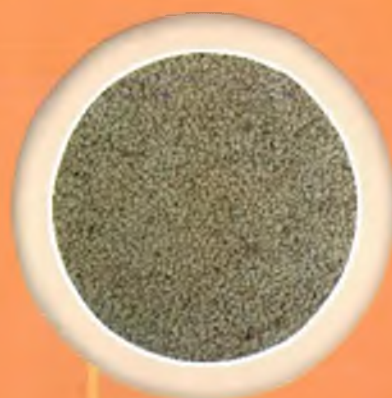




# OILSEEDS BUSINESS OPPORTUNITIES IN ETHIOPIA 2009

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# Oilseeds business opportunities in Ethiopia 2009

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**DISCLAIMER**  
 The statements, findings, interpretations and conclusions expressed in this report are those of the authors and do not necessarily reflect the views of, or are endorsements from, the partners of the Public Private Partnership on Oilseeds: the Ethiopian Ministry of Agriculture and Rural Development (MoARD), Embassy of the Kingdom of the Netherlands in Ethiopia (EKN), the Ethiopian Pulses Oilseeds and Spices Processors and Exporters Association (EPOSPEA) and the Product Board for Margarine, Fats and Oils of the Netherlands (MVO).

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## Foreword

Oilseeds are a mainstay of the rural and national economy of Ethiopia. After coffee, oilseeds are the second largest export earner for the country and already more than 3 million farms are involved in its production. Exports actually consist of sesame and niger seed, for which there is a growing demand in the world market. Also castor, linseed and safflower have good export potential. The growing world demand for these specialty products and the available capacity to expand production turn oilseeds into one of the engines of economic growth of Ethiopia. The Netherlands is the largest importer and processor of edible oils in Europe. It markets a broad range of oils products, not only for the food industry, but also for cosmetics and industrial purposes. This leading position makes the Netherlands an interesting partner in realizing further growth for the Ethiopian oilseeds sector.

In this second version of the Business Opportunities report, more emphasis has been placed upon improving supply for the domestic market of edible oil. At the moment, substantial quantities of edible oils are being imported, so boosting production for the local market can create extra income and substitute import. Also, oilseed cake is very much needed for animal feed. In addition, this second, updated version provides new market data on imports, exports and a world market perspective on the Ethiopian oilseeds sector.

The Ethiopian and Dutch public and private parties work together in the Public-Private Partnership on Oilseeds. The PPP Oilseeds was established in March 2008 to further support and enhance the productivity, competitiveness and added value creation of the Ethiopian oilseeds sector. The PPP brings together the Ethiopian Ministry of Agriculture (MoARD), Ethiopian Agricultural Research Institute (EIAR), the Oilseeds Exporters' Association (EPOSPEA), Oil Millers Association (AAOMA), Dutch Product Board for Margarine Fats & Oils (MVO) and the Embassy of the Kingdom of the Netherlands in Ethiopia (EKN). Together the partners are engaged in public-private dialogue, business-to-business development, and projects. This report is both a result and an input for this partnership.

Financial support for this study came from the Netherlands Ministry of Agriculture, Nature and Food Quality, from the Ethiopian Program on Support to Business Organizations and Access to Markets (SNV-BOAM), supported by the Netherlands and from the Dutch Product Board for Margarine Fats & Oils (MVO).

We trust this study will contribute to develop the oilseeds sector to the benefit of Ethiopia and Europe. Also, we like to reassure that all the partners of the PPP Oilseeds are ready to provide new entrepreneurs in oilseeds advice and useful contacts. On the previous page, you find their contact details.

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## Executive summary

This study explores business opportunities in the Ethiopian oilseeds sector, both for domestic and European companies. Business opportunities range from import substitution of edible oils to export of high value seeds and oil.

Ethiopia has an attractive portfolio of oilseeds for export markets. One third of the Ethiopian oilseed production is sesame seed and 13% is linseed. Ethiopia is the fifth world producer in linseed and the sixth in sesame seed. Sesame is a high value oilseed. In addition, Ethiopia grows specialty seeds like safflower seed and castor beans. Ethiopia is the third world exporter of sesame seed after India and Sudan and an important exporter of noug (niger seed). The Ethiopian share in other oilseeds is negligible. Sesame seed has the highest value per ton of Ethiopian oilseeds, more than twice the value of linseed. World sesame and olive oil import prices are the highest: 3 to 4 times the price of almost all other edible oils. The main oilseed commodities in international trade are soybean and in edible oil, palm and soybean oil.

Oilseeds are the second biggest export earner of Ethiopia. Production growth and quality improvement of oilseeds can substantially contribute to the economic development at national, regional and at family level. The Ethiopian government considers oilseeds as high value export products. The government enhances foreign investments in the oilseeds sector by incentives: e.g. duty and tax income exemptions from 2 to 8 years for foreign investments directed at export. Ethiopia imports large quantities of soybean and palm oil. The value of imported edible oil is 40 to 50% of the export earnings of oilseeds. Increased domestic edible oil production can substitute these imports and improve the trade balance.

Many smallholders and a limited number of large farms grow oilseeds. Oilseeds are cash crops on subsistence farms. Production is characterized as labor intensive, low-input, and rain fed. The potentials to increase the production are huge. Only 20% of the total available agricultural land, mainly in the highlands, is used, of which only 7% for oilseeds. Productivity per ha can be doubled with higher input levels like fertilizer and improved seeds. Area expansion by virgin and fertile lands offers good opportunities for organic oilseeds production. Higher production levels are required, as the Ethiopian food demand will increase at least one third until 2020 due to population and income growth.

The oilseeds value chain has many actors at production and collection levels. Oilseed crushers produce around 20% of the domestic consumption of edible oil: 80% is imported mainly as palm oil and soybean oil. Idle capacity for oilseed crushing and refining enables a larger production quantity. Agricultural research is on an adequate level and impact oriented. Ethiopia's infrastructure is improving rapidly enabling faster transport of cargo. In addition, the Ethiopian Commodity Exchange (ECX) may enhance the market efficiency in oilseeds, by standard setting, market clearing and payment certainty; though it could jeopardize specialty trade.

The fatty acid composition of Ethiopian oilseeds does not differ from oilseeds produced in other countries: in this respect, they are not special. Opportunities for oilseeds export are not fully exploited yet because of inefficient marketing, insufficient knowledge of the export market requirements, and insufficient knowledge of the oilseed composition, improper cleaning, and at times poor contract discipline.

The Ethiopian oilseed sector has several strengths:

1. A large diversity of high value oilseed crops
2. A significant production in sesame seed, linseed and noug
3. High quality sesame seed for a wide range of high value applications
4. The production can be doubled
5. Entrepreneurship and an ambitious oilseeds exporters association
6. Available land and labor
7. Attractive Investment Package from the government

On the opposite also weaknesses exists:

1. Lacking sufficient international market orientation
2. High transaction costs due to the large number of chain actors
3. Contract discipline is weak
4. Weak supply of farm production technologies, inputs, credit and storage facilities
5. Most oilseed crushing and refining plants do not meet European quality standards

The opportunities and threats are analyzed in a SWOT framework. The strategies to take advantage of the opportunities and to reduce the impact of threats are discussed as business opportunities in table 1.

Table 1: Opportunities at business level

<i>Chain actor</i>	<i>Opportunities</i>
Suppliers	<ul style="list-style-type: none"> <li>• Enterprises in sowing-seed, chemicals, and farm equipment both for imported as for domestically produced products.</li> <li>• Credit facilities for farmers.</li> <li>• Animal feed based on by-products (oil cake) of oil millers.</li> </ul>
Growers	<ul style="list-style-type: none"> <li>• Production of oilseeds like soybeans, sunflower, peanuts, olives, jatropha and safflower.</li> <li>• Production of safflower petals for dyeing purposes.</li> <li>• Achieving higher yield levels by using inputs (fertilizer, higher-yielding seeds) and by applying crop rotation.</li> </ul>
Processors	<ul style="list-style-type: none"> <li>• Establishing 99.5*% cleaning, hulling and sterilization companies for sesame and niger seed. Despite new companies started recently, the overall production capacity of especially hulling and sterilization is still less than 10% of all exports.</li> <li>• Improved edible oil processing practices for the domestic market with special attention for bottling, branding, and promotion.</li> <li>• Olive and peanut oil production.</li> <li>• Production of shortening for bakery applications.</li> <li>• Small-scale castor and jatropha factories for local energy production to substitute mineral oil.</li> </ul>
Collectors/ middlemen	<ul style="list-style-type: none"> <li>• Collecting large quantities of specialties as support for dedicated supply-chains or large export chains.</li> <li>• Optimizing ECX trade in such a way that it is in line with market opportunities.</li> <li>• Organizing efficient logistics between growers and processors or exporters.</li> </ul>
Exporters	<ul style="list-style-type: none"> <li>• Export of high value oilseeds and edible oil. See table 2 for a specification.</li> <li>• Establishing dedicated supply-chains from farmer to end users in specialties e.g. sesame oil, hulled sesame, organic seeds, linseed oil.</li> </ul>

Two strategies to develop the Ethiopian oil sector are recommended:

1. *Substituting imported edible oil.* Ethiopia spends 40 tot 50% of the export revenues of oilseeds on the imports of edible oil. Ethiopia has excellent opportunities to produce edible oil for domestic consumption and substitute imported edible oil.
2. *Export to global and European market.* By identifying market windows and implementing supporting institutions the export quantity can increase as well as the average price per unit.



The two strategies are mutual dependent and success of one enhances the success of the other.

On the domestic market, the most important market windows are:

- (i) substituting imported by domestically produced edible oil.
- (ii) using castor and jatropha seeds for biofuels.

The market windows for export markets are summarized in table 2. Firms with a different structure can serve different markets. E.g., large state farms or large oil millers who are able to produce large volumes serve the export markets. Small-scale enterprises might have the best opportunities on the domestic market.

Table 2: Export market windows for oilseeds

<i>Product</i>	<i>Market</i>	<i>Opportunity</i>
Sesame seed with high purity level (99.5+%)	Bakery applications	Investment in cleaning facilities
Hulled sesame seed	Bakery applications	Investment in hulling facilities
Specially sesame seed oil	Different food purposes (e.g. 'wok' oil)	Organizing local crush and bottling.
Organic sesame seed	Organic food applications	Organizing organic chains from farmer to end user
Linseed with high omega-3 and 6 fatty acids	Applications in specific healthy food products	Identify specific varieties with highest amounts of omega 3 and 6. Setting up export chains
Castor beans	Wide variety of technical applications	Identify opportunities for organizing collection. Identify main characteristics. If cost competitive with India, setting up export chains to Europe and other destinations
Olive	Different food purpose	High value export oil as sesame oil.
Safflower seed	Applications in specific healthy food products	If high C18:2 level, identify opportunities for organizing export chains
Safflower petals	Dyeing industries	Colors based on natural ingredients.

Overall sector recommendations are:

- Increase productivity
- Maximize the use of crushing & refining capacity
- Ensure a level playing field for edible oil (import vs. domestic production)
- Investigate growing conditions and make a cost-benefit analysis for soybean and sunflower
- Create more added value through processing (cleaning, hulling, sterilization)
- Improve knowledge of international market demand
- Improve contract discipline (Code of Conduct)

The Public-Private Partnership on Oilseeds in Ethiopia (PPP Oilseeds) aims at improving the overall competitiveness, quality, and added value of the oilseeds sector. The PPP assists in business-to-business linkage for trade and joint investment, stimulates public private dialogue, and carries out projects in the field of: improving productivity in linseed and sesame, improving edible oil quality, the development of an Exporters' Code of Conduct and capacity building for the exporters' association EPOSPEA.

# 1. Introduction

This study explores business opportunities in the Ethiopian oilseeds sector, both for domestic and European companies. Business opportunities range from import substitution of edible oils to export of high value seeds and oil. This report builds on an earlier version of the study 'Oilseeds Business Opportunities in Ethiopia' of 2007, and the many positive reactions and comments we received on that report.

The findings are derived from intensive field visits, the day-to-day work in linking Ethiopian and European businesses over the past two years and public databases and reports. This report portrays success cases and additional opportunities. The report represents experiences from all stakeholders, from government officials to traders, and from factory managers to importers in Ethiopia as well as in Europe.

The report is structured as follows: chapter 2 provides general background information on Ethiopia. Chapter 3 describes Ethiopia in the global oilseeds chain and chapter 4 the Ethiopian oilseeds chain from primary production, collection and trade to oilseed crushing and refining. Chapter 5 deals with Ethiopian oilseed markets, both domestic and international, and the opportunities for growth. Special attention is paid to two of the main Ethiopian export oilseeds, sesame, and linseed. Strengths, weaknesses, opportunities, and threats (SWOT analysis) of the Ethiopian oilseeds chain are analyzed in chapter 6 based on information of chapters 2 to 5. The report concludes with recommendations for enhancing trade and investment in the Ethiopian oilseeds sector (chapter 7).

## 2 Country profile of Ethiopia

### Key findings:

- Ethiopian food demand will increase at least with one third until 2020 due to the population and income growth.
- The oilseeds sector can benefit from a special government regulation to encourage exports and foreign investment
- Ethiopia's infrastructure is improving rapidly enabling faster cargo transport.
- Ethiopia's economy grew on average by more than 7% over the past 10 years. Also for 2009, more than 6% is expected.
- Agricultural research is on an adequate level and impact oriented.

### 2.1 General

#### Key Figures:

Population in 2008:	77.2 million. Growth rate 2.6%.
Capital:	Addis Ababa, 3.6 million inhabitants.
Land Area:	113 million ha, 27 times the Netherlands.
Agricultural land:	20% of land area in use, 56% is suitable for agriculture.
GDP:	56 USD billion (Purchasing Power Parity =PPP).
GDP-growth:	6.8% in 2009 (est.), 11.6% in 2008, 11% in 2007 and 2006.
Origin GDP:	Agriculture 47%, industry 13% and services 40%.
GDP (PPP) / capita:	700 USD (Sudan 1.900; Kenya 1.700; Egypt 5.000, The Netherlands; 39,000 USD) in 2007.
Currency	Ethiopian Birr (ETB); 1 € = 18.6 ETB; 1USD = 12.6 ETB (13/10/2009).
Literacy:	male 50%, female 34% (2003 est.).
Inflation:	40% in 2008.
Main exports:	coffee, chat, gold, flowers, leather products, live animals, oilseeds.
Export destinations:	Germany 8%, Saudi Arabia 7%, US 7%, Djibouti 7%, China 7%, Italy 7%, Japan 6%, Netherlands 5% (2007).
Main imports from:	Saudi Arabia 17%, China 16%, India 8%, Italy 5% (2007).

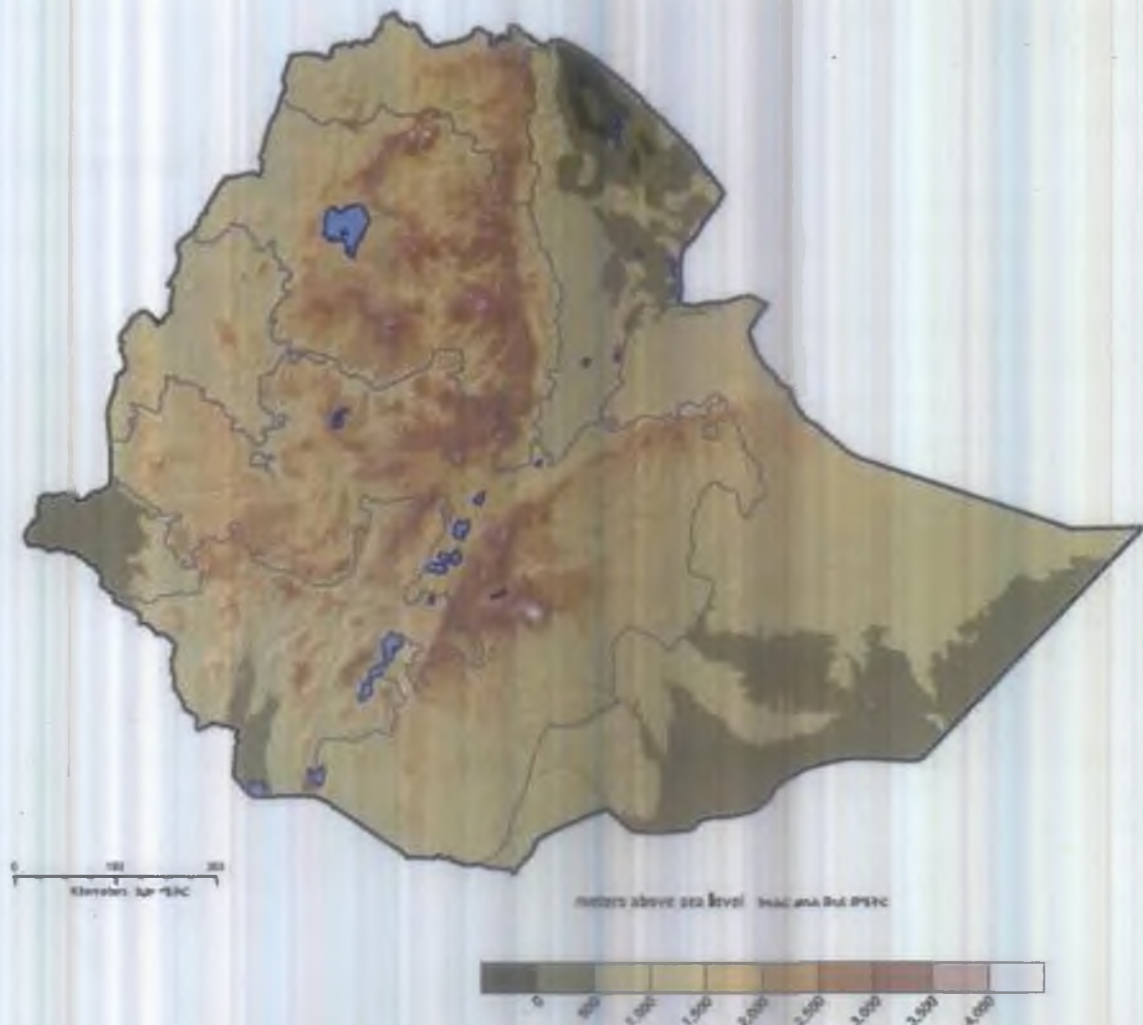
#### Regions of Ethiopia



1. Addis Ababa (city)
2. Afar
3. Amhara
4. Benishanqul-Gumuz
5. Dire Dawa (city)
6. Gambela
7. Harari
8. Oromia
9. Somali
10. Southern Nations, Nationalities and People's Region
11. Tigray

Source: CIA, 2009; Wikipedia, 2008, World Development Indicators and The Economist Intelligence Unit Limited, 2009.

