



AGRICULTURE AND FOOD AUTHORITY NUTS AND OIL CROPS DIRECTORATE

SESAME VALUE CHAIN STATUS REPORT



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(Nuts and Oil Crops Directorate)**

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Introduction to Sesame

Sesame (*Sesamum indicum* L.), is one of the oldest cultivated plants in the world grown for edible oil. Production records have been found dating back to 1600 B.C from the Tigris and Euphrates valleys. Many wild relatives are found in sub-Saharan Africa, with somewhat fewer also found in India. Sesame was widely adopted as an early crop, because it had the ability to grow in areas where other crops couldn't, particularly under hot and dry conditions. It been called a 'survivor' crop.

Simsim is a rich source of food, nutrition, edible oil, health care and bio-medicine. The crop has potential as it is drought tolerant and can therefore be cultivated with minimal amount of rainfall. In addition, the crop requires small parcels of land for its cultivation facing minimal competition from other enterprises.

Subsector Overview

Oils and nuts are important agricultural commodities due to their high quality and nutritive value, contribution to employment, incomes and raw materials for rural and industrial processing, source of processed edible oil, animal feed and industrial oil. Locally, the major oilseeds produced are sunflower, sesame, rapeseed, coconut, oil palm. Nuts, though largely used as confectionaries are also sources of vegetable oils. The major nuts comprise of coconut, cashew nuts, macadamia nuts, peanuts and Bambara nuts.

The oil and nut crops sub sector in Kenya is underdeveloped resulting in huge importation of vegetable oils and nuts. Local production of vegetable oils and fats accounts for less than 5 percent of the demand. The estimated vegetable oil requirement for Kenya is about 1,000,000 tonnes, valued at about Kshs. 60 billion. About 95% of this is mainly in the form of crude palm oil, which is imported from South-East Asian Countries. Importation of vegetable oils has been increasing steadily with importation increasing from 83,000 tonnes in 1985 to 249,000 tonnes in 1994. Imports reached 300,000 tonnes in the year 2000; in 2001 the imports were 302,500MT valued at Kshs.12.5 Billion, reaching 591,400 metric tonnes valued at Kshs. 54.7 billion in 2018 (KRA, Statistics).

In 1994 about 22,000 tonnes of vegetable oils were re-exported, after refining and re-exports reached 40,000 tonnes in the year 2000. In 2018, Kenya re-exported 106,000 MT of vegetables oils valued at KES13 billion (provide updated info on import /export of oil, seed cakes, meals and oilseeds 2006-2016). In 2018 about 4,000 MT of Sesame valued about Kshs.10 million were exported to China and Japan while in 2019 bout 25,000 tons of peanuts were imported for local processing form neighboring countries.

AFA through the its Nuts and Oil Crops Directorate is mandated to regulate, develop and promote scheduled nuts and oil crops in Kenya. These crops include coconut, cashew nuts, oil palm, safflower, sesame, macadamia, sunflower, canola and peanuts among other. NOCD is accomplishing the above mandate through collecting and collating data, identifying priority areas for research undertaking, promoting Good Agricultural Practices in liaison with the county governments, developing industry upgrading strategies, developing products standards in liaison with KEBS, developing code of practice for the industry and drafting Rules and Regulations in liaison with stakeholders for enactment by Parliament; and advising the Government on policy formulation.

Global Consumption and Production Tread of Sesame

The global sesame seed market has shown an upward trend from 2007 to 2016, reaching eight million tons in 2019. The increased global consumption of sesame seeds is mainly due to the heightened demand for the product from the growing Asian and African populations. The highest annual rates of growth with regard to sesame seed consumption from 2007 to 2016 were recorded in Tanzania (+32.5%) and China (+9.1%). Sesame seeds are one of the main seed crops in the Asian and African regions, in particular in Tanzania, China, Sudan, Myanmar, India, Ethiopia, and Nigeria, etc. They are used in the preparation of traditional dishes and confectionery, as well as in the pharmaceutical and cosmetic industries.

Sesame seed is mainly produced in the regions of South Asia and Africa. The global production volume has been steadily increasing over the last decade. Around 5.5 million tons of sesame seeds were produced in 2019, according to FAO. The top 5 producing countries in 2019 were:

1. Tanzania (805.7K tons)
2. Myanmar (764.3K tons)
3. India (751K tons)
4. Nigeria (550K tons)
5. Sudan (550K tons)

Sesame production in Kenya

Sesame is predominantly grown in the Coastal and Western parts of the country however production has remained low due to poor agricultural practices and variety selection. The planting material which is seed is mainly sourced from previous years' harvest. In Kenya the average acreage for sesame production is less than 4 acres. The

low acreage dedicated to the crop is attributed lack of a ready market and availability of processing facilities. There is also competition from other crops such as sorghum which have a ready market. Farmers in some sesame growing zones have opted to grow sorghum which has a ready market as they are contracted by beer brewing companies to produce sorghum for beer processing. The crop has however become popular due to the high quality oil it produces which is a clear edible oil with a pleasant taste and a very good long shelf life if properly refined. The crops oil content is 48-55% while the protein content ranges from 44 to 48%.

