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Socio-economic paper

Marketing and Socioeconomics Aspects of Large Cardamom Production in Tehrathum, Nepal

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ABSTRACT

A survey was conducted in November 2015 in one of the pocket area of large cardamom production in Teharthum District, eastern Nepal with aim to investigate the status of cardamom enterprises. The parameters used were cardamom production area, type of manure used, drying facilities, technical skills of farmers, market channels and variable cost etc. We purposively selected 30 cardamom producers and stakeholders for interview pre-designed questionnaires. The result showed that average area, production and productivity of large cardamom per household were 0.86 ha, 200 kg and 232 kg.ha^{-1}, respectively, with the average farming experience of 22 years. It was revealed that 13% farmers used farmyard organic manure, the use of 1.5 kg/plant farmyard manure might produce 28.5% higher yield cardamom compared to without using any manure or fertilizers. It was also revealed among the responded only 7% had received improved drying machine from District Agriculture Development Office (DADO) at50% subsidy, while only 23% of farmers received training and technical services from DADO. The study showed that per hectare average total cost of large cardamom production, selling price and gross revenue were NRs. 2,36,705 ($2255), NRs. 5,50,305 ($5240) and NRs. 3,13,600 ($2985), respectively, with benefit/cost (B/C) ratio of 2 after the completion of gestation period of 4 years. Our survey showed that predominant marketing approach was by direct sell to the traders located at district headquarter. The productivity of large cardamom was influenced by various factors, such as nearly 75.2% of the variation in productivity was explained by the number of active family members, farming period, area, intercultural operations, variable cost and depreciated fixed cost.

Keywords: Large cardamom, Cost, Profit, Regression

सारांश

बि.स.२०७२ मंसिरमा तेह्रथुम जिल्लाका १० वटा गा.बि.स.हरु क्रमश; दागपा, फुलेक, बसन्तपुर, सुंइनाम, सोल्मा, जिरीखिम्ती, साब्ला, इसिबु, श्रीजुंग र ओयाकजुंगमा अलैची खेतीको सामाजिक आर्थिक र बजारीकरणको अध्ययन गर्न अलैची उत्पादक कृषक र सम्बन्धित सरोकारवालाहरुलाई उद्धेश्य अनुसार छानेर अनुसन्धान गरिएको थियो । प्राथामिक जानकारीका निम्ती ३० जना कृषकहरुको अन्तवार्ता र सो व्यवसायसंग सम्बन्धि जानकारी मुख्य जानकारसंग अन्तर्वार्ताका माध्यमबाट लिइएको थियो । अलैचीको औसत क्षेत्रफल, उत्पादन र उत्पादकत्व क्रमश; ०.८६ हेक्टर, २०० केजी र २३२ केजी प्रति हेक्टर पाइएको र औसत कृषकहरुको खेती अवधि २२ वर्ष पाइएको थियो । त्यस्तै गरि १३% कृषकहरुले मात्र मल प्रयोग गर्ने गरेको र गोठेमल १.५ केजी प्रति बिरुवा प्रयोगले अन्य मल प्रयोग नगरेको भन्दा २८.५% उत्पादकत्व बढेको पाइएको थियो । ७% किसानहरुले मात्र जिल्ला कृषि बिकास कार्यालयको ५०% अनुदानबाट कृषक समुहहरु मार्फत उपलब्ध हुने सुधारिएको भट्टीको उपयोग गर्ने गरेको र २३% किसानहरुले मात्र जिल्ला कृषि बिकास कार्यालयबाट तालिम र प्राविधिक सेवा पाउने गरेको पाइएको थियो । अध्ययन अनुसार प्रति हेक्टर अलैची उत्पादनको लागत, बिक्री मुल्य र कुल आम्दानी क्रमश; नेरु दुई लाख छत्तिस हजार नेरु पाँच लाख पचास हजार र नेरु तीन लाख चौध हजार भएको र ४ बर्षको अवधीम आम्दानी खर्च अनुपात २.० हुनुका साथै व्यापारको प्रमुखमा माध्यम जिल्ला स्तरिय व्यापारीहरु रहेको पाइएको थियो । अलैचीको उत्पादकत्वमा असर गर्ने धेरै कारकहरू मध्ये करिव ७५.२% उत्पादकत्व परिवारको सक्रिय सदस्य, खेती गरेको अवधि, गोडमेल, चल लागत र ह्रास अचल लागतले निर्धारण गरेको पाइएको थियो । परिवारको सक्रिय सदस्य, खेती गरेको अवधी र चल लागत प्रमुख कारक रहेको अध्ययनबाट पाइएको थियो ।

