Project African Integration for the Sustainable Genetic Improvement of Cotton

An overview of the cotton sector

in Africa and Brazil

ABC BRAZILIAN COOPERATION AGENCY
MINISTRY OF FOREIGN AFFAIRS

MINISTRY OF FOREIGN AFFAIRS
FEDERATIVE REPUBLIC OF BRAZIL

Project African Integration for the
Sustainable Genetic Improvement of Cotton

An overview of the cotton sector

in Africa and Brazil

ABC BRAZILIAN COOPERATION AGENCY
MINISTRY OF FOREIGN AFFAIRS

MINISTRY OF FOREIGN AFFAIRS
FEDERATIVE REPUBLIC OF BRAZIL

Fact Sheet

AMBASSADOR CARLOS ALBERTO FRANCO FRANÇA
Minister of State for Foreign Affairs

AMBASSADOR FERNANDO SIMAS MAGALHÃES
Secretary General of Foreign Affairs

AMBASSADOR SARQUIS JOSÉ BUAINAIN SARQUIS
Secretary of Foreign Trade and Economic Affairs of the Ministry of Foreign Affairs

AMBASSADOR RUY CARLOS PEREIRA
Director of the Brazilian Cooperation Agency under the Ministry of Foreign Affairs of Brazil (ABC/MRE)

NELCI PERES CAIXETA
General Coordination of Technical Cooperation with Africa, Asia and Oceania (CGAA)

MELISSA POPOFF SCHEIDEMANTEL
Project Officer responsible for the Project

FERNANDO ALVES DA SILVA ANDRADE
Project Assistant

JANAINA PLESSMANN AND CLAUDIA CAÇADOR
Communication Unit

LUCAS CUREAU, MARGUERITE L. MARQUE, MOHAMMED HADJAB AND PAULO EDUARDO PRESTES COHEN
Translators/French

DANIEL ALVES AND ALINE LORENA TOLOSA
Translators/English

JANAINA PLESSMANN AND CLAUDIA CAÇADOR
Proofreading/Portuguese

MARCOS GAMBINI
Proofreading/English

MOHAMMED HADJAB
Proofreading/French

GRAPHIC DESIGN AND DIAGRAM
Sense Design & Comunicação

COOPERATING INSTITUTIONS IN PARTNER COUNTRIES:

Benin
Emmanuel Sekloka - Director CRA-CF/INRAB
National Institute of Agricultural Research of Benin (INRAB)

Brazil
The Minas Gerais State Association of Cotton Farmers (AMIPA)
Brazilian Association of Cotton Farmers (ABRAPA)
Technical Assistance and Rural Extension Company of Minas Gerais (EMATER-MG)
Brazilian Public Agricultural Research Corporation (EMBRAPA)
Agricultural Research Corporation of Minas Gerais (EPAMIG)

Burkina Faso
Bazoumana Koulibaly: Head of Bobo-Dioulasso Regional Station/INERA
National Institute of Agricultural and Environmental Research (INERA)

Burundi
Nibasumba Anaclet - Researcher
Institute of Agronomical Sciences of Burundi (ISABU)

Cameroun
Sadou Simplice - Rural Delegate for Agriculture and Rural Development of the Far North
Regional Delegation for Agriculture and Rural Development of the Far North (MINADER)

Chad
Reoungal Djinodji - Head of the Bébédjia Regional Station/ITRAD
Chadian Institute of Agricultural Research for Development (ITRAD)

Côte d'Ivoire
Dr. Mel Eg. Representative for Animal Resources, Fisheries and Food Security Policy Issues
Ministry of Agriculture and Rural Development

Ethiopia
Dr. Taye Tadesse - Director of Variety Research
Ethiopian Institute of Agricultural Research (EIAR)

Malawi
Ketulo Lackson Salipira - Senior Deputy Director (TD)
Ministry of Agriculture, Irrigation, and Water and Development - Department of Agricultural Research