Politics of Ethiopia take place in a framework of a federal parliamentary republic, whereby the Prime Minister is the head of government. The government exercises executive power. Federal legislative power is vested in both the government and the two chambers of parliament. The judiciary is independent of the executive and the legislature. The Ethiopian People's Revolutionary Democratic Front (EPRDF) dominates the government. In 2005, the EPRDF won almost 60% of the seats in the parliament, despite the loss of 150 seats to the opposition. In June 2010 new general elections will be held.



**Figure 1: Topographic map of Ethiopia**

Ethiopia has a good main road infrastructure, although with 35 km per 100,000 ha the road density is relatively low considering the African average of 50 km per 100,000 ha. The main roads converge on Addis Ababa. Currently the roads from Addis Ababa to Djibouti and from Bahir Dar and Hawassa to Addis Ababa are in perfect shape. In addition, new asphalt roads are being built between Gonder and Humera (main sesame producing areas) and Bale Mountains (Robe/Goba) to Hawassa (important linseed producing areas). The Bale road is expected to be finished before the end of 2010. To the West the road to Gambella is already paved and a new road linking Mekelle to Djibouti is almost finished. Road transport costs are estimated at around 50 USD for transporting 1 ton of goods from Mekelle to Djibouti or from Addis Ababa to Djibouti. In conclusion, the primary roads are good; the secondary and tertiary roads need improvements for efficient logistics. In recent years, telecommunication and information technologies have considerably improved. Large investments have been made to improve further road, rail and ICT infrastructure. The bulk (95%) of Ethiopia's international trade is handled by Djibouti. Though Djibouti remains the most important and largest port, Port Sudan (Sudan) and Berbera (Somaliland) rise in importance. Port Sudan is taking a substantial share of the sesame exports of Humera and Metema, while Berbera can become more important for new growing areas in the Ethiopian Southeastern regions. However, transport to especially Berbera remains complicated, as road infrastructure is still poor. Now, a new dry port for cargo transshipment is finalized in Mojo (80 km East of Addis on the main road to Djibouti), where containers can be checked and cleared for Djibouti port. In addition, storage facilities are established to relieve the congested port of Djibouti. A second dry port is planned for Semera Town (Afar), 580 km Northeast of Addis Ababa, close to the border with Djibouti. In October 2009, prices for container shipment to Rotterdam ex-Djibouti were around 1,250 USD per

container excluding bunker surcharge and paperwork. This price is on the same level as from other East African countries and almost twice as high as from Canada to Rotterdam.

Hydroelectricity provides 98% of the generated power and has still large potentials. New dams are being built in the west and north of the country and it is expected that Ethiopia soon will become a net exporter of electricity. This might alleviate the present shortage of electricity that many producers face.

Ethiopia has abundant agricultural land, but a large part is not (yet) in cultivation. Water shortages are common, though irrigation (flood and drip) is on the increase. Despite Ethiopia's association with severe drought, the country is well endowed with mostly unused water resources (springs and rivers). For example, more than 85% of the river Nile originates from Ethiopia. Nevertheless, Ethiopia is facing natural and environmental degradation, especially in the highlands. Forests are diminishing and soil fertility is declining. In the lowlands and midlands (between 500 and 2000 meters altitude) still much fertile and uncultivated land is available for agricultural investment. The population growth of 2.6% annually results in a population of 110 million people by 2020: an increase of one third compared to 2008. Together with continued economic growth, this will steer the demand for more luxury and processed food.

Fundamental economic reforms were initiated in 1991. Though land remains in public ownership barring private ownership, the government allows for leasing (49 to 99 years) land in urban and rural regions. The economic reform, the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP) has been set to improve both macro and micro-economic indicators, ranging in objectives from macro-economic adjustments, structural reform, poverty reduction and food security. Among others, the World Bank granted loans for improvement of roads, water and sanitation, education, ICT and private sector capacity building. Ethiopia started negotiations to join WTO. This will strengthen the economic liberalization and might support foreign investments.

Table 2.1: Selected business indicators in 2007/2008

Indicators	Ethiopia	Kenya	Sudan	Egypt
Ease of Doing Business Rank	116	82	147	114
Starting a Business	118	109	107	41
Dealing with Construction Permits	59	9	135	165
Employing Workers	95	68	144	107
Registering Property	154	119	35	85
Getting Credit	123	5	131	84
Protecting Investors	113	88	150	70
Paying Taxes	37	158	67	144
Trading Across Borders	152	148	139	24
Enforcing Contracts	78	107	143	151
Closing a Business	74	76	181	128

Source: World Bank: Doing Business in 2007/2008; Ranking out of 181 countries: 1= best and 181 is the worst performer.

Table 2.1 provides some information on doing business in Ethiopia together with the neighboring countries and Egypt. Kenya performs better, Ethiopia performs on the same level as Egypt and better than Sudan. Ethiopia's rank is lower compared to 2006: in that year it ranked 97 out of 175. Improvements are made on the indicators 'Employing workers', and 'Paying taxes'. Though, 'Starting a business', 'Registering Property', 'Protecting Investors' and 'Trading Across Borders' did not improve and stayed at the same level.

Inflation is a key problem in the Ethiopian economy. Especially during the food crisis of 2008 inflation levels reached more than 40% on a year-to-year basis. As the Ethiopian Birr (ETB) is pegged to the USD, this inflation is not reflected in the exchange rate. Current large imports of wheat and maize are curbing down food price inflation. The inflation for 2009 is expected to decrease to around 15%.

The second major challenge in the monetary policy of Ethiopia is the availability of foreign exchange currency. Imports largely exceed exports and in June 2009 foreign exchange reserves at the banks stood at 2 months of imports. This affects imports of all goods and commodities including machinery and factory equipment. Due to the relative overvaluation of the ETB, domestic market prices are often higher than world market prices. Depreciation of the ETB can make Ethiopian products more price competitive on the world market.

Manufacturing industry only represents 13% of GDP, so more domestic manufacturing of previously imported goods and new (agro-processed) export commodities can have good prospects in Ethiopia. Non-agricultural manufacturing industry is only 3-5%, the remaining 8-10% is agricultural manufacturing industry. Donors and the IMF recommend depreciating the ETB in order to improve Ethiopian competitiveness on the world market.

## **2.2 Agriculture**

Agriculture, mainly smallholdings, employs 80% of the labor force and accounts for 47% of the GDP. The growth rate of the GDP of the agriculture sector is high compared to that of industry and services: 13 to 17% in 2003 till 2005 for agriculture and 6-10% in the other sectors. This can partly be attributed to the good rainfall in these years. The highlands are fertile, but are threatened by overpopulation and soil degradation. The farming is rain fed and low rainfall is often a cause for severe food shortages. The Ethiopian government indicates the oilseeds sesame, noug (niger seed), safflower and rapeseed as high priority export crops. Oilseeds exports registered substantial growth: 46,000 tons in 2001, 70,000 to 74,000 in the period 2002 to 2004 it peaked on 224,000 in 2005 and dropped to 193,000 in 2006 and 145,000 tons in 2007. The government earmarked agro-processing and textiles as high priority, which can result in larger availability of cottonseeds.

To boost exports, the Ethiopian government has developed a package of incentives under Regulation No.84/2003 to encourage investments in agriculture. Section 2.3 presents an overview of these incentives. The flower industry is flourishing and enhanced by government initiatives: Ethiopia is now an important world producer of roses.

The agricultural research in the Ethiopian Institute of Agricultural Research (EIAR) is divided in federal research institutes and several regional research institutes. Recently, the focus has been shifted to a more thematic and interdisciplinary approach and to the impact on the sector. We got the impression that the visited institutes are well focused and are performing at a good level. Research clearly showed that higher oilseeds yields are achievable with relatively minimal efforts.

## **2.3 Incentives to enhance institutional environment**

The government started economic restructuring, invests in road, telephone, and railway infrastructure and wants to become a member of the WTO. Land is state owned and can be leased from the government. To encourage private investment, the Ethiopian Government has developed a package of incentives under Regulation No.84/2003 for domestic and foreign investors engaged in new enterprises and expansions, across a range of sectors. The incentives that are available both to foreign and domestic investors are mentioned below. An extensive Investment Guide ('Investing in agricultural sector of Ethiopia – A guide for new investors (2008)') can be obtained through the Dutch Embassy ([add-lnv@minbuza.nl](mailto:add-lnv@minbuza.nl)) explaining all investment procedures to set up a business in the agro-sector.

### *Customs Duty Exemption*

A 100% exemption from the payment of import customs duty and other taxes levied on imports is granted:

- for investments in capital goods and construction materials necessary for the establishment of a new enterprise or
- for the expansion or upgrading of an existing enterprise as well as spare parts worth up to 15% of the value of the imported capital goods.

Such investment capital goods may be transferred to investors enjoying similar privileges.

Exemptions from customs duties or other taxes levied on imports are granted for raw materials and packing materials necessary for the production of export goods.

All other goods and services destined for export are exempted from any export and other taxes levied on exports.

### *Income Tax Exemption and Loss Carry Forward*

Any income derived from an approved new manufacturing, agro-industrial or agricultural investment is exempted from the payment of income tax ranging from 2-8 years depending on the area of investment, export volume and the location in which the investment is undertaken. Income derived from an expansion or upgrading of an existing manufacturing, agro-industrial or agricultural enterprise is exempted from income tax for a period of two years if it exports at least 50% of its products and increases, in value, its production by 25%. Business enterprises that suffer losses during the tax holiday period can carry forward such losses for half of the income tax exemption period, after the expiry of such a period.

### *Remittance of Funds and Investment Guarantee and Protection*

Foreign investors are entitled to make the remittances out of Ethiopia (from e.g profits, interests and proceeds from sale of an enterprise) in convertible foreign currency at the prevailing rate of exchange on the date of remittance. In Ethiopia, both the Constitution and the investment Code protect private property. Ethiopia is also a member of MIGA (Multilateral Investment Guarantee Agency), which issues guarantees against non-commercial risks to enterprises that invest in signatory countries. Besides, Ethiopia has signed bilateral investment promotion and protection treaties BITs (Bilateral Investment Treaties) with a number of countries.

Most major Ethiopian oilseed exporters are member of the Ethiopian Pulses, Oilseeds and Spices Processors Exporters Association (EPOSPEA). This association is working hard to improve its market information system. EPOSPEA also organizes workshops together with SNV and the Private Public Partnership (PPP) on Oilseeds to share knowledge within the supply chain in order to better anticipate on critical market issues.

The Public-Private Partnership on Oilseeds in Ethiopia (PPP Oilseeds) has been established by the main public and private stakeholders in the oilseeds value-chain to improve the overall competitiveness, quality and added value of the oilseeds sector. Partners in the PPP are the Ethiopian Ministry of Agriculture and Rural Development (MoARD), Ministry of Trade and Industry (MoTI), the Ethiopian Institute of Agricultural Research (EIAR), the Federal Cooperative Agency (FCA), the Ethiopian Pulses Oilseeds and Spices Processors and Exporters Association (EPOSPEA), the Addis Ababa Oil Millers Association (AAOMA), the Dutch Product Board for Margarines Fats and Oils (MVO) and the Embassy of the Kingdom of the Netherlands in Ethiopia (EKN).

The PPP assists in business-to-business linkage for trade and joint investment, stimulates public private dialogue and carries out projects in the field of: boosting productivity in linseed and sesame, improving edible oil quality, the development of an Exporters' Code of Conduct and capacity building for the exporters' association.

### 3. Ethiopia in the global oilseeds chain

#### Key findings:

- One third of the Ethiopian oilseed production is sesame seed and 13% linseed. Ethiopia is the fifth world producer in linseed and the sixth in sesame seed.
- Ethiopia is third world exporter of sesame seed after India and Sudan. In other oilseeds except for niger seed, the share is negligible.
- Sesame seed has the highest value per ton of relevant Ethiopian oilseeds, more than twice the value of linseed. World sesame and olive oil import prices are the highest: 3 to 4 times the price of almost all other edible oils.
- The main oilseed commodities in international trade are soybeans and in edible oil, palm and soybean oil.
- Ethiopia imports large quantities of soybean and palm oil. The value of imported edible oil is 40 to 50% of the export earnings of oilseeds.
- A high level of poly-unsaturated fatty acids and a high omega-ratio are preferred characteristics in edible oils.
- Poly-unsaturated fatty acids are interesting for the paint industry and the flooring industry (linoleum), because of drying properties.

#### 3.1 Production of Ethiopian oilseeds

Oilseeds are cultivated by 30% of the agricultural holdings on 7% of the total agricultural land. Oilseeds are the third important crop in acreage after cereals and pulses. Figure 3.1 presents the distribution of the total production of oilseeds in Ethiopia, which amounted to 665,000 tonnes in 2008/2009. The main crops in 2008/2009 are sesame, noug (neug or niger seed; mainly represented by the category Not elsewhere specified, Nes, in FAOStat) and linseed.<sup>1</sup> Ethiopia is the sixth world producer of sesame seed and the fifth for linseed. The world's shares of seeds are presented in figure 3.2. In addition, Ethiopia is a relative important world producer of safflower and castor beans. The country has low world shares for cottonseed or groundnuts, despite that these crops are number 4 and 5 in country's production volume. Annex 3.1 provides annual data from 1997-2007.

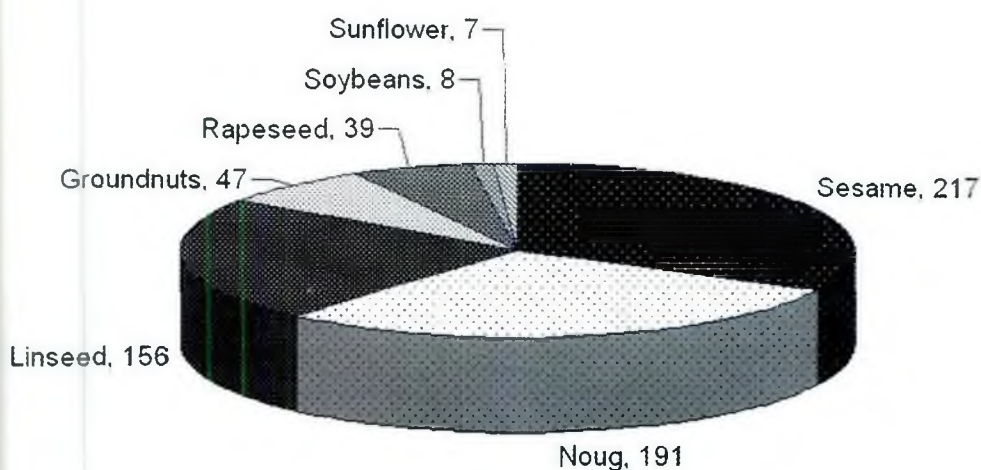


Figure 3.1: Ethiopian oilseeds production: tons in 2008/2009 (2001 E.C)

Source: CSA

<sup>1</sup> CSA, FAO and UN Comtrade data show substantial variation in oilseed production figures. In this report we have chosen CSA data for domestic market production, and UN Comtrade/FAO data for international comparisons.



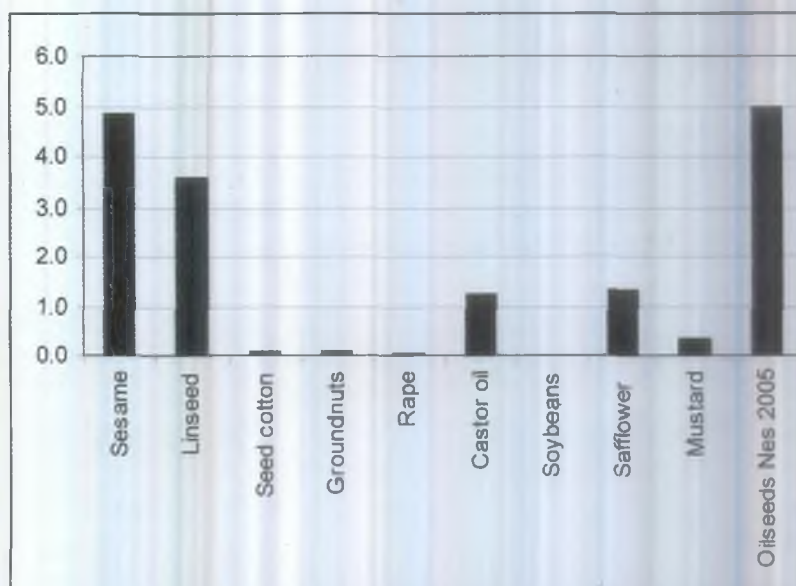


Figure 3.2 World shares (%) of Ethiopian oilseed production (tons) in 2007

Source: FAOSTAT, Oilseeds Nes 2005

### 3.2 International trade in oilseeds

The market prospects of edible oil are promising. According to the OECD the demand increases faster than for other agriculture products. This will result in attractive prices. The prices in 2008 are relatively high for most oilseeds or edible oil. For comparison, the 2006 prices are added. Ethiopia ranks third in sesame seed exports in the World, after India and Sudan. Except for sesame seed, the Ethiopian exports are negligible. Ethiopia is also a large exporter of Niger seed which is not specified in the UN Comtrade data. Despite Ethiopia's large world share in linseed production, its export is rather small. Table 3.1 shows that the world's major commodities in oilseeds are soybeans and rape / colza seeds.

Table 3.1 Exports of oilseeds by the World and Ethiopia, world price and main exporters in 2008

Product	World		Main exporters (% of world export)	Ethiopia 1,000 Tons	
	1,000 Tons	Export price (USD / ton)			
			2006	2008	
Soybeans	96,035	238	365	USA (53), Brazil (26), Argentina (12)	2.1
Ground-nuts fresh	1,194	759	1,154	India (25), USA(21), China (19), Argentina (12),	0.1
Linseed	1,029	312	694	Canada (63), Belgium (19), Russia (5)	0.0
Rape/colza seeds	16,926	295	510	Canada (39), Ukraine (14), Slovakia (13), France (12)	3.3
Sunflower seeds	2,597	387	769	Bulgaria (18), Romania (18),France (11), USA (10)	0.0
Cotton seeds*	338	201		USA (47), Greece (18), Australia (14)	0.1
Castor oilseeds	111	438	83	Indonesia (100)	0.0
Sesame seeds*	891	871		India (26), Sudan (22), Ethiopia (21)	131.0
Mustard seeds	289	385	1,064	Canada (55), India (15), Germany (7)	0.2
Safflower seeds*	3	349		Argentina (32), Australia (17), India (15)	0.0

Source: UN Comtrade data

\*Quantities and shares are from 2006 due to insufficient trade data.

