Analysis of Factors Determining the Supply of Ethiopian Cardamom Spice (Aframomumcorrorima): A Case from Bench Maji Zone of SNNPR, Ethiopia

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ABSTRACT

The objective of the study is to analyse factors determining the supply of Ethiopian cardamom spice (Aframomum corrorima) in Bench Maji Zone. Both primary and secondary data were used for the study. The primary data was collected by using questionnaire from randomly selected 250 cardamom spices producers. In the first case, of 10 woredas of Bench Maji Zone, Shey-Bench and four of its PAs were purposively selected on the ground that they are the leadingproducerofEthiopiancardamomspices.Descriptivestatisticsandeconometric model were employed for analyzing the data. From regression analysis, Out of those explanatory variables included in the model, seven variables such as Market price, Lagged price , Distance to the market, non-farming income ,Size of cardamom output, Extension service and Cooperative membership had significant effect on quantity of cardamom supplied. ThesurveyresultalsoindictsthatLackofuseofappropriatemoderntechnologies, Unlicensedtradersbrokersinthetradingofspices,Poortrainingprogram,Lackof organized market information service, Lack of proper post-harvest handling practices and lack of improved yield varieties of cardamom as their bottleneck problems. Meanwhile, irregular supply and quality deterioration due to limited commercial investors in spices production, poor access to credit facilities, absence of effective linkage among stakeholders, adulteration of inferior varieties with better ones for marketing , keeping spices in store for long in expectation of higher prices, inadequate processing facilities, price volatility due to changes in demand and supply in local and overseas markets, lack of organized market information service to the different actors in the spices farm to market chain, absence of capacity building like training program, inadequate transport in remote markets specially during wet seasons and challenges from unlicensed traders in the cardamom markets are constraintsreportedbymostofthesamplecardamomtraders.Theenhancementof cardamom producers' bargaining power through cooperatives is the best measure that should target at reducing the olgopolistic market structure in the regional markets. Such measure also facilitates the regular supply of cardamom spices at reasonable price to consumers. In addition, there is a need to improve extension system and technical supervision and follow up must be strong. Strengthening of market extension (linking farmers with markets, building marketing capacity of farmers, etc.) is necessary. It is also necessary to provide information and enhance the knowledge and skills of farmers. Moreover, there is an urgent need for government intervention with regard to market price setting strategy. Improvement of the marketing infrastructure is another area of intervention to improve the efficiency of spices marketing in the study area. Furthermore, attention should be given to the improvement of roads and communication networks in different production and trading center.

1. INTRODUCTION

Agriculture remains the main activities in the Ethiopian economy. Indeed, the Ethiopia's economy is highly influenced by the performance of the agricultural sector as it accounts for 50% of the GDP, provides employment opportunities to 85% of the population and supplies raw materials for 70% of the country's agro-industries. An agricultural growth is not only necessary tofeedthepopulation,butisalsothe drivingforce behindforeignexchange generation. About 80 % of Ethiopia's foreign exchange is derived from agricultural exports (EEA, 2008).

According to EEA (2010), in a country like Ethiopia where capital shortage is the bottleneck to the economic growth, enhancing production and export trade from agricultural sector is said to be very important remedy to the problem. The country almost exclusively imports essential development inputs like machinery, equipment, transport and communication facilities, semi-finished goods, raw materials and substantial amount of consumers' goods. All these are demanding for foreign currencies. In the face of binding current account constraints and to the extent that possibility of import substitution is severely limited, the promotion of growth can only be achieved through faster production and export expansion.

As a result, the government of Ethiopia composed a strategy paper (PASDEP[1]) which aims to realize in

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[1] PASDEP – Plan for Accelerated & Sustainable Development to End Poverty

the five year period (2006-2010) a growth in quantity and quality of marketable

Agricultural products.Inaddition,farmers will been courage to focus on agricultural activities where they have the best comparative advantage. To this end, the Government will provide the required support and technology package, which will be adopted and implemented as appropriate to each specific zone to benefit the population through specialization and diversification. The aim applies to a wide variety of crops, of which spices are one category. It is acknowledged that spices are important export products, with a huge potential to transform farmers from producing merely for subsistence to amoremarket-oriented mode of production. It suggests that more land needs to be allocated to spice production (Rutgers, 2010).