Agronomic benefits of growing sesame

In terms of agronomic aspects, sesame is increasingly being used as rotational crop against cotton, maize, groundnut, wheat, and sorghum in addition to the following benefits:

- It is an excellent soil builder - as it improves the soil texture and moisture retention and lessens soil erosion.
- The composted sesame leaves left on the soil binds the ground; retains soil moisture better for planting the next crop; and increases the yield of the following crop.
- Sesame is resistant to drought, tolerant to insect pests and diseases, a low cost crop and therefore one of the best alternative specialty crops.

Climatic conditions for growing sesame

Sesame needs the following conditions for growth and optima performance:

- Temperature: High and constant, the optimum range of between 26 to 30 Degrees.
Altitude: From sea level up to 1500 m.
- Rainfall of 300-600 mm
- Soils: A wide range of soils are suitable for sesame cultivation. Optimal are well-drained, loose, fertile and sandy alluvial soils that have a pH value between 5.4 and 6.75.

In Kenya the optimal conditions cut across different ecological zones and the crop is grown in the following areas:

- Coast Region - Kwale, Kilifi and Lamu Counties
- Western Region - Busia, Bungoma and Kakamega Counties
- North Eastern Region- Mandera County

Area under Sesame, production and value 2018 -2019

COUNTY	Area (Ha)		Quantity (MT)		Values (Ksh) Millions	
	2018	2019	2018	2019	2018	2019
BUNGOMA	16	12	14.2	10.2	1.04	0.99
BUSIA	720	490	418	363	47.9	39.9
HOMABAY	6	5	4	3.7	0.52	0.51
KAKAMEGA	5	7	3.6	5.7	0.46	0.77
LAMU	11,200	11,480	7,840	9,924	428.11	541.3
MANDERA	160	230	96	204	10.33	22.3
SIAYA	101	98	69	70.1	7.01	7.12
TANA RIVER	113	138	51.2	77.1	0.86	0.91
Total	14,339	14,479	10,514	10,657.8	496.225	613.8

Source: AFA-Nuts and Oil Crops Directorate

Generally, Sesame production has had an upward trajectory in the last two years with major production taking place in Lamu county where farmers are producing targeting the export market. Acreage under the crop increased marginally by more than 100 hectares from 14,339 ha reported in 2018 to 14,479 ha reported in 2019. The production volumes also grew marginally to 10,657.8 tons valued at KES 613.8 million up from 10,514 tons valued at KES 496.225 million reported the previous year. To a large extent the exponential growth in value was as a result of the improved farm gate prices in Lamu and Mandera Counties which account for a good chunk of Kenya's production.

Varieties of sesame

There are local varieties of sesame with black, white and brown seed colors. The black varieties are grown in the coastal region and the white in the western region of Kenya. Imported varieties have lower performance than local varieties. The best of the imported varieties is "Morada", identified by its purple stems and leaves. It originated in Congo and further selected in Venezuela. It is higher yielding and more resistant to aphid attack. The local sesame varieties are branched and drought resistant but have a low yielding capacity and are susceptible to most diseases. KS-S6 variety can be grown from 200-1000 M. a.s.l, gives an average yield of 2.5-3.0 tons/ha. This variety has a high podding ability, is tolerant to rust and shoot fly.

Harvesting and Marketing of Sesame

Sesame matures between 3-4 months. It ripens very unevenly with the bottom seeds ripening first. Capsules shattering to shed their seeds is a problem in harvesting. If harvesting is delayed, most of the yield will be lost. With good management, yield should be between 450-550 kg/ha.

Because sesame is a small flat seed, it is difficult to aerate it in a storage bin, so the seeds need to be harvested as dry as possible and stored at 6 percent moisture or less. If the seed is too moist, it can quickly heat and the oil become rancid.

The channels used by farmers to market their produce have a significant effect on the price realized. The main marketing channels used by over 90% of the farmers are farm gate and sale in local market. In the local markets there is no definite measure unit for sesame. In some cases, farmers use weighing machine while others use a two (2) kilogram tin as a unit of measurement. In Lamu and Kwale County however there is contract farming by registered farmers which provides a ready market. Regrettably the two marketing channels have no formal or institutional framework to support efficient marketing for maximum benefits to the farmer. The result of continued use of these marketing channels has been a lack of a common selling strategy and coordination in marketing of sesame, farmers are treated to very unreasonable price undercuts ending up very low prices for their produce.

