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NAMIBIAN AGRONOMIC BOARD

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Creating a marketing environment that is conducive to growing and processing crops in Namibia

AGRONOMY AND HORTICULTURE MARKET DEVELOPMENT DIVISION

RESEARCH AND POLICY DEVELOPMENT SUBDIVISON

EVALUATION OF SESAME SEED PRODUCTION AND MARKET OPPORTUNITIES FOR NAMIBIA

Windhoek, Namibia
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Table Contents

1. EXECUTIVE SUMMARY

Sesame is an oilseed crop that mainly grows in tropical and subtropical regions. The uses of sesame are diverse, from direct consumption as food to an ingredient in cosmetic and pharmaceutical products.

Namibia, having a sub-tropical climate with a rainy season from October/November to March in north-central areas and in the north-east, is well suited for resilient crops like sesame. The opportunity for Namibian farmers to commercially produce sesame is determined by a combination of several factors such as growing market demand, climatic conditions, and the availability of suitable land. However, high input costs are a competitive disadvantage and these can be a barrier to sesame cultivation in Namibia. Technological innovation, adoption of high-quality sesame varieties, and the economies of scale of Namibian production systems will be key to overcoming labour cost competitiveness.

On the other hand, the growing world's population, changing consumption patterns and the health awareness of consumers has led to recent growth in the sesame market. In 2019, the world production of sesame was approximately 6.55 million tonnes, and the major share of sesame was produced in Africa and Asia. In 2019, the global market value of sesame was estimated at USD6.5 billion (N$97.5 billion). It is expected that by 2025, the global sesame seed market will reach USD17.77 billion (N$266.5 billion). Global sesame production is forecast to reach 9.26 million tonnes by 2040, up from 6.5 million tonnes in 2019. The demand for sesame in China alone is expected to reach 2.56 million tonnes in 2040, up from 900 million tonnes in 2019.

In international markets, the average price of sesame seed stood at USD1229/tonne in 2019, with the black sesame price approximately 45% higher than white sesame. The price difference is due to the higher production costs of black sesame, along with the additional demand created by its perceived health benefits. White sesame is used solely as a food condiment; whereas black sesame is in demand as a food oil, cosmetic, and pharmaceutical ingredient. Sesame production costs range between N$2,291.14 and 2,561.17 per ha, with a net farm income (before tax) of about N$4,537.88.

Furthermore, Namibia is a net importer of sesame seeds, predominantly from South Africa, with demand generally fluctuating annually. During the year 2019, Namibia imported about 25 tonnes of sesame, equivalent to N$678 000, which clearly indicates that the market for sesame seeds in Namibia is small when compared to other countries. However, the strong and ongoing growth in demand for sesame seeds in international markets, particularly in Asia, presents an opportunity for Namibian farmers to enter into commercial production of sesame, given the perfect climatic and soil conditions in the current maize growing areas.

Together, these four factors: growing global demand, access to suitable land, and tolerance of Namibian environmental stressors, place Namibian farmers in a strong position to establish a viable long-term sesame industry, generating revenue through import replacement and export sales. However, it is recommended that Namibia runs trials to test different varieties of sesame in order to find varieties that are suitable to our climatic conditions, and also establish the exact production cost and viability of sesame production in the Namibia context.

2. INTRODUCTION

Sesame (Sesamum indicum) is one of the world's most ancient oilseed crops, with evidence that it originated in India, 3000 years ago (Bedigian, 2015). Depending on soil moisture and variety, the sesame plant is usually 0.6m to 1.8m tall and the fruit is a dehiscent capsule that shatters, when ripe, to release small seeds. The level of dehiscence is a key characteristic for sesame varieties as limiting harvest loss is crucial to obtaining maximum value from the available seed.

The core of the seed is protected by a hull which may be white, brown or black depending on the variety. The sesame contains 48-55% oil, which is higher than other oilseeds (e.g. canola seed yields 44% oil), and proteins including amino acids (Eskandari et al., 2015; Pathak et al., 2014). The international standard of oil content is 52%, 48%, and 45% for first, second, and third grades of sesame seeds respectively. The allowable moisture content for all grades of sesame is 6-8% (Abebe, 2016). Sesame is commonly categorised into two main market segments based on the seed coat colour, being white sesame and black sesame.

Sesame is cultivated mostly in tropical and subtropical regions (ideally within the 25° north and south latitudes) and it requires an annual rainfall of about 300-800 mm. For maximum yield, the sesame plant requires a temperature range from 21°C to 37°C throughout the growing season. Medium texture fertile soil is most suitable for growth. Sesame is an excellent drought and heat-tolerant crop as it thrives where other crops fail.

According to FAO (2019), the world production of sesame exceeded 6 million tonnes in 2019, of which about 57% was produced in Africa and 40% in Asia. One industry report (Mordor Intelligence, 2019) suggested that the global market value of sesame was about USD 6.5 billion (N$97.5 billion) in 2018 and this is following a positive trend with value increasing in line with growing demand as consumption patterns change in line with the health awareness of consumers.

Sesame is a good source of plant protein and healthy fat and it can act as an alternative to animal proteins and animal fats in human diets. Sesame is also a good source of vitamins, minerals, and fibre (Elleuch et al., 2011; Zebib et al., 2015). Food innovations that develop new products, such as sesame milk and ready-to-use Tahina (also known as Tahini), a dip made from toasted sesame, have contributed to the growing demand for sesame seeds. Additionally, the perceived health benefits of sesame as an antioxidant and as an ingredient in pharmaceutical products have also supported the expansion of sesame markets. It is expected that by 2025, the global sesame seed market will be valued at USD 17.77 billion (N$266.5 billion) (Cision, 2019).

3. SCOPE OF THE STUDY

In this report, sesame seed has been considered as a commodity and excludes any data concerning sesame seed for sowing. The report includes data related to the cultivation, production, consumption, importation, and exportation of sesame seed as a commodity, focusing at continental, regional, and country levels. This study only used secondary data from credible databases including FAO, Tridge, UN ICT, and other sources. As this report is based on a desktop study, there are some limitations due to the unavailability and inconsistency of data. Some data are average figures and these may not represent a specific case or country.

4. ENVIRONMENTAL REQUIREMENTS

4.1 Climatic requirements

As a drought and heat tolerant crop, sesame has the ability to retain a relatively higher level of hydration under conditions of soil and/or atmospheric water stress, due to its extensive root system. However, sesame plants require adequate moisture for germination and early growth, and minimum rainfall of 300-800mm per season is necessary for reasonable yields. Optimum yields are obtained in areas with 500-650mm rainfall per annum well distributed over the 3-4 months growing period.

In production areas where rainfall is erratic and does not support crop growth, application of 75mm water every 15 days' interval until 120 days is recommended. However, irrigating will increase the cost of production and ultimately affect competitiveness in the global market. Moisture levels before planting and flowering have the greatest impact on yields. Sesame is intolerant of waterlogging and rainfall late in the season prolongs growth and increases shattering losses.

