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Determinants of Sesame Commercialization among Smallholder Farms: The Case of Melokoza and Basketo Districts, Southern Ethiopia

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Abstract

This study investigated determinants of sesame commercialization among smallholder farms, the case of Melokoza and Basketo special woredas, Southern Ethiopia. For this study cross sectional data was collected from 184 randomly selected smallholder farm households in the district. The survey data was analyzed using descriptive statistics and double-hurdle model. From the descriptive statistics it was found that the level of commercialization of sesame in the district was 79%, which by far above the national commercialization average (35%).

Keywords: Smallholder farm • Commercialization • Market participation • Intensity of market participation • Ouble hurdle model

Introduction

Results of the double-hurdle model analysis showed that in the first hurdle (probit regression), educational status of the household head, farm size, farming experiences, distance to nearest market, family labour force, tropical livestock and availability of cooperative played positive and significant role in households' decision to participate in sesame output market; whereas, amount of credit received, number of extension visit and off-farm activities played negatively and significantly role in households' decision to participate in sesame output market. In the second hurdle(truncated regression);education, volume of sesame production, use of agricultural technologies and tropical livestock have positive and significant influence in the level of sesame sold; whereas farm size and family labour force do negatively and significantly.

Background of the study

In Ethiopia, smallholder farmers cultivate approximately 95 percent of the total area Cultivated and produce more than 95 percent of the total agricultural output [1]. It is justified that 41 percent of the country's gross domestic product (GDP) and more than 90 percent of the county's' foreign currency earnings covered by them. These show the leading contribution of smallholder farmers to the overall agricultural growth in the country. In short, as the overall economy of Ethiopia depends on agriculture sector development, the entire movement of the sector depends on what is happening in smallholder sub-sector [1].

The government of Ethiopia in its policy and growth strategy, with the current Growth and Transformation Plans (GTPs), places smallholder farmers as a primary source of agricultural growth and agriculture as the main source of overall economic growth. The commercialization of smallholder farming received high government policy priority through GTPs. In this regard, the major effort is placed to support the intensification of marke table farm products - both for domestic and export markets-by both small and large scale farmers. Such fundamental strategy involves an enhancement of producing high value crops - paying a special focus on high-potential areas [2].

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According to, Ethiopia is among the top-five sesame producing countries in the world, ranked at fourth place in 2011/2012 [3]. Accordingly, sesame is the major oilseeds crop in the country in terms of exports next to coffee, accounting for over 90 percent of the value of oilseeds exports. There is still potential arable land in different areas of the country to cultivate this crop and there is a considerable demand for Ethiopian sesame seed at international markets. This indicates that, growth and improvement of the sesame sector can substantially contribute to the economic development at national, regional and family levels.

Therefore, with the agriculture centered economy of Ethiopia and the dominance of smallholder sub-sector, it is vital to conduct a study which emphasizes on identifying factors determining smallholder farmers' participation in commercialization and its intensity for potential cash crops. Accordingly, exploring smallholder farmer's participation in commercialization of sesame in study area is the core concern of this study.

Statement of the problem

Agriculture remains the back bone of the development strategy of the country hence Ethiopian government has formulated agricultural development led industrialization (ADLI) policy framework since 1994. This policy frame work contains various components that can enhance agricultural growth, including technology, finance, rural infrastructure, internal and external markets and the private sector focusing on improving food security, the commercialization of agriculture, the extension of credit to small farmers and industrialization [4].

Lack of proper information, high transaction costs, market imperfection, poor infrastructure, household resource endowments, household specific characteristics and lack of agricultural credit are hindering smallholder farmers from using outcomes of commercialization. Hence, it is not possible for the smallholder farmers to assimilate with the market and enjoy the benefits of commercialization unless the already existing problems are removed and better environment is created [5].

According to the sesame value chain development Strategy report (2015-2019), the quality of sesame (purity, moisture content, oil content, color, size, aroma, insects, traceability, etc) is very crucial in sesame marketing. If this is not known, the value of the seed and the price of the product will decrease. The existing quality control system is weak due to default in quality control implementation and weak infrastructure for quality. Moreover, the centralization of warehouses of ECX also limits to maintain the purity of the seed and provision of the seed cleaning facilities.

