

Economic Analysis of Ginger Production in Triveni Rural Municipality, Salyan, Nepal

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Abstract

Ginger is the largest produced spice in Nepal, due to its high export value. Limited research, a lack of storage and processing facilities, have narrowed the productivity and profitability of ginger in Nepal. A survey was conducted to study the economic viability and to assess production and market problems of ginger production in Triveni Rural Municipality, Salyan, Nepal. Random and purposive sampling methods were employed to collect data from 102 ginger farmers using a well-structured interview schedule. Problem Ranking, B/C Ratio for Economic Viability and Multiple regression for factors affecting B/C ratio were calculated using Excel 2019 and SPSS version 25. Ginger farming was profitable, as shown by the B/C Ratio of 1.37, indicating positive returns and financial feasibility despite the challenges. High cost and low-quality seed and a lack of processing facilities were the major problems. This study revealed that the ginger production in the study area was high, but a long chain of middlemen has resulted in the low profitability of farmers. Thus, addressing key issues such as farmers group establishment and cooperative marketing could enhance the financial sustainability of ginger farming in the study area.

Keywords: B/C ratio, Economic analysis, Ginger, Nepal

Introduction

Nepal has three climatic zones: the terai, the hills and the mountains, which provide distinct comparative advantages for agricultural production (Joshi et al., 2021). Nepalese economy depends largely on the agriculture sector, which contributed 24.1% to the Gross Domestic Product (GDP) in the fiscal year 2022/2023 (Kafle, 2023; MoALD, 2023). Within the agricultural sector, food crops account for the largest share (44.95%), followed by vegetables and cash crops with 17.41% and 15.23% respectively. Among cash crops, spices hold an important position, with a 2.4% increase in production in fiscal year 2023 than the previous year (MoALD, 2023).

Ginger, a significant cash crop, plays a notable role in that 2.4% of GDP. Ginger is a tropical and sub-tropical plant that thrives well in 25-30°C with annual rainfall of 150-200cm (Praveen Kumar et al., 2025). Ideal cultivation conditions include rich, well-drained soils, ideally slightly acidic and deep enough to support healthy rhizome development (CRS & AFU, 2020; TEPC, 2020), ideal for mid-hills of Nepal. In the fiscal year 2021/22, ginger was cultivated across 22,441 hectares, yielding 287,823 metric tons (AITC, 2023). The major ginger producing regions in Nepal include Salyan, Doti, and Kailali in the western region; Palpa, Syangja and Nawalparasi in the central region; and Illam, Jhapa and Sindhupalchowk in the eastern region (NTIP, 2023). Despite its high potential yield of 24.5 tons/ha, the actual average yield is significantly lower at 12.3 tons/ha, highlighting a gap in production efficiency (Joshi & Khanal, 2021). Notably, ginger production costs are generally lower in the western regions of Nepal compared to the eastern regions. The costs of ginger cultivation in Nepal include expenses related to seed, land preparation, fertilizers, manure, pesticides, labor, transportation and other operational costs (Chalise et al., 2019).

The ginger market in Nepal is primarily driven by producers, commission agents and wholesalers (Chalise et al., 2019), with smallholder farmers often selling their produce to the nearest available trader due to limited access to market information such as pricing, quality standards, and buyer networks (TEPC, 2020). This lack of access leaves

Nepali ginger market largely influenced by aggregators, traders and middlemen, resulting in a value chain dominated by intermediaries rather than producers themselves (CRS & AFU, 2020; TEPC, 2020). Supplier, Producer and Processor are the key players in the value chain function of ginger in Nepal with companies like Dabur Nepal and Gorkha Ayurveda being key processors (NEAT, 2011).

However, this fragmented and trader-controlled market system has contributed to unequal participation and benefits across ginger-producing regions. While ginger cultivation is widespread, regions like Salyan in the Karnali Province – despite their high production potential— remains unknown. Existing researches are primarily concentrated on a selective location, thereby centralizing the ginger industry and overlooking other regions which are equally prominent. In particular, the Karnali region – characterized by difficult terrain and limited accessibility – has remained largely undervalued in terms of both production and producers of ginger, leading to significant underutilization of its potential. To address this gap, this study was undertaken to shed light on the status of ginger production in the completely shadowed region, which world has not heard of.

The main objective of this study was to evaluate the productivity of ginger in the research site, assess the current cost-benefit ratio of producers and identify key challenges faced in the production and marketing of ginger.

Methodology

Site Selection

The study was conducted in Tribeni Rural Municipality of Salyan district, which is recognized as the second-largest area in Nepal for both ginger cultivation and production (MoALD, 2023). A multi-stage sampling technique was employed for site selection. First, the Salyan District was chosen due to its significant contribution to ginger production. Within the district, Tribeni Rural Municipality was purposively selected based on its high level of ginger production, market

accessibility, research feasibility, previous research and commercialization. Further, three wards: 1, 3 and 4 were specifically selected for the study as these wards are the primary areas where ginger cultivation is concentrated within the rural municipality. The study area is depicted in the Figure 1 below:

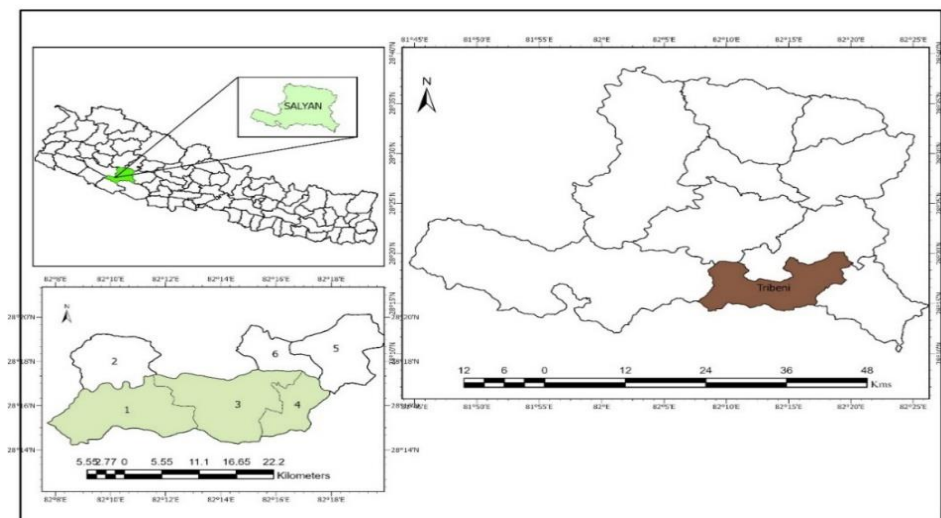


Figure 1. Map of Nepal showing the study area

1.1 Sample Size and Sampling Techniques

The study targeted all ginger-growing farmers as the sample population. The total number of ginger farmers was obtained from the Tribeni Rural Municipality Office, which identified approximately 600 commercial ginger farmers. To determine the appropriate sample size, Slovin's formula was applied, as previously used by Rono (2018).

$$n = N / (1 + Ne^2)$$

where,

n= Sample size: N= Number of ginger farmers, e= Margin of error (0.09 for this study)

Therefore, the sample size of our study was **102**.

1.2 Data Collection

A semi-structured questionnaire was used as the primary tool for data collection. The questionnaire included various sections covering socio-economic characteristics, area under ginger cultivation and input usage in ginger farming. The list of farmers was obtained from Tribeni Rural Municipality, and a total of 102 farmers were randomly selected for the study. Data collection was conducted in May 2024 through personal visits and face-to-face interviews with the selected farmers using a pretested interview schedule.

1.3 Data Analysis

The raw data obtained from the field were coded, tabulated and analyzed using MS Excel 2019 and IBM SPSS version 25.

1.3.1 Cost of production

Only variable cost was considered by adding all the expenditure on variable inputs as follows:

Total variable cost = Rhizome cost + labor cost (land preparation, planting, manure application, weeding, mulching, harvesting, and other post-harvest activities) + Farm Yard Manure (FYM) cost + fertilizer cost + insect-pest management cost

Gross return

It is the total revenue was obtained by selling the commodity.

$$GR = Q \times P$$

where,

Q = Total quantity of product marketed (kg)

P = Per unit price of the product (Rs/kg)

Here, GR = total quantity of fresh ginger marketed (kg) × price (per kg) of ginger + total quantity of sutho (kg) × price (per kg) of sutho + total

quantity of seed rhizome (kg) $\times$ price (per kg) of seed rhizome as based on Acharya et al. (2019).

1.3.2 Benefit -cost analysis

It is the ratio between the gross return and the total cost. In this study, the benefit-cost ratio was calculated by using the following formula as used in Gurung et al. (2021).

$$\text{B/C Ratio} = \frac{GR}{TVC}$$

Where, GR= Gross return

TVC=Total Variable Cost

1.3.3 Likert scale

A five-point scaling technique was employed to systematically rank ginger's production and marketing problems, prevailing in the study area. The intensity of the problem was scaled based on Gurung et al. (2021).

Strongly Agree = 1,

Fairly Agree = 0.8,

Neutral = 0.6,

Fairly Disagree = 0.4 and

Strongly Disagree = 0.2.

A total of 102 ginger farmers participated in the ranking process, where they rated each problem on a scale of one to five. To derive the ranking, the frequency of responses for each problem category was first calculated and then multiplied by the corresponding weight. The weighted scores obtained for each problem were then summed, and the total value was divided by the number of respondents (102) to determine an index value. The following formula was used to calculate the index value based on the severity as perceived by the farmers (Upadhyaya et al., 2020).

$$I_{\text{imp}} = \sum (S_i f_i / N)$$

where,

I_{imp} = Index of importance

S_i = i_{th} scale value ($i = 1, 0.8, 0.6, 0.4, 0.2$)

f_i = frequency of the i_{th} importance given by respondents

N = total number of respondents.

The problems were ranked according to the index score, as previously done in Gurung et al. (2021). Problems with equal index were then ranked using the Preference Ranking method.

Result and Discussion

Socio-Demographic Characteristics of Ginger Farmers

The socio-demographic characteristics of farmers include age, education, primary occupation and total land owned by them.

Age

The age composition of the respondents observed in the study is presented in figure 2. The study found that the average age of ginger farmers was 51.43 years, indicating that most farmers involved in ginger production fall within the economically active age group. According to the result shown in the figure below, 74.5% of ginger farmers fall within the age group of 30-59 years, making this the largest demographic group involved in ginger cultivation. Only 18.6% are aged 60 years and above, followed by 6.9% of ginger farmers aged 15-29 years old ginger farmers. This age distribution suggests that ginger farming is primarily carried out by middle-aged individuals, with a smaller proportion of youth and elderly farmers involved.