Spices are an important additive to Ethiopian meals and currently, there are also a growing new demand wave for organic spices in Europe, USA and Japan, etc. in which Ethiopia has a comparative advantage for this product (NTFPs, 2004). These clearly indicate that there are a massive domestic and international market opportunities for spices production and marketing.

Despite availability of the diverse agro-ecologies of the country to produce these huge plant spices having high demand at local and international market, the spices sector can be characterized as underdeveloped, unorganized and small-scale. Compared to coffee alone which accounts for 60 % of total export earning, the Export of spices from Ethiopia is very small, currently contributing only about 1% of the Country's total agricultural exports due to insufficient supply (Ohno, 2009). According to Ethiopian spice extraction factory, due to shortage in supply of important spices like cardamom, Timz , Ginger, etc., the factory is only working with production capacity as low as 10-15 tons per year, while its attainable is 40-50 tons per year.

Thus, the spice production & marketing in the country should be export-oriented so that it can be valuable foreign exchange earnings.In order to indentify the gap to be narrowed to wards improvements of the sector, research on these huge cash crops still need to be strengthen

Therefore, this study is contributing to the national development priority areas by identifying marketing channels and investigating factors determining the supply of Ethiopian cardamom (Aframomum corrorima) spice in Bench Maji Zone.

The findings of this research output can be used to inform policy debates at national and regionallevelthatseektoextendtheproductivityofthespicesector.Furthermore, stakeholders, such as NGOs, the private sector, donor community, industrial organizations, and others can use the findings in their activities within the spice sector

2. METHODOLOGY
2.1. Location and Description of the Study Area
Bench Maji is one of the 13 zones in the Southern Nations, Nationalities and People's Region (SNNPR) of Ethiopia. The zone has a total area of 1,932,659 hectares and it is bordered on the south by the Ilemi triangle, on west by Sudan, on the northwest by the Gambella region, on the north by Kefficho and Shekicho and on the east by Debub Omo. It is located at 651 kms southwest of Addis Ababa. The administrative centre of Bench Maji zone is Mizan Teferi. The zone comprises of 10 woredas (namely, North Bench, South Bench, Shey-Bench, Minet Shasha, Minet Goldia, Sheko, Gura Fereda, Bero, Maji and Surma),with a total of 230 peasant associations (PAs).

Shey-Bench woreda is among 10 woredas of the Bench Maji zone has a total area of 46215.04 which is located at about 555km south west of Addiss Ababa. The woreda consists of 20rural kebeles and 1 urban kebele. The district can be classified in to three major climatic zones on the bases of rainfall, altitude and temperature. These are 3% Kolla, 5% Dega and the rest 92% is Weynadega. The average temperature of the woreda ranges from 60c-250c with annual average rainfall 1223.69mm. The woreda is known for the production of Ethiopian cardamom with atotal coverage of 1800 ha.

2.2. Source and Method of Data Collection
Both primary and secondary data were used. The primary data were collected from randomly selected 250 spices producers and 30 purposively selected traders by using structured questionnaires. In addition to the questionnaire, an informal survey in the form of market visit and focused group discussions was employed to acquire additional supporting information. The discussions were conducted with key informant farmers,spicetraders,and spices marketing experts at the district and zonal level.

2.3. Sample Size and Methods of Sampling
The sample respondents were spice growers and spice traders. In the first case, of 10 woredas of Bench Maji Zone, Shey-Bench and four of its PAs were purposively selected on the ground that they are the leading producer of Ethiopian cardamom spices. After identifying the area, with the approval of and in collaboration with the local chairman and development agent, systematic random sampling technique were used in order to select 250spices growers. Moreover, out of forty spices dealers in the study area, which also undertake some processing along

with spices merchandizing business, thirty were included in the present study based on the availability of vital financial records and facilities.

2.4. Method of Data Analysis

The main tools and methods employed for analyzing the data were both descriptive statistics (mean, frequency, Minimum, maximum) and econometric model (Multiple Regression).

MultipleRegressionModel:recentstudiesarecommonlyusingregressionmodelsto estimate supply function. Similarly this particular study was employ a multiple regression model to analyze factors deterring the supply of two major spices at the farm level in the study area which is the first objective of the research. Following Gujurati (2004) the multiple regressions is specified as:

$$Y_i \quad _0 \quad _iX_i \quad _i \tag{2}$$

Where:

Y = Dependent Variable (Average Ethiopian Cardamom output per HH).

