



Strategic Analysis of Sesame (*Sesamum indicum* L.) Market Chain in Ethiopia a Case of Humera District

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Author's contribution

The sole author designed, analyzed and interpreted and prepared the manuscript.

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ABSTRACT

Humera is the well-known area in producing quality sesame seed. Both commercial and smallholder farmers involved but it can divide to individual farmer, Investors and farmer associations. About 30 percent of the country's total sesame seed production comes from Humera, Tigray. Sesame is a high-value edible oil that is exported to china, Japan, Israel, Turkey and the Middle East. Information for the analysis was collected through a desk study with secondary sources from internet and previous information. After reviewing available data, sesame value chain was identified. The PESTEC, quantitative and qualitative and other analysis was done. Due to different factors, the yield and productivity has been low with high post-harvest loses. These factors include high cost of production, ineffective disease, pest control measures, limited improved variety, poor market infrastructure, frequent droughts and erratic rainfall, disease and pests' outbreaks, and poor infrastructural development. To reduce post harvest loses, stakeholders must work together to improve the income of smallholder farmers and investors as well as to increase the amount of sesame export.

Keywords: Sesame; value chain map; challenges and opportunities; stakeholders.

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1. INTRODUCTION

1.1 Overview of Sesame Sub Sector in Ethiopia

Ethiopia Located in the continent of Africa, it covers 1,000,000 square kilometres of land and 104,300 square kilometres of water, making it the 27th largest nation in the world with a total area of 1,104,300 square kilometres [1]. Agriculture is the country's most promising resource like coffee, pulses, oilseeds, cereals, potatoes, sugarcane, and vegetables. Ethiopia ranks among the top six world producers of sesame. Sesame (*Sesamum indicum* L., 2n = 26) belonging to the *Pedaliaceae* family, is one of the oldest oilseed crops and is cultivated in tropical and subtropical regions of Asia, Africa and South America [2]. Ethiopian sesame oil contains a significant amount of fatty acids, mainly linoleic (39.3-59%) and oleic (32.7-53.9%) acid, and palmitic (9-11%) and stearic (5-10%) acid [3]. In Ethiopia, sesame grows well in the semi-arid areas of Amhara, Tigray, Lowlands of Oromia, BenshangulGumuz, and Somali Regions. More than 3.7 million smallholders are earning their living from oilseeds production [4]. Sesame is the most important oilseed crop in Ethiopia. It grows from sea level up to 1500 m above sea level with uniformly distributed rainfall of about 500 to 800 mm and temperature of 20-30°C under various soil conditions [5]. Sesame in Ethiopia is grown mainly for the export market and only about 5% is believed to be consumed locally [6]. Humera, Gondar and Wollega type sesame seeds are quality sesame well known in the world market. This area constitutes about 30 percent of the country's total sesame seed production [7]. The highest average productivity is of Tigray followed by Amhara region [7]. Both commercial and smallholder farmers involved but it can divide into individual farmer, investors and farmer associations. Currently, China is the largest import market for Ethiopia's sesame followed by Israel, Turkey and Jordan [8].

Sesame oil is unique among vegetable oils due to the presence of natural antioxidants such as sesamin and sesamol and their derivatives (sesamol and sesaminol), which provide a significantly long shelf life and stable characteristics. Sesame oil is mostly used for cooking purposes. Sesame oil is also used in soaps, paints, perfumes, pharmaceuticals and insecticides. The cake produced after the

extraction of oil from un-hulled seeds is an excellent protein feed for poultry and ruminants [9].

1.2 Description of the Area (Humera)

The desk study area, Kafta Humera district, is one of the 35 administrative districts of Tigray Regional state and it is found in Western Zone of the region. It is located at 13° 14' - 14° 28' N and 36° 20' - 37° 31' E. Kafta Humera is bordered on the south by Tsegede, on the west by Sudan, then by the Tekeze River which separates Kafta Humera from Eritrea on the North. The economy of this district is centred on the production of sesame, sorghum and livestock. Mostly, the farmers grow the local seeds Hirhir (92.5%) followed by Baowunge (18.8%) [10]. Farmers also grow improved sesame varieties, like Setit-1 and Humera-1, in a less proportion.