In southern Ethiopia, particularly in study areas have good potential in sesame crop production for which smallholder farming have diversified from staple food subsistence production into more market oriented and higher value

commodities. Despite production potentials and its high demand in the market, majority of smallholder farmers are not participating in sesame marketing and most of them are participating under expectation [6]. Therefore identifying specific factors limiting households from sesame commercialization and its intensity in study area is very vital.

Research questions

This research scheme is going to answer the following research questions:

- What are factors determining household's participation in sesame marketing?
- Is the level of commercialization of sesame in study area is comparable with national recommended level of commercialization?
- What factors are affecting the level of smallholder sesame farmers' marketing participation in sesame sale?

Objectives of the study

The general objective of the study is to identify factors affecting smallholder farmers' participation and level of participation in sesame crop commercialization in study areas.

Specific objectives:

- To describe the status of sesame marketing in study area
- To identify determinants that influence smallholder sesame producing farmers' participation decision in sesame marketing.
- To analyze the degree of commercialization for the participating farmers in sesame marketing and
- To identify factors that affect the level of smallholder sesame marketing farmers' participation in sesame sale

Research Methodology

Research design

Sampling procedure and sample size: The study was conducted in Melokoza and Basketo Special woredas, South west part of Ethiopia. The areas have high potential for the sesame production [7]. This study followed three stage sampling procedures. In the first stage, all sesame producing kebeles purposively selected and then classified in to three clusters based on distance.

In the second stage, from each cluster, two kebeles that produce sesame were selected purposively. In the third stage, the sampling frame for each selected kebele was prepared with the help of development agents (DAs) [8]. The sampling frame included all formal lists of sesame producing farmers. After complete lists of sampling frame, households were selected from prearranged lists using simple random sampling based on the Probability-Proportional-to-Size (PPS) and cross sectional data were obtained from sampled smallholder sesame producing farmers [9].

The sample size was determined by using Cochran (1977) formula and sample was drawn from the lists of sampling frame of the respective kebeles using probability proportional to size (PPS).

First, Cochran (1977) formula was used to drawn sample size:

$$n_0 = \frac{z^2 pq}{e^2}$$

Accordingly, $n_0 = \frac{(1.96)^2 (0.5)(0.5)}{(0.07)^2} = 196$

Then the above Cochran formula for known target population (in this case, N = 3029) was adjusted and final sample size become:

$$n = \frac{n_0}{1 + \left(n_0 - 1\right)/N} = \frac{196}{1 + \left(196 - 1\right)/3029} = 184$$

This sample size (184) redistributed to each kebele based on probability proportion to size.

Methods of data analysis

The raw data collected were entered in to SPSS software and analyzed using STATA software. Descriptive statistics and Econometrics regression models were used in the data analysis. Statistically, descriptive statistics like mean, percentages, frequency, table and figures were employed (Table 1), (Figure 1).

Empirical econometric model description: Econometric models were used to assess the demographic, socio economic and institutional factors that are hypothesized to determine the smallholder farmers decision to participate (or not) in output markets and the degree of market participation. Though there are other models to employ this study, the most appropriate approach was to use the double-hurdle model (probit and truncated). The Double-hurdle model assumes that households make two decisions separately regarding their decision to sell their product and the volume of sale, each of which might be determined by a different set of explanatory variables.

Probit model is specified as:

$$Y_i^* = X_i\beta + \varepsilon_i, \varepsilon_i \sim N\left(o,1\right)$$

$$Y_i = \begin{Bmatrix} 1 if Y^* i > 0 \\ 0 if Y^* i \le 0 \end{Bmatrix}$$

Where: Y_i^* is a latent (unobservable) variable representing households' decision whether or not to participate in the sesame product market; Xi is a vector of independent variables hypothesized to affect household's decision to participate in the sesame market; β is a vector of parameters to be estimated; Y_i is a response variable for status of households' participation in the market which takes Value of 1 if the household participates in the market and 0 if the sesame producing households report no sale.

And the truncated model is expressed as:

$$Z_i^* = X_i\gamma_i + \mu_i, \mu_i \sim N\left(o, \delta^2\right)$$

$$Z_i = Z_i^* if Z_i^* > 0 and Y_i = 1$$

Where: Zi is the intensity of commercialization which depends on latent variable Zi* being greater than zero (is the percentage of sesame output that is sold by household) and conditional to the decision to commercialize yi. Truncated regression model mainly focused on the degree of participation in the output market for those smallholders who have already participated or joined in the output market and it tried to categorize why some farmers sold more and others less.