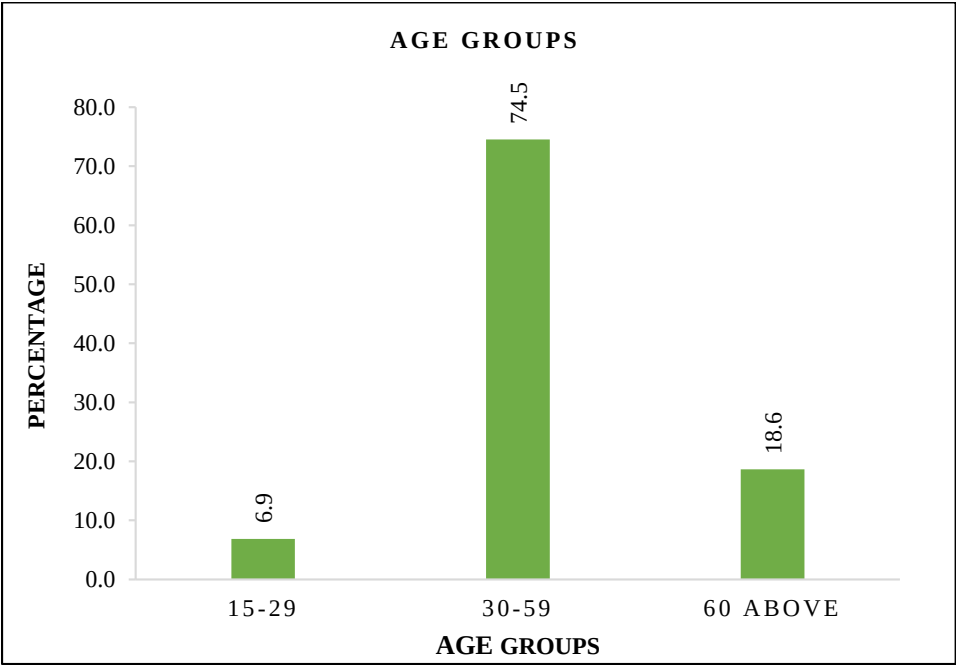


Figure 2. Age of respondents.

Education level and land holding characteristics

Figure 3 presented below presents The distribution of respondents by education level was presented in Figure 3. The study revealed that the majority of respondents (57.8%) had not completed basic level education, with only 41.2% having completed the primary level, and a mere 1% of the population possessing education beyond the primary level. This suggests that agriculture in the study area is predominantly carried out by individuals with limited formal education, reflecting a broader perception of farming as a less-skilled or alternative occupation

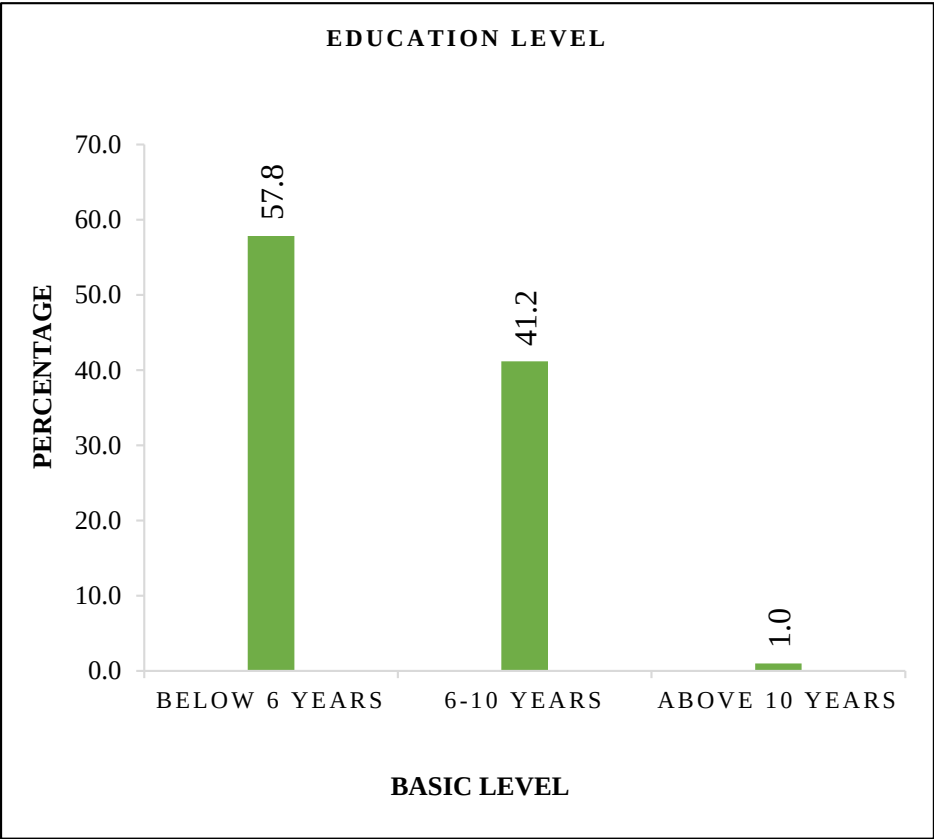


Figure 3. Education level of respondents

Furthermore, the study found that the average farm size was 0.6 hectares, with only 0.07 hectares dedicated to ginger cultivation. Figure 4 presents a side-by-side comparison of the average total landholding and the average land area under ginger cultivation in the study area. This suggests that, although farming is a common livelihood in the area, ginger cultivation occupies a small portion of the available land, potentially due to challenges in ginger production and marketing faced by farmers.