Furthermore, commercial varieties of sesame require 90 to 120 frost-free days. The sesame plants need a fairly high temperature during their life cycle and normally the optimum temperature required during their life cycle is between 21°C and 35°C. If the temperature is more than 40°C with hot winds, the oil content reduces. If the temperature goes beyond 45 °C or less than 15°C, there is a severe reduction in yields.

Initiation of flowering is sensitive to the photoperiod and varies among varieties. The oil content of the seed tends to increase with increased photoperiod. Because protein content and oil content are inversely proportional, seed with an increased oil content has a decreased protein content.

4.3 Soil

The climate of Namibia, especially in Zambezi, Kavango and the Maize triangle, is favourable to the production of sesame under rainfed environments. Summer is from October to April and temperatures can reach 40 ºC and they fall at night to cooler levels. Average monthly temperatures range from 20 ºC to 34 ºC in summer, with frost occurring in some few areas during winter time only. The average annual rainfall varies from less than 50mm (1.9 inch) along the coast to 350mm (13.8 inch) in the central interior and 700mm (27.5 inch) in the Zambezi area. The rainy season is from October till April. Rainfall is highly variable, and droughts are common. Sesame production in Namibia should fit well into the existing white maize farming system.

Namibian soils in the South (Hardap), Central (Hochfeld and Summerdown), Maize Triangle, North Central Areas (NCAs), Kavango and Zambezi, are characterised as light, medium, and clay texture, with neutral pH and suitable for sesame production.

Sesame is adapted to fertile, well-drained soils and is not salt tolerant. Medium (loamy) textured soils are most favourable. Sesame prefers neutral to a slightly alkaline pH, with moderate fertility. Sesame does not like heavy clay soils or irrigation water containing a high concentration of salt. Sesame, which has an extensively branched feeder root system, appears to improve soil structure and has a very low salt tolerance, and cannot tolerate wet conditions.

4.4 Seed preparation and germination

The seed should be cleaned thoroughly and treated with 28 grammes of captan per 45kg of seed to prevent damping off. This treatment is especially important for non-shattering varieties because they are slower to emerge than the shattering varieties. This is due to the fact that the seeds of the non-shattering varieties spend more time in the soil before germination, and they need more protection from fungal pathogens in the soil.

5. CULTIVATION PRACTICES

5.1 Growth habitant

Sesame is an erect annual plant (or occasionally a perennial) that grows to a height of 0.6 m to 1.8m, depending on the variety and the growing conditions. Some varieties are highly branched, while others are unbranched. Leaves are variable in shape and size and they may be opposite or alternate. The bell-shaped white to pale-rose flowers begin to develop in the leaf axils from 6 to 8 weeks after planting and this continues for several weeks. Multiple flowering is favoured by opposite leaves.

Sesame is normally self-pollinated, although cross-pollination by insects is common. The fruit is a deeply grooved capsule (2.5 to 8 cm in length) that contains 50 to 100 or more seeds. The seeds mature 4 to 6 weeks after fertilisation. The growth of sesame is indeterminant; that is, the plant continues to produce leaves, flowers and capsules as long as the weather permits. Sesame seeds are small and vary in colour. One thousand seeds weigh about one ounce. The lighter coloured seeds are considered higher quality.

STAGES OF THE GROWTH AND DEVELOPMENT OF SESAME

The Sesame development is sequenced into several development stages, starting from the day after planting (DAP) to the harvest stage.

Picture 1: Sesame growth and development stages

5.2 Seedbed preparation

Sesame requires a warm, moist, and weed-free seedbed. Good drainage is important because the plant is extremely susceptible to waterlogging at any stage of growth.

5.3 Seeding date

Sesame should not be planted before the soil reaches a temperature of about 20°C, roughly one month after the last killing frost. Planting date is linked to rainfall distribution in the area and length of the crop season. Soil moisture must be sufficient to guarantee good germination.

Depending on the various maturity periods, the optimum planting season for sesame under rainfed conditions in Namibia should be from December/January each year, and this should be done to avoid harvesting during the rainfall season.

5.4 Method and rate of seeding

Sesame can be seeded with a row crop planter equipped with vegetable planter boxes. Populations of 250,000 to 300,000 plants/ha, that is 4 kg/ha by seed drilling on flat land and on 5 kg/ha on ridges. The recommended practice for a sole crop of sesame is to plant on a "flatbed" with 60 cm between rows and 10 cm within rows. Planting on the flatbed by seed drilling makes the operation very easy and this could be used in relatively large farms. The spacing between plants will ensure vigorous growth and a high yield. Planting on ridges with 75 cm between rows and 15 cm within rows can be adopted when sesame is intercropped with another crop.

Depth of planting varies with soil type and soil moisture from 2 to 2.5 cm. Uniform depth and seed rate are essential for stand establishment resulting in maximum yield. Sow the seeds after rain or wet the soil prior to sowing. For the seeds to germinate, they need adequate moisture in the soil for around 3 days. Never sow the seeds on dry soil but always wait for rain or irrigation water.

5.5 Fertility and lime requirements

Fertility requirements for sesame are similar to millet: Sesame does not require much fertilizer except where the soil is very poor. Therefore, 3 bags (150kg) per ha of NPK fertilizer should be applied at planting and 2 bags (100kg) per ha of Urea should be applied at the juvenile stage. For optimum seed yield, sesame requires an application of 60-75 kg N/ha, 13.5-45 kg P/ha and 22.5 kg K/ha (Haruna & Aliyu, 2012; Haruna et al., 2010; Shehu et al., 2010).

5.6 Seed variety selection

Sesame varieties are usually divided into two types: shattering and non-shattering. Shattering varieties: Most of the shattering varieties are grown in the United States and the seeds of this unbranched variety have a high oil content of over 50% but their bitter flavour limits their value on the whole-seed market. Non-shattering varieties: Non-shattering varieties have been developed to allow mechanical harvesting. Though these varieties usually contain somewhat less than 50% oil, their seed is used for oil production only.

Furthermore, because of environmental variations, there is great diversity within varieties of sesame grown in different countries. The agro-ecological diversity requires the development or trial of varieties that fit specific environments; hence, no variety grows well across countries. However, for subtropical climates, high-yielding varieties with good qualities for export can be grown, such Humera,

Gonder, Wellega and Abassina from Ethiopia (Kostka & Scharrer, 2011); NCRIBEN-01M, NCRIBEN-02M and E8 from Nigeria (Alegbejo et al., 2003); Elobeid1, Promo and Hirhri from Sudan (El-Naim et al., 2012); and Sinyadanar-4 (white) and Sinyadanar-3 (black) from Maynmar (Myint et al., 2020). All the above varieties are highly exported to Japan, the European Union, South Korea, the USA and Egypt (Kostka & Scharrer, 2011).