Mali (Cotton Soils)
Moro Diakite - Senior Trainer/Head of Training and Technical Iinnovations Service
Malian Textile Development Company (CMDT)

Mali (Cotton-4)
Fagaye Sissoko - Mali's Institute of Rural Economy – IER
Head of the Sikasso/IER Regional Station

Mozambique
Yolanda Milena Mangore Gonçalves - General Director of the Cotton and Oilseeds Institute
Cotton and Oilseeds Institute of Mozambique (IAOM)

Kenya
Teresa Okiyo - Researcher
Kenya Agricultural and Livestock Research Organization (KALRO*)

Senegal
Dr Djibril Bandiane - Entomologist and Director of the Agricultural Research Center in Tambacounda
Agricultural Research Institute (ISRA)

Tanzania
Everina Lukonge - Researcher
Tanzania Agricultural Institute (TARI)

Togo
Akantetou Pikassalé - Head of the CRA-SH/ITRA in Parakou
Togolese Agricultural Research Institute (ITRA)

Zimbabwe
Washington Mubvekeri - Director of the Cotton Research Institute

Contents

Foreword

These two publications present the data available on the cotton sector and cotton varieties found in 15 African countries and in Brazil, as well as the outcome and results achieved in the activities carried out under the Technical Cooperation Project "African Integration for the Sustainable Genetic Improvement of Cotton"," signed on January 26, 2021. This project is part of the Brazilian Program in Support of the Cotton Initiative in Africa, which started in 2009 under the initiative known as the Cotton-4 Project "Supporting the Development of the Cotton Sector in the C-4 countries" for the benefit of Benin, Burkina Faso, Chad and Mali.

By strengthening capacities in the development of genetic material, which constitutes the heart and starting point of cotton growing and cotton production, the African regional integration project is expected to complement the other bilateral and regional projects of the Brazilian Programme in Support of the Cotton Sector, and thereby ultimately contribute to increasing cotton crop productivity on the African continent. The Brazilian interaction with African countries will, in turn, allow Brazilian researchers to have access to technical knowledge on the dynamics of infestations of pests and diseases in cotton crops in Africa and thereby enable countries to prepare for possible new challenges that cotton farming may be faced with in the future.

The information contained herein is therefore intended to develop research capabilities in the cotton sector; it also provides a foundation for the African and Brazilian researchers in charge of genetic improvement programmes in their respective countries for decision-making on the characteristics of the genetic material most suitable for use in their research work. Likewise, Brazil will benefit from the compilation of detailed data on the technologies and biodiversity found in the African cotton sector, for the integration of African genetic material in alignment with the Brazilian interests is likely to support future research in this field, right here in Brazil.

ABC takes pride in the work developed in partnership with its African fellow countries, as it is relevant for the future of international cotton farming and will thus contribute to the social and economic progress of this group of cotton producing countries. Moreover, Brazil is also likely to benefit from such exchanges with African countries, as these may result in innovative technology solutions (ITS) for the Brazilian cotton production sector as a whole.

AMBASSADOR RUY CARLOS PEREIRA
Director of the Brazilian Cooperation Agency (ABC)

Cotton, a strategic crop

Cotton is a multi-purpose plant: from clothing to oil production, from papermaking to the chemical industry, just to name a few areas where man has historically used this fundamental input, as the infographic below shows.

Cotton = multi-purpose plant

Marketed in world markets as fiber (lint and linter);
as an oilseed (mankind's sixth most important source of oil);

and **source of high biological value proteins**.