Uses of Sesame

Sesame seeds are either consumed directly as a highly nutritious foodstuff or processed by the confectionery and bakery industries. The seed hulls, which are bitter due to their oxalic content, can be removed with the use of steam. Ragouts and soups are often prepared with crushed sesame seeds. Sesame hay, if carefully dried, can be used as fodder. A large proportion of the world's sesame production goes towards producing edible oil. Purely white sesame seeds are in demand on conventional and on ecological markets, because of their higher oil content than pigmented varieties. By-products of oil extraction are an excellent protein component to mix into animal feed.

Value addition for Sesame

Value addition of the sesame in Kenya is mainly done by the retailers to obtain products such as; sesame oil, sesame ball, cake, sesame butter and sesame flour with an aim of obtaining extra income. There have been minimal value addition initiatives at farm level

save for a few farmers. The limited cottage of farm based value addition is mainly attributed to lack of simple processing equipment, skill and knowledge.

Business Opportunities in Sesame Value Chain

- i) Oil Extraction
- ii) Animal Feeds
- iii) Carbonated and carbonated Charcoal briquettes
- iv) Use in the confectionary industry

Challenges faced across sesame value chain

1. Production challenges

a) Limited access to quality planting materials

A good proportion of farmers rely on seed recycled from the previous season as their planting materials. This situation has compromised crop quality since the farmers had limited seed selection skills. It is envisaged that addressing the current shortage of planting materials and lead to increased production and productivity.

b) Poor crop husbandry

Over half of the sesame orchards in Kenya are rarely weeded. Physical observations in most farms indicate that the crops have nutritional deficiencies because there is hardly any farmer who applies either manure or fertilizers after establishment. As the plants continue producing year in year out, they utilize the available nutrients in the soils with the quantities reducing every year. This successive nutrient mining from the sesame plantations leads to nutrient depletion and hence low yields. At the same time, many farmers have no technical know-how to manage sesame in the fields.

c) Inadequate and unreliable rainfall

Kenya's rainfall patterns have drastically changed in recent years. Rainfall amounts have kept on reducing along with poor distribution patterns resulting to unpredictable seasons. Since most farmers rely on rain fed agriculture, it has become very difficult for them to decide when to plant new seed in order to reduce the effects of drought. Existing crop plantations also suffer the same consequences and hence experience reduced annual yields. Water scarcity is thus a threat to increased production of sesame which has been mitigated through irrigation in some parts of the country such as Mandera

d) Pests and Diseases

There is a huge problem with pests and diseases that applies to both the pre-harvest and post-harvest moments. Kenya's sesame crop is affected by early bugs, aphids, white flies, spider mites and bugs as pests of economic importance. With regard to diseases, blights attack is the second most severe challenge being experienced in the counties in addition to high cost of pesticides

e) Narrow genetic base

Ever since sesame was introduced in Kenya, the sub-sector has had limited or no attempt towards any breeding research towards the development of either improved varieties or hybrids. This scenario has resulted into farmers continually planting mainly the two types of the sesame varieties (white and black). While other sesame growing countries in the world have developed hybrid plants that are high yielding, have short stature and are product specific, the efforts made so far in Kenya have been limited. There is need to establish a comprehensive breeding programme that will ensure the increase of the sesame genetic base as well as enhance production and productivity.

f) Effects of climate change

The unreliability of rainfall being experienced in the country at large has led to unprecedented seasonal shifts and in turn contributed to low sesame productivity. The effects of climate change are diverse including, inadequate raw material supply to the agro-based industries in the sub-sector. This leads to low attraction of investment to the entire industry thereby casting a shadow to the Country's ambition outlined in the Vision 2030. There is need therefore to mitigate against the effects of climate change by developing technological interventions that target at increasing production and quality of sesame seed produced from the farmers' fields. The interventions should at the same time provide alternative sources of sustainable income to the farmers in order to promote their adoption.