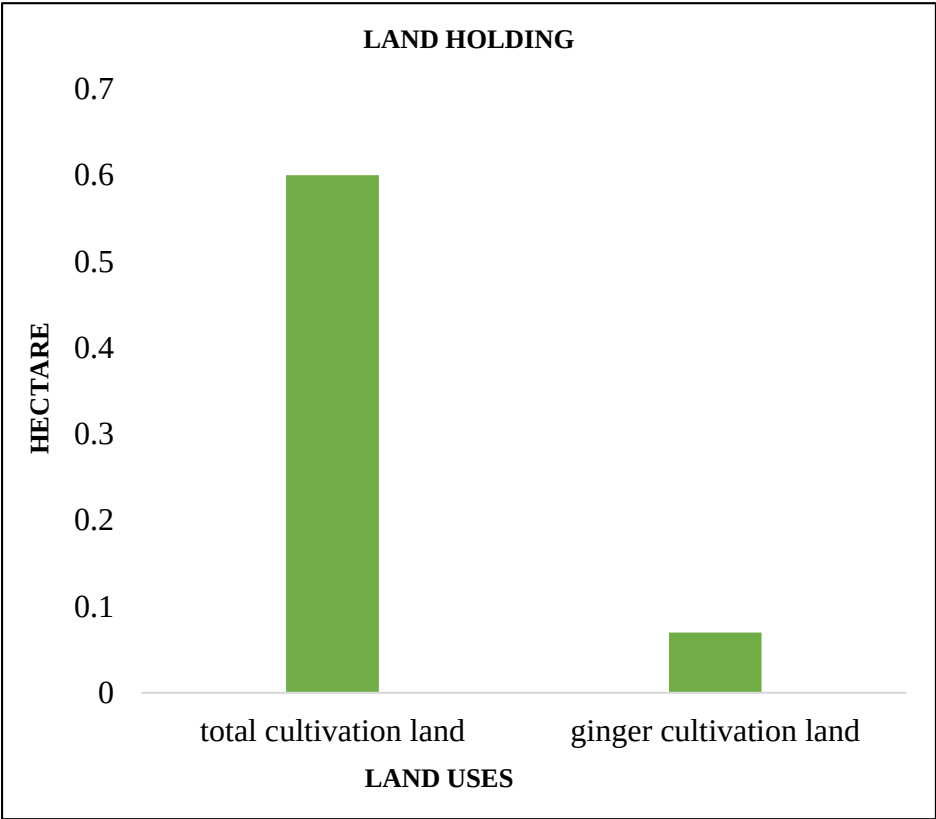


Figure 4. Land characteristics of respondents

Source of Income

The distribution of major sources of household income in the study area is presented in figure 5. The study indicated that the majority of the respondents were involved in agriculture (47.1%), but they were not engaged in ginger cultivation despite the area’s reputation as a major ginger-producing region. Instead, farmers primarily focused on orange, cereals and Sichuan pepper cultivation due to various production and marketing challenges associated with ginger farming. Remittance

(43.1%) was the second most common source of income, reflecting a strong reliance on foreign employment. Other occupations included service (3.9%), ginger farming (2.9%), wage labor and business.

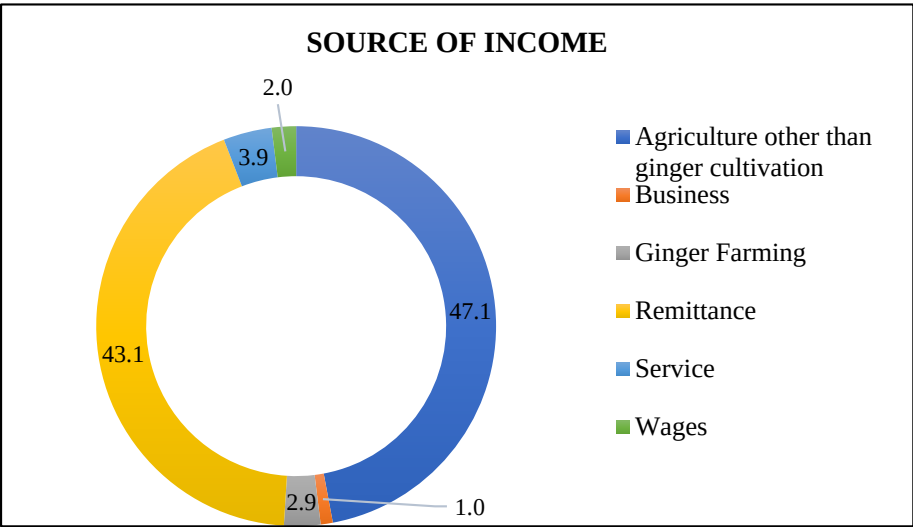


Figure 5. Primary occupation of respondents

Membership/affiliation of farmers in cooperative and farmers group

Figure 6 below illustrates the membership status of respondents in farmers’ group and cooperatives. The study demonstrated that 20.5% of the respondents had membership in cooperatives, 27.0% had membership in farmers’ groups, and 14.7% of them had membership in both cooperatives and farmers’ groups, benefiting from collective support in marketing, training and financial assistance. However, a majority of respondents, 38.2% didn’t hold membership in any of those organizations, limiting their access to resources, opportunities and institutional support.

