

Dynamics of Large Cardamom Farming in Taplejung District, Nepal

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Abstract

Large cardamom is a pivotal high-value cash crop for the eastern Himalayan region of Nepal, particularly in Taplejung, due to its agronomic and economic resilience. This study, conducted in 2017 in Sirijangha Rural Municipality, Taplejung, analyzes the socio-economic dynamics and sustainability of large cardamom farming. Employing a mixed-methods approach, primary data was gathered from 86 purposively selected households, supplemented by field observations, interviews, and group discussions. The findings show that large cardamom farming significantly improves rural livelihoods. However, its long-term sustainability depends on addressing climate, market, and policy challenges. Key policy implications advocate for the establishment of price stabilization mechanisms, such as cooperative marketing, and the implementation of financial literacy programs to promote productive investment. A coordinated, multi-level response integrating on-ground support with enabling policies is crucial to secure the socio-economic wellbeing of dependent communities and ensure the sector's future viability.

Keywords: Large Cardamom, Cash Crop, Price Volatility, Family Income, Improved Household Facilities

Introduction

Large cardamom (*Amomum subulatum*), also known as black cardamom, is a high-value spice crop native to the Eastern Himalayas. It is not only a significant flavouring agent but also holds important medicinal value in traditions like Ayurveda, known for its carminative, diuretic, and stimulant properties (Ojha, 1992; Limbu, 1996). This shade-loving, perennial crop thrives in the humid subtropical climate of Nepal's hills, particularly at altitudes between 400 and 2350 meters, making it an ideal agro-forestry crop for the region (Ministry of Agriculture Development, 2014). Nepal is a leading global producer and exporter of large cardamom, with cultivation spread across 42 districts. Taplejung District stands as the nation's largest producer, where cardamom farming is a cornerstone of

the rural economy and a primary source of cash income for smallholder farmers (Ministry of Agriculture Development, 2014). The crop was introduced to Nepal (Ilam) in 1865 by returning migrant laborers from Sikkim, with planned development beginning after the establishment of the Cardamom Development Centre in Fikkal, Ilam in 1975. Despite its economic importance, the sector faces challenges. The pricing of Nepalese cardamom is heavily influenced by the international market, primarily determined in Siliguri, India—the global trading hub for the commodity. Prices fluctuate based on grade, size, and quality, directly impacting farmer incomes. Furthermore, while government plans have recognized cardamom as a major commercial crop, a dedicated policy framework is lacking, with development relying on broader strategies

like the Nepal Trade Integration Strategy (NTIS) (GoN, Ministry of Commerce, 2016).

In Taplejung, while the area under cultivation has expanded, productivity has stagnated due to aging plantations, disease, and poor management practices. More critically, the substantial income generated from this "green gold" is often channelled into unproductive or demonstrative expenditures (like luxury goods and real estate) rather than productive reinvestment, which can limit long-term socioeconomic transformation and even foster negative social impacts.

Accordingly, this study examined the socio-economic impact of large cardamom farming in Taplejung district, Nepal. Specifically, it assessed the status of farming, analyzed how farmers utilize their cardamom income, compared the crop's role in changing socio-economic conditions over the past decade, and identified the major challenges farmers face in using their income for productive purposes. The findings are intended to provide valuable insights for farmers, economists, and policymakers to enhance the sustainability and positive developmental impact of this critical cash crops.

Literature Review

Large cardamom (*Amomum subulatum* Roxb.) is a high-value perennial spice crop widely cultivated in the humid sub-tropical regions of the eastern sub-Himalayan belt. As a shade-loving, semi-evergreen plant, it thrives at elevations ranging from 400 to 2,350 meters above mean sea level under well-distributed annual rainfall of approximately 3,000–3,500 mm (Shrestha et al., 2018). The crop is traditionally integrated into agroforestry systems and remains an important component of subsistence and commercial farming in Nepal's mid-hill regions. In addition to its economic importance, large cardamom has long been recognized for its medicinal properties in Ayurvedic practice, functioning as a carminative, diuretic, and cardiac stimulant, and as a remedy for respiratory and gastrointestinal ailments (Limbu, 1996).

Historically, large cardamom was introduced

to Nepal in 1865 in Ilam district by Nepalese laborers returning from Sikkim, although its commercial cultivation began later in 1953. The establishment of the Cardamom Development Centre in Fikkal in 1975 marked a turning point in promoting its systematic production and expansion (Ojha, 1992). At present, the crop is cultivated in more than 40 districts across Nepal, particularly in eastern hill districts such as Taplejung, Panchthar, Sankhuwasabha, and Ilam, as well as in selected districts of the central and western regions (Ministry of Agriculture Development, 2014). Nepal has emerged as one of the leading global producers of large cardamom, with a significant proportion of its produce exported primarily to India and subsequently to international markets (Khatiwada, et al., 2019).