If sesame seed production is meant for oil purposes, varieties with darker seed colour can be grown. Nevertheless, for the export market, white seed colour, medium to large seed size is preferred. Generally, for drier areas where rainfall is low and erratic, using early maturing varieties such as Pat-Le-War-Hmyaung, She-Ka-lay, Pin-Lon-War, Bok-hmwe, Man-Shwe-Wa, Mai-Thi-hla, and Ye-Kyaw, is recommendable (Myint et al., 2020).

Therefore, research trials must be conducted on different varieties in the targeted production zones, before commercialisation, in order to find varieties that are well adapted to the specific production zone in Namibia. This will be done in collaboration with UNAM in terms of the existing MOU. Different sesame seed varieties will be sourced through non-profit making research-for-development organisations that develop improved varieties of sesame, internationally.

5.7 Weed control

Sesame plants are poor competitors against weeds because they are slow early growth plants and therefore farmers should select fields with low weed densities.

Mechanical: Sesame fields should be cultivated early and as close to the rows as possible. Shallow cultivation is recommended because the fine and fibrous sesame roots grow close to the surface and they are easily damaged. Early cultivation causes seedlings to grow faster, possibly as a result of improved soil aeration. After the plants reach a height of 7 or 10 cm, they grow rapidly.

Chemical: Herbicides are available that can help control weeds during the production of sesame:

- Use of pre-emergence herbicide: Pendimentalin 3-4 litres/ha (e.g. Stomp).
- Use of post-emergence herbicide: Glyphosate 3-4 liters/ha (e.g. Roundup, Sarosate, or Fitscosate).

5.8 Diseases control

Sesame has an excellent disease tolerance, with very few disease outbreaks. The most common sesame diseases are leaf spot, leaf and stem blights, Fusarium wilt, charcoal rot, and root rot. Some of the disease organisms are carried on the seed. It is advisable to use disease-free seed and treat it with a fungicide before planting. Aflatoxin contamination can occur in the field before harvesting, during harvesting, and during the post-harvest handling processes, e.g. field sun-drying, storage, and transportation of the product. Proper drying should be done until the moisture content is reduced to about 10 %.

This will help avoid Aspergillus infestation and consequent aflatoxin contamination. Normally this can be achieved by sun-drying of pods and avoiding seeds exposure to the rain. Crop rotation can help avoid disease problems that could eventually develop.

5.9 Insects control

Sesame plants are often attacked and damaged by aphids, but despite this, sesame has an excellent pest tolerance. Thrips will stunt seedlings and injure developing flower buds so that capsules do not set. The gall midge (Asphondylia sesami Felt) and various caterpillars have been important in some countries. Green stink bugs, red spiders, grasshoppers, cutworms, armyworms, and bollworms also attack sesame but do not cause extensive damage. Regular monitoring and the application of integrated pest management strategies are essential to minimise damaging impacts. Insecticides are available for sesame but they should be applied only after scouting.

5.10 Harvesting and yield

Sesame seeds become ready for harvesting within 3-5 months after planting the seeds depending on the variety selected. But in most varieties, you can expect to harvest then when the leaves, stems, and pods begin to turn yellow and the lower leaves of the plant start shedding.

It is not advisable to wait until the crop becomes dead ripe as this will cause the seeds to shed. The ripe sesame plants should be cut at the ground level and they should be stacked for 7 to 10 days in the sun to get them ready for the threshing process. To minimize seed damage and loss, non-shattering types can be combined at low cylinder speed (450-500 rpm) or about half of that required for cereals.

To minimize seed damage and loss, non-shattering types can be combined at low cylinder speed (450-500 rpm) or about half of that required for cereals. Total yield always depends on the variety selected, and also on good farm management practices, however, it is possible to expect between 500-1500 kg (0.5 to 1.5 tons) per hectare.

In Namibia, sesame from rainfed production may be harvested from April/May onwards, depending on the variety's maturity period (early, medium and late).

5.11 Drying and storage

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 becomes rotten.

Sesame may be stored at room temperature, with humidity of about 50%, for approximately 5 years without loss of viability. Freezing temperatures damage seeds and make them less marketable. Poor storage conditions can decrease the quality of sesame seeds. Dirt, sand, or stones can easily mix with the small sesame seeds, so it's imperative to ensure the quality of the harvested seeds.

Picture 2: Sesame pods

Picture 3: Brown sesame grain

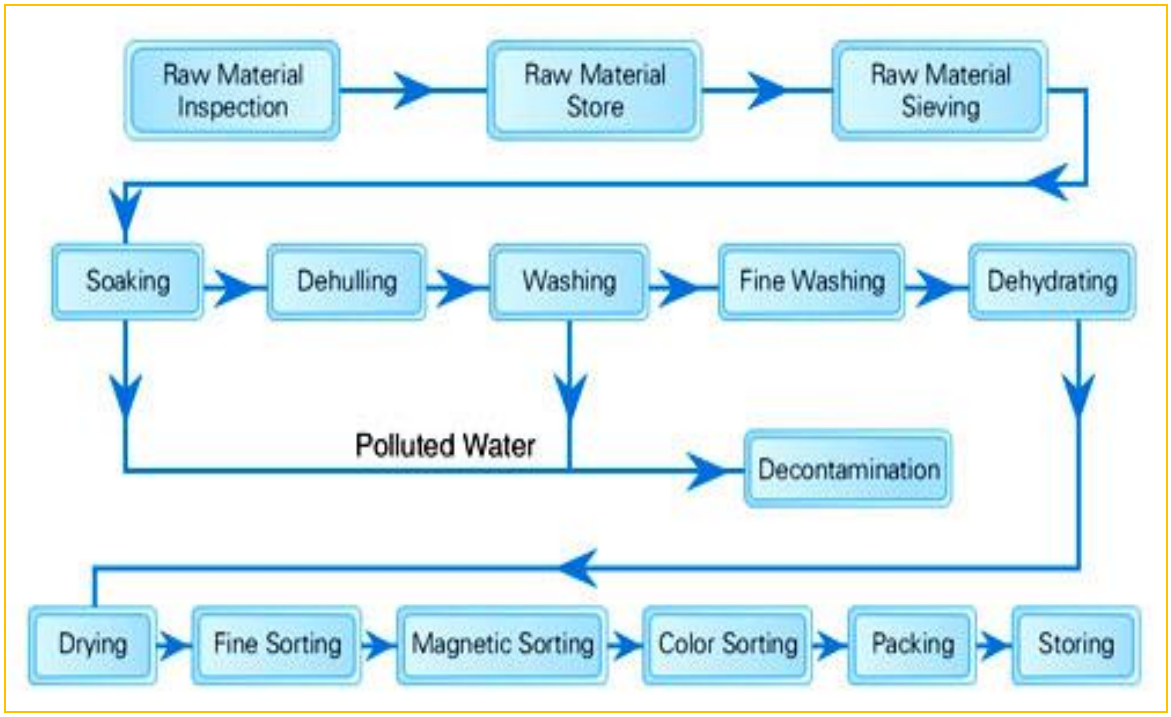
5.12 Processing

After harvesting, the seeds must be cleaned and dehulled. The seeds pass through an air separation stage to remove any foreign particles. About 10 percent, the "cleaned natural seed" moves directly into food use as a whole seed to be blended into flour for baked goods.