1.3 Sesame Production in Humera

Humera is the well-known area in producing quality sesame seed. About 30 percent of the country's total sesame production comes from Humera, Tigray [4]. For the stated period, the highest average productivity for Tigray was about 9 quintals/hectare, followed by 8 quintals/hectare for Amhara region. [11] examined shorter value chain for sesame in Humera district. According to these institutions relatively longer chain involves producers/farmers/ selling to exporters through brokers. Alternatively, farmers may sell to cooperatives, which in turn sell to unions and then to exporters. In Humera the farmers have no way or access for post-harvest handling rather than selling it with low market price due to excessive limited access to credit, insufficient storage facilities and transportation problems. In Ethiopia, there are few companies processing or changing sesame to other products. This changed product is only used locally and it is not for export market.

1.4 General Objective

- To analyse sesame value chain in Humera for the identification of the general constraints and opportunities in the chain
- To identify the causes of the main problem
- To formulate preliminary recommendation for the Humera areas of intervention

2. METHODOLOGY

2.1 Data Collection

Information for the analysis was collected through a desk study from secondary sources such as articles and journals from Internet services using Google and Google scholar. Additional information and data were also collected on personal experience and from stakeholders engaged in the sesame sector.

2.2 Process Related to the Problem Statement

After reviewing existing data, contextual factors surrounding the sesame value chain were identified. A PESTEC analysis was done. Analysis of quantitative data, qualitative aspects of the chain, information flow and quality management was done. Constraints facing the chain were also identified. This process led to the identification of the main problem affecting the sesame chain in Humera.

3. VALUE CHAIN ANALYSIS

3.1 Stakeholder Analysis

3.1.1 Actors of sesame value chain in Humera

3.1.1.1 Supplier

The suppliers in sesame chain are Cooperatives, Humera agricultural research center, Setit Humera cooperative Union, Tigray Marketing Federation, Office of Agriculture, and NGOs. In Humera, area primary cooperatives and private suppliers are playing an important role in supplying input required for sesame production. Fertilizer, pesticide, and improved seeds are the main inputs deliver. In addition to providing inputs, the 19 primary cooperatives are also buying sesame from the cooperative member farmers and sell it to farmers' cooperative union/Federation or to exporters in the ECX market. Most of farmers sell sesame to their cooperative for the purpose of getting dividend from profit, good market price and sustainable relationship with their cooperative.

3.1.1.2 Producer

The next major sesame value chain actors following input suppliers are sesame growers or

producers. They are generally individual farmer, Investors and farmer's association. There are 25,293 household farmers and 500 commercial farmers in investment. Sesame average productivity levels are estimated by the local District offices is between 300 and 400 kg/hectare. Post-harvest losses are very high. Harvesting, drying and threshing losses are estimated at 30% [12]. These farmers have different land size. The major value chain functions that sesame growers perform include land preparation, ploughing, fertilization, weeding, pest/disease control, harvesting, threshing and post-harvest handling.

3.1.1.3 Traders

Farmers sell their sesame produce to private traders.

3.1.1.4 Processor

In that area, there are two identified processors (hulling companies). They are Sellet Huling and Dippassa Agro plc. They buy the product of farmers by making agreements at fair price, they processed it (hulled) and export to Europe countries like Holland.

3.1.1.5 Exporter

They are traders who export sesame to the international market. The most sesame importer countries are China, Turkey, Israel and USA through the port of Sudan and Djibouti.

3.1.1.6 Retailer

The retailers in the chain buy sesame from the traders and exporters and sell to different consumers internationally and locally.

3.1.1.7 Consumer

These are the ultimate users of the product. In sesame, there are local and international consumers in raw forms and after processed in the form of oil.

3.1.2 Chain supporter

These include sector specific equipment providers, financial service, business management services and market information access and dissemination, technology suppliers, Training and advisory services.

3.1.2.1 Ethiopian commodity exchange (ECX)

In the study area, there is one ECX office in the zone town Humera, and there are 17 ECX, primary markets in different district where the private traders and primary cooperatives buy sesame from farmers.