Results and Discussion

Descriptive results

Socio-demographic characteristics of sampled households: Sample

Table 1: Sex of sampled farmer.

Variable	Participants in sesame market						Non-participants in sesame market					
Sex	Female		Male		Total		Female		Male		Total	
	Count (freq)	%	Count (freq)	%	Count (freq)	%	Count (freq)	%	Count (freq)	%	Count (freq)	%
	13	7.1	152	82.6	165	89.7	5	2.7	14	7.6	19	10.3

of 184 household heads were used in this study. Out of the interviewed farmers, 165(89.7%) participate in sesame market and the remaining 19(10.3%) do not. As presented in table, among total respondents, 166(90.2%) are male heads and 18(9.8%) are female. The table also shows that among market participants, 152(82.6%) are male and 13(7.1%) female headed whereas among non-participants, 14(7.6%) are male and 5(2.7%) are female headed households.

Sesame marketing and related problems in study areas: Farmers in study area sell their sesame product to different actors. The survey result indicates that farmers supply their produce to urban consumers, cooperatives and merchants from woreda town. As shown in the table, most of farmers (57%) sell their produce to licensed merchants and 33.9% sell to cooperatives which are available in the area (Table 2). The table also shows that 31% of sampled farmers sell their produce at farm gate and 63.7% do at the village or kebele markets.

Farmers explained that almost all the time buyers set the selling price and producers are price takers. As indicated in the table, 80.6% of the sampled farmers responded that buyers decide on selling price and they have no power to make decision. The other problems farmers facing in sesame selling are buyers' problems (price lowering and scale cheating or measurement cheating and primary market road access.

The very important problems, farmers were complaining on sesame marketing were the price fluctuation which is declining from time to time. As shown in the figure, the price of sesame declined from 2014 to 2017 (Figure 2). Accordingly, the average price of sesame in 2014 was around 2500 birr per quintal. One year later (2015), the average price become 1500 birr per quintal, which was 60% declined within one year.

Farmers also reported that there was no warehouse (store) to keep on or wait for their produce for long time [10]. They said that if it is kept not in good place, the seed become decay (grow moldy). Therefore, whatever the price decided by the buyers they were forced (obligated) to sell their produce. By mentioning these and other problems, Part of the farmers were reporting that they are going to shift from sesame to other crops.

As verified during conducting survey, sesame is the first cash crop for most of residents in study area. Though the farmers were complaining the challenges related with sesame production and marketing, the benefits of sesame are many-sided.

As indicated in the figure, whatever costs invested for sesame production, the net benefit earned from sesame is positive (Figure 3). The respondents explained that sesame is the only option to get cash income and they prefer to invest on it.

The most importance of sesame is availability of global demand. Accessibility of market at international level for sesame crop brings great opportunities for producers in order to earn better household income.

Farmers produce sesame mainly for marketing purpose. As indicated in the figure, most of the sesame produced were sold and very little of it was consumed whereas most of maize and common bean produced were consumed and little amount of them were sold in the market. This shows that sesame is the only option to earn cash income compared to other crops (Figure 4).

The first three figures (a, b and c) show production, consumption and sell for sesame, maize and common bean respectively whereas the second figure

Table 2: Sesame marketing conditions in study areas.

Conditions	Percent (%)
Place of sell	
Farm gate	31
Village/kebele market	63.7
Woreda/district town market	4.7
Sesame market center	0.6
Buyers	
Urban consumers	4.8
Cooperatives	33.9
Licensed merchants	57
Non-licensed merchants	4.2
Who set selling price	
Yourself	1.8
Market	12.1
Buyers	80.6
Negotiation	5.5
Place of sell	
Farm gate	31
Village/kebele market	63.7
Woreda/district town market	4.7
Sesame market center	0.6
Buyers	
Urban consumers	4.8
Cooperatives	33.9
Licensed merchants	57
Non-licensed merchants	4.2
Who set selling price	
Yourself	1.8
Market	12.1
Buyers	80.6
Negotiation	5.5

Figure 1: Transportation system of sesame to the market place.