Next, a combination of water and friction work together as the seeds are passed against the chamber of the hulling machine to separate the hull from the seeds. Once the seeds have been hulled, they are passed through an electronic colour sorting machine that rejects any discoloured seeds to ensure perfectly coloured sesame seeds. An immature or off-sized seed is removed but saved for oil production.

Sesame oil is extracted by pressure in a mechanical expeller and it is tolerant of only minimal heating by the extraction process. The oil is often blended with other vegetable oils for salads and other food uses. Sesame oil should be kept refrigerated. Sesame seeds can become rotten if exposed to prolonged heat. If properly stored, the packed seeds have a 2-year shelf life with little reduction in quality.

The cost of a standard sesame seed processing plant with a production capacity of 3 - 4 tonnes per hour ranging from N$300 000 to N$650 000, Free On Board (FOB) price. The machine can clean, dehull and automate the grading (3 grades) . Nonetheless, such a machine requires at least 550m^2 of land and 200m^2 of building.



Picture 4: Flowchart for dehulled sesame seeds

6. PRODUCTION COST

The sesame seeds production cost, including dehulling costs, varies from country to country, ranging from as low as USD215 (N$3,436.71) in Nigeria to USD240 (N$ 3,842.36) per ha in India, which brings the average total production cost to about USD227 (N$3,639.54). Average production per tonne is about 0.550 tons/ha, with an average export price of USD2,000 (N$32 000) per tonne.

The average total revenue is estimated at USD1,100 (N$17,600) per ha, resulting in a net farm income (before tax and transport costs to the export market) of USD872 (N$13,960.46). However, this is based on the scenario of the sampled countries, and hence there is a need to establish the exact production costs and net farm income during the research trials.

7. PRODUCTION OVERVIEW

7.1 Global production of sesame seeds

According to FAO (2019), in 2019, sesame seed was produced on 12.8 million hectares of land, with a total production of 6.55 million tonnes and an average yield of 554 kg/hectare. There has been an upward trend in world sesame production over the last 50 years (FAO, 2019).

Global sesame production is forecasted to reach 9.26 million tonnes by 2040, up from 6.5 million tonnes in 2019. Sesame seeds are mainly produced in Africa (55%) and Asia (40.6%), followed by America (4.4%) and Europe (0%).

The white and other lighter-coloured sesame seeds are common in Europe, the Americas, West Asia, and the Indian subcontinent. The black and darker-coloured sesame seeds are mostly produced in China and Southeast Asia.

Figure 1: World's biggest producers of sesame seeds (FAOSTAT, 2019)

According to Figure 2, in 2019, the largest or top 10 global sesame seeds producing countries are Sudan (23%), Myanmar (14%), India (13%), Tanzania (13%), Nigeria (9%), China (9%), Burkina Faso (7%), Ethiopia (5%), South Sudan (4%) and Chad (3%), accounting for 81% of the total production. On the other hand, the top main producers of sesame seeds in each continent are:

- Asia (Myanmar, India, and China)
- America (Mexico, 58 848 tonnes)
- Africa's highest producers are Sudan, Tanzania, Nigeria, Burkina Faso, Ethiopia, South Sudan, and Chad. About 55% of the world's sesame production is in Africa, with Sudan leading in production.
- In Southern Africa, insignificant quantities of less than 50 tonnes per annum are produced in South Africa, Zimbabwe, Zambia, Malawi, Mozambique, and Botswana. Each producer covers an average of almost 2 to 3 ha per farmer, with a low record yield of 150 – 350 kg/ha, mainly because of severe drought (Southern Africa Sesame Board, 2020).

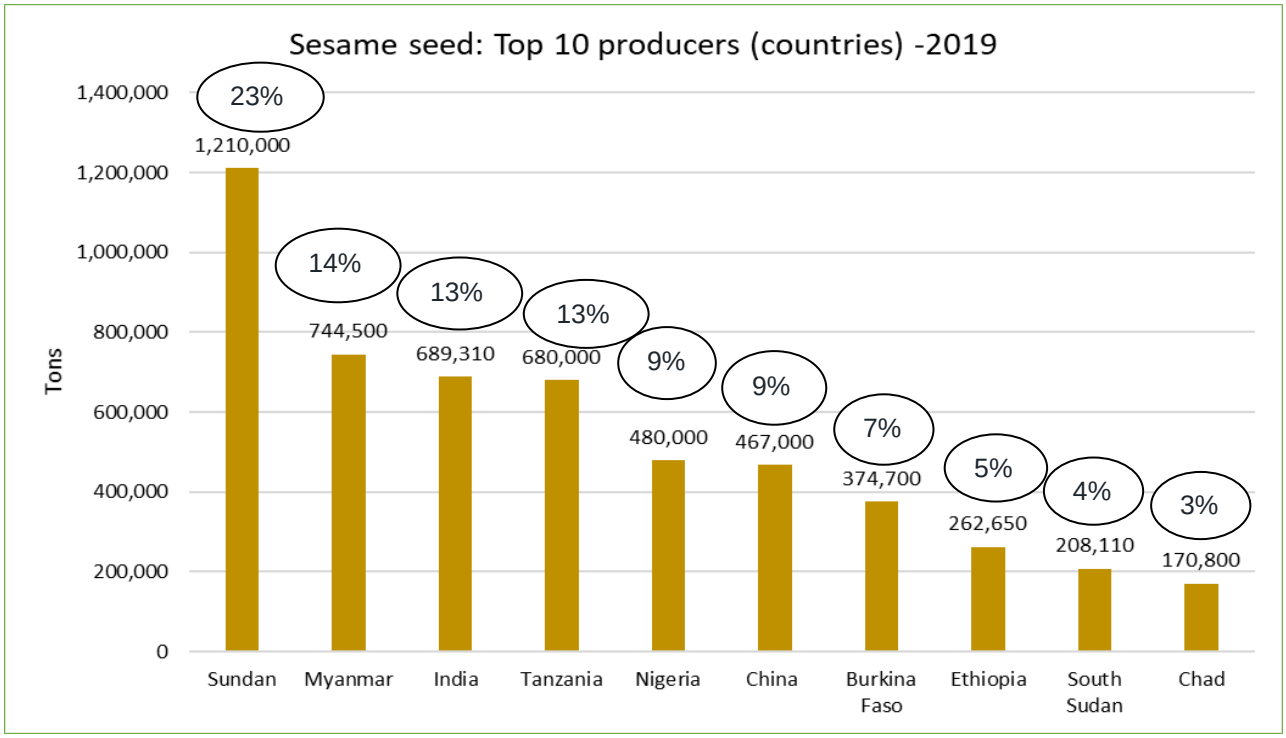


Figure 2: World's biggest producers of sesame seeds (Tridge, 2019)

7.2 Africa top 10 producing countries - 2019

Table 1 indicates that Tanzania is the biggest producer in Africa, producing about 1.2 billion tonnes per annum, representing 33% of the tonnage produced by the top 10 countries.