3.1.2.2 Training and advisory services

Farmer get service from BOARD specifically advices on impute applications like Fertilizer, seed and pesticides. Two projects of NGOs called USAID -AGP and SBN are providing training to farmers to update the knowledge on modern agronomic practices, post-harvest losses and market information and linkages. Humera Agricultural Research Center also gives directly, indispensable advice and training to farmers.

3.1.2.3 Financial service providers

In Humera area, debit microfinance and primary cooperatives are the source of credit. There are informal money lenders from which farmers are borrowing money with higher interest rate particularly in the critical production season (July to October).

3.2 External Factors Influence the Sesame Value Chain

3.2.1 Importance of the sesame value chain

The Humera variety originates from Humera areas of north west of Ethiopia which constitute the highest amount of the country's annual sesame seed production and the total area under cultivation is 380,000ha involving both commercial and smallholder farmers [13]. The Humera type being top quality sesame seed worldwide for its uniform white seeds, sweet aroma and pleasant taste, usually earns higher price on the international market. Mbwikida [6] also noted that sesame is the major oil seed in terms of exports in Ethiopia, accounting for over 95% of the values of oil seeds exports. Oilseeds are also the mainstay of the rural agrarian community and important players in the national economy in Ethiopia [14]. The existence of various governmental and community based organizations, who are involved in the sesame sector development in the area, is an opportunity for innovation. For example, Humera Agricultural research institutes, Ministry of Agriculture will

help in technology development and dissemination.

3.2.2 Contextual factor in the sesame value chain

According to [15], Constraints to the sesame value chain include lack of improved cultivars; poor seed supply systems; poor agricultural production techniques and post-harvest lost crop management. It has been shown that different 20 improved varieties were released at different times for production [3]. In Humera, there are two improved seed varieties recently released by Humera Agricultural research center (setit-1 and Humera-1). The varieties are better in productivity than the local variety Hirhir and bawunge but still the farmers need sesame varieties that are non-shattering to reduce post-harvest losses and suitable for mechanize harvesting due to shortage of labors. It is generally assumed that 30% of harvestable sesame is lost [10].

In Humera, a limited financial facility is one of the constraints of sesame production. Because of this fact, many farmers obliged to use informal moneylenders as credit source for one to three months and this charges them 10% interest when they back the money.

As the soil type of Humera is predominantly covered with clay soil, water logging happened and as sesame is sensitive to water logging, both quality and quantity of sesame seed is affected.

- Yield also decrease due to drought and wind damage.
- Diseases and pest constraints are common in sesame production.
- Smallholder producers remained in a low bargaining position due to the absence of market information on the current status of local and international price of sesame.
- Price fluctuations are common in sesame that, the average price of sesame grain during the 2012 production season was **2835.5** Eth Birr /Qt this was raised to **3688.3** ETH Birr/Qt in 2013 and significantly decrease to **2366.6** birr/Qt in 2014. In the year 2015/2016, it was 2700 EH Birr. This confuses farmers to adjust cost of production across years. Price volatility is also common across months and weeks.

3.2.3 External factor analysis (PESTEC)

Political factors	<ul style="list-style-type: none"> • Strong Government support for sesame sector • Inadequate institutional framework • Poor governance in that area • Political unrest in border area • Corruption
Economic factors	<ul style="list-style-type: none"> • Price disincentives for sesame producer • Large number of traders who lower prices for producers and wholesalers • Delayed in payment
Social factors	<ul style="list-style-type: none"> • Conflict • Using costly and illegal chemicals • Illiteracy and education
Technological factors	<ul style="list-style-type: none"> • Inadequate of post-harvest storage • Using Un improved sowing machinery • Un improved harvesting machinery • Insufficient improved variety • Training on agronomic and management practice
Environmental factors	<ul style="list-style-type: none"> • Good arable land • Frequent droughts • Chemicals used to control pests is harmful for environment. • Erratic rainfall • Insufficient knowledge on climate change and consequences for sesame • Prevalence of disease and pest • Logging nature of the area • Wind occurrence
Cultural factors	<ul style="list-style-type: none"> • Thefts Collected sesame from farm • Traditional ways of marketing and transportation using Camel.