The market dynamics of large cardamom are influenced by global demand, quality grading, and international trade linkages. Price fluctuations are common and depend on capsule size, moisture content, and post-harvest processing practices. Despite its high export potential and importance as a foreign exchange-earning commodity, policy frameworks specific to large cardamom development remain limited. However, broader initiatives such as the Agribusiness Promotion Policy (2006) and the National Trade Integration Strategy (Ministry of Agriculture and Cooperatives, 2006; GoN, Ministry of Commerce, 2016) have indirectly supported the production and marketing of the crop.

Empirical studies indicate that large cardamom cultivation has significantly contributed to rural livelihood improvement and socio-economic upliftment in Nepal's hill communities. Income generated from cardamom farming is commonly allocated to essential household needs such as education, healthcare, food, and clothing, thereby enhancing overall living standards (Limbu, 1996). Similarly, Jimée (1997) concluded that cardamom cultivation has flourished particularly in eastern Nepal and has gradually improved the living standards of farming households. As a high-value, low-volume crop suitable for sloping land, its cultivation has helped reduce

rural outmigration and promoted income diversification among smallholder farmers (Khatiwada et al., 2024; Pandeya, 2025).

However, challenges associated with climate change, pest infestation, declining productivity, and environmental concerns such as biodiversity loss due to monoculture practices have been increasingly reported (Pandeya, 2025; Swar et al., 2023; Yadav, 2013). Research highlights the need for climate-smart agricultural practices, including soil and water management, disease-resistant cultivars, and improved knowledge dissemination among farmers to ensure sustainable production (Sharma et al., 2017b). Therefore, while large cardamom farming presents substantial economic opportunities, its long-term sustainability depends on adaptive farming practices, institutional support, and effective income utilization strategies among farming households. Many studies have examined large cardamom farming in Nepal at a general or national level. However, few studies focus specifically on Taplejung District. There is limited understanding of how local farming practices, climate challenges, and market conditions affect farmers in this area. Therefore, this research aimed to fill this gap. The objective of this study was to analyze the dynamics of large cardamom farming by examining its status in 2017, assessing major income utilization patterns, comparing its role in changing the socio-economic status of farmers over the past decade, and identifying the major challenges farmers faced in utilizing their income for productive purposes.

Methods of the Study

This study employed convergent mixed-methods approach (Katz-Buonincontro, 2024). Both qualitative and quantitative data were collected from primary and secondary sources. Quantitative data were obtained through a complete census of 86 cardamom-farming households involved in the Himalica Pilot Project using structured questionnaires. Qualitative data were obtained through interviews with three participants, including a youth, a mid-

career adult, and an established elder, as well as through field observations. Quantitative data related to farming status and income utilization were analyzed using simple statistical methods, while qualitative data on existing challenges were examined descriptively. The fieldwork was conducted in 2017 in Sirijangha Rural Municipality, Taplejung District, as part of a thesis to fulfill the requirements for a Master's degree in Rural Development at Tribhuvan University. Ethical procedures were strictly applied at field by seeking informed consent from all participants, maintaining their anonymity and confidentiality, and ensuring voluntary participation (Fang et al., 2024).

Findings

This section presents the findings under the following headings: demographic and socio-economic status; status of large cardamom farming; economics of production; changing socio-economic status; improved household facilities; changes in asset composition; challenges in the productive use of income from cardamom; and narrative analysis and cross-case synthesis.

Demographic and Socio-economic Status of the Study Area

Taplejung District, located in the former Mechi Zone of eastern Nepal, is one of the seventy-seven districts of the country. Phungling serves as the district headquarters. The district exhibits considerable altitudinal variation, ranging from 310 meters to 8,586 meters above mean sea level. Geographically, Taplejung is bordered by Sikkim (India) to the east, Terhathum and Panchthar districts to the south, Sankhuwasabha district to the west, and the Tibet Autonomous Region of China to the north. Previously, the district was administratively divided into 48 Village Development Committees (VDCs) and one municipality; however, following the federal restructuring of Nepal, it currently consists of eight rural municipalities and one municipality.

Taplejung District covers a total area of approximately 3,646 square kilometers.