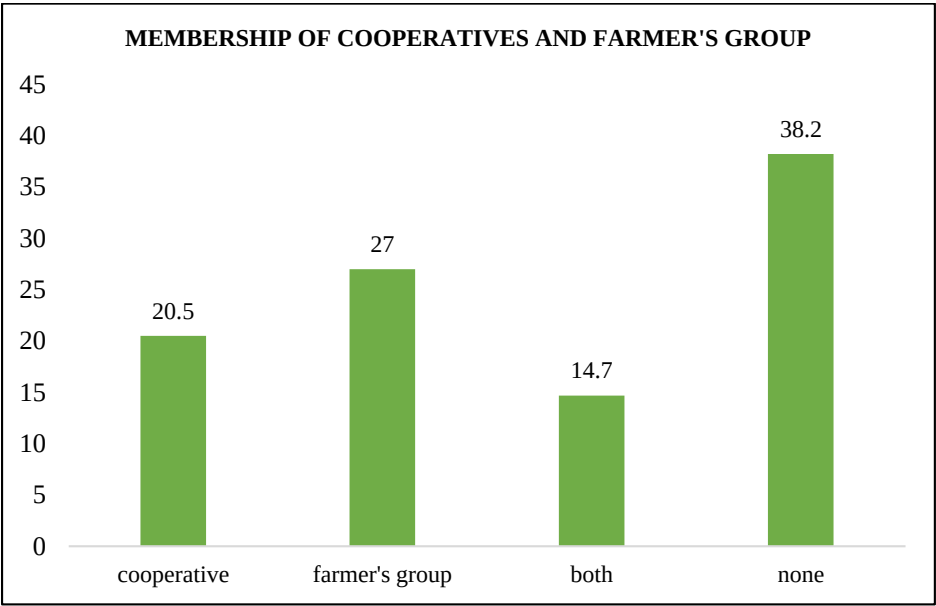


Figure 6. Membership of cooperatives and farmers' groups

Forms of Ginger Sold

The study revealed that in an average household, in the same cultivation season, ginger produced was sold in different forms. The majority of the produced (73%) was sold in fresh form during the months of Mangsir-Poush (Nov-Dec). Then 17% of the ginger was sold in the form of sutho (dried ginger) all year round, in addition to these forms, ginger is also sold as mother rhizome (7%) during months of Asar-Shrawan (Jul-Aug). Lastly, ginger is also sold as a seed. Rhizome (3%) during Magh-Falgun (Feb-Mar). These different processed or unprocessed forms of ginger sold are depicted in figure 7 below.

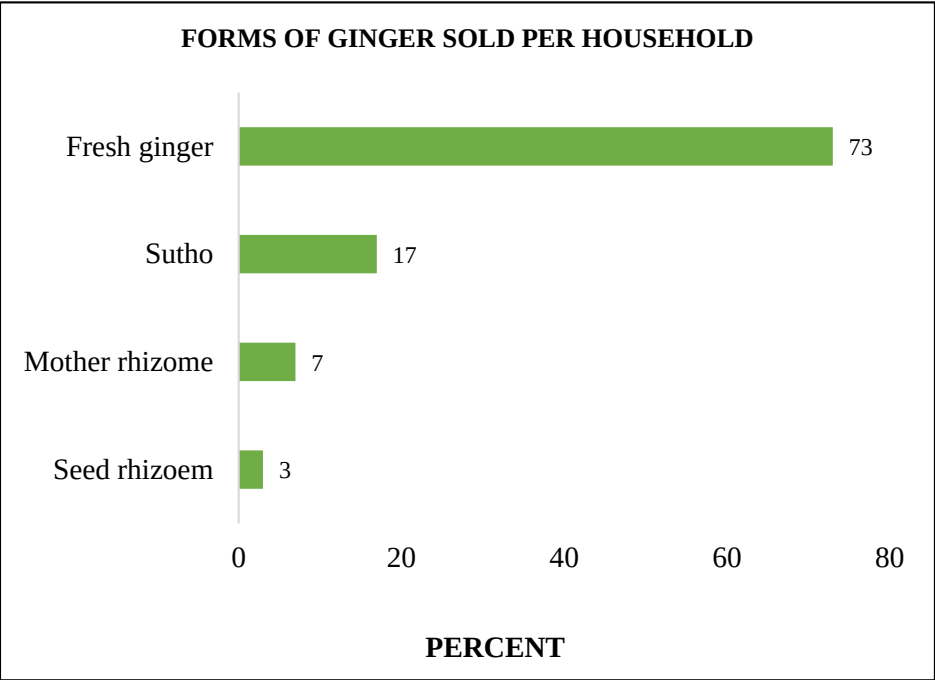


Figure 7. Forms of ginger sold

Price of Different Forms of Ginger

The study revealed significant price variations among different forms of ginger, with sutho (dried ginger) being the highest valued. That range of prices (maximum and minimum) of different forms of ginger sold in the study area is presented in the figure 8. With the minimum price of sutho (dried ginger) is NRs. 60 per kg with the maximum price in NRs 300 per kg, Sutho is the highest rated form of ginger based on the study. There, after the mother rhizome has the highest market price of maximum NRs 150 and minimum NRs 65. Seed rhizome also follows mother rhizome with the same minimum price, but the maximum price for seed rhizome is NRs. 30 less than that of mother rhizome. Finally, the least priced but highest sold form of ginger was the fresh form, with the

maximum selling price of NRs 100 per kg and a minimum of NRs. 20 per kg. Despite Sutho’s high market value, farmers were unable to capitalize on its potential due to the labour-intensive drying process.