2. Market access challenges

- a) Insufficient information about the sesame Value chain. The investment opportunities existing across the sesame value chain are not known to the general public as the existing players are unwilling to share production and market related data to enable government and potential investors make informed decisions
- b) Inefficient Marketing Channels
- c) Competition from cheap imported oils
- d) Lack and/or weak farmer organizations
- e) lack of information on the prevailing market conditions

- f) Poor postharvest management
- g) Fluctuating market prices

3. Processing challenges

- a) Inadequate raw material for processing. Kenya installed capacity is much higher than the available raw material for processing. The existing potential for increased production and productivity is yet to be exploited.
- b) Limited on farm value addition. This is a result of lack of affordable and appropriate technologies and skills for processing. Cottage level processing will help farmers increase their incomes as opposed to the returns currently accrued from sale of raw produce

4. Research and Development challenges

- a) **Limited Research.** Research activities relating to sesame which is spearheaded by KALRO suffers from lack of budgetary allocation to realize the objectives envisioned. For instance, new varieties cannot be multiplied and made available to farmers due to lack of finance. Similarly, little research has taken place to develop new varieties, better processing technologies and development of new sesame finished products.
- b) Weak research and extension linkages

5. Policy and Legal Framework challenges

- a) Weak regulatory framework. The sesame value chain players do not operate under the prevailing regulatory regime within the nuts and oil crops subsector. The dealers and processors have not been licensed and the imports/exports consignments are not cleared from the Nuts and Oil Crops Directorate. The lack of control on industry operations poses challenges in data collection and also in crafting interventions to jumpstart the industry.
- b) Weak inter-agency collaboration
- c) Lack of an integrated value chain
- d) Stringent product standards in some destination markets

Interventions to address the challenges

To revitalize the sesame value chain, there is need to focus on building institutional capacity to enable the government agencies and private sector to effectively and efficiently carry out their rightful roles. This is with a view to integrate the sesame value chain to address the bottlenecks in various segments of the chain. These are the necessary foundations for attracting value chain actors to the sub-sector. The following interventions are likely to turn around the sesame value chain fortunes

- a) Improving availability of planting material.** This can be made possible through seed multiplication and commercialization of the varieties released by KALRO instead of relying on imports from others parts of the world
- b) Making information available to the general public.** There is need to promote the sesame value chain as an alternative to the existing enterprises to attract more players. The promotion can be spearheaded by the respective County government as a priority value chain in the high potential zones. More players will make the industry open to scrutiny, this will make it possible to have information about the investment opportunities in the subsector readily available.
- c) Increasing raw materials for processing.** Promotional activities need to be carried out to bring more farmers on board and bring land under the crop while at the same time sensitizing farmers on good agricultural practices to increase productivity per unit area.
- d) Increasing the number of players operating in the industry.** There is need to licence more players across the value chain right from seed production to processing. More players will make the industry competitive leading to better prices for farmers as processors scramble for their produce.
- e) Improved regulatory framework.** The gazetted Nuts and Oil Crops rules and regulations provide a framework to regulate the sesame value chain players previously not regulated. Seed imports will be documented while final value added products will also be properly accounted for. Such regulatory measures will inform the industry growth and expansion path. To achieve this the Directorate must therefore prioritize the development of an implementation plan for the rules and regulations.
- f) Increased farm and cottage level value addition.**
Capacity building and training on value addition activities are urgently required in the sesame value chain. These can be targeted at farmers, famer groups, youth groups and women groups who want to venture into new income generating activities. Introduction of processing technologies to the targeted groups will also boost value addition to realize a wide array of new products.
- g) Increased research activities**
Research activities along the sesame value chain have been hindered by lack of financing especially in seed production and value addition. To adequately address these financial constraints, the nuts and oil crops subsector may have to come up with a research fund ring fenced to address the research gaps identified
- h) Creation of value chain linkages** - The value chain players profiled are working in isolation. There is need to create linkages across the value chain. Farmers required direct contact with processors to be guaranteed of a ready

market. Similarly, the processors require direct contact with farmers in order to obtain a steady supply of raw materials

- i) **Improved access to information** – Most of the activities across the value chain are either undocumented or unknown to the general public and the potential investors and government agencies. To effectively address this challenge, publicity activities be prioritized to provide information
- j) **Improved financing** – Farming and value addition activities in the sesame value chain suffer from insufficient capital for expansion, this is mainly because the crop is unknown to a majority of financing agencies in order to develop focused financial products for the value chain. Future activities by the Directorate on financial linkages shall therefore prioritize sesame.
- k) **Investment in production of certified seed-** Farmers in the sesame value chain rely on seed bought from open markets as their main source of planting material. In most instances there are no certified seed available from the seed producing companies. In a few instances good quality seeds is obtained from community seed multiplication groups or ongoing projects in the focal area. The seed supply gap need to be addressed through stakeholder engagements spearheaded by the Directorate.
- l) **Increased value addition.** The sesame value chain has very few established processing companies across the country. In most instances these companies are engaged in general oil pressing from whichever oil producing crop available. There is need for increased value addition especially at the cottage level through dedicated trainings to women and youth groups spearhead by the Directorate