A large number of countries exports sunflower seeds, the third major export commodity in table 3.1. If Ethiopia aims at becoming an exporter in one of these oilseeds, the performance benchmark will be these large exporters. Only for sesame seeds, Ethiopia is in the top 5 exporters. India's and China's booming economies result in more domestic demand for the relatively luxury product of sesame, this in turn increases the overall demand for sesame from countries like Ethiopia. The prices for rape, sunflower, and mustard seeds are relatively high in 2008 compared to previous years.

Table 3.2: World imports of oilseeds and edible oil, prices and main importers

Product	1,000 tons	Import price USD / ton		Main importers (in% world imports)
		2006	2008	
<b>Oilseeds</b>				
Soybeans	68,783	269	566	China (54), the Netherlands (6), Japan (5)
Ground-nuts fresh	1,576	723	1,153	The Netherlands (19), Indonesia (13), Mexico (7)
Linseed	1,022	340	691	Belgium (43), USA (19), Germany (16)
Rape or colza seeds	14,130	308	604	Germany (19), Japan (16), the Netherlands (14), Mexico (9)
Sunflower seeds	2,293	446	878	Turkey (20), Germany (17), The Netherlands (11)
Cotton seeds*	1,2220	205		Mexico (30), Italy (16) Japan (13)
Castor oilseeds *	175	207		China (48), Brazil (37), Thailand (11)
Sesame seeds*	982	901		China (26), Japan (16), Turkey (9)
Mustard seeds*	248	457		USA (25), Bangladesh (23) Germany (15), France (10)
Safflower seeds*	26	509		Belgium (34), The Netherlands (18), UK (8)
<b>Edible Oil</b>				
Soybean oil	8,003	572	1,209	China (32), India (7), France (7)
Ground-nut oil	2178	1,019	1,930	France (20), USA (18), Italy (17)
Olive oil	1,450	4,190	4,116	Italy (35), USA (18), France (8)
Palm oil*	26,2234	465		China (19) India (11), Bangladesh (7), Pakistan (6), the Netherlands (6)
Safflower, sunflower and cotton-seed oil	3,862	752	1,579	Turkey (11), The Netherlands (9), Belgium (8), Germany (8), France (8)
Coconut, palm kernel, Babassu oil*	4,853	560		USA (16), Malaysia (13), Germany (11)
Rape, colza, mustard oil	4,271	765	1,382	USA (24), Germany (11), France (9)
Linseed oil refined*	159	900		the Netherlands (16), Germany (12), Gambia (8), Japan (6)
Linseed oil crude	77	743	1,408	the Netherlands (28), Germany (22), China (9)
Maize oil refined	253	1,030	1,786	Tunisia (12), UAR (12), USA (8), Canada (7)
Maize oil crude*	429	722		Turkey (29), Saudi Arabia (18), Tunisia (10) Italy (7)
Castor oil	402	855	1,485	France (24), China (21), USA (12), Germany (11)
Tung oil*	16	1,336		USA (13), Japan (12), Rep. Korea (11), Netherlands (10)
Sesame oil	39	2,458	3,546	USA (28), China + Hong Kong (14), UK(7)

Source: UN Comtrade data

\* Quantities and shares are from 2006 due to insufficient trade data.

The largest commodity in world imports (tons) is soybeans in seeds and palm oil in edible oil; they outnumber the total of the other commodities. Linseed ranks sixth and sesame seed seventh in the oilseeds imports. Belgium is the major linseed importer with a share above 50%. Many countries import sesame seed in rather small quantities. China, Japan, and Turkey are the overall largest

importers of oilseeds and edible oil. Chapter 5 discusses the market of linseed and sesame seed in detail. India ranks on the second position for edible oil imports. Table 3.2 shows that fresh groundnuts and sesame seeds are the most expensive of the selected seeds followed by sunflower, safflower and mustard seeds. The large commodities such as soybeans and rape / colza seeds have rather low prices. The high transaction and transport costs in Ethiopia reduce the potentials for bulk commodities as sunflower, soybean, and palm oil on the world market; however they might be promising and of interest on the domestic market. Especially high value products such as sesame seeds and fresh groundnuts are of interest for export. Other seeds, like linseed are of interest if these have a fatty acid composition preferred by consumers.

The price of sesame oil is next to olive oil the highest, while the commodities e.g. palm and soybean oil are rather low in price (table 3.2). This underlines the specialty feature of olive and sesame seed. Sesame is for 65% used as oil extraction and 35% for food, mainly roasted. The fatty acid composition is rather attractive, due to the level of unsaturated fatty acids.

### ***3.3 Domestic use, import and export***

It is noteworthy that Ethiopia imports large amounts of edible oil, mainly palm oil. Despite the large production of linseed and some soybeans, the country imports linseed and soybean oil especially in the years 2003 until 2005 (see for detailed information annex 3.2). The value of these imports ranges from 56 million USD in 2006 to 75 million USD in 2007. This is 40 to 50% of the export earnings of oilseeds; in 2008 is the value the edible oil imports more or less on the same level as the value of oilseeds exports.

Oilseeds are the second Ethiopian export product. Sesame seed is the main oilseed export product. Niger seed, as second, is exported mainly to the US and UK as birdseed. All other oilseed crops (soybeans, linseed, groundnuts, cottonseed etc.) grown in Ethiopia are almost entirely used domestically. Reliable figures on domestic use are not available. At the moment, Ethiopian edible oil export is of any significance.

The oilseed crushing and refining industry produces for the domestic market. Most of the oil is consumed as crude oil. Ethiopia is a net importer of refined oil, mainly refined palm oil. Table 5.1 provides detailed information. Refined oil is mainly used in the urban regions. Palm oil is mainly imported from Malaysia, Singapore, and the United Arab Emirates. Italy is the major supplier (75%) of soybean oil, followed by Turkey (10%). The peak in 2003 is the result of food aid.

Table 3.3: Production, exports and imports of oilseeds and edible oil by Ethiopia in 2007

Product	Production 2007	Exports 2008		Imports 2008	
	1,000 tons	1,000 tons	price USD / ton	1,000 tons	Price USD / ton*
<b>Oilseeds</b>					
Soybeans	8	2.12	451	0.57	625
Ground-nuts fresh	28	0.10		0.39	5,896
Linseed	67	0.02			
Rape or colza seeds	26	3.30	670	0.62	1,322
Sunflower seeds	na	0.01			
Cotton seeds	65	0.14			
Castor oilseeds	15	0.00			
Sesame seeds	164	130.98	1,603	7.50	2,008
Mustard seeds	2	0.19			
Safflower seeds	7	0.00		7.50	2,008
Oilseed not elsewhere specified (2005)	120	27.99	1,431	0.45	2,078
<b>Edible Oil</b>					
Soybean oil	na			6.79	1,400
Ground-nut oil	na	0.02		0.00	
Olive oil	na			0.32	2,003
Palm oil	na			142.65	1,413
Safflower, sunflower and cotton-seed oil	na			0.12	
Coconut, palm kernel, Babassu oil	na			0.36	
Rape, colza, mustard oil	na	0.20		0.00	
Linseed oil	na			1.53	1,690
Maize oil	na			0.01	
Castor oil	na				
Tung oil	na				
Sesame oil	na			0.01	

Source: UN Comtrade data and FAOstat

na = not available

\* Prices of imported oilseeds (except soybeans) are not mentioned, because of the small quantities or the prices seem not realistic.

### 3.4 Fatty acids in oilseeds and consumer preferences and industrial applications

Worldwide vegetable oil use is about 385 million metric tons of oilseeds per year (with 110 million metric tons of vegetable edible oil in 2005/2006) and 260 million tons of seed meal. About 85% of the vegetable oil is used for food and feed purposes and 15% for industrial uses like paints, plastics, lubricants, and specialty chemicals. The growth in the world demand for plant oils (1970-2000) was 4.4% per annum and for seed oil meal 3.9% per annum. The use of plant oils is expected to increase e.g. due to higher levels of consumption in emerging countries and the use of biodiesel as substitute for fossil oil and to reduce carbon dioxide emission.

Unsaturated fatty acids both in food and non-food industry are highly in demand. For better understanding of the different fatty acids, we explain first the names and structure of plant oils and fatty acids in general. Plant oil is a molecule with a glycerol (glycerin) backbone on which three fatty acids are bound – through esterification of the carboxyl-end of the fatty acids. The length of

the carbon chain and the number and position of the double bonds distinguish fatty acids. For example, a C16:0 fatty acid (a palmitic acid) has a carbon chain with 16 C-atoms and has no double bonds and C18:3 (linolenic acid) has 18 C-atoms with three double bonds. More specifically, in most sources of linolenic acid, the double bonds are located at positions 9, 12 and 15 from the carboxyl end (COOH-end) of the fatty acid. As this is the most common form it is called alpha-linolenic acid. It is one of the omega-3 or n-3 fatty acids. This means that the first double bond from the C-end of the fatty acid chain (opposite to the carboxyl- or COOH-end of the fatty acid) is at the third carbon atom, this is at position 15 counted from the COOH-end (alpha-end). Figure 3.3 presents an alpha-linolenic acid (C18:3) as found in linseed oil. It is officially called all-cis-9,12,15 octadecanoic acid (9, 12 and 15 are the positions of the double bonds counted from the COOH-end (the alpha-end)). It is an omega-3 (or n-3) fatty acid, because the first double bond counted from the omega end (the C-end) of the fatty acid is at the third carbon.

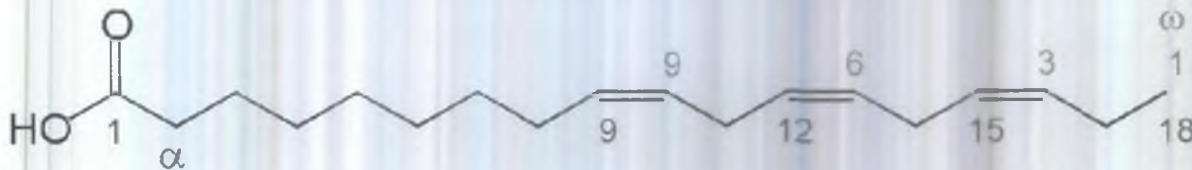


Figure 3.3: Example of numbering system of fatty acids.

#### *Vegetable oil for consumption*

The advantage of mono-unsaturated fatty acids (C18:1, unsaturated fatty acid with only one double bond, oleic acid) is the lower melting point, but a higher oxidative stability than the poly-unsaturated fatty acids (C18:2 and C18:3). Towards food application poly-unsaturated fatty acids (more double bonds) reduces storability as these oils turn rancid faster. Especially the trend towards liquid frying oil on basis of plant oils increases the demand for high C18:1 oil. Also towards biodiesel high C18:1 is preferred over high C18:3 or C18:2, because of the higher oxidative stability.

Intake of  $\alpha$ -linolenic acid through food is claimed to have a beneficial effect on human health, because it is related to a lower risk of cardiovascular disease. About 10% of the  $\alpha$ -linolenic acid is converted to EPA (eicosapentaenoic acid, C20:5, n-3) and EPA can be converted to DHA (docosapentaenoic acid, C22:6, n-3). These two fatty acids play a vital role in many metabolic processes. EPA and DHA are available in fish oil. Humans cannot metabolise these fatty acids directly, but can synthesize them from  $\alpha$ -linolenic acid to a limited extent. Many plant oils contain limited amounts of C18:3 (n-3), but some plant oils like linseed oil can contain this in high amounts (linseed oil can contain more than 55% C18:3).

Other applications of edible oil are shortening (semisolid fat used in food preparation) and margarine. These oils with more saturated fatty acids have a higher melting point, which makes them more suitable for bakery applications.

When comparing the relative health benefits of different plant oils, highly saturated fatty acid containing oils are less preferred (C16:0, C18:0) and a high omega-3 (C18:3) to omega-6 (C18:2) ratio is preferred in combination with a high total level of poly-unsaturated fatty acids. For frying oils a high C18:1 content is preferred over C18:2 and C18:3, because of the higher oxidative stability (does not get rancid easily and can withstand higher temperatures).

Oilseeds do not only contain oil but also protein. Therefore, production of extracted vegetable oil leads to a protein rich by-product that is used in the food and feed industry.

### *Growing industrial demand for vegetable oils*

Poly-unsaturated fatty acids (C18:2, C18:3) are interesting for the paint industry and the flooring industry (linoleum), because of drying properties. Specialty oils like castor oil (high content of ricinoleic acid), tung oil (conjugated, very fast drying oil) or high erucic rapeseed oil (contains 50% C22:1, erucic acid) are not edible oils and they are exclusively used for industrial purposes. As a result of bio-energy and greenhouse gas emission policies, an increased use of vegetable oil as raw material for bio-diesel is foreseen.

As fossil oil reserves are depleting, the industry substitutes fossil oil by vegetable oils. In addition, government ambitions in various countries towards energy independency and reduction of greenhouse gas emissions have led to policies promoting the use of vegetable oils. Compulsory blending of biodiesel up to 5.75% in the EU by 2010 will use up to 2.4% of all vegetable oil production on this planet. This may be driving up vegetable oil prices in the future.

## 4. The Ethiopian oilseeds chain

### Key findings

- The oilseed value chain has many actors at production and collection levels.
- Use of high yielding sowing seeds, other inputs and better agricultural practices can double to quadruple yields per ha.
- Crop grown in a rotation scheme has much higher yields and gross margins than monocropping.
- The Ethiopian Commodity Exchange (ECX) may enhance the market efficiency in oilseeds, by increasing transparency, standard setting, market clearing and payment certainty.
- Oilseed crushers produce around 20% of the domestic consumption of edible oil: 80% is imported as palm oil, sunflower, and soybean oil.
- Underutilization of the capacity for oilseed crushing and refining enables a larger production quantity for substitution of imported oil and for export.

### 4.1 The value chain

This chapter describes the oilseed chain. Figure 4.1 presents the value chain. The following sections discuss the players in the oilseed chain in order of the presented value chain in figure 4.1 as well as business opportunities.

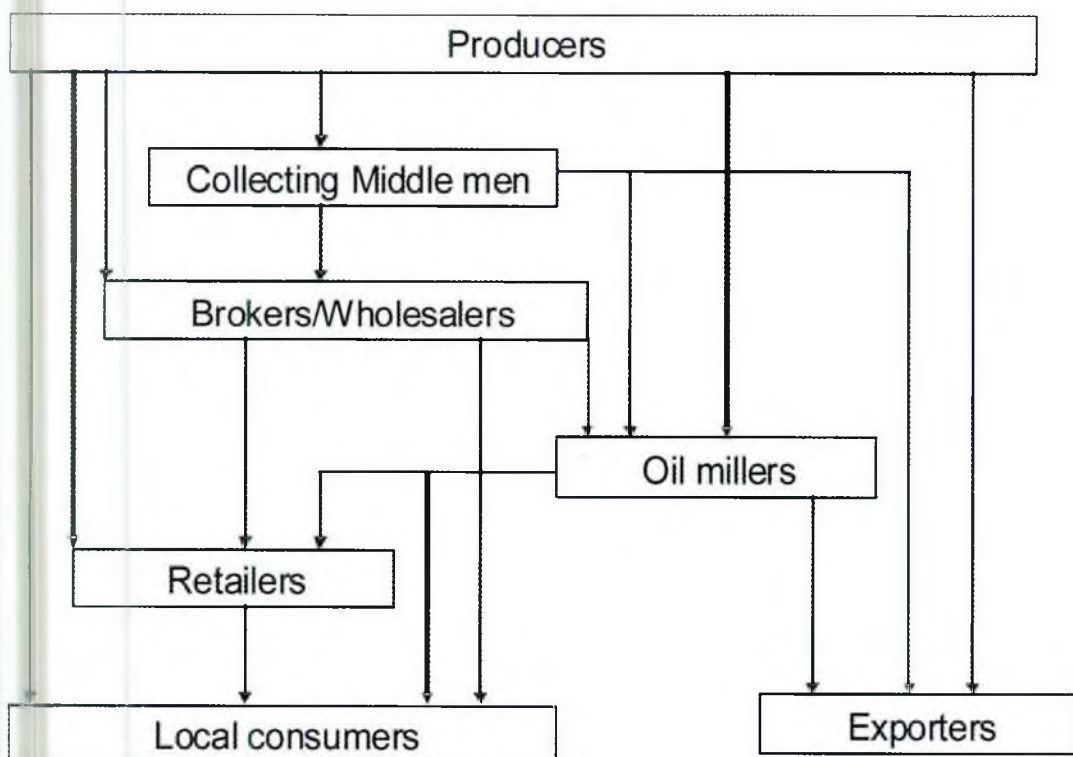


Figure 4.1: Oilseeds and oil chain

## 4.2 Breeding and primary production

This section describes some characteristics of a standard agronomy practice in linseed and sesame and potential improvements to increase the level and quality of the output. The analysis will be carried out separately for both crops, since linseed (highland) and sesame (lowland) require different agro-ecological zones.

### Linseed

The characteristics of suitable agro-ecological zones for linseed are:

- Total rainfall should preferably be between 500 and 1000 mm. If linseed is grown in areas with a water supply of less than 500 mm, the seed and oil yield reduces and there is a shift towards more saturated fatty acids and more protein in the seed.
- Day temperature should be below 30 °C, night temperatures above -5 °C during seedling stage and above 0 °C during flowering and seed set. Total temperature sums are needed of 1600-1850 °C days. Preferred average daytime temperatures are between 19.5 and 24 °C. The total crop duration is between 90 and 110 days.
- High temperatures and low rainfall during flowering and seed set lead to lower seed yields, lower oil content, lower content of unsaturated fatty acids (C18:3, C18:2, C18:1) and increased saturated fatty acids (C16:0, C18:0) and increased protein content.
- Linseed needs vernalization (a cold period that induces flowering), which can be realized with temperature of 2° during 5 to 20 days. With vernalization flowering starts two weeks earlier than without.
- Linseed grows best on medium-heavy soils (sandy-loam). Unsuitable soils are dry sandy soils, wet, compact clays, waterlogged (marshy) soils, or very acid soils. The preferred pH of the soil is between 6 and 7. Linseed is moderately tolerant to salinity.
- Soil nutrients: linseed often only gives a small response to fertilizer application as it can produce well on the residual nutrients that remain in the soil after fertilized crops like wheat.
- Altitudes above 1200 m and below 3500 m, but the main production areas are between 1600 and 2000 m in SW Ethiopia and between 2200 and 2600 m in Bale and Arsi. Agro-ecological zones suitable for linseed have an area of about 2,500,000 ha.