INTRODUCTION

Large cardamom also known as black or brown cardamom is the dried fruit of *Amomum sabulatum*, a perennial herbaceous plant of family Zingiberaceae (CNI 2013, Yadav et al 2015). Cardamom is a high value low volume crop having highest export value in terms of foreign currency earning (Sharma et al 2016). This crop has been further prioritized by Nepal Trade Integration Strategy (NTIS) 2010 and Agriculture Development Strategy ADS (KC and Upreti 2017;MoAD 2015). The cardamom a spice crop suitable to cultivate in higher moisture containing valleys and gullies of higher hills is commercially cultivated in about 37 districts of Nepal. However,

about 97% of total cardamom production is concentrated in 7 eastern hilly districts, namely Taplejung, Ilam, Panchthar, Dhankuta, Tehrathum, Bhojpur and Sankhuwasabha (MoAD 2015). Nepal is one of the leading producer of large cardamom with the area, production and productivity of 11501 ha, 5225 mt and 0.454 ton/ha, respectively in which Tehrathum shares about 4.7% of total large cardamom production of the country with area and productivity of 625 ha and 0.39 t/ha (MoAD 2014). Cardamom constitutes the bulk of on-farm income with more than 90% of total production exported to India and lesser extent to other neighboring countries such as Pakistan, United Arab Emirates and Bangladesh (MoAD 2014). About 4914 ton of cardamom was produced with the value of 4.27 billion Nepalese Rupees during the fiscal year 2013/14 (TEPC 2015). Production and marketing of large cardamom has been seen as one of the most promising business in Tehrathum since last 25 years. Majority of farmers living in sloppy areas attracted towards the commercial cultivation of cardamom under the agro-forestry system, where cereals, vegetables and fruits enterprises are not suitable. The large cardamom is one of the major commodities with its largest share in export values among other agricultural products. However, there are only few studies revealing its status and socio-economic hindrances for its further growth. Thus, this study examines the current situation of large cardamom production and marketing channels in relation to various farm based socioeconomic variables.

METHODOLOGY

A study was conducted in 10 Village Development Committees of Teharthum District during November, 2015 involving purposively selected cardamom producers and stakeholders. Primary information was collected by 30 producers using structured questionnaire while business related information was obtained from key informants (7 district traders, 4 local collectors, DADO and Chamber of Commerce) of the district. Secondary data were collected from the publication of DADO Tehrathum, MoAD, Department of Agriculture, Central Bureau of Statistics, Agribusiness Promotion and Statistics Division and National Cardamom Development Board.

Data processing was carried out by examining, categorizing, coding, editing, tabulating and recombining information. Data coding was done by categorizing data into different scales such as nominal, ordinal and scale variables depending upon theirs types. Simple statistical tools were used to estimate frequency, percentage and average values from the collected data. Likewise Microsoft word, Microsoft excel and SPSS 16.0 version were used for analysis. The data were interpreted from the results, further assisted by qualitative and quantitative information available from both primary and secondary sources. Parameters such as Descriptive and econometric analyses were carried out to find out the current situation of large cardamom production and marketing, whereas regression model was used to determine the effect of socioeconomic variables on productivity of large cardamom. Before analysis of the variables, study set following null and alternative hypothesis.

- **Null Hypothesis (H0):** Number of active family members, farming period, area, intercultural operations, variable cost and depreciated fixed cost do not effect on the productivity of large cardamom production in Tehrathum district.
- **Alternative Hypothesis (H1):** Number of active family members, farming period, area, intercultural operations, variable cost and depreciated fixed cost has effect on the productivity of large cardamom production in Tehrathum district.

A multiple regression analysis involving the use of Ordinary Least Square (OLS) estimation technique was used to determine the effect of socioeconomic variables on the productivity of cardamom. The implicit form of production function was represented by given equation,

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + U_i$$

Where,

y_i = production per hectare of cardamom measured in kg, x_1 = Number of active family members, x_2 = Farming period (in years), x_3 = Area of Cardamom growing land (in hectare), x_4 = Intercultural operations/year, x_5 = Variable cost (in NRs), x_6 = Depreciated fixed cost (in NRs), U_i = Error term which included unknown factors affecting the cardamom productivity and $\beta_0, \beta_1, \ldots, \beta_6$ are the estimated coefficients.