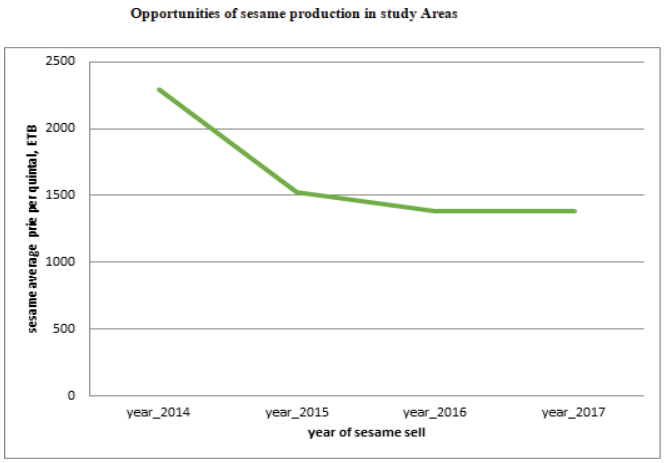

Figure 2: Price trends of sesame from year 2014 to 2017.

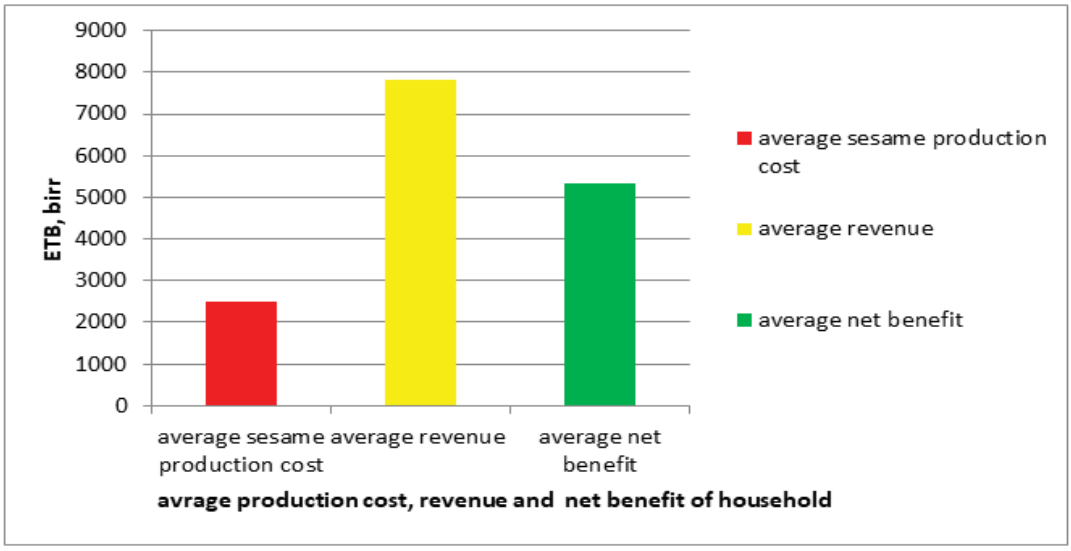

Figure 3: Direct cost benefit analysis of the sesame production for household.