Table 1: Africa's top 10 producers of sesame seeds (Tridge, 2019)

Country	Tonnes	Share %
1. Sudan	1,210,000	33%
2. Tanzania	680,000	18%
3. Nigeria	480,000	13%
4. Burkina Faso	374,700	10%
5. Ethiopia	262,650	7%
6. South Sudan	208,110	6%
7. Chad	170,800	5%
8. Uganda	144,000	4%
9. Niger	97,700	3%
10. Mozambique	95,000	3%
Total	**3,722,960**	**100%**

7.2 Yield per hectare

The annual production and yield data combined provide a good indicator for the performance of the countries producing sesame. The FAO (2019) data indicates that the average yield of sesame is 550 kg/ha. The average yield (kg/ha) varies considerably in the top 10 sesame-producing countries (Fig 3).

China has the highest yield, a little over 1400kg/ha, and most of the leading sesame producing African countries produce a greater yield per ha than India and Myanmar. Notably, Tanzania has achieved an increased yield in recent years which has led to an increase in total production.

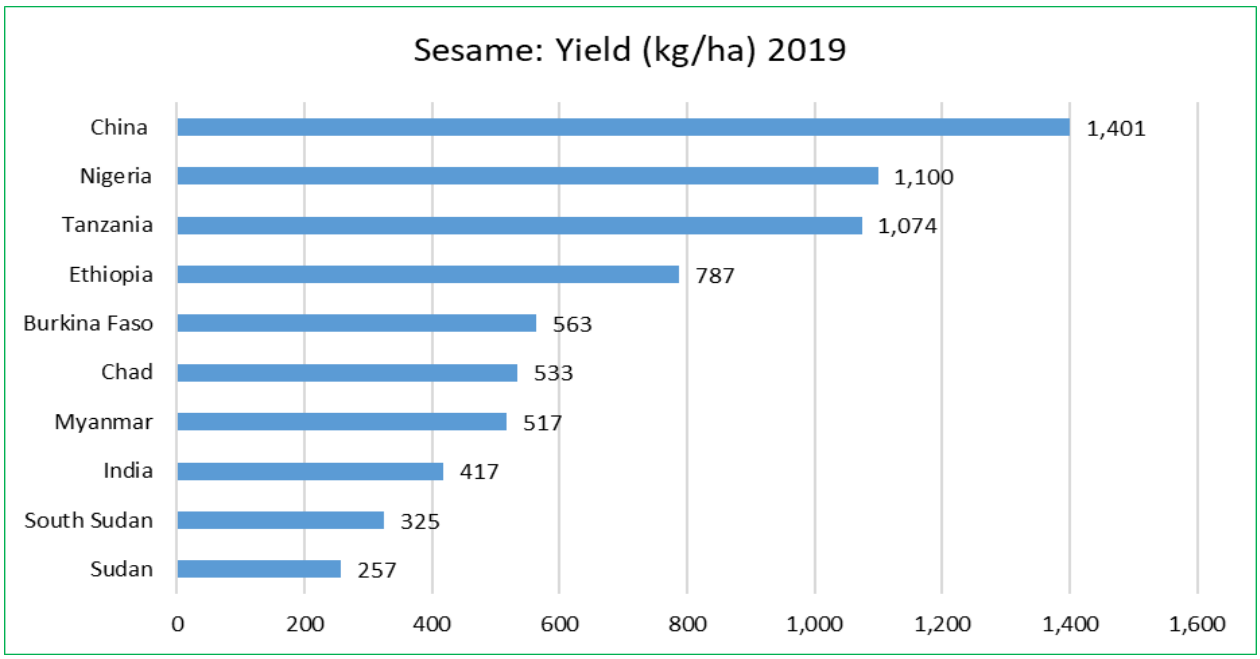


Figure 3: Sesame yield (kg/ha) for the top 10 sesame-producing countries (FAOSTAT, 2019)

8. GLOBAL CONSUMPTION

It is expected that the global consumption of sesame seeds will grow at a rate of 2% per year in the next four years, which will increase the market size to 9.5 million tonnes in 2025 (Bizcommunity, 2018).

Across the world, there is a growing appetite for healthy ingredients in diets among consumers, especially the millennial population across North America and Europe. The nutritional profile of these seeds has gained consumer attraction over the last few years and the growing demand for superfoods among health-conscious consumers is driving the demand for the market. However, price fluctuations and allergies associated with the commodity are holding back the growth of sesame seeds.

The drivers identified in this market are consumption patterns and increasing health awareness, increasing demand across nations, and advancements and innovations in terms of hybrids. The restraints identified in the market are international price fluctuations, strong international competition, and salmonella risk in sesame seeds.

The ongoing COVID-19 pandemic compelled the consumers to rethink their consumption patterns, which has led to the growth in demand for healthy ingredients, which has created an opportunity for sesame seeds as ingredients to various food and personal care products. However, the trade disruptions have created a decline in the initial months of the year though the market is anticipated to grow in the future.

The countries with the highest consumption were Tanzania (21% based on tonnes), China (19%), followed by Sudan (9%), Myanmar, India, Ethiopia, and Nigeria (6% each), together comprising almost 74% of global consumption. The highest annual rates of growth with regards to sesame seed consumption from 2007 to 2016 were recorded in Tanzania (+32.5%) and China (+9.1%). These high rates of growth in Tanzania can be explained by the increased production of sesame oil in the country

(Bizcommunity, 2018). These high rates of growth in Tanzania can be explained by the increased production of sesame oil in the country.

Table 3*:* Sesame seeds consumption per capita (Bizcommunity, 2018)

Countries	Percentages based on tonnes	Consumption per capita (kg/year)
Tanzania	21 %	30.8
China	19 %	1.1
Sudan	9 %	17.6
Myanmar	6 %	10.1
India	6 %	0.4
Ethiopia	6 %	Less than 0.4
Nigeria	6 %	Less than 0.4

Amongst the leading consuming countries, high levels of per capita consumption were recorded in Tanzania (30.8 kg per year), Sudan (17.6 kg per year), and Myanmar (10.1 kg per year), while the global average per capita consumption of sesame seeds was estimated at 1.1 kg/year in 2016. China (1.1 kg per year) and India (0.4 kg per year) recorded the lowest per capita consumption figures in terms of the major consumer countries.