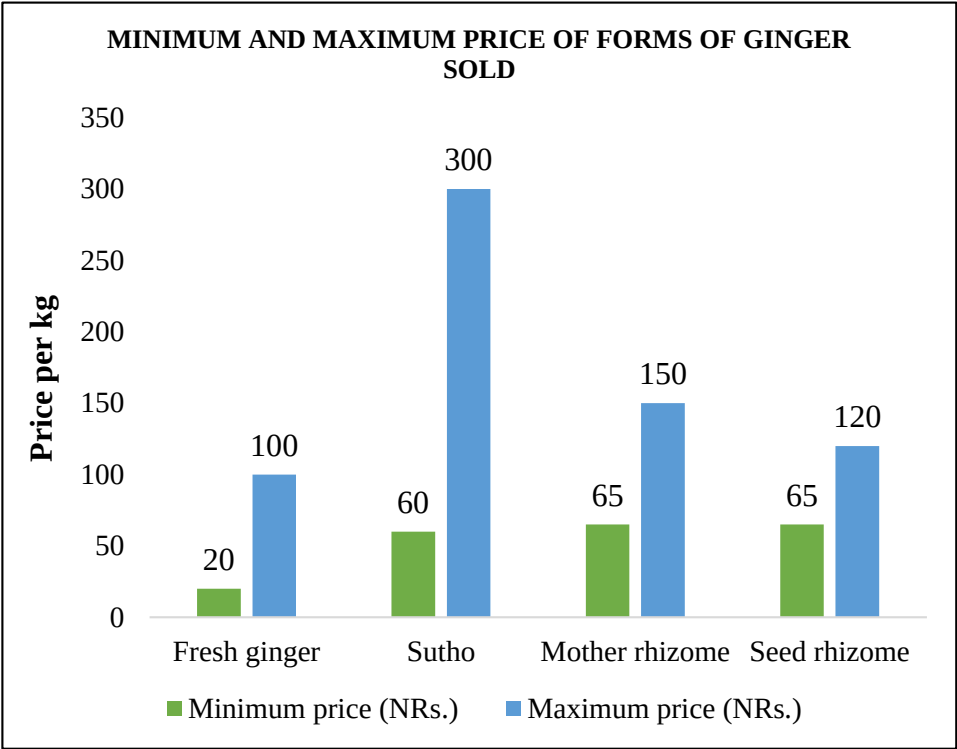


Figure 8. Minimum and maximum price of different forms of ginger

Cost of Ginger Production

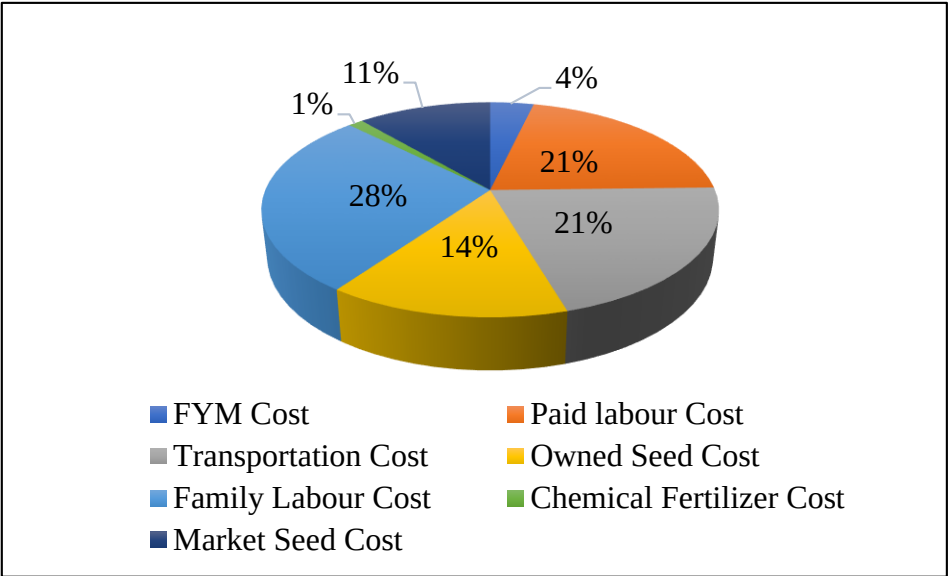


Figure 9. Cost structure of ginger production

The cost components of ginger production are shown in figure 9 above. Among the various cost components in ginger production, human labor accounted for the largest share at 49% of total production expenses. The labor cost was further categorized into family labor (28%) and paid labor (21%). The second-largest expense was seed, which constituted 25% of the total cost. Seed costs were divided into two sources: market-purchased seeds (11%) and own-grown seeds (14%). Transportation cost followed closely, making up 21% of the total cost, while compost manure and chemical fertilizer accounted for 4% and 1% respectively. The high proportion of labor costs highlights the labor-intensive nature of ginger cultivation in the study area. This is because of the complete absence of mechanization, compelling farmers to rely heavily on manual labor for various farming operations, including land preparation, plantation, mulching, weeding, harvesting and curing. Among these activities, the harvesting and curing phases required the highest labor input.

Most of the farmers in Triveni Rural Municipality used their own ginger seeds for cultivation. However, due to crop losses in prior seasons, some farmers had to purchase seeds from fellow villagers. Under both circumstances, farmers' second-highest expense was seed. Similar cost structures have been reported in previous studies Acharya et al. (2019) and Gohain et al. (2020) identified labor as the largest cost, followed by seed costs in ginger cultivation.

Transportation accounted for 21% of the total production costs, emerging as a significant financial burden for farmers. The problem was particularly severe in the areas that were not prioritized by ginger collectors. The lack of market accessibility further exacerbated this issue, often forcing farmers to bear high costs to transport their produce to markets or collection centers.

In terms of fertilizer usage, chemical fertilizers played a minimal role in ginger cultivation, accounting for only 1% of total costs. Instead, farmers primarily depended on farmyard manure (FYM), which constituted 4% of the whole production expenses. This preference for organic inputs aligns with the previous findings by Acharya et al., (2019); Raj Dahal & Rijal, (2020), who reported that FYM is the dominant fertilizer used in ginger farming. The minimum use of chemical fertilizers is mainly due to two reasons: lack of access to synthetic fertilizers and lack of knowledge about their proper use in ginger cultivation, as well as the weak financial condition of the farmers.” However, heavy reliance on FYM could influence both soil health and crop productivity in the long run.

The cost structure analysis indicates that the absence of machinery significantly increases production cost. Additionally, seed and transportation costs are substantial, further affecting profitability. Addressing these challenges through mechanization and improved market access could boost economic returns for farmers. Moreover, promoting efficient nutrient management strategies, including improved composting techniques and judicious use of chemical fertilizers may enhance productivity.

Benefit-Cost Ratio

Table 1. B/C ratio of ginger production.