Xi= Explanatory variables determining the supply of cardamom;

βo= constant; βi = coefficients of hypothesized explanatory variables,i = disturbance term

Variable Description and Working Hypothesis; In this study, cross-sectional data of the hypothesized variables will be used to estimate the determinants of marketable supply of the two major spices Ethiopian Cardamom.

Dependant variable2: The dependent variable is composed as follows. A single farmer's total yield is divided by the land he allocated to Ethiopian Cardamom. These steps were done for all two years. Than all two years were summed up, which gives the final dependent variable. Average cardamom/ginger output over three consecutive years in quintal per HH (Yi)

The independent variables

Table 1: summary of variables definition and working hypothesis

Independent Variables	Variable type and measurement	Expected effect (X_i) on (Y_i)
Market Price of cardamom	Continuous[3] (in birr per quintal)	Positive
Two years lagged price of spices	Continuous (in birr per quintal)	Positive
Non- cardamom income	Continuous (in birr per quintal)	Positive/negative
Total farm size	Continuous (in hectors)	positive
Sex of household head	Dummy[4](1=if HH is male 0=Otherwise	Positive/negative
Age of Household	Continuous(in years)	Positive/negative
Membership in local organization	Dummy[5](1=if the members 0=otherwise)	Negative
Size of cardamom output in quintal	Continuous measured in quintal	Positive
Family size	Continuous measured in number	Positive
Distance to market	Continuous (in km)	Positive/ negative
Education in formal schooling	Dummy (1= if attending, 0= if not)	Positive
Credit received/access	Dummy(1= if access to, 0= if not)	Positive
Extension contact	Dummy(1= if access to, 0= if not)	Positive
Market information	Dummy(1= if HH access to, 0=if not)	Positive

2 Average output over three consecutive years in quintal

3 Refers to variables that can take any integer value

4 Refers to variable that can take o and 1, as yes or No responses

5 Refers to variable that can take o and 1, as yes or No responses

3. RESULT AND DISCUSSION

3.1. Marketing channels: participants in the cardamom market:

Thecardamomspicesmarketchainofactivitiesinvolvesproduction,collection,drying,

storage, and processing, transporting, and marketing and selling activities. The small holder farm households, the predominant production system for spices in the Shey-Bench district, produces and then sells the Ethiopian cardamom to local traders(local collectors and wholesaler) in the nearest town. The cardamom growing farmers

sell the spice either in a wet/fresh stage (in most cases), or after drying depending upon their cash need, interest and experience in spice drying processes. Marginally cooperatives/unions, small to big Local Collectorsandregionaltraders(buyers)/includingsmalllocalshopsingrowingareas, engaged in purchasing and bulking from farmers and their cooperatives/unions/. They resell their spices purchases to local wholesalers after making a sort of processing (drying), and also sell directly to consumers the Local traders/buyers in turn may do further drying of the spices, do bulking operation till it reaches the level to be transported using trucks to transport and selling to traders in terminal markets or at Addis Ababa.

There are national level wholesales of spices in terminal markets, which do further bulking mainly from local traders and mainly engage in selling to processors/factors, exporters, or domestic wholesalers and retailers besides, brokers and commission agents are also involved