Sesame seeds are one of the main seed crops in the Asian and African regions, namely Tanzania, China, Sudan, Myanmar, India, Ethiopia, and Nigeria. They are used in the preparation of traditional dishes and confectionery, as well as in the pharmaceutical and cosmetic industries.

The steady demand for sesame seeds and sesame seed-related products is also being generated by the increasingly popular healthy eating trend and the tendency to prefer organic cosmetics and other such products. In addition, the increased popularity of Asian and African sesame seed-based seasonings, marinades, and sauces in Europe and North America is also a factor.

In 2018, the global market value of sesame was estimated at USD6.5 billion (N$97.5 billion). It is expected that the consumption of sesame seeds will grow at a rate of 2% per year in the next four years, which will lead the market to 9.5 million tonnes by 2025.



Picture 4: Sesame products

Furthermore, based on the type, the global sesame seeds market is classified into black, brown, and white. The white sesame seed segment captured the dominant market in 2019 and it is expected to boost the market in the forecast period from 2020 to 2027. Due to the anti-allergic and skin-nourishing properties of white sesame seeds, they are being used in cosmetics, pharmaceuticals, toiletries, food, oils, and other industries, and they are expected to witness the highest growth in the future market.

9. EXPORTING COUNTRIES

9.1 Global exports of sesame seed

Most of the sesame-producing countries in Africa export sesame outside the continent. In 2019, the global export volume of sesame seed reached about 1.8 million tonnes, equivalent to about USD3.2 billion (N$47.4 billion) (Figure 4).

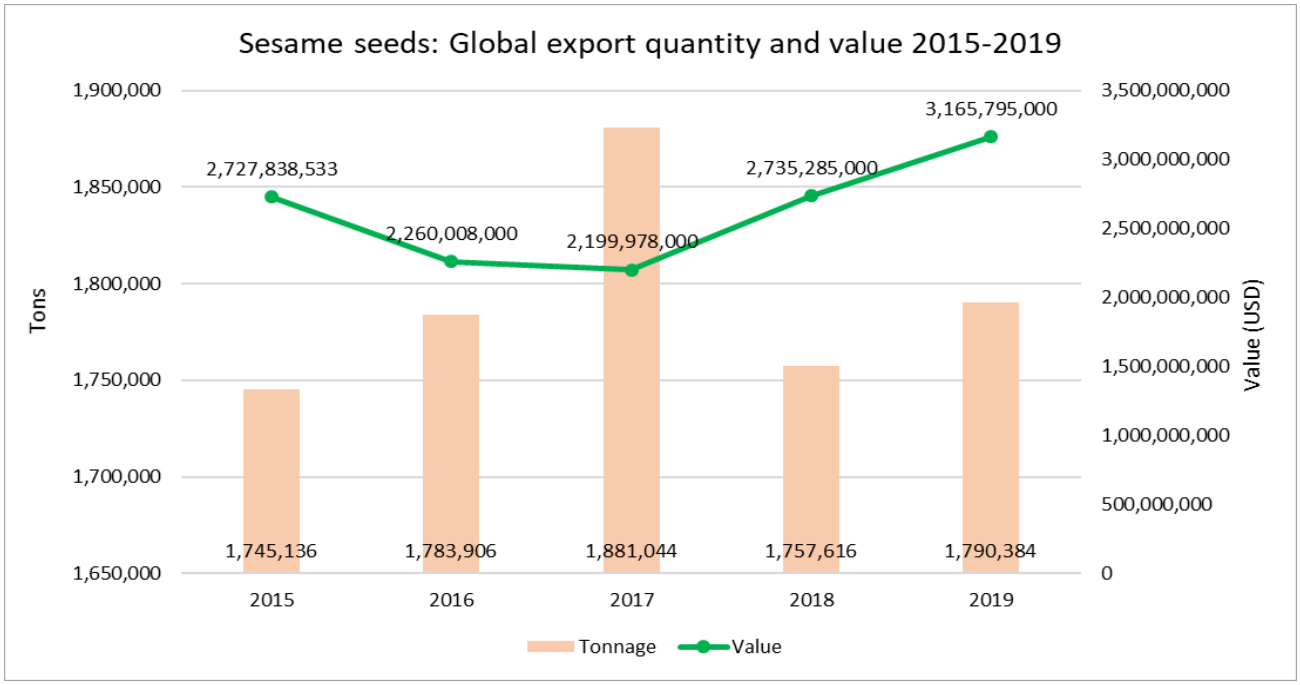


Figure 4: Sesame seeds global exports (ICT, 2019)

Sudan is the largest exporter of sesame seeds, followed by India and Nigeria, accounting for about 52% of global sesame exports. Over the past years, several sesame-producing African countries have exhibited steady growth in the sesame export markets and this can be seen in Figure 5.

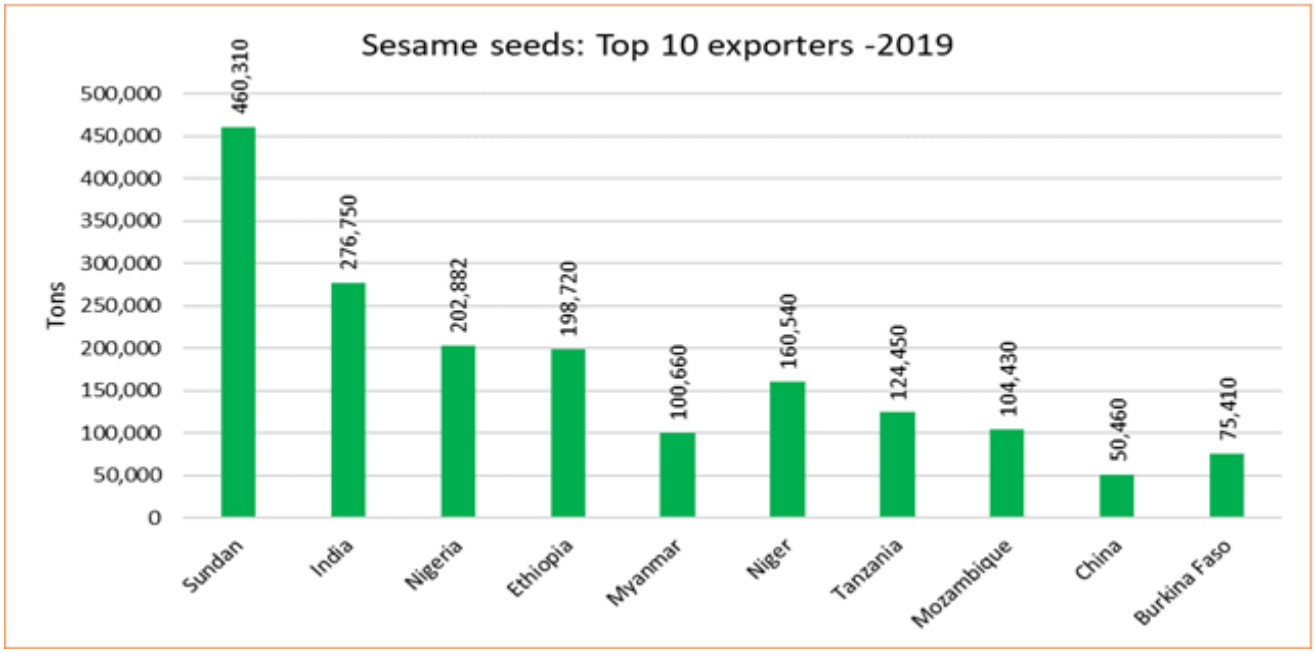


Figure 5: Sesame seeds top 10 leading exporting countries (Tridge, 2019)