The current practices in linseed primary production are:

- Linseed in Ethiopia only grows as an oilseed crop (not as fiber).
- Farmers use seed of previous harvest as sowing seed. These mainly local varieties are not uniform.
- Land preparation on the smallholdings is done with oxen. Tillage of three times is recommended to create a fine seedbed, but in practice, labor and oxen are limited during the sowing season. This often leads to allocation of the ploughing capacity to crops that have higher economic yields like wheat. Often only one preparation is carried out which creates a coarse seedbed and a lower initial development of linseed. Farmers compensate this by higher levels sowing seed -up to 80 kg/ha-, while with optimal tillage establishment 25 to 40 kg/ha sowing seed is sufficient. The large state farms use modern equipment like tractors and combine harvesters.
- Linseed is normally sown as the last crop in a rotation, without fertilizer application. With the average yields in Ethiopia of 600-800 kg/ha, the crop will take up in the above ground an amount of 50-75 kg N/ha, 10-16 kg P/ha and 40-60 kg K/ha. Care should be taken when nutrients are exported from the field, replenishment of the soil nutrients should take place.

In Ethiopia, Holetta Research Station (part of the Ethiopian Institute for Agricultural Research, EIAR) carries out breeding of linseed among others. Improved varieties show improved resistance to diseases (e.g. mildew and *Fusarium*), improved yields (see table 4.1), and oil content. Fatty acid



composition only has become a breeding target recently and selection for it is not yet fully incorporated in the Ethiopian breeding programs.

Table 4.1: Yields of improved versus local varieties of linseed

Field trial by		Seed yield (kg/ha)
Research station carried out on farms with use of 'extensions package'	Improved varieties	2500
	Local varieties	2000
Farmers' level	Improved varieties	1000
	Local varieties	560

Source: Data from extension research of EIAR.

Oil content ranges from 35% to 42% and fatty acid composition is not normally recorded in Ethiopia but C18:3 (linolenic acid) is known to vary from 40 to over 60% (see table 4.2). For the European markets C18:3 (linolenic acid) as percentage of total fatty acids should be above 55 %, both for food products and industrial uses (e.g. in alkyd paints and linoleum).

Current Ethiopian linseed productivity at 600-700 kg/ha is only half of the normal production levels in Canada (1200-1300 kg/ha). Canadian linseed normally is of the required quality (linolenic acid above 55 %). Still linseed productivity is higher than in India where it is between 300 and 350 kg/ha. Experimental data show that with use of improved varieties the yield at farmers' level is near the level of the Canadian productivity.

Table 4.2: Fatty acids in linseed oil as percentage of oil content in Ethiopia

Fatty acid	Minimum	Maximum
C16:0	4.3	12.3
C18:0	1.9	6.3
C18:1	11.3	29.4
C18:2	10.0	17.4
C18:3	40.5	68.3

## Sesame

Agro-ecological zones suitable for sesame:

- *Rainfall*

Sesame is very sensitive to water logging just after sowing, so sowing should take place at the end of the first rainfall. The crop is fairly drought resistant. About 300-750 mm of rainfall is considered sufficient, but sesame is also grown in areas with over 1000 mm. Too high humidity will cause large problems with leaf blight. In the Awash region with low rainfall, use of irrigation can more than double the yield of sesame compared to rain fed production: 1600 kg/ha with irrigation and 600 kg/ha with rain fed production with the best adapted sesame variety, at the Research Center of Melka-Werrera.

- *Temperature*

Sesame has a high temperature requirement for germination: soil temperatures should be above 25 °C and sesame should be grown therefore in the tropical climates of Ethiopia.

- *Soils*

Soils should be well drained but with good water retention capacity: sesame is sensitive to water logging and mostly grown as a rain fed crop. Soil fertility needs to sustain an uptake of 60 kg N/ha, 30 kg P/ha and 15 kg K/ha. Fertilizer is not normally used on sesame as in many cases no yield response was found. However, with improved disease resistance, increasing yields and declining soil fertility in Ethiopia, the need for fertilization becomes apparent.

- *Altitude*

In Ethiopia, sesame can be grown on altitudes between 500 and 1500 m, but higher altitudes are possible if the temperatures are high enough for good germination.

Sesame requires a normal labor input for land preparation and sowing, a similar labor input for weeding as linseed and a high labor input during harvesting. Harvesting should be carried out in a 2-4 day window, and therefore in many regions labor input from outside the region is used during harvesting. Labor input per ha for harvesting is about 30-40 person-days. Hand harvesting is needed to prevent shattering losses, as the Ethiopian varieties are shattering types, and the seed pods need to be partially open at harvest, since otherwise threshing is difficult. In other countries with higher labor costs, mechanical harvesting is used, but this is only possible with non-shattering types with 'paper shell' pods. These are currently not used, but introduction could be an interesting opportunity.

The growth in sesame productivity is about 2% for Ethiopia and India and 2.8% for China in the period of 1990-2007. The yield growth is induced by improved varieties or improved agronomy practices and crop protection. The potential yield of sesame still is much higher than the actual yield, as still much damage occurs by pests and diseases, insufficient weed control, too high levels of mono-cropping, inefficient harvesting (shattering) and unrealized genetic potential. Potential yields are probably as high as 2000 kg/ha.

Ethiopia is aiming at increasing export of organic sesame. This requires organic farming systems that never use inorganic fertilizers or pesticides. The challenges in such systems are: 1) soil fertility and prevention of exhaustion of the soil, 2) control of pests and diseases, 3) control of weeds, 4) designing a fully organic rotation system. This enables the exploitation of the benefits of the higher prices for organic products.

#### *Crop protection*

More attention to crop protection improves yields of sesame. The yield loss due to diseases and pests in sesame can be very high. In high rainfall areas, full crop losses can occur due to leaf blight. In drier areas, leaf blight is no problem at all. Insect pests can technically be controlled using insecticides. Weed control uses a high labor input as currently this is done by hand. Opportunities will exist to improve weed control by mechanization, if sowing in rows is used. A major option for yield losses is breeding for resistance.

### **Crop rotation: an opportunity for oilseed crops**

Monocropping of wheat leads to severe yield reductions. The second year of continuous wheat production on virgin land or land cultivated with other crops, yield reductions of wheat can range from 15-40 %. Finally, yields can drop to lower than 50 % of the wheat yield on virgin land or after a non-wheat crop. Cultivation for one year with another crop can therefore considerably increase the yield of wheat in the next season compared to continuous wheat cropping. Table 4.3 shows an example of how linseed as a break crop can increase total economic yield. The order of the crops is important in the virgin land situation as the gross return is highest when starting with wheat in the first year. The steady-state order is not important as it is assumed that on the farm all phases of the rotation are present each year. After cultivating the virgin land becomes the steady-state order. It is very clear that monocropping is not optimal both for spring wheat and for linseed. These examples are more or less the common practice in the Bale Highlands. A study showed indeed that the gross margin of wheat is almost 50% higher than for linseed, which is also the case in steady state scheme 3. As wheat needs more inputs than linseed the gross margin, without valuing land, labor and management are for wheat and linseed almost equal. The gross margin per workday however turned out to be twice as high for linseed as for wheat.

Table 4.3: Yields (ton/ha) of spring wheat and linseed in different crop rotation schemes and 4-years total gross return USD / ha

Scheme	Year								4- years' total ton/ha	4 years' gross return total USD / ha	
	1		2		3		4				
	wheat	linseed	wheat	Linseed	wheat	linseed	wheat	linseed	wheat	linseed	
<b>Virgin land</b>											
1	2.5	--	2.0	--	1.5	--	1.0	--	7.0	0.0	1,400
2	2.5	--	2.0	--	1.5	--	--	0.8	6.0	0.8	1,520
3	2.5	--	--	0.8	2.5	--	--	0.8	5.0	1.6	1,640
4	<b>2.5</b>	--	--	<b>0.8</b>	<b>2.5</b>	--	<b>2.0</b>	--	<b>7.0</b>	<b>0.8</b>	<b>1,720</b>
5	--	0.8	2.5	--	--	0.8	--	0.7	2.5	2.3	1,420
6	--	0.8	--	0.7	--	0.6	--	0.5	0.0	2.6	1,040
<b>Steady-state</b>											
1	1.0	--	1.0	--	1.0	--	1.0	--	4.0	0.0	800
2	--	0.8	2.5	--	2.0	--	1.5	--	6.0	0.8	1,520
3	--	<b>0.8</b>	<b>2.5</b>	--	--	<b>0.8</b>	<b>2.5</b>	--	<b>5.0</b>	<b>1.6</b>	<b>1,640</b>
4	--	0.8	--	0.7	--	0.6	2.5	--	2.5	2.1	1,340
5	--	0.5	--	0.5	--	0.5	--	0.5	0.0	2.0	800

Gross return based on 200 USD / ton wheat and 400 USD / ton linseed. Maximum gross return in bold.

Also for the lowland areas where sesame can be grown in the crop rotation will have similar benefits. Data on effects of monocropping of sesame have not been found, but demonstrations of optimal rotation schemes are being implemented (e.g. by EIAR and extension services). The advised rotations contain multiple crops (e.g. sesame-sorghum-soybean-maize, or sesame-sorghum-cotton-maize). The situation with sesame is different from that for linseed, as the farm income per hectare for sesame is often higher with sesame than with other crops leading to a situation of monocropping of sesame.

### 4.3 Collection and trade

No statistics on numbers of collectors and wholesalers and their economic performance have been identified. Great differences exist between linseed and sesame trade. During the fact-finding mission respondents mentioned that linseed is mainly used for domestic consumption, while sesame is for more than 95% exported. In some villages and rural towns, small processing facilities are available for crushing the seeds and the crude oil is sold to local consumers.

Collection of linseed and noug demands substantial efforts due to the small-scale production, over 3 million smallholders produce on average 160 kg oilseeds each. The number of actors involved in the marketing of oilseeds will therefore also be large. An estimation made by SNV mentions over 300 wholesalers in sesame seed only for the capital city of Addis Ababa. This indicates that the number of collectors and wholesalers for the whole country might be in thousands. The relative fragmentation, corresponding transport costs and difficulties for tracking and tracing systems might cause difficulties for large-scale international trade. For sesame this picture is slightly different, especially in the Northwestern regions of Humera, Metema, as landholding size is bigger (on average 4.5 ha.), and production is more specialized towards sesame.

Recently, the Ethiopian Commodity Exchange has been established to facilitate trade between producers and wholesalers and exporters, and to increase transparency. Box 1 highlights the main characteristics of the Ethiopian Commodity Exchange.

### **Box 1: Ethiopian Commodity Exchange**

The Ethiopian Commodity Exchange (ECX) is designed to be a marketplace where buyers and sellers meet to trade, with a certain level of quality assurance and with clear delivery and payment procedures. The ECX is a national multi-commodity exchange with the aim of providing market integrity, by guaranteeing the product grade and quantity. It operates through a system of daily clearing and settling of contracts. The ECX was established in 2008 and currently (October 2009) trades in coffee, maize, wheat, beans and sesame. Coffee is compulsory traded through the ECX and the same is proposed for sesame (harvest season 2009).

Trading takes place based on warehouse receipts issued by ECX operated warehouses throughout the country, where commodities are graded, weighed, and certified. ECX guarantees the grading of the commodities and maintains a central registry of warehouse receipts. The ECX provides standardized ECX commodity-based contracts, which specify grade, delivery location, lot size, and other contract terms. The contracts can be either for immediate delivery or at a pre-specified date in the future.

The ECX trading system combines a physical trading floor located in Addis Ababa, where buyers and sellers may participate in "open outcry" bidding for commodities, with electronic remote access to the trading system. Market prices are constantly changing throughout trading hours and are transmitted in real time to producers and consumers directly using electronic price tickers located in 25 major towns around the country including one in Gonder and one in Mekelle serving Metema and Humera, respectively, as well as website and media. In the near future, the ECX aims to work on online trading and futures as well.

The ECX guarantees payment against delivery through an internal system for clearing and settlement of contracts, in collaboration with partner banks. Every trading day, ECX clears the net obligations of all of the market participants and transmits orders to partner banks and warehouses to settle transactions through transferring funds in one direction and warehouse receipts in the other direction. The ECX provides additional layers of security through operating an Arbitration Tribunal with licensed arbitrators to assure the speedy and professional resolution of any commercial disputes that may arise. Additionally, ECX maintains a system of market surveillance where experts monitor the behavior of market actors to protect the market from manipulation, excessive speculation, fraud, or other malpractice.

### **4.4 Oilseeds processing crushing and refining**

Ethiopia has a large number of local small-scale processors. During the fact-finding missions, it has been indicated that mostly domestic, crude oil and imported palm oil are used for cooking. The estimated actual domestic production ranges between 5,000 and 8,000 tons annually for the medium and large-scale enterprises. This production is less than half of the full capacity. This provides an opportunity to increase production for domestic consumption as substitution for imports. Taking into account that the small-scale producers have a market share of two third, the total available production is between 15,000 and 24,000 tons annually. Ethiopia imports between 15,000 and 160,000 tons edible oil in the period 2001-2008 (Annex 3.2) and in the years before between 10,000 and 20,000 tons. That means that in the last 5 years the imports are 10-15 times the domestic production. This results in an available amount of edible oil of less than 0.5 kg per capita in 2000 to around 2.0 kg per capita in 2009. The increase of import suggests a potentially large domestic market, with rising incomes. Main imports of edible oil are palm and soybean oil. *Substitution of these oils by domestic production especially sunflower, soybean or maize oil seems feasible, encouraged by high domestic prices. Imports show large variations between years, which can partly be explained by food aid of specific edible oils (e.g. soybean oil in 2003).*

The firms mentioned in table 4.4 are almost all crude oil producers. The number of processors of (semi)refined oil is estimated at 9 to 15. Table 4.4 shows that two third of the (crude) oil (measured as gross value of production) is produced by small-scale producers. The division between public and private owned medium and large-scale processors is more or less the same as in the period 2000 until 2005. Recently, many public owned oil milling and refining companies have been sold to private owners.

Since 2008, in the food regulations it is obligatory to refine plant oils for human consumption. However, until now the legislation has not been fully enforced. The small-scale millers cannot fulfill this obligation. The oil crushers association is active to improve the facilities and focuses on a code of good manufacturing practice on processing; new marketing possibilities for deodorized oil and more attention to the raw material supply chain.

Table 4.4: Key figures of the edible oil industry in Ethiopia in 2004/2005

	Large and Medium		Small-scale	Total
	Public	Private		
<b>Industry total</b>				
Number of establishments	7	19	834	860
Number of persons engaged	816	376	4,120	5,312
Gross value of production (GVP) (1,000 Birr)	60,688	49,122	202,935	312,745
<b>Per establishment</b>				
Number of persons engaged	117	20	5	6
Wages and salaries (1,000 Birr)	976	67	5	15
Gross value of production (GVP) (1,000 Birr)	8,670	2,585	243	364
Value added at factor cost (1,000 Birr)	1,781	219	46	64
Fixed asset (1,000 Birr)	20,578	1,042	65	254
<b>Economic ratios</b>				
Wages and salaries in% of GVP	11.3	2.6	2.2	4.0
Wages and salaries per person engaged (Birr)	8,376	3,386	1,066	2,353
Value added at factor costs in% of GVP	20.5	8.5	18.8	17.5
Fixed assets in% of GVP	237.4	40.3	26.9	69.8
Value added at factor cost in% fixed assets	8.7	21.0	69.9	25.1
(Value added at factor cost minus wages and salaries) in% fixed assets (=rent capital)	3.9	14.6	61.8	19.4

Own calculation based on data from Bactec (2007).

Sesame oil is hardly being produced locally, since the export price of seed is usually very attractive and sesame oil is hardly locally consumed. It is seen as a business opportunity to increase the local capacity to produce sesame oil for export, increasing added value and foreign exchange. A Dutch-Ethiopian joint venture recently started construction for a sesame and linseed oil mill for export (see box 2).

## Box 2: Sesame oil from Ethiopia

Oasis PLC is relatively young joint venture between a Dutch group of investors and Soretti PLC. Oasis, jointly run by Dutchman Hans van Aalst and Ethiopian Bulbulla Tulle, has engaged in high value oil crushing for the export market. *Currently, all oil is being used at the domestic market, but the world market increasingly demands oil instead of seeds.* In addition, they see great potential for sunflower to substitute for imported oil on the local market. *'Currently, all domestic sunflower oil is imported, and prices are 3 to 4 times higher than in the Netherlands!'*, explains Mr. van Aalst. Sunflower is an ideal crop for the Ethiopian midlands (1000-2000 meters above sea level), where still much land is uncultivated. Compared to local crops as noug (niger seed) sunflower can produce 2 to 3 times as much per hectare.

The Nazreth based factory will start operations in the fourth quarter of 2009 and is currently assuring its sourcing of right inputs. *'Having a reliable Ethiopian partner is crucial in arranging your supplies, imports of machinery and licenses'*, tells Mr. van Aalst, *'Especially as supply of affordable seed for oil processing is not always easy to get hold of.'*

The Ethiopian edible oil market is trapped between cheap, currently tax free imports of palm oil on the one hand and on the other hand the high level of standards for the export of oil (ISO, HACCP, BRC). At the moment, domestic edible oil producers find it very hard to compete with the imported 20 liters palm oil jerry cans. Only a few Ethiopian crushing and refinery units can reach export quality. Addis Modjo PLC, recently privatized, has already acquired HACCP and ISO 22000. In addition, new factories are being established in Nazreth and Bahir Dar where certification plays an important role (see box 2).

The main challenges for the oil-crushing sector in Ethiopia are to ensure adequate and steady supply of oilseeds and to compete with world market prices. Local production of oilseeds like noug, linseed and rapeseed and local crushing exceeds world market prices. A great concern for Ethiopian oil millers lies in the unequal taxation of edible oils. Whereas palm oil can be imported without import tax and VAT, domestically produced oil is liable to pay VAT. Another reason for low competitiveness lies in the high value of the Ethiopian Birr (ETB) to the USD and Euro. IMF and World Bank estimated in 2008 that the ETB is 40-50% overvalued and needs gradual depreciation. This depreciation has taken place in 2009 by 25%. Further depreciation of the ETB can improve export competitiveness in oilseeds and gives more incentives for import substitution (in palm and soybean oil).

The association of Oil Millers in Addis Ababa (AAOMA) increasingly looks for ways to enhance the existing refining capacity at the 9 bigger factories (currently lower than 20%), while at the same time promoting a cooperative, joint refinery for 40 of its smaller members.

One food processing industry, i.e. Sheba Trading in Gonder (an Ethiopian-Israeli joint venture) makes food products from sesame. The plant has a processing capacity of more than 250 tons sesame seeds annually. The major products are: Tahini, Halva, and hulled sesame seed. Other companies are planning to get into the Tahini business as well.