According to the Central Bureau of Statistics (2012), the total population of the district was 127,461, comprising 60,552 males (47.51%) and 66,909 females (52.49%), with a sex ratio of 90.50. The population density was recorded at 35 persons per square kilometer, with an annual average population growth rate of 0.07 percent. The district contained 26,471 households, with an average household size of 4.81 persons (Central Bureau of Statistics, 2012).

Sikaicha, formerly a Village Development Committee and currently Ward No. 3 of Sirijangha Rural Municipality, is situated in the southern part of Taplejung District, approximately 15 kilometers east of the district headquarters. The area is surrounded by Sinam, Ambegudin, Tellok, Mamangkhe, Phawakhol, Tiringe, Tapethok, and Thechambu. The locality is predominantly rural, with limited access to basic infrastructure such

as electricity, road connectivity, safe drinking water, and healthcare facilities.

Sikaicha had a total population of 2,250, consisting of 1,066 males (44.66%) and 1,184 females (55.34%), residing in 417 households (Central Bureau of Statistics, 2012). The major ethnic groups in the area include Brahmin, Chhetri, Limbu, Kami, Damai, and Sarki. Agriculture is the primary occupation of the local population, with large cardamom serving as the dominant cash crop alongside maize, millet, and paddy. Livestock rearing—including buffalo, cattle, goats, pigs, and poultry—also constitutes an integral component of the local livelihood system

Table 1. Socialdemographics of the Respondents

Dimension	Category	Frequency	Percent
Age	15 - 60 years	75	87.20
	Above 60 years	11	12.80
Caste/Ethnicity	Brahmins/Chhetris	44	51.20
	Janajatis (Rai/Limbu/Khas)	40	46.50
	Dalits	2	2.30
Literacy Status	Illiterate	1	1.20
	Literate (Total)	85	98.80
	Breakdown of Literate Farmers		
	a) Can read & write only	15	17.40
	b) Primary Level Pass	15	17.40
	c) Lower Secondary Pass	34	39.50
	d) Secondary Level Pass	15	17.40
	e) Intermediate Pass	5	5.80
f) Bachelor's & above	1	1.20	
Total		86	100.00

Table 1 shows that the age distribution of cardamom farmers indicates more than 87 percent fall within the economically active age group of 15 to 60 years. This demographic

structure is favorable for agricultural activities, as it reflects the availability of a productive labor force capable of undertaking the physically demanding tasks associated with

cardamom cultivation. The study also reveals a notable disparity in participation in cardamom farming across caste groups. A majority of the farmers (over 51%) belong to Brahmin/Chhetri communities, followed by Janajati groups (46.5%), while Dalits constitute only about 2 percent of the total farming population. This low level of participation among Dalit households is largely associated with limited land ownership, as cardamom cultivation typically requires access to cultivable land.

Furthermore, the literacy level within the farming community is remarkably high, at nearly 99 percent. Most farmers possess basic reading and writing skills, with a substantial proportion having attained secondary-level education. This high literacy rate represents a significant advantage for the adoption of improved agricultural practices, as it enhances farmers' capacity to understand technical knowledge and participate effectively in training programs aimed at promoting modern farming techniques

and sustainable production practices.

Status of Large Cardamom Farming

This section presents the status of large cardamom farming in the study area. It includes key aspects such as ownership of cardamom farms, production levels, market price, cost of production, income derived from cardamom farming, major species cultivated, and availability of irrigation facilities. Among these factors, land ownership plays a crucial role in determining the extent and sustainability of cardamom cultivation, as access to cultivable land is a prerequisite for engaging in commercial farming practices (see Table 2).

The ownership structure of cardamom farmland varies across households and significantly influences production capacity and income generation from the crop. Therefore, information regarding the ownership status of land used for cardamom farming was collected through field surveys and is presented in tabular form for further analysis

Table 2. Ownership and Cultivated Area of Cardamom Farming

S.N.	Ownership of Cardamom Farm Land	Area in Ropani [1 Ropani= 508.72 m ²)	Area in percent
1	Own land Self Farming	1143	87.99
2	Lease out	98	7.55
3	Lease in	58	4.46
4	Share Farming	0	0.00
5	Total Areas	1299	100.00
6	Average Cultivated Area per Household	15.10	

The data indicate that a total of 1,299 ropani of land in the study area is under large cardamom cultivation. Of this, 87.99 percent is self-owned by farmers, while 7.55 percent is leased out and 4.46 percent is leased in by farmers who do not possess ownership of the land. The study found no evidence of a sharecropping system in cardamom farming within the study area. On average, each household cultivates approximately 15.10 ropani of land under large cardamom.