RESULTS

Current situation of cardamom production

The average area, production and productivity of large cardamom were 0.86 ha, 200 kg and 232 kg ha^{-1}, respectively with the average farming experience of 22 years of farming. About 60% farmers had grown the large cardamom under the partial shade of perennial woody trees under the agro-forestry system, while only 7% of the farmers followed the sole cropping system. The productivity of cardamom under sole cropping system was 248.90 kg/ha which was slightly higher than that of agro-forestry system (224.85 kg/ha). Mostly farmers were grown the three types of large cardamom in their orchards namely Ramsahi, Golsahi and Chibesahi. The average productivity of all three types of cardamom was more or less equal with slightly higher productivity of Ramsahi (235.8 kg/ha) than Golsahi (196.5 kg/ha) and Chibesahi (225.97 kg/ha). Only about 13% of the farmers used farm yard manure (FYM) in their orchard@1.5 kg/plant, achieving and 28.5% of higher yield of large cardamom.

In the study area, mmajority of farmers were beyond the access of technical services and trainings; only 23% of farmers have recieved technical services and training provided by District Agriculture Development Office (DADO). Only 7% of the farmers had the access to improved large cardamom drying facility, while 93% of farmers used traditional type of dryer.. More than 50% of farmers were involved in farmers group.

Economic analysis

Our conservative estimate without inclusion of land cost it was calcultaed that the cost of production of large cardamon require a sum of NRs. 236,705 per hectare of cultivation for four years.

Table 1. Production cost of per hectare of large cardamom (estimate based on local prices)

Particular	Unit	Quantity	NRs/unit	Total
1st year				
Sapling	No	9825	2.5	24560
Labor for land preparation and transplanting	MD	196	300	58800
Irrigation	MD	40	300	12000
Intercultural operations	MD	60	300	18000
Total cost				113360
2nd year				
Intercultural operations	MD	60	300	18000
Irrigation	MD	20	300	6000
Total				24000
3rd year				
Intercultural operations	MD	60	300	18000
Irrigation	MD	20	300	6000
Total cost				24000
4th year				
Intercultural operations	MD	60	300	18000
Irrigation	MD	40	300	12000
Harvesting	MD	80	300	24000
Total cost				54000
Processing cost	LS	1	17195	17195
Depreciated fixed cost	LS	1	4150	4150
Grand total cost				**236,705**

MD: Mandays; LS: Lumpsum

The total cost of cardamom production for one hectare of land was found to be NRs. 236,705 and 232 kg of cardamom was estimated to be produced. The average farmgate price of cardamom was estimated to be NRs. 2,372 per kg whereas the total income from one hectare of land calculated was NRs. 550,305 and the gross revenue (net profit) obtained from one hectare was NRs. 313,600 with the B:C ratio of 2.0 after the completion of gestation period of four years.

Table 2. Economic analysis of cardamom production

Parameters	Unit	Quantity	NRs/Unit	Total NRs
Income from dry cardamom	Kg	11.81	2371.7	550,305
Total cost of cardamom production for 4 years	LS			236,705
Net profit				313,600
Benefit/cost ratio				2

The farmers responded that 87% of them sold their product to traders located in district directly, while rest of the farmers sold their product through the local collectors**.** All farmers sold their product at the farm gate after primary processing activities. The dominance of marketing through district traders was based on pre-harvest contract taken by traders as well as they provide transportation facility to farmers without extra cost.