Other applications of edible oil are shortenings (semisolid fat used in food preparation) and margarine. Box 3 highlights some recent experience in this field.

### **Box 3: Improving applications of edible oil**

A biscuits producer mentioned that all shortening had to be imported from Malaysia, as no good quality shortening could be obtained from local suppliers. In earlier discussions with an oil crusher/refiner it became clear that all the basic ingredients and equipment were available to manufacture good quality shortening within Ethiopia. The biscuits factory and the oil company were brought together, and within a few months, first deliveries had materialized.

The domestic market is in high demand for local supplies to substitute imports. Other options can develop over time (margarine, vegetable ghee), ensuring more Ethiopian made oils/fats and finished products are sold in the local market, rather than imported.

## **4.5 Organization of the chain**

A survey recently carried out revealed that there are various types of sales outlets for sesame farmers in the Humera, Metema and Wollega areas. Among these, the most important is selling to local collectors in the nearby markets followed by selling to collectors who travel from producers home to home. To minimize transaction risks and costs, there is hardly any visible institutional arrangement practice, like contract farming, observed during this survey. However, the ECX could be such an institution in the near future.

Complaints are often heard that middlemen drive up prices and margins for them are high. However, this has not been supported by research or other data. Some of the producers from Humera aim to supply directly to the central market, bypassing the local market buyers as they think that the local buyers cheat them in different forms. Similarly, most of the East-Wellega producers suspect their local buyers and as a remedy for this they feel selling through cooperatives as a preferred outlet. In addition, the level of trust among chain actors is quite low and the transaction risks and costs are relatively high. Improvements are aimed at more transparency induced by the Commodity Exchange (ECX). Many commercial farmers with large areas of land deliver directly to the cleaning or exporting companies, due to their volume.

Seed cleaning and information on origin are of great importance for the global sesame value-chain. Farmers and traders blend different seed types, such as Humera, Gondar, and Wellega, with particular qualities. This decreases the overall value of the seeds: tracking the origin of the product and matching the particular qualities of the seeds with the specific requirements of the end users are hampered.

Cleaners remove impurities such as straw, dead seeds, soil and pods, resulting in up to 99%-99.5% purity. Up-to-date cleaning machines capable of 99.5+% purity are available (e.g. at Ambasel), but the total capacity is limited and does not meet European demand. We have seen advanced European cleaning machines. Machines with lower cleaning results, below 99.0% purity, are often locally made.

Trucks mainly do transport of oilseeds from the producing region to the port of export, mostly Djibouti. Several of the visited exporting companies have well maintained or new IVECO trucks. The distance between the sesame production regions and Djibouti is about 1,500km: for instance, the distance from Bahir Dar in the Amhara region to Addis is 560 km and from Addis Ababa to Djibouti 900 km. Although road density is very low in Ethiopia, most of the main roads are in good condition. Transport costs to Djibouti port are indicated at 50 USD per ton.

## 4.6 Price formation

Little on marketing costs was mentioned during the fact-finding missions. Transaction costs in the Ethiopian oilseeds chain are generally high due to:

- The large number of suppliers and buyers. Producers (farmers) sell to a local collector, this collector in general sells to another larger broker and this process is repeated a few times;
- Finding information on quantities and prices.
- Negotiating on contractual agreements (price, purity, quantity, delivery time).

For export products world market prices are in general leading. Ethiopia has to compete on the world market with a number of other suppliers. The world market prices are therefore the starting point in price formation. Each link in the chain has costs and will lower the returns for the previous link in the chain. The price of oilseeds at farm gate will be the end result. The cost structure of Ethiopian sesame is visualized in figure 4.2

Until now market orientation in Ethiopia is poorly developed. Market studies on the Ethiopian oilseeds sector are scarce. A better knowledge of applications by buyers and end-users would benefit the chain. Selected seed varieties can be grown, answering specific demands for selected purposes. Characteristics such as color, oil content, fatty acid composition, taste and so on, are hardly known. Too often, oilseeds are still handled as a commodity. In other words, selling gold on the world market as copper.

The chain organization can definitely be improved. Traceability, sufficient high quality seed cleaning capacity, hulling facilities and quality-certified processing and refinery plants are important in this respect.

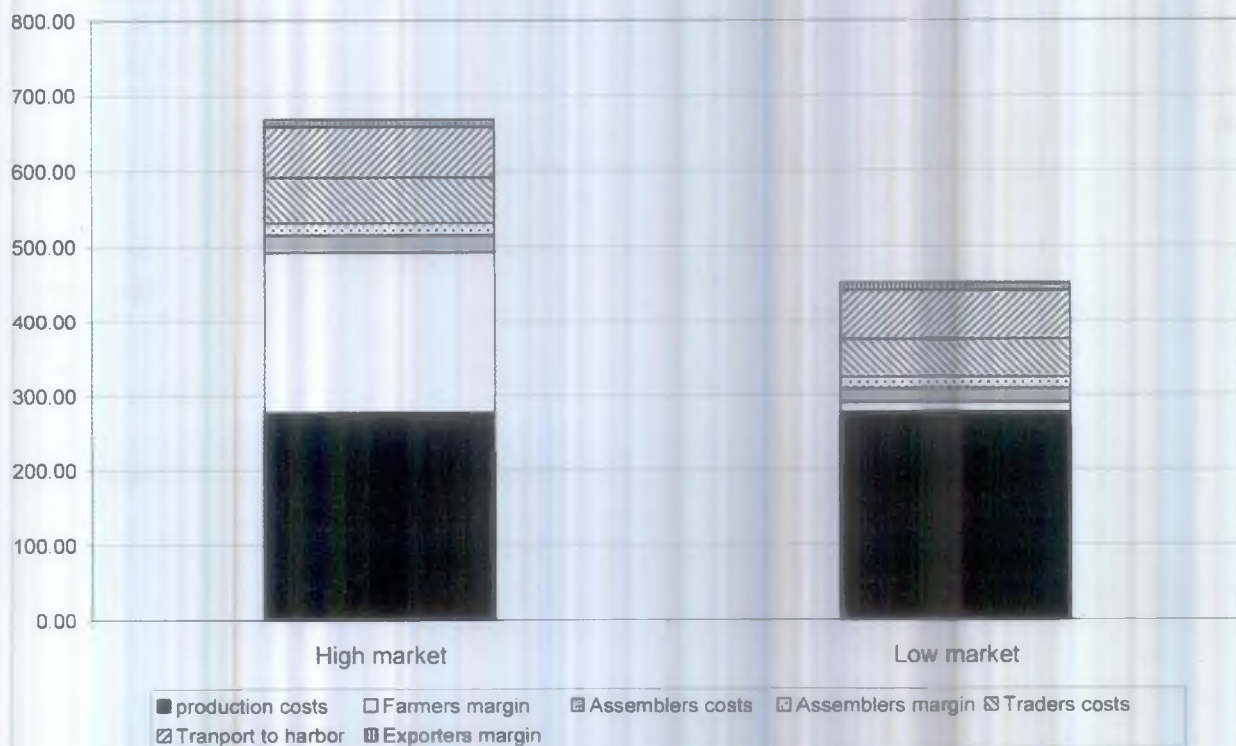


Figure 4.2: Costs and margin of sesame seed export (Birr/100 kg) and farmers' margin for high and low export prices in 2003/2004.



## 5. Oilseeds markets opportunities

### Key findings:

- *Sesame seed has several applications: tasty edible oil with an attractive unsaturated fatty acid composition, (hulled) seeds for bakery/confectionary, for tahini pasta or halva sweets.*
- *Ethiopia ranks sixth as world sesame producer and third as largest world exporter. China, Turkey and Israel counts for three quarter of Ethiopian sesame exports.*
- *Ethiopia has a moderately good yield per ha for sesame seed and the potential to double yield levels for several oilseeds.*
- *Canada is the largest world exporter of linseed, Belgium the largest importer.*
- *Belgium and the USA are the largest exporters of linseed oil; Germany and the Netherlands the largest importers.*
- *Ethiopia is the fifth world producer of linseed, but is negligible as exporter on the world market.*
- *Except for sesame seed, all other oilseeds crops are consumed domestically.*
- *Fatty acid composition of Ethiopian oilseeds is comparable to oilseeds from other countries on the world market.*
- *Total world imports of sesame almost doubled from 460,000 ton in 1995 to 900,000 tons in 2007. This trend is expected to continue.*

### 5.1 Ethiopian opportunities for oilseeds

The focus of this section is on the potential of specialty oilseeds for export markets. Most potential for the Ethiopian oilseeds sector concerns the following oilseeds: sesame seed, safflower seed, linseed, noug (niger seed) and castor beans. These crops are discussed below. Sesame seed is by far the most important Ethiopian export oilseed crop and Ethiopia is a major world producer of linseed. These seeds are discussed more extensively.

### 5.2 Sesame

Sesame is used in a wide range of applications. The most important are:

- **Edible oil.** The refined oil is almost odorless with a distinctive nutty sweet flavor. Roasted sesame oil resists rancidity due to the antioxidants formed during seed roasting. Sesame oil is especially important in the Far Eastern kitchen, mainly Japan and China.
- **Confectionary, biscuit, and bakery industry.** Mostly hulled clear white sesame is required for bakery products. Hulled sesame sticks to the bread or roll, while maintaining the white color after baking. Roasted sesame has a nutty taste.
- **Tahini industry.** Tahini, a traditional Middle East paste, is made from hulled sesame seed and is rich in protein.
- **Halva industry.** Halva is a sweet made of 50% tahini, boiled sugar or honey and some other ingredients.
- **Sesame flour.**
- **Sprouts of sesame seed.**
- **Pharmaceutical ingredients.**

The main Ethiopian sesame seed production regions are situated in the North-West and South-West. The North-West regions have the highest yields per ha. More than 600,000 farmers with an average acreage of below 0.5 ha are involved in sesame seed production. The average production is 360 kg per holding. Compared to 2006 the average area per holding in 2008 is 35% larger, the yields per ha 7% and the production per holding 45%. This means improvement on all indicators and foremost on yields per ha. Many collectors are therefore needed to collect quantities large

enough for export trade.. Large-scale producers might be of more interest for viable exports chains.

Table 5.1: Holdings, area and production of sesame seed in 2008

Region	Holdings (Number)	Area (Ha)	Production (ton)	Production per ha (kg)	Production per holding (kg)
Tigray	114,621	83,658	84,906	1,015	741
Amhara	246,742	135,838	92,870	684	376
Oromia	170,592	34,023	20,858	613	122
Benishangul-Gumuz	67,044	21,563	16,285	755	243
Others	2,230	2,910	1,822	626	817
Ethiopia	601,229	277,992	216,741	780	360

Source: CSA, 2009 (Data Ethiopian Year 2001, Sep-Dec 2008 harvest)

India (20% of the world production), Myanmar (18%) and China (16%), are the largest producers, followed by several African countries (figure 5.1). Ethiopia is with a share of almost 5% of the world production the sixth largest producer in the world. The world production in period 2003 till 2007 amounts 3,378,000 tons. This is 30% higher than in period 1995-2000. The Ethiopian production is in 2007 tenfold the production of the late nineties.

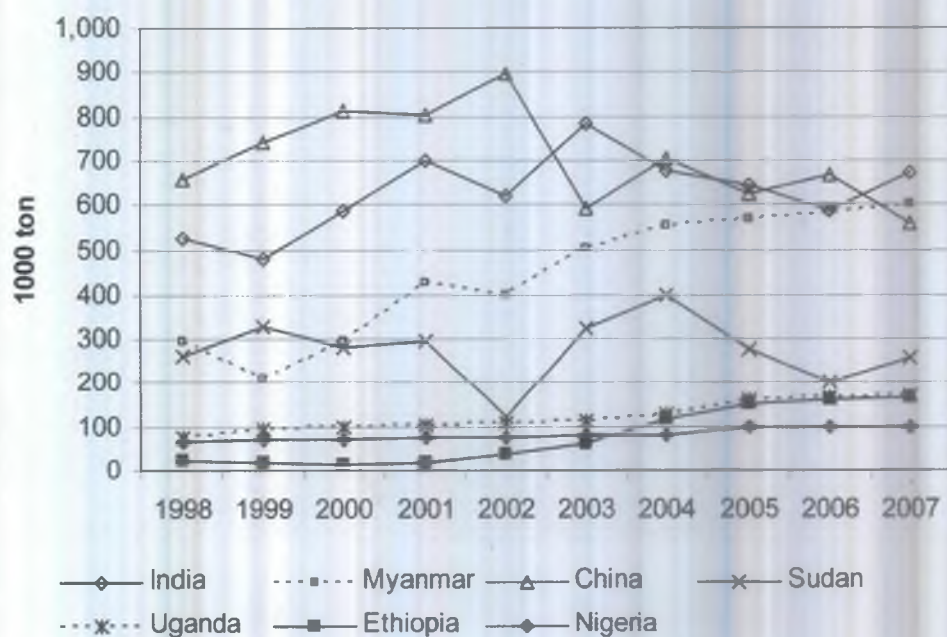


Figure 5.1: Production of sesame seed of the top-7 countries

Source: FAOstat

The average yield per ha increased from 590 kg per ha in 1997 to almost 730 in 2007 in Ethiopia. Figure 5.2 compares the yield with other large producers. China has higher yields, but almost stable during these 10 years. Ethiopia is second with a growth during the presented 10 years. All surrounding countries i.e. Sudan, have lower yields. Ethiopian Research (EIAR) showed that yields up to 1600 kg per ha are achievable.

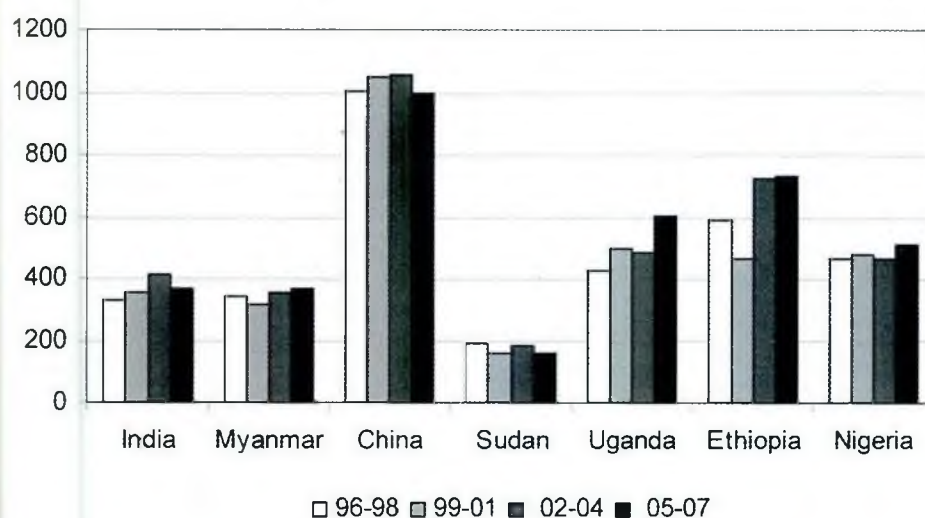


Figure 5.2 Yield in kg per ha of sesame seed

Source: FAOstat

### Characteristics Ethiopian sesame seeds

In Ethiopia, a large number of sesame seed varieties exists. Three varieties are well known: Humera, Gonder and Wellega. The characteristics of the three main export varieties are mentioned in table 5.2.

Table 5.2: Characteristics of Ethiopian varieties

Varieties	Local name	Market name	Characteristics	Application
t-85	Hir hir	Humera	Positive: - Whitish - larger seed, - sweet taste, - sweet aroma - 48-50% oil level - high productivity Negative: - high possibility of shattering losses - requires intensive management	Bakery Tahini Confectionary
kelafo-74	Delello	Gonder	White, good uniformity of the seed	Bakery
Mehado 80	Wollega	Wellega	Small seed High oil content 49-56 percent Not so sweet	Oil

The Humera variety is appreciated world wide for its aroma and sweet taste. The Humera type has good uniform white seeds, which are quite large. This makes it very suitable for bakery products. The Gonder type is also suitable for the bakery market. For this market a high level of seed purity is demanded, which has sometimes proven to be problematic for Ethiopia. The major competitive advantage of the Wellega type is its high oil content. Type and quality are very important. White seeds, with a white to golden colour, are mainly used in raw form because of their aesthetic value and are mostly priced higher than mixed seeds (yellow to dark brown) which are generally crushed into oil. The oil content in sesame seed varies between 40-56. Also on the ECX these 3 varieties

are introduced, each with a number of grades depending on level of admixture, damaged seeds, soil moisture content and colour.

The purchase price of sesame for export is largely determined by the evenness of colour, taste, dryness and purity. These are important purchasing criteria for traders. Hulled seeds and bleached hulled seeds have a higher market value than untreated seeds. The oil level is mainly important when selling the sesame to the oil industry. The level of free fatty acids (FFA) should not be more than two percent, however, many purchasers demand percentages lower than that. The moisture level of the sesame seeds should be 8%. The purity of the sesame seed is specified in terms such as 99-1. The 99 in the figure means that each 100 grams of sesame seed contains no more than 1% impurities such as dirt, branches, stones etc. The 1 indicates that no more than 1% is black seeds.

