management in the first year, followed by peak harvesting and post-harvest activities in August and September. The drying is done using improved kilns, and sales depend on seller availability and deals. The dry season requires irrigation in February to May, and labor demand is highest during plantation and harvesting. Other tasks are usually carried out by imputed labor of the households.

4.3.4 Productivity Trend of Cardamom in Study Area

The average productivity of cardamom in the study area over five years is 448.30 Kg per Hectare, lower than the national average of 531 Kg per Hectare, but with the potential for improvement through better technical support and training



Source: Household Survey, 2022.

The annual productivity data is visually represented in Figure 8, showing variations in computation with total output and mean

Table 21: Responses about Decreasing Production of Cardamom in the Area

Likert Scales	Frequency	Percent	Cumulative Percent
Strongly Disagree	3	3	3
Moderately Disagree	29	29	32
Neutral	15	15	47
Moderately Agree	51	51	98
Strongly Agree	2	2	100.0
Total	100	100.0	
Mean Statistic	3.20		
Mode Statistic	4		
Maximum Likelihood Percentage = 64%			

Source: Household Survey, 2022 and Author's Computation.

Table 21 presents the Likert scale responses on whether cardamom production is decreasing, with 64 percent of respondents disagreeing, indicating a majority belief that cardamom production is not declining.

5. Summary

Large Cardamom is a valuable spice crop with high global demand, and Nepal is its largest producer. This study analyzes the production economics and its impact on household economy in the Likhu-Pike Rural Municipality, Solukhumbu District. Primary data from 100 samples was collected through interviews were used for analysis of the socio-economic characteristics and their relation to cardamom farming attributes. The study reveals gender and ethnic differences in productivity, with better productivity observed in households engaged in agriculture. Good communication facilities, group involvement, and cooperative memberships are present in the area, but insurance coverage is lacking. Average landholding is 1.087 Ha, with 87% of land being irrigated and only 14% owned by females. The study also observed better productivity in households involved in food crop farming and animal husbandry.

6. Conclusion

The cultivation of perennial cardamom plants in Nepalese hills has been a profitable income-generating activity contributing significantly to household economies. The study analyzes the socio-economic profile of cardamom growers and their relation to cardamom farming attributes, confirming a significant influence of socio-economic characteristics on cardamom farming. The higher contribution margin and proportionate share of cardamom income in total household income highlight its profitability and importance in household economies. Challenges such as price fluctuations, animal damage, and lack of marketing support are identified. The expansion of cardamom cultivation and value addition is essential to maximize its benefits in the agricultural economy and global spice market.

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