Cost of production Rs per kg	Income NRs. Per kg	B/C ratio
116.313	160.313	1.378

The benefit-cost ratio, cost and income per kg of ginger production, in the study area, is summarized in table 1 above. The per kilogram cost of ginger production in the study area was found to be NRs 116.31, while the income per kilogram of ginger was calculated to be NRs 160.313 which is higher than NRs 85.63/kg reported in Solukhumbu district (Parajuli et al., n.d.). This results in a gross margin of approximately NRs. 44 per kg, i.e. higher than the study of Khatiwada & Yadav (2022). The relatively high cost of production in the study area is primarily attributed to lack of mechanization, which has led to a heavy reliance on manual labor. Among the various production expenses, labor costs accounted for the highest share, significantly influencing overall production expenses.

Despite the high production cost, the calculated Benefit-Cost (B/C) ratio for ginger cultivation in the study area was 1.37, indicating a profitable return on investment. This finding aligns with the general financial feasibility of ginger cultivation but is slightly lower than the B/C ratios previously reported in Salyan. For instance, the B/C ratio of ginger production in the Salyan district has been reported as 1.55 by Acharya et al.,(2019) and 1.53 by Upadhyaya et al., (2020). However, it is slightly higher than the B/C ratio of 1.06 reported for ginger cultivation in Palpa district (Chaudhary et al., 2023), but lower than the 2.37 reported in Solukhumbu district(Parajuli et al., n.d.). The variation in B/C ratios across studies may be attributed to differences in input costs, production efficiency, market conditions, and the level of technology adoption among farmers.

Comparing our findings with the study conducted by Khatiwada & Yadav (2022), we observed that the gross margin in our study was higher. This suggests that despite higher production costs, the market price and returns on ginger cultivation in the study area were relatively favorable. The B/C ratio greater than one, along with a positive gross return, further reinforces the financial viability of ginger production in Triveni Rural Municipality. However, to enhance profitability and reduce production costs, the adoption of mechanized farming practices and efficient resource utilization should be encouraged.

Determinants of B/C Ratio

Table 2. Determinants of B/C ratio.

B/C ratio	Coefficients	Std. Error
(Constant)	4.734	2.864
Agriculture other than ginger farming	1.079	1.232
Cultivation land	-2.495	2.010
Livestock Unit	-.318	.286
Member of a cooperative	1.832	1.230
Member of the farmers' group	2.548*	1.362
Training in agriculture	-2.913	1.877
Training on ginger cultivation	1.875	3.618
Subsidy for ginger cultivation	3.217**	1.561
Paid worker (Female)	.475***	.144
Economically active Male	-1.034	.653
Economically active Female	.854	.674
Distance to nearest service centre	.001	.000
R square	0.267	
F- value	2.705***	
R-value	0.517	

Note: *, ** and *** represent significance at the levels 10%, 5% and 1% respectively
Source: Field Survey, 2024

Several key factors were found to significantly impact the Benefit-Cost (B/C) ratio of ginger cultivation in the study area and they are presented in the table 2. These factors, presented in Table 2, highlight the role of institutional support, subsidies, and labour efficiency in improving the financial viability of ginger farming.

Household participation in farmers' groups was found to be positively significant at the 10% level of significance. The analysis showed that there is a 2.548% improvement in the B/C ratio with every 1% increase in farmers' group membership. This indicates that the farmers' group played a crucial role in enhancing the profitability of ginger cultivation. Cooperatives and farmers' groups in the study area provided critical support in marketing and training, enabling farmers to adopt better farming practices. These groups facilitated collective bargaining, reducing marketing constraints and improving access to essential resources. As a result, both production level and profitability increased for members.

Seed subsidies were another significant factor influencing the B/C ratio, with a positive significance at the 5% level. A 1% increase in subsidy boosted the B/C ratio by 3.217%. The provision of subsidized seeds benefited farmers in two primary ways. First, it allowed them to access improved seed varieties, which contributed to enhancing productivity and better crop performance. Second, by receiving subsidised seed, farmers were encouraged to sell their stored seeds, generating additional income. The combined effect of high yield and supplementary income resulted in a positive impact on the B/C ratio.

The participation of female workers in ginger cultivation was found to be positively significant at 1% level of significance. A 1% increase in female paid labor led to a 0.457% increase in the B/C ratio. This finding highlights that women were more skilled and experienced in ginger farming, such as planting, weeding, harvesting and post-harvest processing in the study area. Their expertise and efficiency in ginger production activities contributed to better productivity and economic returns.

Therefore, encouraging greater participation in farmer cooperatives, expanding seed subsidy programs, and promoting women's involvement in agriculture can lead to increased productivity and higher profitability for ginger farmers.

Problems of Ginger Cultivation

Production problems

The Five-points problem ranking technique was used to analyze the different problems ranked by the farmers themselves and table 3 below presents those production problems encountered in the study area. The analysis revealed that the high cost and low-quality of seed emerged as the most significant problem faced by ginger farmers. This issue was attributed to the lack of access to affordable, high-yielding seed varieties, as well as the presence disease disease-prone seeds. Farmers' concerns about seed quality and cost have also been highlighted in the previous research, including the findings of Gurung et al., (2021). The problem of high cost and low quality seed was also the highest ranked in the results of Gurung et al.(2021). Institutional and organizational support ranked as the second most important issue. The study found that there were very few supporting institutions for ginger farmers, apart from self-formed cooperatives and farmers' groups. The lack of structured institutional support within reach hindered access to financial aid, modern technology and better market linkage. The third major issue was a lack of technical support for ginger farming. Most farmers relied on traditional, ancestral knowledge for cultivation, as there was no formal extension service or technical guidance. Farmers struggled most to manage diseases and pests in the absence of technical assistance.

Table 3. Production problems of ginger cultivation.