These findings suggest that the majority of cardamom farmers operate on their own land, which enhances the stability and sustainability of cardamom cultivation practices. The dominance of self-owned landholdings indicates favorable conditions for the promotion and expansion of cardamom farming. At the same time, the presence of land leasing practices highlights potential opportunities for increasing cultivation through the leasehold system, particularly for farmers with limited land ownership.

Economics of Production, Price, and Cost of Cardamom

Cardamom production in the study area exhibited considerable fluctuation between 2012 and 2016. Production increased from 7,955 kg in 2012 to 8,810 kg in 2013, but declined in 2014 and 2015 to 7,938 kg, before rising sharply to 11,095 kg in 2016. These variations can be attributed to changing climatic conditions, particularly low rainfall during 2014–2015, as well as the positive impact of climate-resilient farming practices introduced through the Himalica Pilot Project in 2016. This trend underscores the importance of consistent farm management practices including irrigation, manuring, and pest control in stabilizing production levels.

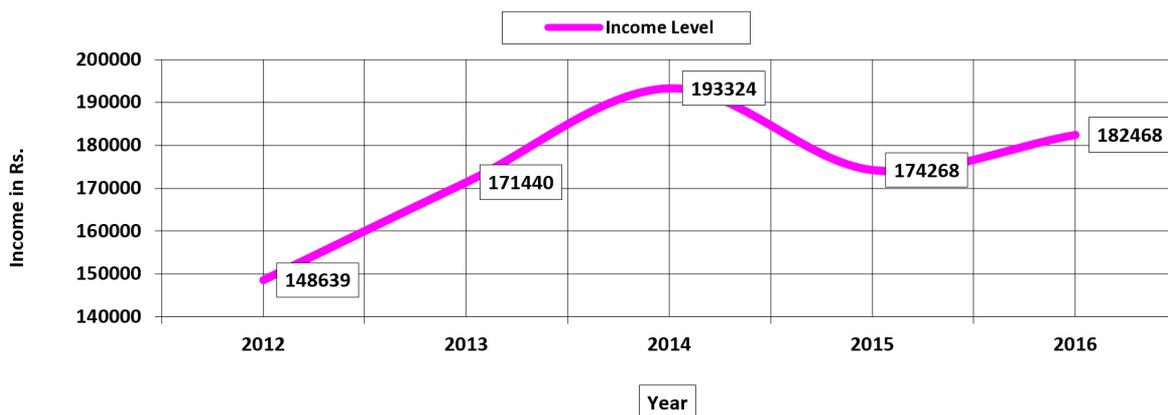
Similarly, the market price of cardamom demonstrated significant volatility during the same period. The average price per kilogram increased from Rs. 1,607 in 2012 to Rs. 1,925 in 2014, before declining to Rs. 1,888 in 2015 and dropping sharply to Rs. 1,414 in 2016. Such price fluctuations are influenced by both domestic and international market trends, government policies, and variations in global production levels. In this context, diversification through intercropping or integrated farming systems may help reduce farmers’ exposure to market risks.

Production costs followed an unstable trend,

rising from Rs. 129.26 per kilogram in 2012 to Rs. 184.08 in 2015, primarily due to increased labor and input costs. However, the cost declined to Rs. 142.44 per kilogram in 2016, likely due to improved productivity and efficiency gains associated with the adoption of climate-resilient practices promoted by the Himalica Pilot Project. The use of improved drying technologies and climate-smart farming techniques can further reduce production costs and enhance net returns.

The average household income from cardamom farming also varied over the study period. It increased from Rs. 148,639 in 2012 to Rs. 171,440 in 2013 and Rs. 193,324 in 2014, before declining to Rs. 174,268 in 2015 and subsequently rising to Rs. 182,468 in 2016. The increase in income from 2012 to 2014 was largely driven by higher production and favorable market prices, whereas the decline in 2015 resulted from reduced production and price alongside increased production costs. Despite the continued decline in prices from 2015 to 2016, the substantial increase in production contributed to a moderate rise in household income (see Figure 1). Overall, these findings indicate noticeable fluctuations in income from large cardamom farming, largely influenced by changes in production, market price, and cost of cultivation

Figure 1. Trend of Average Household Income



The findings reveal a significant interrelationship between production, cost of production, market price, and income derived from cardamom farming. An increase in production is generally associated with a rise in production costs, primarily due to inflationary pressures on labor and input markets. At the same time, higher production levels often coincide with fluctuations in market prices driven by supply-demand dynamics and market volatility. Despite these variations, increased production tends to result in higher overall household income from cardamom farming. Thus, the relationship among production, cost of production, price, and income is interdependent and triangular in nature, with each factor exerting a direct or indirect influence on the others.