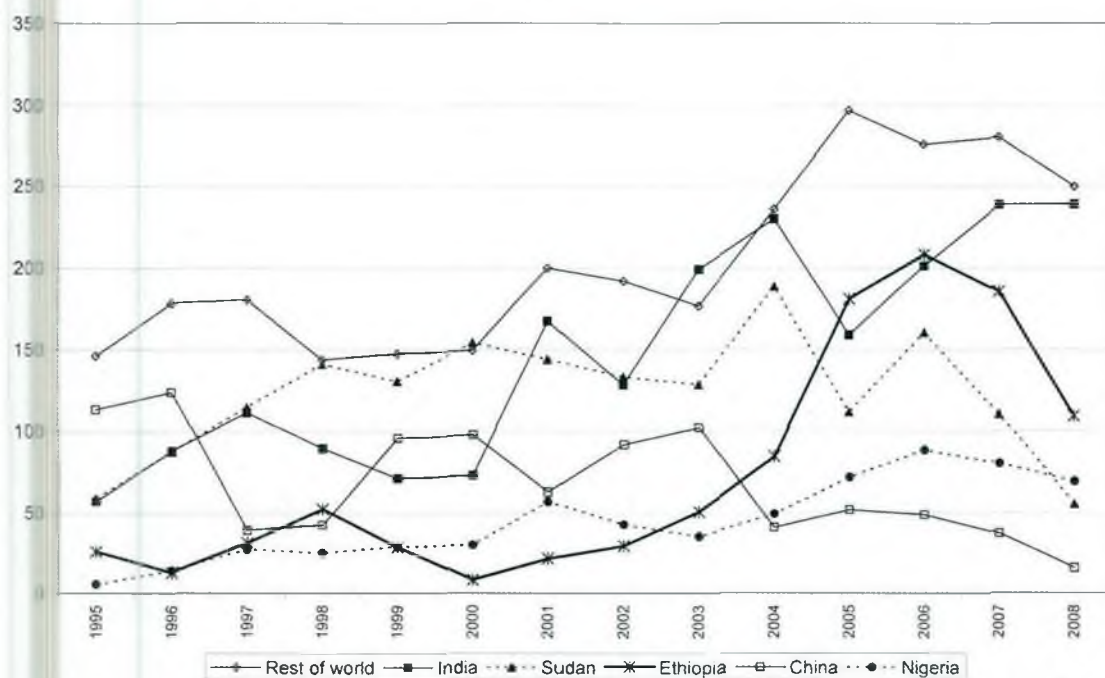
#### **Box 4: Hulled sesame for the world market**

In 2007 a joint venture between Tradin Organic Agriculture BV (the Netherlands) and Kaleb Trading PLC (Ethiopia) materialized in the joint venture Selet Hulling PLC. Having been granted the support of the PSI program (Private Sector Investment program of the Dutch Ministry of Economic Affairs), the joint venture started selecting equipment and building its facilities to establish a state-of-the-art cleaning, hulling and packaging plant. The factory, warehousing and storage area covers around 5.000 square meters and meets international food standards. In addition, Selet Hulling has chosen the dry-hulling technique that minimizes the water-usage in the processing and therefore harms the environment less. Export is expected to start in June 2009.

Selet Hulling is also engaged in farming activities in Humera. Both, through an own 300 hectares farm, as well as an outgrower scheme of 1000-1500 farmers. 'Supply of certified organic seed is the key to establishing a sound organically hulled sesame supply chain', explains Mr. Roel Engelen, plant manager of Selet Hulling PLC. 'Only through an own farm, well-trained farmer outgrower scheme, solid traceability, and well-trained factory staff we can secure top class, organic sesame for our clients'. Though it is sometimes said that Ethiopia is 'by default' organic, many organic producers in the past have failed to assure organic quality. Pesticides from adjacent fields or from warehouses (to minimize rodents and insects) have proven to damage the name of the 'default' organic quality of Ethiopian commodities. Setting in place a controlled and structured system of organic production and processing is therefore necessary. Selet Hulling has a full-time agronomist, six extensionists and a well-experienced part-time farm manager employed in Humera, to assist farmers and guarantee an effective organic quality assurance system. Furthermore, a laboratory is equipped at factory level, intrinsic and organic quality testing protocols, pest control systems and computerized traceability systems are set in place.

Selet Hulling is a first mover in the hulling, or better phrased de-hulling, of sesame in Ethiopia. High purity, graded, de-hulled and attractively packed sesame provides a sharp premium over the currently poorly cleaned, raw exported sesame. At present, two companies operate in the de-hulled sesame market and a third party is involved in Tahini. For the near future, it is expected that more companies will step into the market of high quality de-hulled sesame and Tahini.

Five countries count for two third of the total sesame exports in 2008. As is shown in figure 5.3 Ethiopia became the most important exporting country in the world in 2005 and 2006 but lost this position in 2007 and 2008. The peak was reached in 2006 with 208,000 tons that dropped to 185,000 tons in 2007 and 109,000 in 2008. Ethiopia competes on the world market in the first place with the countries mentioned in figure 5.3. The Chinese export dropped from around 100,000 ton end nineties of below 50,000 tons in the period 2006-2008.



**Figure 5.3: Exports of sesame seed in 1,000ton of the top-5 countries**

Source: UN Comtrade data: Based on import data.

Table 5.3 presents the imports for the sesame from Ethiopia and total world. The main export markets for Ethiopian sesame seed were China, Israel, Turkey, and other countries in the Middle East. The price paid for Ethiopian sesame seed is below world average. Table 5.3 shows that Ethiopia exports to countries that pay rather low prices. Remarkable is that no direct exports exist from Ethiopia to Japan, the second largest world importer. This is the result of strict food safety regulations resulting in high percentage checks and consequent costs. It also indicates that good opportunities for adding value to Ethiopian sesame export chain exist.

Recently China stopped producing enough sesame seeds to meet its own demand. This has led to a strong increase in Ethiopian sesame seed exports to this country in the past 2 years. Ethiopia is the main supplier of sesame seeds to Israel with a market share of around two thirds. On the Turkish market, the Ethiopian share is around 20%. In the past years, Ethiopia gained market share in the Middle East (especially Yemen) at the cost of Sudan. In the Middle East sesame seeds are used for topping on bread and bakery, and in ethnic dishes as well, such as tahini paste, halva and oil. They mainly use mixed colored sesame seed, which they clean and put in mixed, form on their bakery products or for the production of oil.

The major importers of sesame seed in Europe are Greece (3% of total world imports), Germany (3%), and the Netherlands (2%). In Europe, several trading houses purchase sesame seeds and resell the seeds to buyers all over the world. When the trading houses doubt the quality, they first transport the seeds to Europe, clean them, and often sort them by color.

Japan is the second biggest world importer of sesame seed. Sesame oil, particularly from roasted seed, is an important component of Japanese cooking and traditionally this is the principal use of

the seed. Japanese are very strict on quality. Many traders in Japan have their own cleaning installations and color sorters. Because of quality problems in the past, Ethiopia is not an important exporter to Japan. However, it seems that via China the volume of Ethiopian oilseeds exported to Japan is increasing.

**Table 5.3: Imports of sesame seed from Ethiopia and from the world**

	Ethiopia				World			
	Share	1,000 Ton	USD / ton		Share	1,000 Ton	USD / ton	
	2008	2008	2006	2008	2008	2008	2006	2008
China	36	39	812	1,453	25	214	800	1,164
Israel	19	21	1,252	1,789	4	37	1,252	1,849
Turkey	18	19	803	1,621	9	80	723	1,529
Jordan	10	10	838	1,957	2	13	844	1,934
Greece	8	9	954	1,520	3	29	966	1,841
Egypt	3	4		1,796	2	20	962	2,176
Yemen	3	3	554	691	1	9	538	972
Mexico	1	1	955	1,769	3	24	833	1,643
USA	1	1	1,036	1,858	4	38	1,251	2,363
Netherlands	1	1	1,042	1,886	2	20	996	2,072
Germany					3	27	1,162	2,150
Japan					22	185	933	2,021
others	4	5			19	158		
Totaal	100	109	845	1,610	100	846	901	1,707

Source: UN Comtrade data. Figures based on import data

Figure 5.4 provides the development of the imports of sesame seed by the top-5 importers. These countries take a total share of 62% of the total world imports in 2008. China turns out to be a fast grower on the imports even faster than the decrease in domestic production. Total world imports almost doubled from 460,000 ton in 1995 to a peak of 1,023,600 tons in 2006 and 850,000 tons in 2008. This growth is much higher than the production growth. A continuation of this growth offers opportunities for Ethiopia.

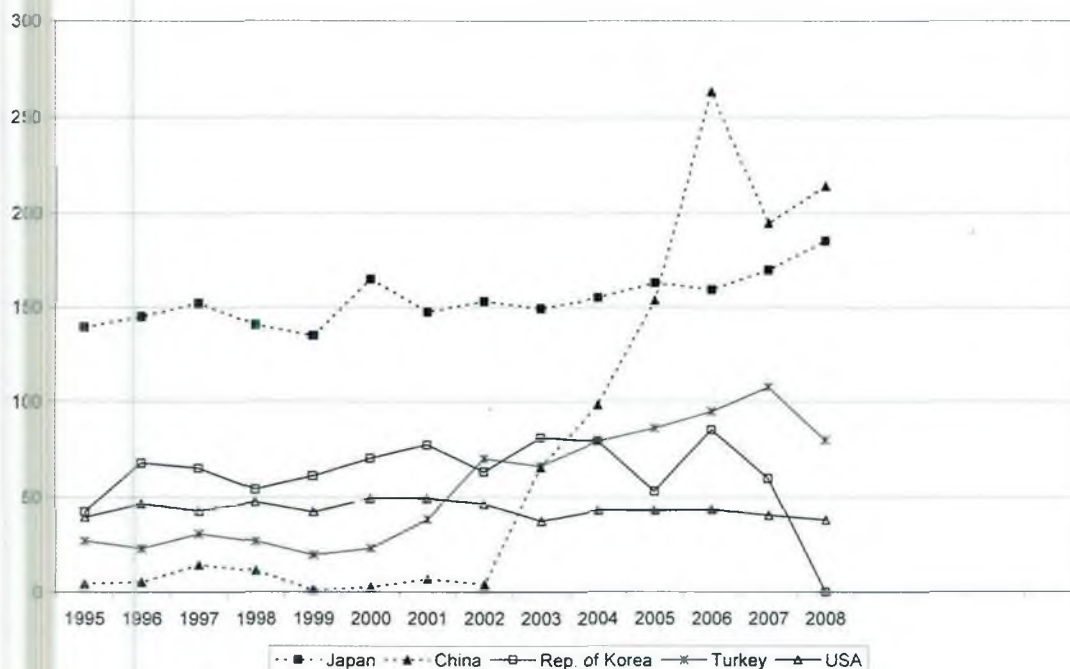


Figure 5.4 Imports of sesame seed in 1,000 tons by the top-5 countries  
Source: UN Comtrade data

### Growth opportunities for export to Europe

Europe is a large user of sesame seed for bakery applications. If Ethiopian farmers and traders manage to prevent blending of different types with the mentioned distinct Humera, Gondar or Wellega qualities and provide adequate seed cleaning up to 99.5-99.9%, sales to Europe could significantly increase. As mentioned in the previous chapter, up-to-date cleaning machines are available in Ethiopia, but still have limited capacity.

Sesame seed hulling is aimed at raw materials for the bakery industry. In this case it is important that high food safety standards are assured. The value added of hulled sesame seed compared to untreated seeds is 200-400 USD / ton.

Europe imports sesame seed mainly from India thanks to attractive pricing, better cleaning facilities, hulling and better general trading terms. With better basic quality seeds Ethiopia has strong possibilities in entering this market. If Ethiopia wants to be a major player in Europe further investments in more advanced cleaning facilities and hulling operations will be required.

Crushing of Ethiopian sesame seed in Ethiopia is yet not undertaken, though one Dutch-Ethiopian joint venture is working on it (see Box 2). The potential for Ethiopian sesame oil, however, is large and might create much added value. In addition, most probably one processor in Ethiopia, Addis Modjo, might be able to deliver further processed products suitable for European customers. Another, new crusher in Bahir Dar might offer opportunities as well. Exports could be considered in 1 ton packaging for redistribution in Europe.

Due to the low levels of inputs and the use of virgin new areas, oilseed production in Ethiopia is near organic standards. The potential of exporting sesame seed under the organic farming label to Europe is seen as a prospect by many stakeholders in Ethiopia. As far as the mission knows there is now only one exporter of certified organic sesame seed. The higher prices at several markets are indeed challenging. However, tracking and tracing and sound Quality Assurance systems are necessary for guaranteeing organic status (see also Box 3) and a sound cost-benefit analysis therefore is highly necessary to assess economic feasibility.

### 5.3 Linseed

Linseed is mainly used for domestic consumption in Ethiopia. Linseed is of increasing importance for the food industry in highly developed consumer markets due to the specific non-saturated fatty acids, omega-3 and omega-6 fatty acids. Fatty Acids logos can now be seen on packages of dairy products (desserts, butter, milk and even eggs), margarines and cookies.

Ethiopia is the fifth world producer of linseed, with a share of about 5%. Almost the whole production is consumed domestically. Figure 5.5 presents the production of the 5 largest producers. The Ethiopian production increased annually since 1999. In Ethiopia Oromia produces 75% of the linseed, with a average production of 207 kg per holding. Worldwide 2,500,000 ton linseed is produced, with strong fluctuations. About 40% is traded internationally as seeds: in 2007 the production dropped till 1,900,000 tons of which two third is traded. Next to 1 million ton of linseeds, almost 100,000 crude linseed oil and 150,000 tons of refined linseed oil are imported (figure 5.6). The trade in refined linseed oil has surpassed crude oil since 2000.

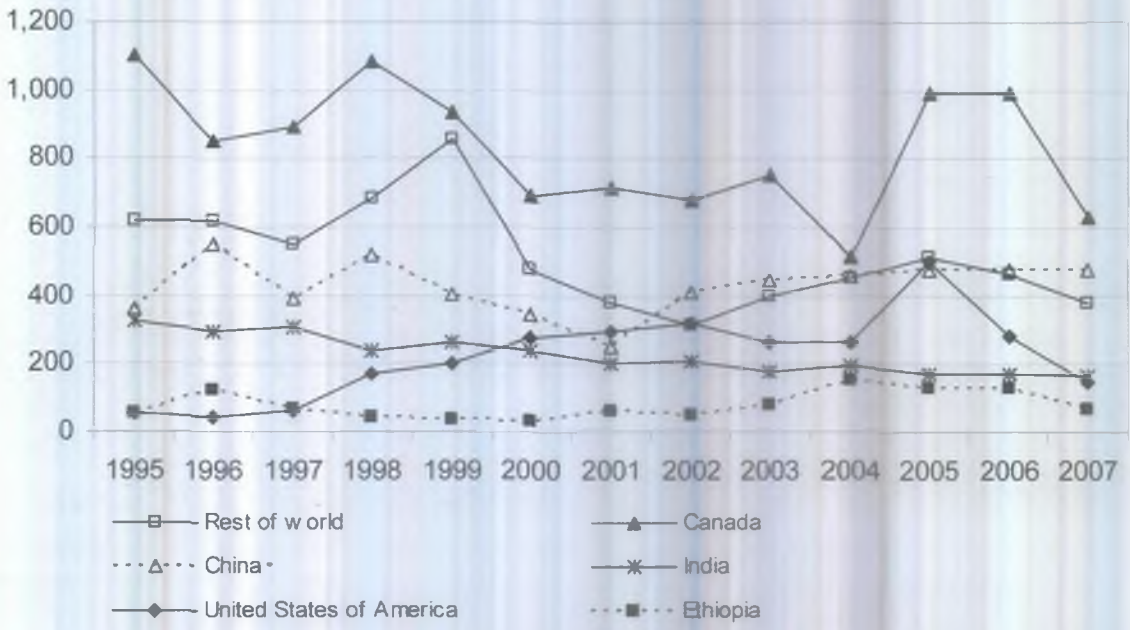


Figure 5.5: Production of linseed in 1,000 tons  
Source: FAOstat



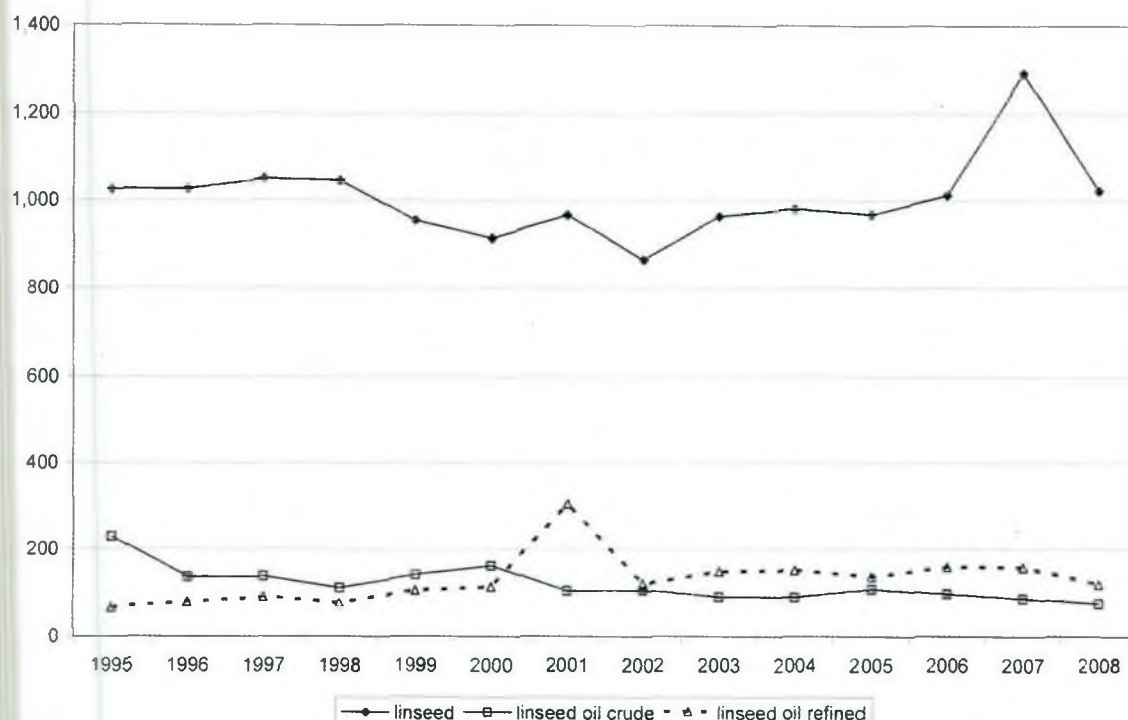


Figure 5.6: Total world imports of linseed and linseed oil in 1,000 ton

Source: UN Comtrade data

Countries like Belgium, Germany and USA import linseed, process it, and export linseed oil. A detailed overview of the trade is presented in Table 5.4. Belgium is the world largest importer of linseed, which is partly re-exported to the Netherlands and Germany. Belgium is also the second largest exporter of seeds and the largest exporter of linseed oil. Canada as largest exporter had very low yields in 2007; the exports include partly stocks from previous years.

Table 5.4: Production, imports and exports of linseed and linseed oil in 1,000 ton for selected countries

	Production 2007	Export 2008			Import 2008		
	Seeds	Seeds	Crude oil	Refined oil	Seeds	Crude oil	Refined oil
World	1,885	1,029	115	86	1,022	77	121
Belgium	10	195	60	43	440	2	2
Canada	634	645	5	11	10	1	2
China	480	6	0	1	39	7	1
Gambia	0	0	0	0	0	0	32
Germany	6	9	15	9	166	17	16
Netherlands	4	13	12	1	34	21	16
Russia	47	53	0	0	1	0	0
USA	150	43	17	14	192	1	2
India	167	0	0	1	0	0	1
Ethiopia	67	0	0	0	0	0	2
Rest of world	320	64	5	7	139	27	46

The price per ton differs for the three products, which is a result of processing. Belgium as largest exporter is the competition benchmark for linseed oil and Canada for linseeds. Canada has an export price for linseed below world average as Belgium has for refined linseed oil. The target benchmarks are Belgium for linseed and Germany, the Netherlands and Gambia for edible linseed oil.