3.3 Quantitative Analysis

Over the last two decades, the quantity of sesame traded on the world market has more than doubled. Highest export was recorded from October 2013 to September 2014 because of better production seasons.

3.4 Qualitative Analysis

3.4.1 Chain relations

3.4.1.1 Actor relation

In sesame, there are different actors involved in the chain. In this case, trader has the power and the farmer are the most vulnerable relation in the chain. Now a day formation of co-operatives in the areas represents a major improvement in chain relations. Producers and traders collaborate in setting up a joint organization to address their common problem. They develop strategies to develop new markets, such as negotiating a deal with Ethiopian commodity exchange (ECX).

3.4.1.2 Chain co-ordination

Most of producer and other chain actors have good co-ordination in the value chain. They have

access to market information with regard to prices but some sesame producers do not get information easily specially who lives in remote area.

3.4.1.3 Power relations

The Trader also control the largest part of the value chain, as they are involved in collection at both primary and secondary markets and wholesaling at the terminal markets.

3.4.1.4 Vulnerable relations

The sesame producers are the vulnerable actors in the chain. They are having lack of information concerning prices and therefore the trader dictates the market price. The producers are also suffering due to natural environment such as frequent droughts, which result in loss of large amount of sesame yield and lack of basic facilities such as post-harvest storage and chemicals to control disease and pest. Producers also incur lot of cost in transporting their sesame yield to primary markets. This makes them even more vulnerable as they do not have market information even before they bring their yield in the market. Sometimes they are forced to sell their sesame product at very low prices.

Table 1. Trend in cultivated area and volume of sesame, Humera Zone

Year	Cultivated area for (ha)	Percentage increase	Production volume (Qt)	Percentage increase	Yield /hectare (Qt)
2006/2007	203,170		998,071		4.91
2007/2008	223,918	10%	1,403,548	41%	6.27
2008/2009	226,788	1%	1,428,956	2%	6.30
2009/2010	260,562	15%	1,584,478	11%	6.08
2010/2011	253,100	-3%	1,469,415	-7%	5.81
2011/2012	248,687	-2%	1,123,352	-24%	4.52
2012/2013	222,575	6%	1,168,115	6%	5.25
Average			1,310,848		5.59

Sources: A Study Report Sesame Marketing, Transactions Risks and Institutional Arrangement with Emphasis to Cooperatives Girar Development Consult [16]

- The fluctuation in the size of cultivated land was mainly due to erratic nature of rainfall. Whenever rain starts late or there is excessive rain, farmers tend to sow sorghum instead of sesame resulting in decline in sesame acreage

3.4.2 Gender aspects

Women are participating in production of sesame as well as processing of edible oil locally. Women also participate in weeding and harvesting of sesame crop. Sometimes Women are also involved in the marketing of the sesame.

3.4.3 Sustainability profile (PPP)

3.4.3.1 People standard

- Basic needs – in Humera areas, basic amenities such as good health care and education facilities are inadequate.
- Discrimination – Now a day most of this area getting much attention in terms of infrastructural development.

3.4.3.2 Planet standards

- Access to water – most of these areas has adequate water for home consumption but not so much for irrigation. This forces them to wait for rain.
- Natural resources – this area is heavily degraded due to over using of the land without crop rotation and without using inputs like fertilizer.

3.4.3.3 Profit standards

- Fair and clear agreements – Some small-scale farmers make agreements with the cooperatives and some processor company, but most sesame producer has a tendency to get help of middlemen.
- Market infrastructure – Most of markets are not well organized in this areas.
- Market barriers – government taxes, fees and licences imposed.
- Market power – market power is in the hands of traders who control the markets but sometimes traders may lose their control on market price when there is reduction in sesame demand internationally. Most of the farmer can get information from ECX (Ethiopian Commodity Exchange) through calling and sending message.