Changing Socio-Economic Status through Cardamom Farming

Cardamom farming has significantly influenced the socio-economic structure of the study area, particularly in terms of occupational patterns and household income sources. Prior to the expansion of cardamom cultivation, approximately 54 percent of the population was engaged in traditional agricultural activities. Following

the increased adoption of cardamom farming, this proportion slightly declined to 51 percent, while the percentage of individuals involved in educational pursuits increased from 29 percent to 34 percent. In contrast, participation in foreign employment and small-scale business activities showed a marginal decline. This shift suggests that the profitability of cardamom farming has encouraged youth to remain engaged in local agricultural practices and has enabled households to invest more in education, thereby reducing reliance on overseas employment opportunities.

The economic contribution of cardamom farming is further reflected in changes in household income composition. The share of agriculture in total household income increased substantially from 42 percent to 63 percent, establishing it as the primary source of livelihood in the study area. At the same time, dependence on remittances from foreign employment declined sharply from 27 percent to 15 percent. These findings indicate that income generated from cardamom farming has reduced economic dependence on migration and reoriented the local economy toward a more agriculture-based income structure centered on this high-value cash crop.

Table 3. Increased Family Income

S.N.	Major Income Source	Changes from the cardamom Farming in Agricultural Activities of Total Family			
		Before Cardamom Farming		After Cardamom Farming	
		Frequency	Percent	Frequency	Percent
1	Livestock	8,74,000	43.66	16,21,000	7.88
2	Cardamom Farming	0	0.00	1,71,00,000	83.09
3	Rice	64,000	3.20	45,000	0.22
4	Maize	2,26,000	11.29	1,50,000	0.73
5	Millet	3,11,000	15.53	2,11,000	1.03
6	Wheat	22,000	1.10	38,000	0.18
7	Bee Keeping	19,000	0.95	2,28,000	1.11
8	Forest Product	32,000	1.60	1,46,000	0.71
9	Cash Crop	2,99,000	14.94	6,48,000	3.15
10	Others	1,55,000	7.74	3,92,000	1.90
11	Total	20,02,000	100	2,05,79,000	100.00

Table 3 illustrates the role of cardamom farming in transforming agricultural income sources in the study area. The data indicate that prior to the expansion of cardamom cultivation, livestock was the primary source of agricultural income, accounting for 43.66 percent, followed by millet farming (15.53%), cash crops (14.94%), maize farming (11.29%), other crops (7.74%), rice (3.20%), forest products (1.60%), wheat (1.10%), and bee-keeping (0.95%).

However, following the adoption of large cardamom farming, the income structure shifted markedly. Cardamom emerged as the dominant source of agricultural income, contributing 83.09 percent of total income from agricultural activities. In contrast, the contribution of livestock declined to 7.88 percent, followed by cash crops (3.15%), other crops (1.90%), beekeeping (1.11%), millet (1.03%), maize (0.73%), forest products (0.71%), rice (0.22%), and wheat (0.18%). These findings highlight the significant shift from diversified traditional farming practices toward a more specialized, cardamom-centered agricultural system.

Improved Household Facilities and Declined Family Food Sufficiency

Cardamom farming has contributed to notable improvements in housing conditions, sanitation, and healthcare facilities in the study area, although it has also introduced emerging challenges related to household food security. Housing conditions have improved significantly, with a gradual shift from traditional construction materials to more durable modern alternatives. Previously, all house foundations were constructed using mud stone; however, approximately 8 percent of households now utilize reinforced cement concrete (RCC). Similarly, the use of galvanized iron (GI) tin roofing increased substantially from 20 percent to over 95 percent. Income generated from cardamom farming was identified as the primary factor driving these improvements in housing infrastructure, accounting for approximately 68 percent of such changes.

Significant progress has also been observed in health, education, and sanitation facilities.

Access to household toilets increased from 26 percent to 100 percent, while tap water coverage also reached full accessibility. These improvements were achieved through collaboration with development programs, with cardamom income playing a supportive role—contributing approximately 56 percent toward toilet construction and 30 percent toward access to safe drinking water. Healthcare access improved markedly, with the proportion of households seeking hospital treatment increasing from 45 percent to over 95 percent.