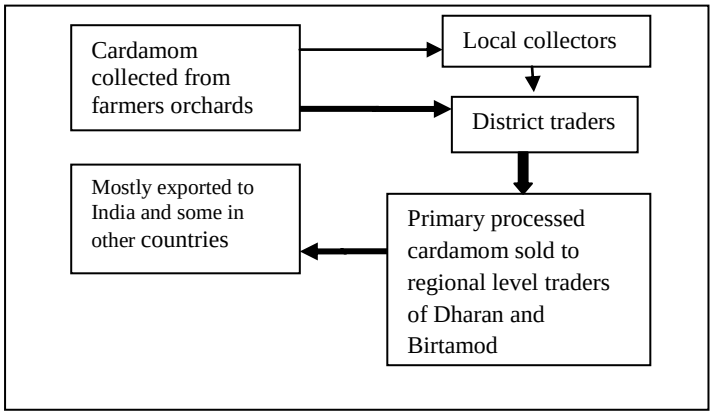

Figure 1. Market channel of large cardamom

Marketing of large cardamom in Tehrathum district is channeled via producer, collector and district level traders up to wholesaler of located at Dharan and Birtamod. Our study showed that The largest chunk of margin was enjoyed by farmers (NRs. 2086/kg) followed by district traders (NRs. 44.5/kg) and local collectors (NRs. 20.5/kg). The marketing cost for farmers was only about 1.42% of total variable cost. However, they faced the several types of marketing problems such as lack of proper marketing information, price fluctuation and lack of transportation facility.

Table 3. Analysis of price margins of large dried cardamom

Operations		Associated cost		
		Farmers/growers (NRs. Per Kg)	Local collectors (NRs. Per Kg)	District traders (NRs. Per Kg)
Production cost		208		
Processing cost		74		
Purchase price	Farmers		2372	2372
	Local collectors			2400
	Average			2386
Sorting and packaging			1	1.90
Tail cutting				9
Transportation		4	3	6.60
Loading and unloading				0.30
Loss				7.40
Communication and other personal expenses			0.5	1.30
Total cost		286	2379.5	2412.5
Sell price		2372	2400.0	2457
Margin		2086	20.5	44.5

Effect of socioeconomic variables on cardamom production

The value of R^2 was 0.752, which indicated that 75.2% of the variations in the cardamom productivity were explained by the explanatory variables included in the model. The analysis of variance table obtained from multiple regression analysis showed that the overall regression model was highly significant ($p<0.05, 0.01$).
Hence the production function in the form of regression equation can be expressed as,

$$y_i = -3.273 + 1.284x_1 - 1.92x_2 + 3.39x_3 + 1.261x_4 + 0.003x_5 + 0.000x_6 + 0.248$$

Table 4. Estimated production function for cardamom producing farmers

Explanatory Variables	Estimated coefficient	Standard Error	t-value	P- value
Constant	-3.273	3.261	-1.004	0.326
No of active family members	1.284	0.635	2.023	0.05*
Farming period experience	-1.92	0.042	-2.324	0.029*
Area	3.39	0.069	2.494	0.020*
Intercultural operations/year	1.261	0.881	1.431	0.166
Variable cost	0.003	0.001	4.747	0.000**
Depreciated cost	0.000	0.001	-0.896	0.380
R^2	0.752			

** refers to significant at 0.05 level of significance, ** refers to significant at 0.01 level of significance*

The effect of explanatory variable on the productivity of cardamom has been discussed

Analysis showed that number of active family members significantly ($p<0.05$) affected the productivity of large cardamom because calculated probability value was found to be equal with the alpha level at 5% of significance. Hence the null hypothesis was rejected in this case. About 1% increase in active family members increases the productivity by 1.28% taking all other factors are constant which was mainly due to increase in intercultural operations as well as better management of orchard.

Analysis revealed that farming period of the farmers significantly affected the productivity of cardamom because calculated probability value was smaller than the alpha level at 5% of significance. Thus the null hypothesis was again rejected in this case. However, the negative value of coefficient of regression indicates that one year increase in farming period decreased the productivity by 1.92 kg per hectare keeping all other factors constant which was mainly due to traditional methods of farming practices. Area significantly affects the productivity of cardamom. Thus the null hypothesis was again rejected in this case. One hectare increase in area increases the productivity by only 3.39 kg taking all others factors are constant. However, the average productivity was estimate to be 232.5 kg/hectare but the analysis showed that only 3.39 kg yield was increased with increase in one hectare of land. There was increase in area in proportionate with decrease in productivity, which was due to inadequate intercultural operations, inadequate input supply and improper orchard management.

There was no statistically significant relationship between intercultural operations performed by farmers and productivity because the calculated value of probability was greater than alpha level at 5% of significance. Thus the null hypothesis was accepted in this case. However 1% increased in intercultural operations increased the productivity by 1.261% taking all other factors are constant. Intercultural operations such as orchard sanitation, pruning, mulching and irrigation showed positive role to increase the production which ultimately increased the productivity.