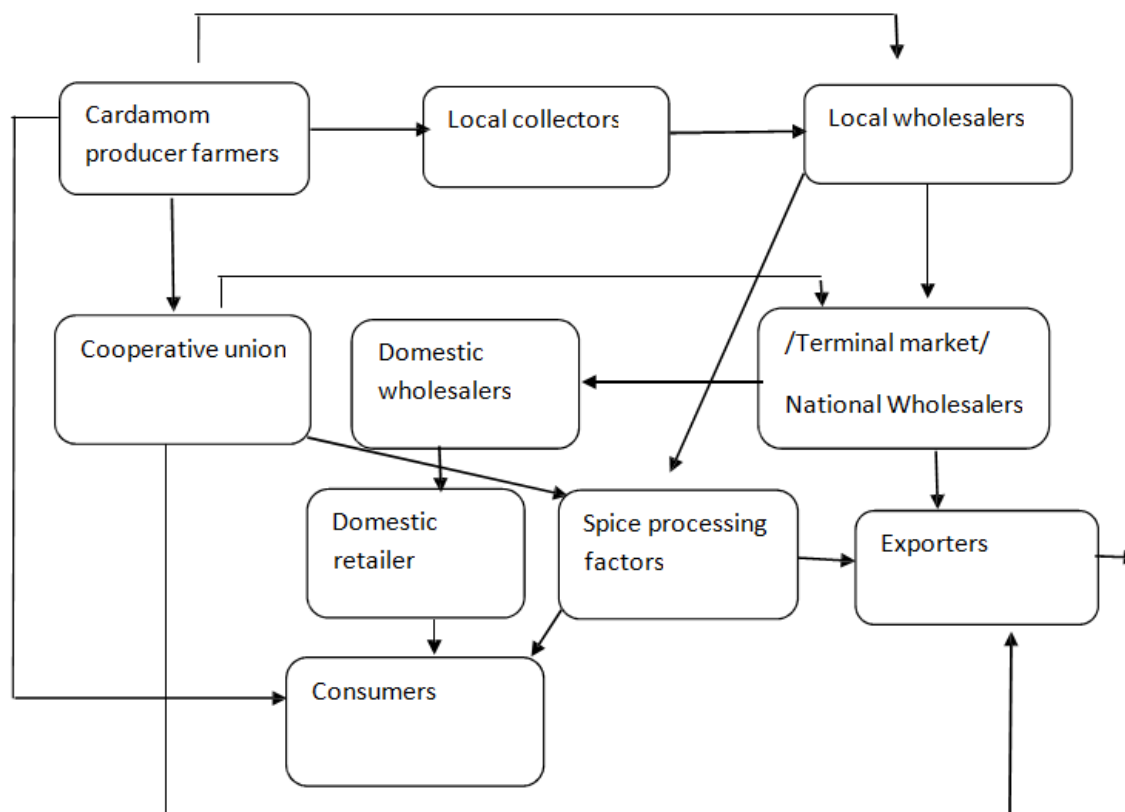in the market channel of spices purchase and selling.

Figure 1. Ethiopian cardamom marketing chain in the study area

3.2. Factors affecting quantity of Ethiopian cardamom: Regression output

In this research 14 potential explanatory variables are included in the regression model. Each of the 14 regression coefficients estimates the amount of change in supplied quantity of cardamom for one percent change in the explanatory variables. Out of these explanatory variables,7variables such as Market price($X1$),Lagged price($X2$),Distance to the market($X5$), non farming income ($X6$), Size of cardamom output($X8$), Extension service($X9$) and Cooperative membership had significant effect on quantity of cardamom supplied. The F- test value 5.11 for the regression model was highly significant and the adjusted was 99.07%.

Table 2 Estimates of OLS regression model

Variables	Coefficient	Standard deviation	t-ratio	Marginal effect
Constant	-5.5281	8.2933	-0.667	-5.5281
Market price(X_1)	2.417	0.8135	2.971**	2.417
Lagged price (X_2)	0.4932	0.2070	2.383**	0.4932
Sex of HHH(X_3)	-1.4928	3.7463	-0.398	-1.4928
Age of HHH(X_4)	0.0621	0.0667	0.932	0.0621
Distance to the market(X_5)	-4.0040	1.003	3.992**	-4.0040
Non farming income(X_6)	-4.5428	2.5851	-1.757*	-4.5428
Access to credit(X_7)	-2.5770	2.6278	-0.981	-2.5770
Size of cardamom output(X_8)	0.9710	0.0072	135.078***	0.9710
Extension service(X_9)	4.8113	1.7743	2.712***	4.8113
Market information(X_{10})	-0.8691	1.9392	-0.448	-0.8691
Total land size(X_{11})	0.1661	0.7568	0.219	0.1661
Family size(X_{12})	-0.2137	0.1898	-1.126	-0.2137
Cooperative membership(X_{13})	7.7730	3.7503**	2.073**	7.7730
Education level HHH(X_{14})	2.1165	1.9876	1.065	2.1165

Source: Own computation, 2013

R-squared = 0. 99074 Adjusted R-squared = 0. 9901 Rho = 0.61003

Probability value = 0.00000 F-value 5.11 *** N=250

***, ** and * show the values statistically significant at 1%, 5% and 10% respectively

Current market price(X1) and lagged price(X2): In this study, the coefficient of current price of cardamom, which is, shows a positive relation to cardamom sold or supplied to market. An increase in current market price of cardamom by one birr per Kg will to an increase of marketed quantity of cardamom by 2.417 quintals at 5% significance level. Here, producers checked the price of spices for their best benefit and this led the determinant to be significant at 5% level.