Despite these socio-economic advancements, household food sufficiency has declined following the expansion of cardamom cultivation. The proportion of households maintaining food security for 9–12 months decreased from 51 percent to 15 percent, as agricultural land previously allocated for staple food crops was increasingly converted to cardamom farming. This trend highlights the need for integrated farming practices that balance cash crop production with subsistence food cultivation.

On average, households in the study area earn an annual income of approximately Rs. 182,468 from cardamom farming. The expenditure pattern of this income reveals a mixed trend. Nearly 48 percent of the income is utilized for productive purposes, including savings, land purchase, education, and reinvestment in farming activities. However, around 18 percent is allocated to less productive expenditures such as non-essential consumption, ornaments, and social or cultural celebrations. Although a substantial portion of income is directed toward asset formation and savings, there remains potential for reallocating discretionary spending toward more productive investments to enhance long-term financial security and capital accumulation.

Changes in Assets Composition

Cardamom farming has significantly influenced the composition of household assets in the study area. Fixed assets, particularly land and housing structures, experienced notable growth over time. The total landholding increased by approximately 17 percent, while the number of

houses rose by 18 percent, with income from cardamom farming contributing substantially (74%) to this expansion. However, the considerable increase in the monetary value of these assets exceeding 900 percent for land and 866 percent for housing is largely attributable to general market appreciation and inflationary trends, with cardamom income playing a relatively limited direct role in value escalation (see Table 4).

Similarly, liquid assets, including cash savings

and jewellery, showed a marked increase in their overall value. Although cardamom farming contributed to this growth (approximately 43%), broader macroeconomic factors, such as rising market prices and the passage of time, were identified as the primary drivers behind the increase in asset valuation. These findings suggest that while cardamom farming has enhanced household asset accumulation, external economic conditions have also played a significant role in determining the monetary value of these assets.

Table 4. Changes in Household Assets Attributed to Cardamom Farming

Asset Category	Name of Assets	Before Cardamom Farming (Rs.)	After Cardamom Farming	Percentage Change (%)
Fixed Assets	Land	84.02Ha 1,96,68,000	98.26Ha 21,51,00,000	Quantity: +16.94% Price: +933.65%
	House	91Units 27,00,000	107Units 2,60,90,000	Quantity: +17.58% Price: +866.29%
	Sub-Total (Fixed)	2,23,68,000	24,11,90,000	—
Liquid Assets	Cash	7,86,500	1,00,09,000	Price: +1172.60%
	Jewellery	13,26,000	1,06,15,000	Price: +700.52%
	Sub-Total (Liquid)	21,12,500	2,06,24,000	—
Grand Total	All Assets	2,44,80,500	26,18,14,000	—

The findings indicate that cardamom farming has acted as a key catalyst in enhancing both the quantity and quality of household assets, with its influence being particularly evident in the acquisition of physical and modern assets rather than in driving general price inflation. A significant transition has been observed from the ownership of basic household furniture to the acquisition of modern consumer assets such as mobile phones, televisions, and motorcycles, with a combined estimated value of nearly Rs. 1 crore. Income generated from cardamom farming accounted for more than half (52%) of these asset purchases.

Challenges of Productive Use of Income from Cardamom Farming

During the field study, information regarding the challenges faced by cardamom farmers in

the productive utilization of income derived from cardamom farming was collected through focus group discussions (FGDs), key informant interviews (KIIs), field observations, and challenge analysis. These methods were employed to ensure the triangulation and reliability of the collected data. The primary objective was to identify the constraints that limit farmers' ability to allocate their income toward productive investments and long-term economic development.

The major findings derived from the field survey are presented in Table 5 and are further discussed in detail in the subsequent sections.

Table 5. Challenges Analysis

Major Challenges	Low Level of Awareness	Insufficient Financial Institute	Absence of investment Friendly Environment	Demonstration Effects	Price Fluctuation
Low Level of Awareness		Low Level of Awareness	Low Level of Awareness	Demonstration Effects	Price Fluctuation
Insufficient Financial Institute			Insufficient Financial Institute	Demonstration Effects	Price Fluctuation
Absence of investment Friendly Environment				Absence of investment Friendly Environment	Price Fluctuation
Demonstration Effects					Price Fluctuation
Price Fluctuation					
Total Value	2	1	1	2	4

The matrix analysis in Table 5 highlights the major challenges associated with the productive utilization of income derived from large cardamom farming. Among the identified constraints, price fluctuation emerged as the most significant challenge, with a value score of 4, followed by low levels of awareness and demonstration effects, each with a value score of 2. Insufficient financial institutions and the absence of an investment-friendly environment were also identified as constraints, each with a value score of 1.