9.2 Africa top 10 exporting countries of sesame seed

Table 3 clearly indicates that Sudan is the leading exporter of sesame seeds in Africa, exporting 227 875 tonnes, equivalent to N$10 billion in value.

Table 3: Sesame seeds leading top 10 African exporters (Tridge, 2019)

Country	Tonnes	Value (USD)	Share % by Value
1. Sudan	460,310	658,400,000	32%
3. Nigeria	202,882	290,190,000	14%
2. Ethiopia	198,720	345,010,000	17%
4. Niger	160,540	230,250,000	11%
5.Tanzania	124,450	189,760,000	9%
6. Mozambique	104,430	153,370,000	7%
7. Burkina Faso	75,410	76,080,000	4%
8. Mali	28,242	61,955,867	3%
9. Chad	23,244	32,692,133	2%
10. Egypt	21,611	29,319,600	1%
Total	**1,399,838**	**2,067,027,600**	**100%**

10. IMPORTING COUNTRIES

10.1 Global imports of sesame seed

The volume of global sesame seed imports totalled 2 million tonnes in 2019, equivalent to USD3.5 billion (N$53 billion) in value, per annum. The imports dynamic was generally in line with exports and globally these trade flows complement each other.

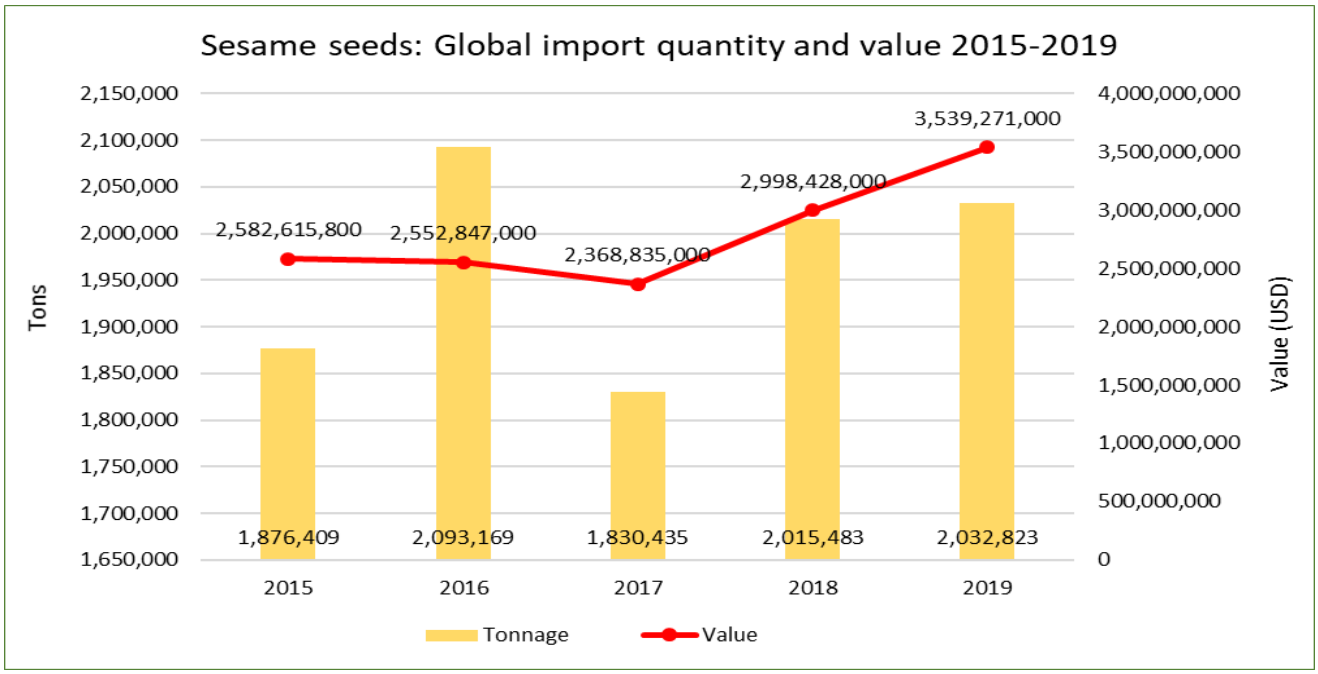


Figure 6: Sesame seeds global imports (Tridge, 2019)

Based on Figure 7 below, China (49% based on tonnes) is the main global consumer of imported sesame seeds, followed by Japan (12%) and Turkey (11%).