3.5 Information Flow

3.5.1 Market institution

The Ethiopia Commodity Exchange, (ECX), is a marketplace, where buyers and sellers come together to trade, assurance of quality, delivery and payment. ECX assures security to all

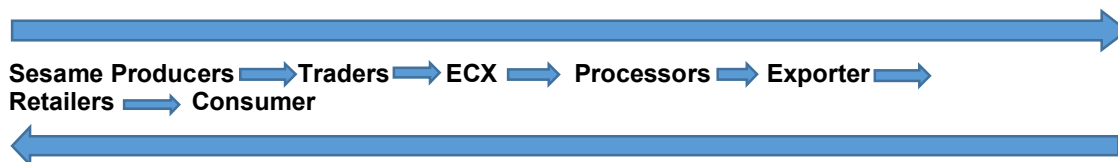


Fig. 1. Information flow chart (product and marketing information)

commodity market players they need through providing a secure and reliable End-to-End system for handling, grading, and storing commodities, matching offers and bids for commodity transactions, and a risk-free payment and goods delivery system to settle transactions, while serving all fairly and efficiently.

3.5.2 Price information and Information flow in the chain

Previously the information flow was very slow towards farmers since they have a limited access to use technology like mobile but now it is somehow good. There is high information flow throughout the chain from consumers to retailers, from retailers to whole sellers, sometimes from collectors to farmers. This is done mainly using mobile phones and also farmers can get information from neighbour farmers, relative in towns. Transport their sesame to the nearby ECX primary markets by animal drawn carts, as the land is flat. In areas where road facilities are good, farmers also use vehicles like car, tractors and lorry mainly Isuzu.

3.6 Quality Management

3.6.1 Quality attributes

Quality can be judged depending on the perspective such as user based (fitness for consumer need), product based, value based manufacturing. There are generally two types of quality attributes, i.e., intrinsic and extrinsic. Grading is done mostly on farm under the supervision of the buyer by looking sesame purity in view of inert material, sesame seed maturity and color.

3.6.2 Intrinsic attributes

- Safety – some Producers did not have good post-harvest facilities thus the product may be attacked by insects.
- Health – the nutritional value of sesame is good.
- Sensory – the texture of sesame is white in colour but may be changed in red due to blight incidence at maturity.
- Shelf life – the shelf life of the sesame will be reduced due to loose of its oil content in absence of proper storage cleaning ventilation.
- Convenience – sesame is convenient to use as such as a seed but for oil, it needs

processing, hulling and then extracting the oil.

3.6.3 Extrinsic attributes

Production system characteristics – inadequate input, disease, pest, and pre maturity harvest may affect the quality of the sesame seed.

3.6.4 Quality standards and quality management systems

Ethiopian Quality and Standards Authority have acknowledged three grades of sesame. However, exporters were ordering their own respective quality standards. Premature harvesting of sesame affects the quality of sesame seed.

- Long storage time may reduce the quality of the sesame.
- Poor storage and poor hygiene area may affect the quality of sesame seed.
- Inadequate care during post-harvest storage affects quality of the sesame seed.
- Storage with high moisture content will affect the quality of sesame seed.

4. PROBLEM RELATED TO THE SESAME VALUE CHAIN IN HUMERA

4.1 Constraints in the Sesame Value Chain

- Lack of improved seed
- Inadequate harvesting machinery
- Shortage of input supply
- High postharvest loss
- Drought/inadequacy of rain
- Lack of information on quality standard
- Pest infestation and Problem of termite
- Problem of weed
- Inadequate research on sesame and linkage among researchers – extension functionaries – farmers

4.2 Problem Statement

The sesame yield loss represents a massive monetary loss. The annual economic loss of sesame in northwest Ethiopia (500,000 ha with productivity of 4.5 quintals/ha and selling price of 4000 ETB / quintal) exceeds 1 billion ETB, which is more than 40 million euro, and 50 million dollar [10]. There is post-harvest losses in sesame production in Humera which resulted into low

quantity of exports of sesame products. Factors such as high labour cost, poor harvesting machinery, poor storage facility, limited improved variety, shattering nature of sesame variety, poor

market infrastructure delay in harvesting, frequent droughts and erratic rainfall, disease and pests are responsible for high post-harvest losses of sesame.