Global cotton consumption in 2021 was **26.6 million tons.**

Global production, in turn, increased in the 2021-2022 period to **25.73 million tons**, *underscoring the importance of the cotton crop to the global economy.*

Source: International Cotton Advisory Committee (ICAC)

Brazil exported **166.4 thousand tons** *in November 2021, totaling a revenue of* **US$ 290.0 million** *from exports.*

In recent years, Brazil has remained among the **top five world producers,** *alongside countries such as China, India, the USA, and Pakistan. It ranks* **first in rainfed yields.**

Brazil has also been among the **world's largest exporters.**
The domestic outlook is promising as the country is among the **world's largest consumers** *of cotton lint.*

Source: ABRAPA

Cotton harvest day in Mozambique

In this market context, international cotton agribusiness is among the most important ones from a social and economic point of view, generating more than 300 billion dollars a year. Exploited in more than 70 countries, more than 30 million hectares are currently planted, being one of the crops that most employ labor in the rural sector and distribute income. According to data from the Food and Agriculture Organization of the United Nations (FAO), growing this fiber involves about 90 million families around the globe.

In regions with few opportunities for crop diversification, growing cotton represents an alternative for income generation in family farming communities.

Therefore, pooling efforts to expand and consolidate cotton growing as a sustainable and competitive economic activity, especially for family-based agriculture, becomes extremely relevant, requiring, when necessary, technical and production organization changes, which entail the adoption of new production systems. These include the use of high-quality seeds, early annual varieties, and substantial changes in crop management practices, such as integrated pest management, as well as greater attention to post-harvest quality control.

Africa's changing reality

Despite the fact that the role of the cotton fiber producer and exporter is reserved to African countries, up until recently production chains were poorly structured and under strong control of foreign and/or state-owned companies. Since the 1990s, this reality has been changing, and the sector is undergoing a process of technological reorganization and modernization. Despite these advances, there is still room for strengthening the cotton sector, by using technologies suited to the different realities of cotton-producing countries. Hence, technical cooperation has been able to contribute to the development of the institutional and personal capacities of the technical teams.

International development organizations and the governments of some of these countries sought to implement institutional changes aimed at increasing the competitiveness of the sector, through a common effort to increasing productivity and the income of smallholder farmers.

With the advance of the Brazilian technical cooperation in these countries, the importance of sharing information about the African cotton crop and the characteristics of the cotton varieties existing in these countries has also become evident. This is the scope of **Project "African Integration for the Sustainable Genetic Improvement of Cotton"**. The availability of varied genetic material, with greater adaptability to the climatic and environmental conditions of the region, using varieties from Brazil and 15 African countries, will ensure that breeding programs - both African and Brazilian - will have ample access to genetic material for research development. This exchange has only been possible thanks to a broad international cooperation program, spearheaded by Brazil, whose results are shown in this publication.

2017-2018 Cotton Season in Africa

1.847.000 tons

Source: Annual Management Report of the Brazilian Association of Cotton Producers - ABRAPA

About the Project

African Integration for the Sustainable Genetic Improvement of Cotton

Project "**African Integration for the Sustainable Genetic Improvement of Cotton**" integrates the Brazilian program of support to the strengthening of cotton production in developing countries in Africa, Latin America, and the Caribbean. The initiative is a response from Brazil to requests for cooperation received from these countries, in search of improvement and adoption of technologies aimed at resuming or revitalizing the cotton sector in these regions.

The program started in 2009 with **Project Cotton-4**, which includes Benin, Burkina Faso, Chad, and Mali, and is implemented under the coordination of the Brazilian Cooperation Agency (ABC), of the Ministry of Foreign Affairs (MRE). Technical implementation is carried out by national public institutions of excellence in the cotton sector, according to the principles of South-South technical cooperation, both bilateral and trilateral with international organizations.

Cotton Field Training Day in Tanzania

2007 *Signing of the Technical Cooperation Agreement between the Government of the Federative Republic of Brazil and the African Union*

2008 *Entry into force of the Technical Cooperation Agreement*

2009 *Beginning of the Brazilian Cotton Program, with Project Cotton-4*

2010-2018 *Program extended to 15 countries*

2018 *A researchers' meeting, in Mali, coordinated by ABC, is the starting point for the Project "African Integration for the Sustainable Genetic Improvement of Cotton"*

2021 *Launch of Project "African Integration for the Sustainable Genetic Improvement of Cotton"*