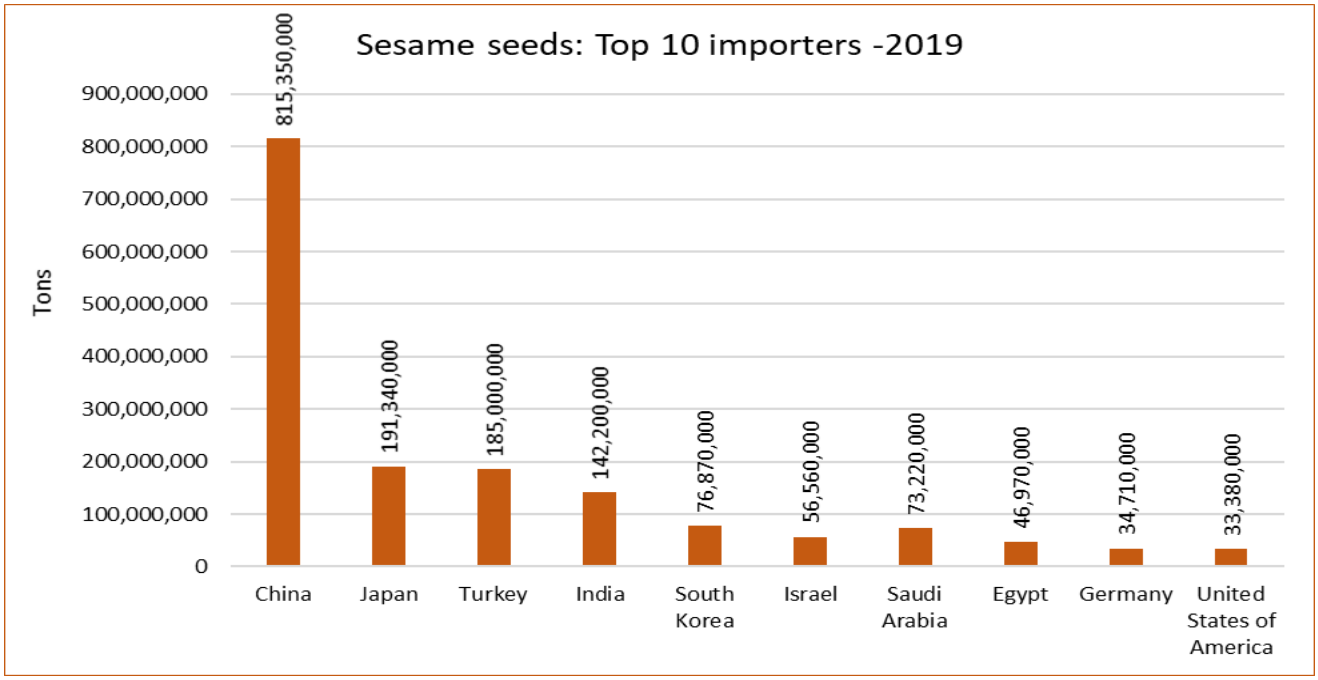


Figure 7: Sesame seeds top 10 importing countries (Tridge, 2019)

10.2 Africa top 10 importing countries

The volume of the top 10 African countries' sesame seed imports totalled 34 319 tonnes in 2019, equivalent to USD55 million (N$819 million) in value per annum. Tunisia is the leading African importer of sesame seeds (11 795 tonnes), and Namibia is the least (19 tonnes) per annum.

Table 3: Sesame seeds leading top 10 African importers (Tridge, 2019)

Country	Tonnes	Value (USD)	Share % by value
Egypt	46,970,000	91,273,000	55%
Tunisia	13,705	20,333,000	36%
Togo	11,795	17,692,500	11%
Morocco	8,501	16,152,000	10%
Algeria	5,388	7,990,404	5%
Nigeria	3,791	5,622,053	3%
South Africa	1,638	2,429,154	1%
Libya	1,444	2,141,452	1%
Burkina Faso	1,105	1,638,715	1%
Kenya	262	388,546	0.23%
Sudan	151	223,933	0.13%
Total	**47,017,780**	**165,884,757**	**100%**

10.2 Namibia sesame seed imports (2015 to 2019)

Table 3 below clearly indicates that Namibia's import tonnage, value, and price of sesame seeds fluctuate yearly, based on supply and demand. Namibia does not produce sesame seeds and therefore the imported tonnage represents national consumption.

Table 3: Sesame seeds consumption by capita (Tridge, 2019)

	2015	2016	2017	2018	2019
Import value (N$)	457,000	630,000	572,000	500,000	678,000
Import Tonnage	48	30	19	22	25
Ave. Price/ton (N$)	9,521	21,000	30,105	22,727	27,120

11. GLOBAL AVERAGE EXPORT AND IMPORT PRICES

Sesame seeds are internationally exported for about USD1 708 (N$25 236)/tonne – USD2 227 (N$32 907)/tonne, and imported for USD1 627 (N$24 045)/tonne – USD2 237 (N$33 555)/tonne respectively.

Table 4: Export and import average prices for 2015-2019 (FAOSTAT, 2019)

	2015	2016	2017	2018	2019
Export Ave. price (USD)	1,847	2,019	1,682	1,787	2,194
Import Ave. price (USD)	1,768	1,821	1,603	2,009	2,237

12. SWOT ANALYSIS

The purpose of this SWOT (Strength, Weakness, Opportunities, and Threats) analysis is to provide basic information regarding Namibia's potential for sesame production and marketing. The study highlights several issues regarding sesame production and marketing that are critical for Namibian producers and policymakers.

Strengths:

- Minimum inputs required (fertilisers and chemicals), when compared to maize and mahangu
- Favourable climatic and soil conditions, particularly in the current maize growing areas
- High employment oriented
- Government support for local production
- Equipment used for other grain crops can be used to grow sesame
- It offers more return for less cost (less risk) than other crops

Weaknesses:

- Few financing possibilities, due to the risk associated with rainfed production in Namibia
- Lack of sesame seed varieties specifically tested under Namibian climatic and soil conditions
- Lack of knowledge among farmers regarding sesame production, processing and marketing
- High export market standard requirement
- There are currently no suppliers of sesame seeds in Namibia and accessing seeds may be challenging
- Sesame production may interfere with the cultivation of staple food crops since it is grown during the same season

Opportunities:

- Increasing global demand
- Local and export market opportunities (China, Japan and EU)
- Foreign exchange earnings for Namibian farmers
- Potential for production of value-added sesame products
- Sesame should fit well into the existing grains based farming system

Threats:

- International price fluctuation with a volatility of around 25% to 30% per annum
- Competition from other oil crops in the market
- Climate change, and pest and disease outbreaks may affect yield
- A lower price offering from other countries could pose strong competition in the international trade of sesame
- Sesame can be susceptible to severe drought and frost

13. CONCLUSIONS AND RECOMMENDATIONS

Sesame thrives well in a harsh environment and requires limited fertilizer and water, and it grows without the need for the use of pesticides due to high levels of natural tolerance for diseases and insects. It is mostly grown under rainfed conditions in tropical and subtropical areas, with sufficient rainfall and well-drained soils.

The outcome of this desktop study indicates that Namibia has favourable climatic and soil conditions for sesame production under rainfed conditions, particularly in the Zambezi, Maize triangle, and Central regions. The production of sesame will perfectly match the rainfed maize production in Namibia since it's a summer crop with similar climatic and soil requirements to those of maize.

On the other hand, the demand for sesame is predicted to continue to increase due to the changing food consumption behaviour, the availability of value-added products such as oil, pharmaceuticals, and niche foods, and by-products such as sesame meal. It is with no doubt that Namibia has great potential to enter into the commercial production of sesame seeds for both domestic and export markets, however, engagement of these markets should be done by way of contract farming as it is the most common practice in many countries. It is thus advisable to establish a market before planting.

Therefore, for Namibia to commence with commercial production of sesame in Namibia, it is recommended that field trials of different varieties should be conducted in the current maize growing areas. This approach is necessary to find varieties that are suitable for the Namibian climatic and soil conditions, and also to establish the exact production cost. This will also enable the NAB to identify a reliable source of certified sesame seeds through the engagement of the agri-input suppliers in the country.

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