A Profile of Sesame Value Chain Players in Kenya

S/N	Area of Operation	Value chain player and role	Status/Activities
1.	Kwale County	Ten senses Africa In - partnership with Farm Africa (Service Provider for Sesame and cashewnuts value chain project)	Sesame and cashewnuts value chain project. The project before being wound up worked with 15,000 smallholder farmers in three coastal counties (6,500 in Kilifi County, 6,500 in Kwale County and 2,000 in Lamu County) to increase incomes for the farmers, create employment and boost food security. The project worked by capacity building communities in good agricultural practices in addition to providing financial linkages to capital for reinvestment. The project was run by Farm Africa in collaboration with Ten Senses Africa

			(TSA). Farm Africa has exited leaving it under TSA which is now facing financial difficulties. The project was funded by the European Union's Emergency Trust Fund.
2.	Kwale County	Ardhini Industries (Processor of sesame)	The company has a ready market for sesame and is working directly with the farmers by provision of certified planting material (white variety) and pesticides on condition that the farmers sell produce to them at KES 100/kg. The company operates a sesame buying center in Vanga Kwale county and a processing facility in Karen Nairobi.
3.	Kwale County	My Mkulima young (Service Provider)	The is a platform for sesame farmers to sell their produce through Mkulima young website. The service provider creates linkages for the black variety
4.	Machakos County	Athi River Oil Africa EPZ ltd (Importer & Processor of sesame)	The company imports sesame seeds in bulk for processing into sesame Oil for export. The processors. Going forward the company is receptive to be linked with farmers to obtain raw materials instead of importing
5.	Machakos County	Fair Oils EPZ Ltd (Importer & Processor)	The company import sesame seeds in bulk for processing sesame into sesame Oil
6.	Lamu County	Farm shine (Aggregators)	Farm shine is an agriculture platform where farmers, buyers and service providers can trade on mutually beneficial terms. The technical field agents provide farmers with advice and support throughout the growing season, and help them aggregate crops for sale to large buyers. Farm shine's platform connects farmers with the information, suppliers and service providers they need to minimize costs and maximize harvests.
7.	Lamu County	Agriculture Finance corporation	The Corporation capital through loans to sesame farmers and co-operatives. AFC also

		(Financier)	provides managerial and technical assistance to the loan beneficiaries.
8.	Lamu County	Shabiby Mahfudh (Buyer)	This is a trader who buys sesame seeds in bulk at a Price KES 70/Kg and sales to wholesalers in Mombasa.
9.	Kilifi County	Nasir- Auni Mselem (Processor)	The company processes sesame seed to produce sesame oil and animal feeds as the by product. The company has an installed capacity of 12 MT/day but the utilized capacity is 500 kgs/day. The farm gate price they offer for sesame seed is KES 70/Kg. The selling price for their sesame oil KES 700/litre and KES 30/kg for sesame cake. The main buyers for oil are wholesale shops in Mombasa, while the cake is sold to Mombasa maize millers.
10.	Kilifi County	Mamoud Fathi (Buyer)	The company buys sesame seed in bulk at KES 50/Kg and sells to processing companies such as Nasr- processor at KES 120/Kg. The proprietor also processes sesame oil and has an installed capacity of 40 litres/day
13.	Busia County	True trade Company (Buyer)	The company buys sesame nuts from famers for processing in Matayos Sub-County
14.	Busia County	Matayos Community seed bank	A group in Nasewa area which engages in seed production for sale to other farmers
17.	Busia County	KALRO – Alupe	Carries out research and provides different seed varieties for most farmers in the region
19.	Busia County	Burumba Ward Value Addition group (processing)	A Value Addition group in Burumba Ward that produces sesame oil and sesame roasted balls
21.	Busia County	Wamama Pamoja Municipality Busia (Processor)	The group carries out sesame processing roasted balls and paste The sesame seeds used as raw materials are imported from Uganda

			The group was formed to empower women and self-reliance
22.	Mandera County	Mandera Growers group	Farmers Group of 20 members who grow Sesame in 206 Acre Scheme
31.	Busia County	Adventist Relief Agency(ADRA)	Adventist Relief Agency(ADRA)runs a project called ADRA Kenya sesame Project in Busia county has trained more than 500 farmers Average production is 400kg per acre farm gate price is Ksh 130 Market Price is Ksh 140/Kg
32.	Busia County	PALWECO- Busia	Busia county government in collaboration with PALWECO (Programme for Agriculture & Livelihoods in Western Communities) sesame is being mainstreamed as an alternative crop for increased incomes