Variable cost significantly affected the productivity as the variable cost was highly significant at 1% level of probability. Thus the null hypothesis was rejected. 1% increased in variable cost increased the productivity by 0.003% keeping all other factors of productions constant. Variable costs involved in performing different operations such as intercultural operations and irrigation were shown direct and positive role to increase the production and productivity of cardamom.

There was no statistical significant relationship between depreciated fixed cost and productivity of large cardamom. So the null hypothesis was accepted as the calculated probability level was greater than alpha level at 5% of significance. Increased in depreciated fixed cost did not increases the productivity as the cost incurred in fixed items generally does not have any role in productivity.

DISCUSSION

In Nepal, Ramsey, Golsey, Dammersey and Chibesey are the major cultivars of cardamom (AICC 2005, Yadav et al 2015). Sharma (2006) mentioned that the large cardamom is a perennial cash crop grown beneath the forest cover on marginal lands. It is widely cultivated under the nitrogen-fixing Himalayan alder (*Alnus nepalenis*), a practice modified by people to maintain soil fertility and increase productivity. Diseases and insects were major problem in large cardamom production; rhizome rot is most frequently reported disease and leaf eating caterpillar as major insect in large cardamom orchards (Yadav et al 2015; Mahato et al 2009).

The low cost of production of large cardamom was mainly due to savings from intensive labor cost during for farming and necessary inputs, planting materials, fertilizers and pesticides (**Table** 1). Higher benefit cost ratio along with higher gross margin indicated that the crop appears to be highly profitable and remunerative enterprise (**Table** 2) because of high market value of cardamom. Lower investment means that lower input use in cardamom which led to the lower production. Lower input use by farmers for cardamom production does not indicate that it require low level of input, but the main reason behind it was appropriate knowledge about input use, poor availability of input, and inadequate cash for investment in the farming. The benefit-cost analysis was higher in Nayabazar (1.86); followed by Pashupatinagar (1.74) and Panchakanya (1.70) VDCs of Ilam district (Acharya et al 2014).

Cardamom was sold to local collection agents as well as directly to district level traders themselves by farmers as depicted in **Figure** 1. Further the produce marketed by traders to big traders and wholesalers of Birtamod and Dharan. It has been observed that wholesalers of Birtamod and Dharan sent the collected produce directly to Silguri and Jogbani export points. Pathak (2015) also reported similar type of marketing channel in Bhojpur, Sankhuwasava, Dhankuta and Tehrathum districts. Acharya et al (2014) reported that the marketing margin of large cardamom cultivation was calculated by deducting the average variable cost from average gross return. These previous studies showed that the marketing margin of the cardamom was highest in Nayabar (NRs. 2106), followed by Pashupatinagar (NRs. 1916) and Panchakanya (NRs. 1876) VDCs of Ilam district. Similarly the largest chunk of margin was enjoyed by farmers and then district traders and local collectors, respectively (Yadav 2013). The analysis of price margin of large cardamom in present study also revealed similar findings (**Table** 3).

Involvement of active family members in large cardamom farming significantly affected the production of cardamom (**Table** 4). Similar to this present finding Acharya et al. 2014 also showed the similar trends. Besides, that as previous by Acharya et al (2014) has shown the present study also revealed that experience in cultivation of the cardamom related with the production (**Table** 4). According to the respondents the main reasons of declining productivity of cardamom was the outbreak of devastating diseases such as Dadhuwa, Chhirke, Furke and Gano Kuhine, as well as low input supply and lesser care and management of orchards due to the lack of information, timely unavailability of inputs such as quality planting materials, pesticides, fertilizers and ignorance i.e. treating cardamom farming is secondary business.

CONCLUSION

Cardamom, considered as black gold in local area, is the high value exportable commodity of Tehrathum which has significantly contributed to the household economy of the rural people. Thus it could be short-term better option for uplifting the socioeconomic status of farmers. Cardamom farming is highly profitable and most remunerative enterprise in the district with B/C ratio of 2.0 at 4 years of production period which is one of the economically sustainable and promising enterprises for the farmers. The marketing channel is also strong and district traders are actively involved but price fluctuation of capsule is the major problem. The productivity of cardamom in the district is influenced mainly by number of active family members involved, farming period, area, intercultural operations, variable cost and depreciated fixed cost. If the large cardamom could be produced using more recent technologies avoiding the diseases and pathogens with known marketing channel and destinations probably this crop could retain the youth migration from hills to various countries in search of employment opportunities.

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