Distance to the market(X5): This hypothesis followed a twofold logic. Farmers living nearby can easier obtain inputs and uphold business relations, while farmers farther away have more land to use. As can be seen from the table above, the distance to the market is negatively correlated with cardamom output (X5=-4.0040).This means that living closer to the market is more advantageous in terms of cardamom production over consecutive years. Transportation costs will belower,inputsare more easily accessible and business relations can be maintained, all of which help to improve farming practice. The distance to the market is significant with 95% certainty.

Non-farmingincome(X6): Ashypothesized,non-farm income of the household heads negatively affected quantity supplied. On average, if a cardamom producer gets non-farming income causes a 4.5428quintal reduction in the quantity of cardamom supply. This may be explained by the fact those farmers who have better non-farm income will not tend to generate cash from sell of agricultural commodities (cardamom) rather from their non-farm income.

Size of cardamom output(X8): As hypothesized the regression coefficient of cardamom production variable was positively related with quantity supplied and significantat 1%probability level. The result shows that a one kg increase in the cardamom production causes 0.9710 kg increase in the amount of marketed supply. Total pepper production influenced the amount of marketed supply of cardamom positively showing that farmers who produce more sell also more, which is consistent with the general expectation.

Extension contact(X9): the other significant variable was extension contact, which affected positively the marketedsupply of cardamom.On average,if a cardamom producergets extension contact the amount of cardamom supplied to the market increases by 4.8113 kg. This suggests that access to extension service avails information regarding technology which improves production that affects the marketable surplus of cardamom.

Membership in local organization (X9): as expected, this variable affects the household supply of cardamom

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positively because producers who are members of local organization are likely to get inputs and market information and thus could supply more cardamom to the market than non members. If cardamom producers are a membership of local cooperatives the cardamom output will increase by 7.7730 quintal.

The study further revealed that farmers are not applying fertilizer and pesticides to their cardamomspices.Other explanatory variable slikeage of the household head,sex of household head, education level, access to credit, total land size and family size had non-
significant effect.

3.3. Ethiopian cardamom production and Marketing Problems

Table 3 Major farm level constraints of cardamom production and marketing in the study area N=250

Problems	Number of farmers	Percent
Low yield varieties in use	240	96.00
Poor training program	245	98.00
Poor quality of final output marketed	180	72.00
Lack of proper post harvest handling practices	241	96.40
Lack of use of appropriate modern technologies	248	99.20
Lack of appropriate spices development interventions	200	80.00
Unlicensed traders brokers in the trading of spices	247	98.80
Lack of value addition	200	80.00
Weak organizational capacity of cooperatives/unions	150	60.00
Price volatility	202	80.80
Lack of organized market information service	242	96.80

Source Survey result 2013

The survey result indicts that the cardamom growers emphasized Lack of use of appropriate modern technologies, Unlicensed traders brokers in the trading of spices, Poor training program, Lack of organized market information service, Lack of proper post harvest handling practices and lack of improvedyield varieties of cardamomas their bottleneckproblems as indicted in table above. Meanwhile, irregular supply and quality deterioration due to limited commercial investors in spices production, poor access to credit facilities, absence of effective linkage among stakeholders, adulteration of inferior varieties with better ones for marketing , keeping spicesinstorefor longinexpectationof higher prices,inadequate processing facilities, price volatility due to changes in demand and supply in local and overseas markets, lack of organized market information service to the different actors in the spices farm to market chain, absence of capacity building like training program, inadequate transport in remote markets specially during wet seasons and challenges from unlicensed traders in the cardamom markets are constraints reported by most of the sample cardamom traders as indicated in table below

Table 4 Ethiopian cardamom marketing problems at trader level (N=30)