The quality of Ethiopian linseed complies with fatty acid criteria of large European importers and crushers. The C18:3 value of Ethiopian linseed is within a range of 45-60%. Especially the higher values, between 55% and 60% are interesting for export. Some of the products have a unique fatty acid profile, which complies fully with consumers preferences in Europe. The high Iodine value (higher than linseed from North America/Canada) and consequently increased linolenic acid content (C18:3) are attractive for the food industry. In fact European buyers are keen to look at improved fatty acid profiles.

However, at the moment, like with many Ethiopian products, domestic prices are higher than world market prices. In a recent export initiative, the price difference between Ethiopia and the world market amounted to USD 200 per ton. It is expected that with higher world market prices, a depreciated ETB and decreased transaction costs in Ethiopia (through large-scale production) Ethiopia can be competitive. Nevertheless, also import substituting activities, linseed oil for e.g. paints and flouring material might be worth looking at.

## **5.4 Other oil crops**

### ***Noug (niger seed)***

Niger seed exports have since 2002 passed coffee exports to the USA and counts for a third of Ethiopia's American exports. Ethiopia uses noug for oil extraction for human consumption (as a cooking oil). A few years ago traders from Singapore, the USA and Europe discovered noug and started to buy from Ethiopian exporters and ship it to the USA. The USA is a major market for noug, used as bird seeds, and buys almost 60% of the world production. Niger seed is being investigated in Europe now to explore the opportunities for applications in food products.

Looking at the fatty acid profile the product is rich in linoleic acid (C18:2), with an average of around 75%. Oil content is around 35-45%, while the remaining noug meal after crushing contains 30% protein and 23% crude fiber. Yields are between 0.7 and 1.2 t/ha. The low yield of oil per hectare and fragmented nature of production does not make this product very attractive as export oil. Local taste favors the use of crude and/or semi-refined noug oil. Sunflower, having similar characteristics but much higher yields per hectare could be a beneficial source for large-scale, refined edible oil production. The prices on the Ethiopian market are relatively high. Hence noug can not compete on the world market: too high price and no special oil characteristics.

### ***Safflower***

Safflower can be a dual-purpose crop: seeds as oil crop and the petals for extracting dyes. The petals can be picked some weeks before harvesting the seeds. Furthermore, the crop can be grown after cereals, as a second crop. The major exporters of safflower seeds are: USA, Australia, China and India. The top 3 importers are Japan, the Netherlands and Belgium.

First test results have indicated that a good possibility might exist for specialized applications in Europe, both for oil and petals. Unfortunately, we need more information, as one test is no guarantee that all seed will be of the same fatty acid profile. Safflower primarily competes with sunflower oil, which is widely used in European edible products like margarine and frying and cooking oils.

The world production is over 600,000 tons of which Ethiopia produces 7,300 tons. The world trade is less than 1% of the world production (table 5.5)

Table 5.5: Main producers, exporters and importers of safflower in 2007

	Production	Export	Import
World	624,084	34,454	30,000
India	178,900	7,427	1,131
Mexico	138,136	4,590	364
USA	99,145	4,371	1,583
Kazakhstan	80,227	1,997	2
Australia	30,125	4,985	4
China	30,000	2,975	2,003
Ethiopia	7,304	2	
Belgium		847	8,643
Germany		65	1,153
Netherlands			4,791
Philippines		2,790	1,011
UK		27	1,697

Source: UN Comtrade data and FAOstat

na = not available

### **Castor beans**

Castor beans are growing naturally and abundantly in the Highlands of Ethiopia. Castor is mainly used as fencing material and to clean pans and pottery. Being very toxic by nature, castor is not grown in large plots on Ethiopian farms. However, recently some Ethiopian and foreign entrepreneurs have discovered the economic potential of castor. Improving castor production and productivity, as well as developing a sound collection system could show great potential for Ethiopia.

Ethiopia is a relative large producer of castor with 150,000 tons production per year. The leaf of the castor plant is identified as one of the best for silk worms. The oil is rich in ricinoleic acid and is high valued oil for a wide range of technical uses. Castor oil is also being studied for use as a potential treatment for cancer. Further research will be needed to identify the export potential of castor beans from Ethiopia.

Castor oil is currently primarily imported by the Netherlands from India and distributed via Rotterdam for European customers. In Europe, over 100,000 tons are used annually, making this an interesting prospect for Ethiopian production. Logistics in Ethiopia, and distribution via IBC Intermediate Bulk Containers of 1 ton might offer potential. Local Ethiopian production must be set up for this. As castor beans are a 'wild crop', and fragmented over many holdings, a judicious feasibility study with a cost-benefit analysis is needed.

### **Cottonseed/Rapeseed**

Mainly used for local consumption as cooking oil. Cottonseed is an excellent frying/cooking oil and has better fatty acid profile compared to palm oil. An increase in production would benefit local availability of these oils, and could substitute imported oil.

### **Rapeseed (Gomenzar)**

Gomenzar could be beneficial to European industries, looking at oils with higher levels of erucic acid (C22). The applications are mainly in the technical field (plastics). Gomenzar is an old indigenous seed, which might in the future, offer potential for export to Europe/USA.

### **Sunflower**

Unfortunately, sunflower is hardly grown at present. Tests in Uganda have shown great potential. Hence, trials have started in Ethiopia to produce sunflower seed more professionally. Next to the

'normal sunflower seed' the high oleic varieties may offer export possibilities. Imports of sunflower oil are considerable in Ethiopia and this could easily be substituted by domestic production. The yield per hectare of sunflower seed (average of 1.8 t/ha) is approximately double that of currently used oilseeds like noug. So, from a food security point of view, sunflower seed can become very important.

### **Soybeans**

Together with sunflower, soybean represents the greatest opportunity for domestic market supply and import substitution. Like sunflower oil, imported soybean oil has a considerable market share on the local market. Growing conditions for soybean in the peripheral areas of Ethiopia, to the west and east, are very suitable for soybean production and could not only satisfy the oil but also the animal feed market. In Ethiopia, there is a large scarcity in high protein animal feed (for the booming dairy, export beef and poultry sectors).

### **Palm oil**

As Ethiopia has a broad variety of 17 agro-ecological zones almost any crop can be grown in Ethiopia. Palm oil is no exception. Recently, newspapers stated that Ethiopia's largest investor, Sheikh Al-Ahmoudi, will develop a large plantation of palm oil in West and Southern Ethiopia on 58,000 hectares together with a Malaysian consultancy. Currently, most Ethiopian edible oil is imported (around 80%) in the form of palm oil. It remains to be seen whether Ethiopia can compete with the production and processing scale of Malaysian and Indonesian palm oil.

### **Jatropha**

Jatropha is a small tree (up to 8 m), which with pruning can also be grown as shrub (1-1.5 m). It produces seeds with high oil content. The oil is not edible as it contains toxic compounds. Traditionally, it is used for the manufacture of candles and soap, as lamp oil and as fuel for cooking. The potential use of jatropha for bio-fuel has only recently been taken in development, partly induced by policies aimed at reducing greenhouse gas emission, at reducing dependency of fossil oil and by the government targets for biodiesel production. The energy balance (the total energy inputs into the crop divided by the energy output) of jatropha bio-fuel is estimated at 4–5 higher than for rapeseed oil.

Jatropha can be grown in areas below 400 mm rainfall, and produces well with 600–800 mm. Ethiopia has abundant underutilized areas that meet this condition: according to the Ethiopian government above 20 million ha. Jatropha can be grown in different agro systems: 1) large-scale mono-cropping, 2) inter-cropping with other crops like tomato, maize, sesame, groundnut, safflower and 3) as hedges, 'living fences', around agricultural fields. Reliable statistics on worldwide production and international trade are not available.

Several companies have started plantations of jatropha in Ethiopia at scales of 10,000 ha. The current initiatives are still in the development phase. With adequate levels of input (water, fertilizer), jatropha yields may be up to 5 tons seeds per ha annually. However, actual yields of full production trees will be around 2-3 tons seeds per ha. Fat content of whole seeds is 32–45%.

Prices for gasoil in landlocked countries of West Africa were US\$ 0.80–0.97 per liter in 2007. It is estimated that large-scale plantations and oil extraction mills could produce jatropha bio-fuel in West Africa at a price 5–12% cheaper than current gasoil prices. The seed meal after milling can be used as cooking fuel or as organic fertilizer.

### **Olive**

Ethiopia competes with Syria for the birthplace of the olive tree. In northern Ethiopia (Amhara and Tigray) wild olive trees are found in abundance. In addition, reforestation schemes for degraded lands often use olive trees. Trials are under way to also introduce high productive Mediterranean species (see Box 4).

### **Box 5: Ethiopia: Birthplace of coffee, birthplace of olives**

Ethiopia is known for its first class coffee. Ethiopian Arabica coffee has been the most important export crop for decades. Many people know that Ethiopia is the birthplace of coffee, however, not many people would associate Ethiopia with the origin of sorghum, niger seed and ... olives! Though the last is being disputed between Syria and Ethiopia, the wild olive tree is a very common feature in the landscapes of Amhara and Tigray.

Recently wild olive trees have also been used for reforestation of degraded lands in East-Tigray to combat erosion and provide timber for the communities. Yet, it took a Dutchman to realize the possible economic benefits of the olive tree. Mr. Lammert Nauta of Oilea Holding B.V. and its Ethiopian joint venture Woira Oil PLC, discovered the large potential of both the wild olive tree and the possibilities for improved Mediterranean species for the region. He is currently developing a farm close to Mekelle, Tigray, to plant high productive species, as well as assist local farmers in pruning the wild varieties.

According to Mr. Nauta pruning is the key to developing the olive sector in Ethiopia. 'The tree has to come in its flowering mode directly after the long rainy season, otherwise the fruits do not grow well'. Pruning the wild species will lead to more active trees with more flowers and leaves, which will combat climate change and soil erosion in these dry land areas. The olive tree creates real sustainability in economic and environmental change for these dry land areas, where other species (e.g. fruit trees) can hardly survive. Mr. Nauta foresees both a profitable market for Ethiopian olives in the domestic market, as well as for the Middle East. Olive oil consumption keeps on rising in the world and also the Chinese middle class increasingly turns to the more tasteful oil of olives. As Mr. Nauta comments: 'Creating high-value, extra virgin oil from Ethiopia is my dream. In another 3 years from now this must be achievable.'

## **5.5 Market opportunities of fatty acid composition of Ethiopian oilseeds**

This section discussed the special features of Ethiopian oilseeds. The demand for special fatty acids is discussed in section 3.4. The economic perspectives are not discussed in this section. It will be clear that in case of a similar product the price is the most important characteristic for buyers. Table 5.6 shows the standard fatty acid composition of the major oilseeds that can be produced in Ethiopia and of some other major plant oils produced in the world.

Only linseed stands out because of its high linolenic acid (C18:3) content, but this oil is in large quantities available on the world market. Ethiopian linseed oil can only compete when the indicated level of 55% C18:3 can be guaranteed. Currently, levels vary between 40 and over 60%. Sesame oil has a profile similar to other plant oils, but its appreciated flavor makes it specialty food oil.

Niger seed has a uniquely high content of C18:2, but it is an omega-6 fatty acid, while the trend in demand is more towards either C18:1 or towards C18:3 (an omega-3 fatty acid). Ethiopian Niger seed and *Brassica carinata* contain glucosinolates which give the oil the spicy (mustard) taste, however for large-scale food applications use of low glucosinolate (Niger seed) and low glucosinolate, low erucic acid varieties (*Brassica carinata*) could provide opportunities. This special taste requires a refinery level that should not be too high, since otherwise the taste is lost.

Gomenzar (Ethiopian mustard, *Brassica carinata*) is used in Ethiopia as a spicy oil to oil frying pans. The taste comes from the glucosinolates in the oil. The content of glucosinolates and the presence of erucic acid (C22:1) inhibit the large-scale expansion of Gomenzar as an export oil for food. However, possibilities exist to use Gomenzar oil as a source of erucic acid for industrial uses. Various crops have been bred for very high C18:1 content (i.e. rapeseed, soybean or sunflower); these high C18:1 varieties are not yet available in Ethiopia, but could offer opportunities.

The overall conclusion is that Ethiopian oilseeds, in terms of their fatty acid profile, are comparable to oilseeds produced in other countries.

**Table 5.6: Fatty acid composition (in% of total oil) of oilseeds.**

Oilseed crop	Palmitic C16:0	Stearic C18:0	Oleic C18:1	Linoleic C18:2	Linolenic C18:3	Specialty	Use
Rapeseed, <i>Brassica napus</i> 'double zero' types *	4	2	63	20	9		Food, chemicals, biodiesel
High erucic acid rapeseed, <i>Brassica napus</i>	3	1	14	13	8	45-50, Erucic, C22:1	Erucamid****
Palm oil	44	5	39	12	-		Food, chemicals, biodiesel
Palm kernel & Coconut	8	3	15	2	-	48, Lauric, C12:0; 16, Myristic, C14:0	Detergents, chemicals
Sesame	9	5	41	43	-		Food, special taste
Linseed	9	4	15	17	55		Paint, flooring materials (linoleum), healthy food
<i>Brassica carinata</i> (Ethiopian mustard)**	4	1	10	17	17	40, Erucic, C22:1	Spicing oil on frying pans.
<i>Crambe abyssinica</i> (Abyssinian mustard)	2	-	17	9	6	57, Erucic, C22:1	Erucamid****, not grown in Ethiopia
<i>Gyzotia abyssinica</i> (Noug, Niger seed)	8	6.5	7	77	1		Bird seed, seed and spicy oil in food
Cotton seed ***	23	3	22	52	-		Food (frying oil)
Maize	11	2	29	57	1		Food
Groundnut	10	3	33	14	-	Minor amounts of arachidic	Food
			66	35			
Safflower *	6	2	12	79	-		Food, alkyd resins
Indian Mustard, <i>B. juncea</i> **	4	1	10	17	17	40, Erucic, C22:1	Food, spicy oil, biodiesel, erucamid****
Sunflower *	3	9	20	66	0.1		Food
Olive	4	11	75	9	1		Food
Soybean *	3	11	28	50	7		Food, alkyd resins, chemicals
Castor	1	1	6	5	1	86 Ricinoleic, C18:1-OH	Chemicals
Tung	6	-	5	10	-	78, $\alpha$ -eleostearic, C18:3t	Alkyd resins, IC-plates for electronics
<i>Jatropha</i>	13	7	35	44	0.2		Biodiesel and chemicals

\*high oleic varieties (C18:1 > 80%) exist

\*\* in India and Australia, *Brassica juncea* (Indian mustard) has been bred with low glucosinolate and low erucic acid (C22:1) content better suitable for food production. Reports exist on low C22:1 *B. carinata* lines in Ethiopia. C18:3t =  $\alpha$ -eleostearic acid, conjugated fatty acid with double bonds at position 9, 11 and 13.

\*\*\* Cotton seed oil needs to be refined as unrefined cotton seed oil contains gossypol

\*\*\*\* Erucamid is slip and moulding agent in plastics

## 6. SWOT analysis of the Ethiopian oilseeds business

### *Key findings:*

- *The oilseed production can be doubled, with adequate inputs.*
- *The domestic market offers opportunities for substituting imported edible oil.*
- *On the foreign market opportunities exist especially for sesame seed products and some specialty oilseeds.*
- *World sesame trade shows a positive upward trend that is likely to continue.*
- *Market orientation especially on foreign markets needs to be enhanced.*

### **6.1 Introduction**

Most oilseed crops - soybeans, linseed, cottonseed and rapeseed - grown in Ethiopia are also grown in other countries in large volumes, called commodities. For these commodities, it will be very difficult for Ethiopia to compete on the world market due to its relatively low volumes, high handling and transport costs, and overvalued currency. However, these crops are important for domestic use in edible oil and cake for animal feed.

This chapter analyses the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of the Ethiopian oilseeds sector. Two markets will be discussed.

- The first SWOT analysis focuses on business opportunities with high-value markets like the EU.
- The second SWOT analysis focuses on the domestic Ethiopian market.

Chapter 7 provides the recommendations - derived from this SWOT analysis – for exploiting business opportunities for the Ethiopian oilseeds sector in general and for trade with the EU and the domestic market in particular.

### **6.2 The international market**

EU countries are buying oilseeds and oils in highly competitive world markets, based on trade and quality standards of highly developed consumer markets. Therefore, the benchmark for the SWOT analysis of the Ethiopian oilseeds sector is its position on the world market.

#### **Strengths**

##### *Diversity of high value oilseed crops*

Ethiopia has altitudes from below sea level up to 4,500 meter above sea level and has very different climatic zones. This enables Ethiopia to grow a wide variety of oilseed crops. Several oilseeds are grown in Ethiopia, which can be considered as high value seeds on the international market (sesame seed and noug). In addition, the large linseed volumes offer importers to diversify their acquisition portfolio. These oilseeds provide a good base for acquiring or expanding a profitable position on the world market.

##### *High quality sesame seed*

Ethiopia has high quality sesame seed varieties that are suitable for a wide range of applications. The Humera variety e.g. is appreciated worldwide for its white color, aroma, and sweet taste; while the Wellega variety is especially suitable for oil crushing due to its higher fat level. If Ethiopian farmers and traders manage to prevent blending of different types with distinct qualities and provide adequate seed cleaning, up to 99.5-99.9% more added value in export markets can be realized and new markets can be created.

### *Productivity can be doubled*

Despite the traditional way of farming with low inputs, yield levels for oilseeds as sesame seed are on the same level as other producing countries and in some cases even higher. Studies from Ethiopian research institutes showed in field trials that with transfer of new technologies and providing inputs, significant higher productivity levels (double or triple) can be achieved. The potential production growth surpasses the growing domestic demand and enables a growing export.

### *Entrepreneurship and ambitious oilseeds exporters association*

During the missions in all different links of the oilseeds chain, real entrepreneurship was identified. Although market orientation needs to be improved, many ambitious entrepreneurs are anxious to intensify business relations with market parties abroad. EPOSPEA, the Ethiopian Pulses, Oilseeds and Spices Processors Exporters Association is working hard to improve market information for its members.

### *Available land and labour*

Virgin fertile new areas are available and can meet organic certification standards, e.g. in Gambella, Beneshangul-Gumuz and SNNPR. These new areas can be cultivated on a large-scale. Labor is cheap and abundantly available. However, some new areas seem to be less attractive for settlement. Most new areas are in the lowlands. The government is supportive in issuing land to investors.