The findings indicate that price volatility in the cardamom market is the primary obstacle to the productive use of farm income. Cardamom prices are highly influenced by both national and international market demand and supply dynamics, including import–export regulations, government policies, global trade conditions, and broader economic fluctuations. Such instability directly affects farmers' income, expenditure, savings, and investment capacity. In many cases, unpredictable market prices compel farmers to store their produce for extended periods in anticipation of favourable market conditions,

thereby immobilizing financial resources that could otherwise be invested productively.

Additionally, a low level of financial awareness among farmers limits their ability to utilize earnings effectively for business development or long-term investment. Social influences further contribute to unproductive spending patterns through demonstration effects, where income is often allocated to non-essential consumption such as social ceremonies and luxury goods rather than savings or reinvestment. The limited presence of financial institutions in the study area restricts access to formal savings, credit, and investment services that could facilitate improved financial management practices. Furthermore, the prevailing social, political, and economic environment is not conducive to investment, discouraging entrepreneurial initiatives and the creation of local employment opportunities. Addressing these challenges requires coordinated efforts at both community and policy levels to promote financial literacy, strengthen institutional support, and create a more favourable investment climate.

Narrative Analysis and Cross Case Synthesis

Based on three interviews with participants (A, B, and C) conducted in the study area, the

successful cultivation of large cardamom has emerged as a transformative approach to rural development. The details are presented in Table 6.

Table 6. Interview Findings

Themes	A: Youth	B: Mid-Career Adult	C: Established Elder	Implication
Demographics & Motivation	26-year-old youth; attracted from early age; rejected foreign migration.	45-year-old; shifted from traditional millet farming.	60-year-old; achieved success in old age after long-term effort.	Diverse Pathways: Cardamom farming attracts and rewards individuals across different life stages youth, mid-career changers, and experienced elders.
Institutional Support & Leadership	Selected as a Demo Farmer by the HIMALICA program (ECDF/ICIMOD) via a farmer's group.	Member of a Cardamom Farmer's Group since 2007.	Founder and President of his own Cardamom Farmer's Group; proactive in knowledge transfer.	Collective Empowerment: Formal and informal farmer groups, coupled with external project support, are critical for knowledge sharing, technical aid, and building farmer agency.
Land Use & Crop Strategy	27 Ropani dedicated to cardamom; diversified with kiwi, soybean, silam, vegetables, and herbs.	Converted 35 Ropani from millet/maize fields to cardamom; also uses diversified intercropping.	Expanded to 61 Ropani (35 self-cultivated, 26 by others); shifted from pasture/cereal to cardamom on cultivable land.	Agro-economic Transition: A clear shift from subsistence cereal farming (millet, maize) and traditional pasture to high-value cash crops (cardamom) with associated diversification for resilience and income.
Challenges Highlighted	Not explicitly mentioned in the case (implies initial need for support).	Pests, irrigation problems, and drastic production volatility (22 to 4 MAN).	Initially, there was a lack of innovative technologies for processing (drying/plucking); family skepticism.	Risk and Vulnerability: Farmers face significant production risks (pests, climate/irrigation) and post-harvest challenges. Success requires overcoming technical and knowledge gaps.

Adoption of Innovation	Utilizes traditional knowledge modernized with project-supported techniques.	Transitioned from small-scale/jungle planting to systematic farming in former grain fields.	Introduced improved species (<i>Saune</i> from Ilam); established a nursery for high-quality seedlings.	Knowledge and Technology Integration: Success hinges on blending traditional knowledge with improved planting material, systematic cultivation methods, and better post-harvest technologies.
Economic & Social Outcomes	Increased production (400kg to 480kg); bought land and built a house in Terai; advocates for youth involvement.	Despite current challenges, sees cardamom as a superior livelihood source compared to traditional cereals.	Major asset accumulation (bought 15 Kathha land + house worth NPR 37 lakh); production increased (712kg to 870kg).	Substantive Livelihood Improvement: Successful cardamom farming leads to significant capital formation, intergenerational asset building (land/house in Terai), and a viable alternative to labor migration.
Advocacy & Future Vision	Actively suggests youth stop foreign migration and invest in cardamom farming.	Concludes farmers should not be dependent on cereal crops if they can adopt cash crops like cardamom.	Serves as a living example of late-career success, inspiring through action and group leadership.	Model for Rural Transformation: All cases position commercial cardamom farming as a sustainable, prestigious, and economically superior model for rural development and youth retention.