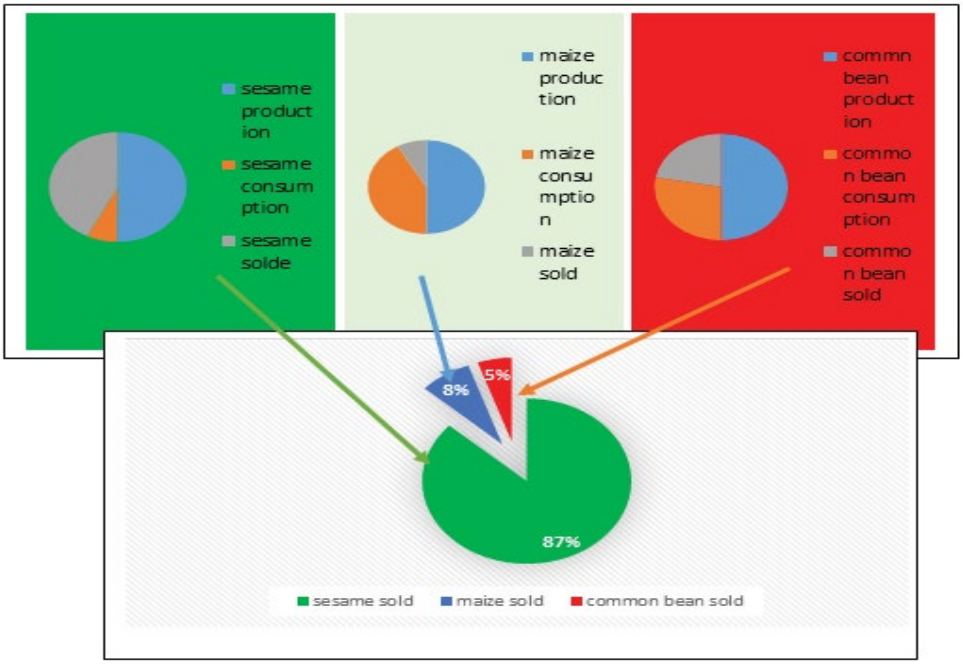

Figure 4: Comparative advantage of sesame over other crops in the market.

Table 3: Household Level commercialization Index.

Level of commercialization	Freq (obs)	Percent	HCI
Low (0-0.3)	19	10.3	0
Medium (0.31-0.75)	-	-	-
High (0.76-1)	165	89.7	0.88
Total	184	100	0.7895

(pie-chart) indicates only selling percentages from total production for three crops. As shown in the figure, sesame sold has the most shares among others and contributes more cash for community in study area.

Analysis of degree of sesame commercialization in Melokoza woreda: The level of any crop commercialization could be measured in terms of household commercialization index (HCI) and calculated as total volume of crop sold divided by total volume of crop produced. ie.

$$HCI = totalvolumeofsesamesold \,/\, totalvolumesesameproduced$$

The index measures the level to which crop production is oriented towards the market. A value of zero would imply a totally subsistence oriented production whereas the closer the index is to 1, the higher the degree of commercialization in a given area.

As shown in the table, the level of household commercialization in the study area varied from 0 to a unit (1) across the sampled households (Table 3). As revealed in table, 89.7% of households found to be at higher level (0.76 to 1) of commercialization, selling on average 88% of the total quantity of their produce, whereas 10.3% of households found to be low level (0 to 0.3) of commercialization, selling nothing of the total quantity of their produce. The table also shows that the general level of household commercialization in the study area was found to be 79%, which is by far above than the national commercialization average, 35%.

Econometric results

In this section, an econometric analysis is performed to identify the demographic, socio-economic and institutional factors that determine the decision of smallholder farmers to participate (or not) in the sesame market and the level of participation.

Table.4: Probit regression Estimates and reporting marginal effects for Determinants of market participation.

Independent variables	Coef.	Std. Err.	z	P>z	Dydx (marginal effect)
Sex	0.661097	0.611865	1.08	0.28	0.01767
Edu	0.267856	0.105955	2.53	0.011**	0.007159
land_siz_3	0.918213	0.207156	4.43	0.000***	0.024543
F_exp	0.376148	0.218016	1.73	0.084*	0.010054
Dist_mrkt	-1.50873	0.256132	-5.89	0.000***	-0.04033
Get_info	0.528017	0.433937	1.22	0.22	0.014113
Amnt_credit	-0.00056	0.000152	-3.68	0.000***	-1.50E-05
Flabor_Total	1.634683	0.413164	3.96	0.000***	0.043693
TLU_TOTLIVSTOCK	0.953366	0.297954	3.2	0.001***	0.025482
Coop_available	0.663337	0.398905	1.66	0.096*	0.01773
No_extn_visit	-0.18318	0.022874	-8.01	0.000***	-0.0049
Off_farm	-1.51972	0.496422	-3.06	0.002***	-0.04062
_cons	-6.95616	1.714623	-4.06	0	-10.0629

Number of obs=184; Wald chi2(12)=283.02; Prob> chi2=0.0000; Pseudo R2=0.9337
*** ,**and * implies statistically significance at ,15 and 10% level respectively

Table 5: Truncated regression Estimates and reporting marginal effects for Determinants of level of market participation.