### *Attractive Investment Package*

Oilseeds are priority export products. The government enhances investments in the oilseeds sector with an extended package of investment incentives.

## **Weaknesses**

### *Lacking international market orientation*

International market orientation is insufficient. Little information from the interviewed stakeholders was retrieved on the requirement of final customers in highly developed export markets. Only with a stronger market orientation and a clear strategy access and growth on specific high-value markets can be realized.

### *High transaction costs*

The oilseeds chain starts with a very large number of smallholders, each producing a very limited quantity. This requires additional efforts from middlemen, brokers and traders to collect sufficient large quantities, meeting the required export volumes. Costs are involved in each transaction, lowering the price for the farmers.

### *Contract discipline*

Doing international business means complying with international trade rules on contract discipline and quality. Ethiopian traders have to regain name as reliable exporters in this field. Some Dutch importers have had problems on contracts executions, once market prices increase. It is important to realize 'contract is contract' for creating a sustainable business environment with European partners. EPOSPEA, within the Public-Private Partnership on Oilseeds is developing an Exporters' Code of Conduct to set ethical guidelines and contract procedures for exporters.

### *Farm production technologies and inputs*

Availability of inputs like quality seeds, fertilizers and credit facilities is limited. The aim should be enhancing an efficient and effective input marketing system. The low levels of fertilizer use and monocropping practices are resulting in unsustainable farming systems and soil degradation.



### *Storage facilities*

Storage facilities need to be improved in most cases. Creating a demand driven supply chain for high demanding markets requires storage capacity that complies with Quality Assurance systems. Vulnerability of storage to pest, moisture and to rodents need to be banned out.

### *Dependence on Far Eastern Markets for sesame*

The growth of exports to the Far East for sesame has made Ethiopia vulnerable. A better spread of exports would be beneficial to the industry.

### *Most oilseed crushing and refining plants do not meet European quality standards*

Most processors do not meet the European quality standards on safety and hygiene. The industry is confronted with high imports on refined oils for use in urban areas (palm oil from Malaysia and soybean oil often donated as food aid). These imports cause large problems to local refineries. Refining capacities are heavily underutilized. In urban areas, consumers prefer imported packaged, refined edible oil for prices not outrageously higher than local bulk oil.

## **Opportunities**

### *Economic restructuring*

The government has started economic restructuring, investments in infrastructure (road, telephone and railway) and has started WTO-membership negotiations. The latter means a more open economy, which might attract foreign investors. At this moment, several economic incentives are already available for sectors producing export priority products. Oilseeds are among them.

### *Increase in demand*

The economic development of China and other emerging countries will increase the demand for edible oils and oilseeds on the world market. The increasing use of oils and fats for the production of bio-energy also leads to higher demand. For these reasons, in the near future relatively high prices for oilseeds and oils are foreseen.

### *Luxury sesame seed products*

Sesame offers the production of several luxury products (tasty edible oil, bakery application, sweets, and tahine). Exploiting these markets by offering tailor-made products improve the market value of Ethiopian sesame seed products.

### *Unsaturated fatty acids: health and industrial demand*

Ethiopia may respond to the demand for healthy oils with high levels of unsaturated fatty acids by producing these types of oilseeds. Several oilseed crops in Ethiopia match the demand for healthy oils. Poly-unsaturated fatty acids are of interest for the (domestic) paint industry and the flooring industry (linoleum), because of drying properties

### *European Quality Standards*

Better deodorization, and the introduction of a code of practice for the industry, will support quality improvement schemes to achieve European standards.

### *Demand for organic products*

Due to the low levels of inputs and the use of virgin new areas, oilseed production in Ethiopia is near organic standards. Because the international market for organic products is growing, real opportunities can be identified. One Dutch company is already setting up a fully certified organic chain.

### *ECX: Ethiopian Commodity Exchange*

The newly established ECX can decrease the transaction costs and risks in the sesame value chain. Opportunities lie further in increasing the transparency and providing incentives for quality production due to the grading system. However, there are concerns that the ECX might jeopardize specialty trade.

### **Threats**

#### *Availability of capital*

Land is state owned and farming is largely based on manual labor. Collaterals at farms are therefore almost not available. A well-functioning credit system would enhance the production of cash crops (to buy improved seeds and other inputs) and facilitate exports (providing working capital).

#### *Negative trade balance*

The current mismatch between imports and exports decreases the availability of foreign exchange at Ethiopian banks. Low levels of foreign exchange hamper smooth imports of foreign machinery and factory equipment.

#### *Consumer preference on local markets poorly developed*

The Ethiopian consumer markets are still in their infant stages. This results in general in poorly developed quality standards and thus in products not suited to well-developed- high-income markets. Specific chains aiming at specific export markets should therefore be further developed, to acquire more export market power. Revenues of these exports can be used for further rural development. It means that the Ethiopian oilseeds sector - especially the refineries - needs to understand the quality requirements of the end users, which differ considerably from the domestic user.

#### *Unfavorable exchange rate*

The Ethiopian Birr is substantially overvalued to international currencies as USD and Euro. Estimates state that a further depreciation of around 25% is needed to bring the Birr in line with its international value. The relatively expensive Birr is hampering exports of products that are also consumed in Ethiopia, like linseed, noug and coffee. For sesame and flowers, this is less the case.

## **6.3 Substitution of imports by domestic production of edible oil**

The major part of the consumed edible oil is imported and the consumption is relatively low. The objective for the domestic edible oil production is substitution of imported oil.

### **Strengths**

#### *Larger production volumes*

Larger production volumes of oilseeds is possible by improvement in yields, by taking new areas into cultivation or by a combination of both.

#### *Land and labor available*

Production areas in the low- and midlands, where sufficient land is still available, are very suitable for oilseed crop such as sunflowers and soybeans. As agriculture provides the majority of employment and mechanization is low, labor is abundantly available. Some mechanization might reduce temporarily labor shortage in growing season.

### *Idle capacity in oil processing*

The oil processing industry is working at less than half of the capacity. Many small-scale processors are in the rural areas near to the producers. This means that in the very short run edible oil for the local market can be processed. As edible oil is low in volume compared to seed, urban markets can be served.

## **Weaknesses**

### *Subsistence farming*

Many smallholders are still focused on subsistence farming. Oilseeds are grown as cash crops to buy some necessities of life. National food security needs to be enhanced, so that growers feel more comfortable growing cash crops.

### *Temporarily labor shortage in growing season*

Some oil crops (e.g. linseed) need much labor in periods other crops with high economic return are also demanding much labor. Labor is then assigned to the crops with higher economic benefits. A higher demand for oilseeds will increase the economic return for oilseeds crops and labor return for such oilseed crops will increase.

## **Opportunities**

### *Developing a domestic market as a step in developing export quality processing*

A critical home market is considered as a key success factor for developing an export market. By producing oil as substitute for imported oil, processors learn how to attain higher quality levels, without much risk. High costs for the logistics to European markets and quality assurance are not incurred for the home market.

### *Growing population and rising income*

Ethiopia with almost 80 million inhabitants is a large market for edible oil. The combination of a growing GDP with an annually population growth of 2.6% makes it even more relevant that the availability of high quality oil, such as refined oil, is improved.

### *Import substitution*

Several oilseed crops (soybeans, linseed, cotton seed, rapeseed etc.) grown in Ethiopia are commodities on the world market. For these commodities, it will be very difficult for Ethiopia to compete on the world market due to its relatively low volumes and high handling and transport costs. Opportunities exist to substitute imported soybean and sunflower oil. The locally produced oils are known and can be marketed at low costs.

### *Oilseed cake as livestock feed*

The oilcakes as by-product of the oil crushing is valuable feed for livestock, e.g. dairy cows. This has two economic benefits: the value of oilseed rises and the production level of dairy cows increases at the same time.

### *Improving trade balance*

The value of imported edible oil is approximately 40 to 50% of the value of the exported oilseeds. By substituting the imported oil by domestically produced oil the foreign trade balance of Ethiopia will improve considerably. Substituting edible oil imports contributes significantly to a lower trade balance deficit.

## ***Threats***

### ***Comparative disincentives for oilseed sector***

The Ethiopian development bank has not set oilseeds as a priority area for investment. This makes credit for investors in the oilseed sector more expensive relative to credits for other sectors. In addition, imported palm oil is free from import tax and VAT: which results in a clear disadvantage for domestically produced edible oil.

### ***Oil imports and food aid***

In previous years, food aid distorted seriously the domestic edible oil market by cheap palm oil. In addition, no import taxes on palm oil make it hard for Ethiopian producers to compete. The majority of consumed edible oil is imported.

## 7. Recommendations and business opportunities

### Key findings:

- *The domestic market offers opportunities by producing larger quantities of oilseeds and by using idle oil milling capacity. By substituting imported by domestically produced edible oil, the trade balance will improve.*
- *Developing the domestic edible oil market enhances the possibilities of exporting processed oilseeds.*
- *Focus export of oilseed on higher market values by exploiting market windows. Several products based on sesame offer opportunities.*
- *Focus on specialty oilseeds for export and on commodities on the domestic markets*
- *Higher production enhances food security and export possibilities.*

### 7.1 Sector-level recommendations

Two strategies are identified to develop the Ethiopian oilseeds sector: (i) developing a critical home market for domestically produced edible oil; and (ii) enhancing export chains of high value products. These strategies are mutual dependent and success of one enhances the success of the other.

Recommendations to create a home market for domestically produced oil are:

- Enhance productivity for all crops through increased use of inputs like high-yielding seed varieties and fertilizer.
- Align research, education, extension, and farmers' efforts better by creating a knowledge system that enables continuous flows of information with sufficient feedback mechanisms.
- Maximize the use of the production and refining capacity of the edible oil millers in the short run. In addition, the improvement of quality, efficiency and marketing of Ethiopian edible oil up to Malaysian palm oil quality standards, can further improve the comparative advantage. For instance, the local cottonseed oil has better characteristics than the imported palm oil.
- Ensure a level playing field for domestically produced oil compared to imported palm oil. A level playing field would include equal VAT rates for all edible oils. In addition, a market-conform exchange rate can benefit the domestic market, as the Ethiopian Birr is currently, according to the IMF, 40-50% overvalued.
- Investigate the growing conditions and general suitability of commodity oilseed crops like palm oil, soybeans, and sunflower seed. In line, make cost-benefit analysis of these crops from a value-chain point of view and comparative analysis with imported oil.

In order to create high value export chains, it is strongly recommended to focus on the specialty oilseed products. Recommendations for the Ethiopian oilseeds sector in more detail are:

- Develop a market information system with information on buyers; prices of different products, grades; and market conditions in competing countries. In addition, business relations with high-value markets could be promoted by EPOSPEA's efforts (experience tours and trade fairs) linked to communication by for instance a website and a magazine for members.
- Improve the knowledge about product characteristics of the different oilseeds and edible oils. Characteristics as color, oil content, fatty acid composition, and taste determine the applications. Final consumer products, such as the highly demanded healthy fatty acids, should match these characteristics. By knowing this, it is possible to create more added value.
- Create more added value, quality and reputation by implementing exporters' codes of conducts and oil millers codes of practice. Partnership between Europe in general and the Netherlands in specific can further accelerate knowledge and information sharing.
- Implement an ECX system that prevents blending of different types of sesame seed, improves quality (e.g. level of admixture, moisture content), and creates incentives for farmers.

- Create a few champions in the edible oil sector who are able to comply with international quality, hygiene, and food safety standards and who can export high-value export oils.

## 7.2 Business level opportunities and market windows

The previous sector recommendations can be more specifically translated in business opportunities as shown in table 7.1. The opportunities are addresses to several links in the chain. Sometimes, a dedicated chain has to be organized to guarantees quality or credence (i.e. organic) requirements. We assume, which can be discussed, that the traders or exporters, as last link in the chain, are the chain captain.

Table 7.1: Opportunities on business level

Chain actor	Opportunities
Suppliers	<ul style="list-style-type: none"> <li>• Enterprises in sowing-seed, chemicals, and farm equipment both for imported as for domestically produced products.</li> <li>• Credit facilities for farmers.</li> <li>• Animal feed based on by-products (oil cake) of oil millers.</li> </ul>
Growers	<ul style="list-style-type: none"> <li>• Production of oilseeds like soybeans, sunflower, peanuts, olives, jatropha and safflower.</li> <li>• Production of safflower petals for dyeing purposes.</li> <li>• Achieving higher yield levels by using inputs (fertilizer, higher-yielding seeds) and by applying crop rotation.</li> </ul>
Processors	<ul style="list-style-type: none"> <li>• Establishing 99.5<sup>+</sup>% cleaning, hulling and sterilization companies for sesame and niger seed. Despite new companies started recently, the overall production capacity of especially hulling and sterilization is still less than 10% of all exports.</li> <li>• Improved edible oil processing practices for the domestic market with special attention for bottling, branding, and promotion.</li> <li>• Olive and peanut oil production.</li> <li>• Production of shortening for bakery applications.</li> <li>• Small-scale castor and jatropha factories for local energy production to substitute mineral oil.</li> </ul>
Collectors/ middlemen	<ul style="list-style-type: none"> <li>• Collecting large quantities of specialties as support for dedicated supply-chains or large export chains.</li> <li>• Optimizing ECX trade in such a way that it is in line with market opportunities.</li> <li>• Organizing efficient logistics between growers and processors or exporters.</li> </ul>
Exporters	<ul style="list-style-type: none"> <li>• Export of high value oilseeds and edible oil. See table 7.2 for a specification.</li> <li>• Establishing dedicated supply-chains from farmer to end users in specialties e.g. sesame oil, hulled sesame, organic seeds, linseed oil.</li> </ul>

The market windows are the domestic market and the export markets. The market windows for export markets are summarized in table 7.2. On the domestic market the most important market windows are, substituting imported by domestically produced edible oil is the largest opportunity and using castor and jatropha seeds for bio fuels. To achieve market success following different tracks is recommended. Firms with a different structure can serve different markets. E.g., large state farms or large oil millers who are able to produce large volumes serve the export markets. Small-scale enterprises might have the best opportunities on the domestic market.

Table 7.2: Export market windows for oilseeds

Product	Market	Opportunity
Sesame seed with high purity level (99.5+%)	Bakery applications	Investment in cleaning facilities
Hulled sesame seed	Bakery applications	Investment in hulling facilities
Specially flavored sesame seed oil (e.g. Humera type)	Different food purposes (e.g. 'wok' oil)	Organizing local crushing and bottling.
Organic sesame seed	Organic food applications	Organizing organic chains from farmer to end user
Linseed with high omega-3 and 6 fatty acids	Applications in specific healthy food products	Identify specific varieties with highest amounts of omega 3 and 6. Setting up export chains
Castor beans	Wide variety of technical applications	Identify opportunities for organizing collection. Identify main characteristics. If cost competitive with India, setting up export chains to Europe and other destinations
Olive	Different food purpose	High value export oil as sesame oil.
Safflower seed	Applications in specific healthy food products	If high C18:2 level, identify opportunities for organizing export chains
Safflower petals	Dyeing industries	Colors based on natural ingredients.

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# Annexes

## Annex 3.1: Oilseeds production in Ethiopia in 1,000 tonnes

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Castor oilseed	15	15	16	15	15	15	15	15	15	15	15
Groundnuts, with shell	8	7	9	12	15	13	29	29	34	35	28
Linseed	66	44	35	32	64	51	77	152	126	128	67
Mustard seed	2	2	2	2	2	2	2	2	2	2	2
Oilseeds, Nes	74	82	85	102	119	84	85	119	120	120*	120*
Rapeseed	9	10	8	14	15	17	20	29	24	26	26
Safflower seed	1	2	4	6	5	5	5	7	6	11	7
Seed cotton	46	46	46	46	46	60	76	76	86	65	65
Sesame seed	17	22	18	16	19	39	61	115	149	160	164
Soybeans	23	24	25	25	26	27	4	10	12	6	8
Total	259	253	246	269	325	313	375	554	574	567	501

Source: FAOstat, retrieved, April 2009

Oilseed nes 2006 and 2007 are 2005 level

Annex 3.2: Imports of oilseeds and edible oil in tons by Ethiopia

Source: UN Comtrade data

Product	HS-code	2000	2001	2002	2003	2004	2005	2006	2007	2008
<b>Oilseeds</b>										
Soybeans	1201	474	2,465	0	0	597	2,953	7,523	118	574
Ground-nuts fresh	1202	0	0	0	0	0	2	0	2	394
Linseed	1204	0	0	0	20	0	0	0	0	0
Rape or colza seeds	1205	0	0	0	0	0	4	342	0	624
Sunflower seeds	1206	9	0	6	0	0	0	0	0	0
Palm nuts / kernels		1	0	55	0	440	1	15,956	55	7953
Cotton seeds	120720	0	0	0	0	440	1	0	0	0
Castor oilseeds	120730	0	0	0	0	0	0	7	51	0
Sesame seeds	120740	0	0	0	0	0	0	15,368	3	7,502
Safflower seeds	120760	0	0	0	0	0	0	0	0	0
Other seeds	120799	1	0	0	0	0	0	385	0	450
<b>Total seeds</b>		<b>484</b>	<b>2,465</b>	<b>61</b>	<b>20</b>	<b>1,037</b>	<b>2,960</b>	<b>23,821</b>	<b>175</b>	<b>9,545</b>
<b>Edible Oil</b>										
Soybean oil	1507	6,584	815	1,508	74,240	19,049	28,270	6,060	8,218	6,790
Ground-nut oil	1508	0	40	0	0	1	2	205	4	1
Olive oil	1509+ 1510	478	465	599	381	953	2,004	529	395	321
Palm oil	1511	4,775	5,144	6,109	26,937	25,786	29,653	41,656	69,585	142,650
Safflower, sunflower and cotton-seed oil	1512	1,315	774	259	36	689	24	34	160	115
Coconut, palm kernel, Babassu oil	1513	165	1075	535	792	1413	657	2053	2010	356
Rape, colza, mustard oil	1514	200	198	17	1	62	54	0	28	1
Linseed oil	15151	4,887	6,145	684	4,906	6,086	9,711	7,401	2,112	1,527
Maize oil	15152	78	22	111	410	56	27	34	78	13
Castor oil	151530	4	0	7	4	6	9	0	0	1
Sesame oil	151550	3	78	11	0	113	3	843	761	9
Other edible oil	151590	499	10508	5284	2296	7986	1976	2248	3096	4883
<b>Total edible oil</b>		<b>18,988</b>	<b>25,263</b>	<b>15,125</b>	<b>110,003</b>	<b>62,199</b>	<b>72,389</b>	<b>61,063</b>	<b>86,449</b>	<b>156,667</b>