4.3 SWOT Analysis of Sesame in Humera

Strength	Weakness
<ul style="list-style-type: none"> -Presence of well experienced investors -Adoption of new technology -Licensed to export to international market -The government enhances investments in the oilseeds sector with an extended package of investment incentives. - planning to scaling up some small scale farmers 	<ul style="list-style-type: none"> -Weak financial base -Lack of information about the international price - low use of input levels e.g. fertilizer -High labour costs. -Poor logistic management and warehousing facilities
Opportunity	Threats
<ul style="list-style-type: none"> - Presence of Suitable agro-ecology - Good government support for sesame sub-sector - Better market infrastructure -Quality sesame seed varieties that are suitable for a wide range of applications. -Demand of sesame globally -Good quality of sesame 	<ul style="list-style-type: none"> -Little access to pesticides and herbicides -Heavy and erratic rainfall - Pest (insect, diseases and weeds) occurrence -Blanket use of fertilizer application. - shortage of warehouse -fluctuating world sesame seed prices -Forced use of fertilizer

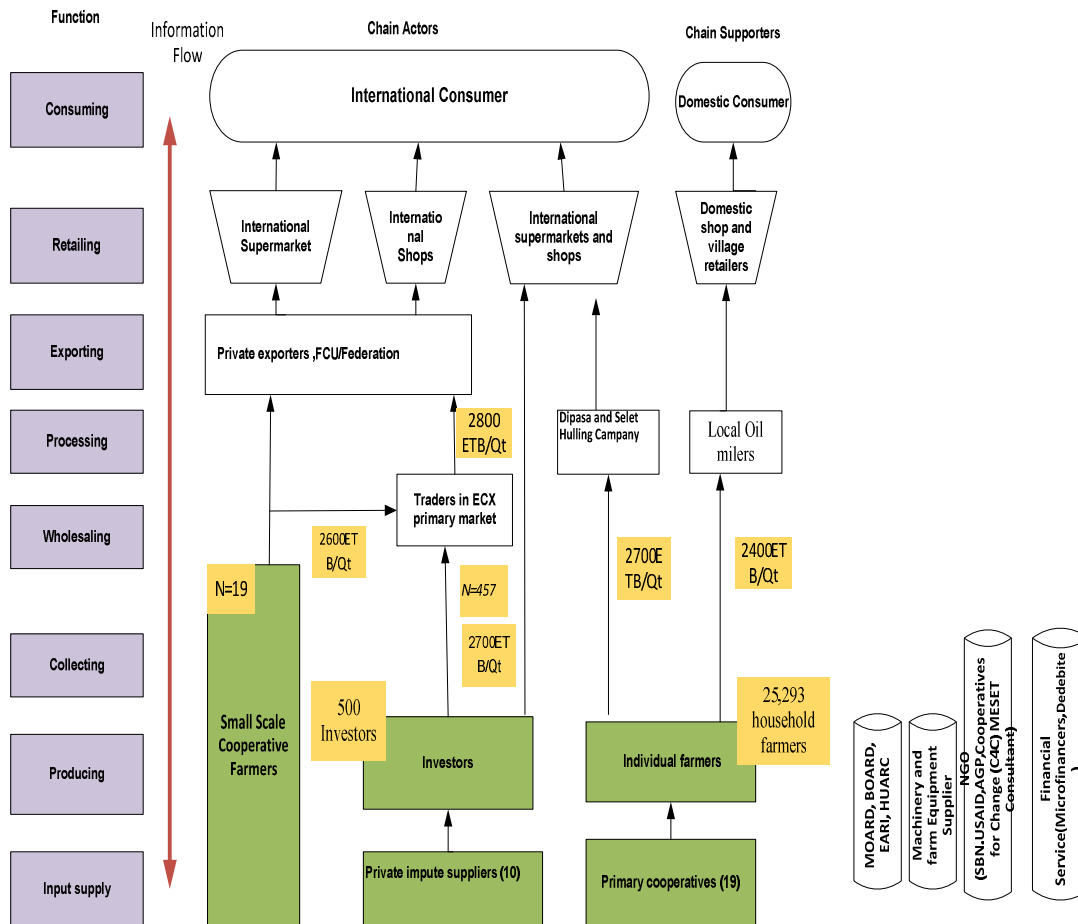


Fig. 2. Sesame value chain in Humera, Ethiopia

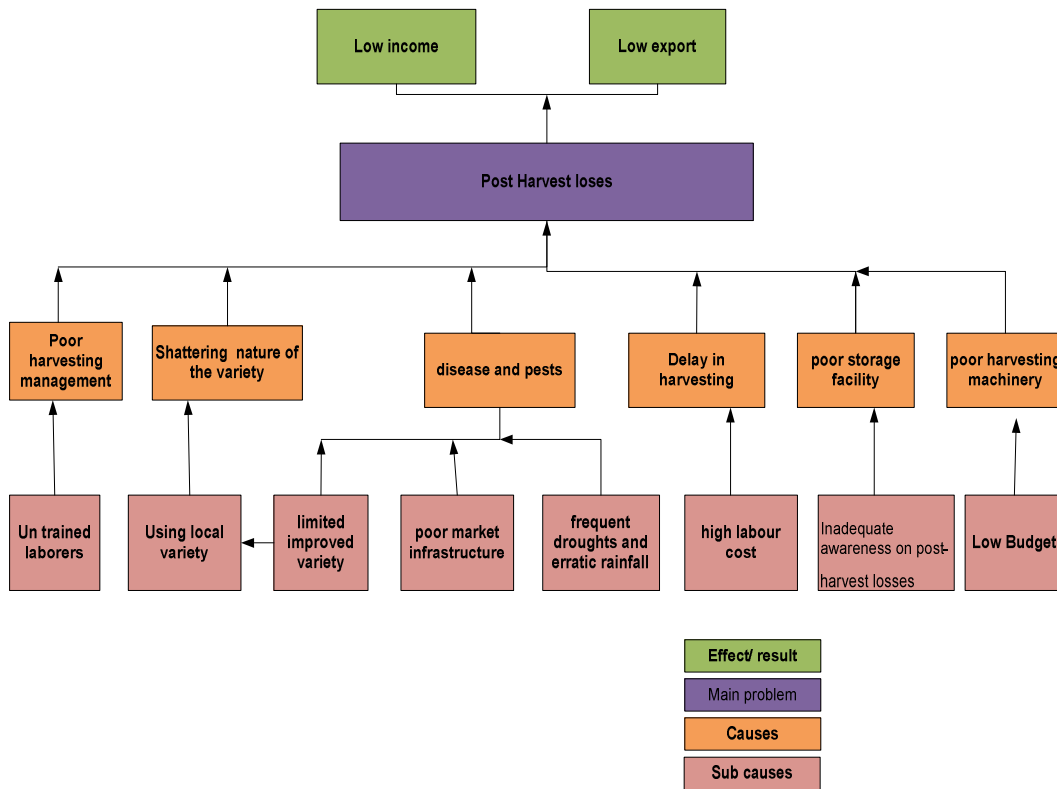


Fig. 3. Problem tree of sesame

4.4 Problem Tree of Sesame

The problem tree for this case is used to identifying main problems, along with their causes and effects on sesame. It is presented in Fig. 3.

4.5 Problem Definition

The main problem in production of sesame in Humera is high post-harvest loses caused by poor storage facility, poor harvesting machinery, delay in harvesting time, disease and pest, shattering nature of the crop and poor harvesting management that results low income of the sesame producer and restrict the export at country level.

5. CONCLUSION

For Ethiopia as sesame is a very important cash crop both for local consumption as well as for export purposes. In order to meet local consumption and exports, productivity should increase. The causes leading to the low production have been addressed. These are: high cost of production, post-harvest loses

ineffective disease pest control measures, limited improved variety, poor market infrastructure, frequent droughts and erratic rainfall, disease and pests' outbreaks, and poor infrastructural development. These problems are because of many actors. To solve these problems, need collaboration between different stakeholders in the chain and they must work together to improve the income of smallholder farmers and investors as well as to promote sesame export.