The qualitative data provides a viable and dignified alternative to foreign employment, particularly for youth, by generating substantial local income and livelihood opportunities. This success is largely supported by collective action through farmer groups and external development programs, which facilitate access to technical knowledge, improved inputs, and institutional resources.

The findings indicate a gradual transition among farmers from subsistence-based agriculture to more intensified, diversified, and market-oriented farming systems. The adoption of improved farming techniques and resilient cardamom species has enhanced farmers' capacity to

cope with environmental and market-related challenges. Consequently, income generated from cardamom farming has contributed to asset accumulation and strengthened long-term livelihood security, thereby supporting intergenerational economic stability among farming households.

Discussions

Findings present cardamom farming as a viable and lucrative alternative to foreign employment, a finding strongly supported by existing literature. Jimee (1997) highlights the improvement in farmers' living standards resulting from cardamom cultivation, while Limbu (1996) explains how income generated

from this crop is allocated across essential household sectors such as education, healthcare, and food consumption. A government report (Ministry of Agriculture Development, 2014) identifies Nepal as one of the world's leading producers of large cardamom, emphasizing its economic importance. Furthermore, cardamom cultivation has been recognized as a factor in reducing migration from hill regions and as a major contributor to foreign currency earnings (Buckingham & Petheram, 2004).

However, the experiences documented in this study also reflect broader sectoral vulnerabilities. Production challenges related to pest infestation and irrigation variability correspond with constraints identified in previous studies (Yadav, 2013). Climate change has been recognized as a significant threat, contributing to declining productivity and income instability among marginal farmers (Pasa et al., 2024; Sharma et al., 2017b; Swar et al., 2023). Additionally, environmental concerns associated with cardamom cultivation, such as forest degradation, biodiversity loss, and the development of monoculture systems, have been documented in earlier research (Buckingham & Petheram, 2004; Yadav, 2013; Yongge, 2000). Market dependency remains another critical issue, as Nepal's cardamom exports have historically been concentrated in a limited number of destinations, primarily India (Acharya et al., 2021).

The study also demonstrates the importance of adopting improved farming techniques and resilient species to enhance productivity. This aligns with the climate-smart agricultural framework proposed by ICIMOD (Thomas et al., 2024), which emphasizes weather-smart, soil-smart, knowledge-smart, water-smart, and energy-smart practices to ensure sustainable production. The success of local cultivars such as Seremna and Dzongu Golsai in Sikkim (Pratap et al., 2014) parallels the introduction of improved varieties in the study area, highlighting the importance of both indigenous and scientifically developed planting materials.

While the study indicates a shift from cereal-

based subsistence farming to cardamom cultivation, existing literature underscores that this transition often involves trade-offs. Cardamom is recognized as a high-value, low-volume crop that requires minimal external inputs and is well suited to sloping land (Bhandari, 2023). Nevertheless, its expansion has sometimes occurred at the expense of forest ecosystems, as farmers clear undergrowth to establish plantations (Buckingham & Petheram, 2004). This highlights the tension between economic advancement and environmental sustainability.

Finally, although national development plans have identified large cardamom as a major agro-commercial crop, the absence of targeted policies and programs remains a concern (Sharma et al., 2017a). This policy gap underscores the critical role of development initiatives such as HIMALICA, along with farmer groups and non-state actors, in facilitating technological adoption, capacity building, and collective action in cardamom farming communities.

Conclusion and Policy Implication

This study concludes that large cardamom farming has emerged as a cornerstone of the local economy in Taplejung, contributing significantly to improvements in livelihoods, employment opportunities, and regional economic development. The sector demonstrates considerable potential for expansion and increased household participation; however, its long-term sustainability is constrained by several critical challenges. Farmers continue to face unpredictable market price fluctuations and often lack adequate financial literacy to utilize their earnings productively, resulting in capital being either immobilized or diverted toward non-essential expenditures.

The findings underscore the need for a coordinated and multi-level response to address these challenges. At the local level, farmers require targeted support through financial literacy programs and training in climate-resilient agricultural practices to enhance risk management and income utilization. At the policy

level, institutional interventions are necessary to stabilize market prices through mechanisms such as cooperative marketing systems and improved storage facilities, as well as to expand access to rural banking and microfinance services. Such measures would foster an enabling environment for savings mobilization and reinvestment in productive activities.

Furthermore, the study identifies existing gaps in understanding the broader cardamom value chain, including production, processing, and market access. Future research should adopt an integrated and interdisciplinary approach to develop comprehensive strategies that ensure the long-term sustainability of cardamom farming and enhance the socio-economic well-being of farming communities dependent on this high-value cash crop.

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