Problems	Number	Percent
Irregular supply and variable quality of spices produced	29	96.67
Weak role of private investors in spices production	10	33.33
Access to credit	20	66.67
Weak business linkage among stakeholders in the chain	23	76.67
Keeping spices in store	22	73.33
Adulteration	25	83.33
Poor processing facilities	24	80.00
Price volatility	15	50.00
Poor market information	27	90.00
Lack of training on spices marketing	26	86.67
Inadequate Transport	21	70.00
Competition with unlicensed traders	30	100.00

Source; survey result 2013

4. CONCLUSION AND POLICY IMPLICATIONS
4.1. Summary and Conclusion
Quantity of cardamom passed through different marketing agents from farmers to consumers.However about 90% of farmers production was purchased by local traders andregional traders. There are national level wholesales of spices in terminal markets, which do further bulking mainly from local tradersand mainly engage in selling to processors/factors, exporters, or domestic wholesalers and retailers. Besides, brokers and commission agents are also involved in the market channel of spices purchase and selling.

Analysis of market structure indicated that spices traders had a significant market power in setting price at the local market. About 63% of the sampled farmers reported that traders set cardamom price. Furthermore, about 55% of sampled spice traders also confirmed that they set purchase price in the local market centre, while 20% of them responded that price is determined by the market itself. The rest of the traders disclosed that prices were sometimes discovered by negotiation with sellers. Traders adjust their purchase price by observing their competitors' purchase price at the market centre. These all indicates that, Due to scattered production and insufficient supply, individual farmers do not effective bargaining power in the spice market. Though brokers are very important for the wholesalers during the major transaction period to handle more volume, about 68% of sampled traders purchase directly without using brokers, while 18% of them purchase through brokers and the rest through a combinationofdirectpurchase&brokers.Whole salers dispatch the cardamom parched farmers, spices collectors, cooperatives and unlicensed traders to Addis Ababa markets.

From regression analysis,Out of the seexplanatory variables include din the model,7 variables such as Market price, Lagged price , Distance to the market, non farming income (, Size of cardamom output(X8), Extension service and Cooperative membership had significant effect on quantity of cardamom supplied indicating an urgent intervention by concerned bodies.

The survey result indictsLack of use of appropriate modern technologies, Unlicensed traders brokers in the trading of spices, Poor training program, Lack of organized market information service, Lack of proper post harvest handling practices and lack of improvedyield varieties of cardamomas their bottleneckproblems as indicted in table above. Meanwhile, irregular supply and quality deterioration due to limited commercial investors in spices production, poor access to credit facilities, absence of effective linkage among stakeholders, adulteration of inferior varieties with better ones for marketing , keeping spices in store for long in expectation of higher prices,inadequate processing facilities, price volatility due to changes in demand and supply in local and overseas markets, lack of organized market information service to the different actors in the spices farm to market chain, absence of capacity building like training program, inadequate transport in remote markets specially during wet seasons and challenges from unlicensed traders in the cardamom markets are

constraintsreported by most of the sample cardamom traders.

4.2. Recommendations and Policy Implications

Based on the findings of this study, the following policy measures could be recommended, because there is a need for the promotion of increasing cardamom production and market supply.

1，	The enhancement of cardamom producers' bargaining power through cooperatives is the best measure that should target at reducing the oligopolistic market structure in the regional markets. Such measure also facilitates the regular supply of cardamom spices at reasonable price to consumers.

2，There is a need to improve extension system and technical supervision and follow up must be strong. Strengthening of market extension (linking farmers with markets, building marketing capacity of farmers, etc.) is necessary.

3，It is necessary to provide information and enhance the knowledge and skills of farmers and other institutional changes ought to be made.

4，There is an urgent need for government intervention with regard to market price setting strategy.

5，Improvement of the marketing infrastructure is another area of intervention to improve the efficiency of spices marketing in the study area. Due attention should be given to the improvement of roads and communication networks in different production and trading centre.

6，Advancing farmer cooperatives to work on cardamom will contribute to poverty reduction for member farmers, and potentially generate spillovers for the wider farmer community (thus, the non-member farmers).

7，Provision of appropriate packing and card drying facilities for farmers at a reasonable price coupled with provision of adequate training on the techniques of harvesting, drying, packing and storing to maintain the quality of cardamom spices are required.

Strengthening quality inspection centre at the local market is also indispensable to improve the quality of spices in the study area.

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