Production Problems	Rank
High Cost and low-quality seed	I
Lack of institutional/organizational support	II
Lack of technical support	III
Irrigation Unavailability	IV
High cost and unavailability of fertilizers	V
Disease/Insect	VI
Lack of awareness	VII
Unavailability of labor/machinery	VIII
The problem of wild animals	IX
Problem of natural calamities	X

The absence of irrigation infrastructure ranked fourth among farmers’ concerns. The fifth-ranked problem was the high cost and unavailability of chemical fertilizers. Farmers faced difficulties in accessing fertilizers at the right time and in adequate quantities. Farmers completely depended on compost manure, which was not sufficient to meet crop nutrient requirements. The lack of disease-resistant varieties, poor management practices and lack of technical knowledge contributed to disease and pest infestation as sixth sixth-ranked problem. There was a huge knowledge gap between farmers and new technology that prevented farmers from adopting best practices in production, storage and marketing. This made the lack of awareness among farmers rank seventh. Although ginger farming is highly labour-intensive, mechanization was almost non-existent in the study area. But as farmers were not even aware of the benefits of mechanization, it was ranked eighth. Among all

identified issues, wild animals and natural calamities were ranked as the least severe problems.

1.3.4 Market problems

A similar technique of five-point problem ranking was also applied in the case of ginger marketing problems. Table 4 below presents those market problems encountered in the study area. Lack of processing facilities was ranked as the most critical challenge faced by ginger farmers. Although the price of sutho (dried ginger) is significantly higher than that of fresh ginger, farmers were unable to process their produce due to the labor-intensive nature of sutho making and the absence of processing units. As a result, they were forced to sell fresh ginger at lower prices, missing out on potential profits from the value-added products . The second major issue was the lack of storage facilities, which contradicts the result of Gurung et al.(2021). Farmers lacked proper infrastructure for storing their ginger seeds and harvested produce. They often stored seeds in pits in the field, which frequently resulted in rotting and loss of entire seed stocks. Additionally, due to the absence of proper storage, farmers had no option but to sell fresh ginger at low prices during the winter harvest season, even though ginger prices reach at peak during rainy seasons in the market. The absence of quality-checking facilities was ranked as the third biggest issue. Without proper quality assessment mechanisms, Indian traders often devalued ginger, leading to low market prices.

Table 4. Market problems of ginger cultivation.

Market Problems	Rank
Lack of Processing Facility	I
Lack of Storage Facility	II
Lack of Proper Quality Checking Facility	III
Poor Bargaining Power	IV
Long Chain of Middleman	V
Low market price	VI
Lack of Transportation Facility	VII
Lack of Access to the market/trader	VIII
Lack of Awareness	IX

Farmers were found to have little to no bargaining power in the market, making it the fourth major issue. Since they lacked access to alternative buyers, they had no role in determining prices, even when their production cost exceeded the market price. This market uncertainty is largely influenced by the heavy dependence on Indian buyers and traders (Aryal, 2022). The presence of a long chain of middlemen was another significant challenge, ranked-fifth. Farmers had only the option to sell their produce through multiple intermediaries, each taking a share of the profit, leading to reduced farm-gate prices. Despite ginger being a high-value crop, the lack of a fixed market price was sixth sixth-ranked market problem in the study area. The lack of transportation facilities was another major issue. Ginger farms located in remote areas with poor transport access made it the seventh-ranked challenge for farmers. Lack of access to markets/ traders and lack of awareness regarding ginger marketing were the least ranked, as middlemen were available at their doorsteps.

Conclusions and Recommendations

To sum up, the study shows several key findings related to ginger farming in Tribeni Rural Municipality. Despite being one of the major ginger-producing areas in the district, farmers face significant hurdles such as high production costs, lack of processing and storage facilities and so on. These issues limit the farmers' ability to capture higher productivity and higher opportunities in the market. The study also reveals that a large portion of the farming community is engaged in alternative crops, with only a small percentage involved in ginger farming. This shift in focus is likely due to the production and marketing challenges associated with ginger cultivation in the study area. Education levels are also low among farmers, which affects their ability to adopt modern farming techniques.

Despite these challenges, the study found that ginger production is financially viable with a B/C ratio of 1.37 in the study area, indicating positive gross returns. The study also indicates several factors, such as membership in cooperatives, seed subsidies and the female workforce, positively influencing the B/C ratio. This suggests that institutional support and labour productivity are the key to profitability increase in the study area. The study also identified major production and marketing problems in ginger cultivation, including high cost and low-quality seeds, lack of technical and institutional support and absence of processing and storage facilities. These challenges significantly reduce farmers' profitability and hinder achievement of full potential of ginger production in the study area.

The ginger farming sector has the potential to grow and contribute significantly to the local economy in Tribeni Rural Municipality, if only with improved infrastructure and support. Strengthening institutional support through the formation and capacity-building of farmers' groups and cooperatives is imperative to improve access to market information, training and collected bargaining mechanisms. The provision of high-quality seed rhizomes at subsidized rates accompanied by regular, targeted technical training on ginger cultivation practices, would address critical production constraints. Moreover, the establishment of local-level

processing and storage facilities is essential to facilitate value addition, minimize post-harvest losses, and enable farmers to benefit from seasonal price variations. Considering the high share of labour costs in overall production expenses, the gradual introduction of appropriate mechanization – particularly in land preparation, mulching and harvesting – could substantially reduce costs and improve efficiency. The study also underscores the positive contribution of female labour in ginger cultivation indicating the need for inclusive agricultural interventions that enhance women's participation and capacity. Furthermore, improving rural infrastructure, particularly transportation networks, and facilitating direct market linkages to reduce the dominance of middlemen, would support better price realizations and strengthen the overall ginger value chain in the study area. Therefore, if effectively implemented the profitability and resilience of ginger farming in the Salyan region could significantly improve.

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