Sesam_sold	Coef.	Std. Err.	z	P>z	Dydx (marginal effect)
Edu	0.0296917	0.0166951	1.78	0.075*	0.0296917
land_siz_3	-0.1394614	0.0412979	-3.38	0.001***	-0.1394614
Sesam_prodn	0.9055535	0.0359523	25.19	0.000***	0.9055535
Perception_costbenfit	-0.2190848	0.1430406	-1.53	0.126	-0.2190848
Agri_tech	0.2611555	0.1026855	2.54	0.011**	0.2611555
Amnt_credit	-0.000018	0.0000175	-1.03	0.304	-0.000018
Flabor_Total	-0.1451129	0.0563783	-2.57	0.010***	-0.1451129
TLU_TOTLIVSTOCK	0.1981665	0.0368033	5.38	0.000***	0.1981665
_cons	0.5806118	0.2689928	2.16	0.031	0.5806118

Limit:lower=0; Number of obs=165; upper = +inf; Wald chi2(8)=2882.00; Log likelihood = -126.40235; Prob> chi2=0.0000
***, ** and * implies statistically significance at 1, 5, and 10% level respectively

Determinants of sesame market participation (probit regression model): Probit regression analysis was executed to find out what factors influence smallholder farmers to participate or not in sesame market.From the regression table result, it shows that Pseudo R2 value of 0.9337 which indicates that about 93 percent of the model was explained by the included explanatory variables and the remaining only 7 percent was explained by unobserved (external) variables (Table 4).

The probit regression analysis shows that different explanatory variables included in the model (education, farm size, sesame farming experience, traveling distance to the nearest market, family labour force, tropical livestock unit and cooperative available) were found to have a significant and positive impact on the likelihood of participating in the sesame output market whereas amount of credit received, number of extension visits and participation on off-farm activities do significant and negative at different significant levels.

Determinants of the level of sesame commercialization (truncated regression model): This section deals with results of truncated regression model estimating the determinants of the level of sesame commercialization. At this stage only farm households who sell or join to the market were considered.

In table, the estimated probability greater than chi-square value (Prob>chi2=0.0000), also suggests that at least one of the hypothesized parameter is significant in explaining the dependent variable at less than 1 percent significance level (Table 5).

The estimation result showed that, level of sesame commercialization was influenced by household education, farm size, and volume of sesame production, agricultural technologies, family labour force and number of tropical livestock.

Conclusion and Recommendations

Conclusion

From findings, the following conclusions are summarized briefly. Though the farmers were complaining the challenges related with sesame production and marketing, the benefits of sesame are multifaceted. It is the main source of income for community in study area and has high international demand. The general level of household commercialization in the study area is found to be 79%, which is by far above than the national commercialization average, 35%.

From econometric results, double-hurdle model analysis showed that in the first hurdle (probit regression), educational status of the household head, farm size, farming experiences, distance to nearest market, family labour force, tropical livestock and availability of cooperative played positive and significant role in households' decision to participate in sesame output market; whereas, amount of credit received, number of extension visit and off-farm activities were found to affect participation in sesame output market negatively and significantly. In the second hurdle (truncated regression); education, volume of sesame production, use of agricultural technologies and tropical livestock have positive and significant influence in the level of sesame sold; whereas farm size and family labor force do negatively and significantly affect level of participation in sesame marketing.

Recommendation

Sesame is one among important agricultural export commodity in Ethiopia. However, its marketing in the study area is limited by different constraints. Therefore, to enhance market participation and its intensity smallholder farmers' policy measures are suggested.

- Cooperative working with sesame in part of area is not powerful and not benefiting farmers whereas in most part of the sesame producing area there is no cooperative at all. Therefore, it is advisable to strengthen the existing cooperatives and establish well-functioning cooperatives. In addition to this, establishing sesame market center in the study area enables smallholders to find sesame market easily and reduces transaction costs.
- Farm size has positive inference on households' market participation of sesame. However, increasing only the size of landholding may not be solution to boost up sesame supply given that land is a fixed resource. Therefore, intensification of agricultural production should be carried out. To increase cropping intensity in order to enhance production and productivity of sesame per unit area of land, promoting and delivering improved technology packages to smallholders is the better solution and in turn that would enable them to link up with sesame output market.
- Development agents who are working at kebele level are not providing enough information on marketing regarding sesame sale. Therefore, local government should build capacity of extension workers and enable them to transfer whatever information to farmers. Promote sesame post-harvest handling technologies among farmers also enables them to produce and participate in output market. Sesame in study area is not branded and certified. Therefore, branding of sesame will strengthen and promotes sesame at international level.
- According to the finding, farmers were complaining also about financial problems to produce and supply sesame to the market. From this point of view, credit providing organization, Omo micro finance is challenging farmers to get credit. The main problems related with Omo micro finance should be solved. For example, high interest, group collateral requirement, providing low amount of credit and not available on time and others should be considered and government should interfere in this institution in order to make good environment for credit services for smallholder farmers.

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