6. PRELIMINARY RECOMMENDATION

- Development of high yielding sesame varieties with non-shattering habit and resistant to biotic and abiotic stresses.
- Strengthen research and extension service to create awareness on post-harvest handling, agronomic and management practice.
- Improved the post-harvest storage facilities and harvesting machinery to reduce losses
- Improve market information as well as producers' access to this information.
- Strengthening of infrastructure facilities
- Integration of stakeholders in the chain should be increase

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. FAO-ETHIOPIA; 2014. COUNTRY PROGRAM FRAMEWORK 2011 – 2015. Available:coin.fao.org/coin-static/cms/.../fao_country_programming_framework_cpf.pdf (Accessed on 19 November 2016)
2. Zhang H, Miao H, Wang L, Qu L, Liu H, Wang Q, Yue M. Genome sequencing of the important oilseed crop *Sesamum indicum* L. *Genome Biology*. 2013;14:401. DOI:<http://genomebiology.com/2013/14/1/401>
3. Geremew Terefe, Adugna Wakjira, Muez Berhe, Hagos Tadesse. Sesame production manual. Ethiopian Institute of Agricultural Research Embassy of the Kingdom of the Netherlands, EIAR, Ethiopia. 2012;49.
4. CSA (Central Statistics Agency), 2009-2014. Agricultural Sample Survey (2009/10-2013/14). Report on Area and Production of Major Crops for Private Peasant Holdings, Meher Season. Addis Ababa.
5. Ayana NG. Status of production and marketing of Ethiopian sesame seeds (*Sesamum indicum* L.): A review. *Agric. Biol. Sci. J*. 2015;1:217-223.
6. Aysheshm K. Sesame market chain analysis: The case of Metema Woreda, North Gondar, Amhara National Regional State. MSc Thesis Haramaya University; 2007.
7. CSA (Central Statistics Agency). Ethiopian agricultural sample enumeration: Report on the primary results of area, production and yield of temporary crops of private peasant holdings in Meher Season, Addis Ababa, Ethiopia; 2013.
8. Ethiopian Revenue and Custom Authority (ERCA), Export Data; 2012. Available:www.erca.gov.et (Accessed on 15 January 2017)
9. Pathak N, Rai AK, Kumari R, Thapa A, Bhat KV. Sesame crop: An underexploited oilseed holds tremendous potential for enhanced food value. *Agricultural Sciences*. 2014;5:519-529. DOI:<http://dx.doi.org/10.4236/as.2014.56054>
10. SBN (Sesame Business Network) Ethiopia. The sesame business network in North West Ethiopia; 2015. Available:<https://www.wur.nl/en/.../The-Sesame-Business-Network-in-North-West-Ethiopiahtm> (Accessed 15 November 2016)
11. Crop market assessment study of wheat, maize, sesame and haricot bean, Ethiopia Commodity Exchange Authority (ECEA), A.A; 2013.
12. SBN (Sesame Business Network) Ethiopia. The sesame business network in North West Ethiopia; 2014. Available:<https://www.wur.nl/en/.../The-Sesame-Business-Network-in-North-West-Ethiopiahtm> (Accessed 15 November 2016)
13. ATA (Agricultural Transformation Agency). Sesame sector strategy in Ethiopia; 2014. Available:www.ata.gov.et (Accessed on 20 November 2016)
14. Ethiopian Institute of Agricultural Research, 2011. Available:<https://agriknowledge.org/downloads/1n79h429p> (Accessed on 15 January 2017)
15. Gelalcha SD. Sesame trade arrangements, costs and risks in Ethiopia. Ministry of Foreign Affairs, The Hague; 2009. Available:www.fao.org/fileadmin/templates/mafappdf (Accessed on 15 November 2016)
16. Girar Development Consult. A study report sesame marketing, transactions risks and institutional; 2014. Available:www.comatch.com/Consultant_Business (Accessed on 20 November 2016)

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