2022 *Online seminar that will bring together representatives of ABC, Brazilian cooperating institutions from the public and private sectors, institutions of 15 African countries that are Brazil's partners in technical cooperation, and other players that are part of the cotton supply chain in Brazil and abroad.*

In this context, in October 2018, ABC coordinated a meeting at the Sotuba Regional Agronomic Research Center in Bamako, Mali, with Malian researchers and those from the Cotton Victoria and Shire-Zambezi Projects, implemented within the scope of the Brazilian Cotton Program. The meeting was aimed at creating an opportunity for the exchange of ideas on issues related to cotton production, such as exchange of plant genetic material, exchange of research protocols and reports, and creation of opportunities for the exchange of research proposals, protocols, and/or the results of studies carried out individually or collectively.

As a result, and to create the means for interaction and exchange among the countries that are part of the Brazilian Program to Support Cotton Farming in Africa, the Regional **Project African Integration for the Sustainable Genetic Improvement of Cotton** was signed in January 2021. The initiative establishes a partnership between Brazil and 15 African countries that have already benefited from Brazilian bilateral and regional technical cooperation projects in cotton farming: Benin, Burkina Faso, Burundi, Cameroon, Chad, Cote d'Ivoire, Ethiopia, Malawi, Mali, Mozambique, Kenya, Senegal, Tanzania, Togo, and Zimbabwe.

This project's primary objective is to promote cooperation among partner countries in the field of cotton breeding, thus contributing to the increase of competitiveness and efficiency of the African cotton sector, by having at its core information sharing, knowledge improvement, and exchange of genetic materials through relations that are being forged among such countries.

The Project
in numbers

Total investment
US$ 1.204.322,00

Duration 18 months,
extendable, starting in January 2021

17 partner institutions

+20 researchers mobilized

+40 cotton varieties brought together in this publication

PLANNED ACTIVITIES

2 publications on seed varieties

2 alignment seminars among participating countries

5 technical visits: Brazil, Benin and Mali

2 workshops to share knowledge and exchange best practicess

Installation of 15 Technical Demonstration Units (TDUs)

Capacity building cycle in Brazil and partner countries

Creation of an information sharing platform

Exchange of genetic material among African countries and Brazil

STAKEHOLDERS

DIRECT PARTNERS:

- National institutions dedicated to the research of cotton genetic material and to technical assistance and technology dissemination actions;
- Seed service researchers and inspectors;
- Farmers' associations;
- Civil servants of Ministries of Agriculture;
- Cotton Farmers.

INDIRECT PARTNERS:

- Families involved in cotton production and trade;
- Cotton marketing companies;
- Textile Industry.

Cooperating institutions
in 16 participating countries

BRAZIL

Brazilian Cooperation Agency - ABC by the Ministry of Foreign Affairs - MRE

Benin

National Institute of Agricultural Research of Benin (INRAB)

Brazil

Coordinating institution:
Brazilian Cooperation Agency (ABC)
Ministry of Foreign Affairs (MRE)

Burkina Faso

National Institute of Agricultural and Environmental Research (INERA)

Burundi

Institut of Agronomical Sciences of Burundi (ISABU)

Cameroun

Regional Delegation for Agriculture and Rural Development of the Far North (MINADER)

Chad

Chadian Institute of Agricultural Research for Development (ITRAD)

Côte d'Ivoire

Ministry of Agriculture and Rural Development

Ethiopia

Ethiopian Institute of Agricultural Research (EIAR)

Malawi

Ministry of Agriculture, Irrigation and Water Development - Department of Agricultural Research

Mali (Cotton Soils)

Malian Textile Development Company(CMDT)

Mali (Cotton-4)

Mali's Institute of Rural Economy (IER)

Mozambique

Cotton and Oilseeds Institute of Mozambique (IAOM)

Kenya

Kenya Agricultural and Livestock Research Organization (KALRO)

Senegal

Agricultural Research Institute (ISRA)

Tanzania

Tanzania Agricultural Institute (TARI)

Togo

Togolese Agricultural Research Institute (ITR)

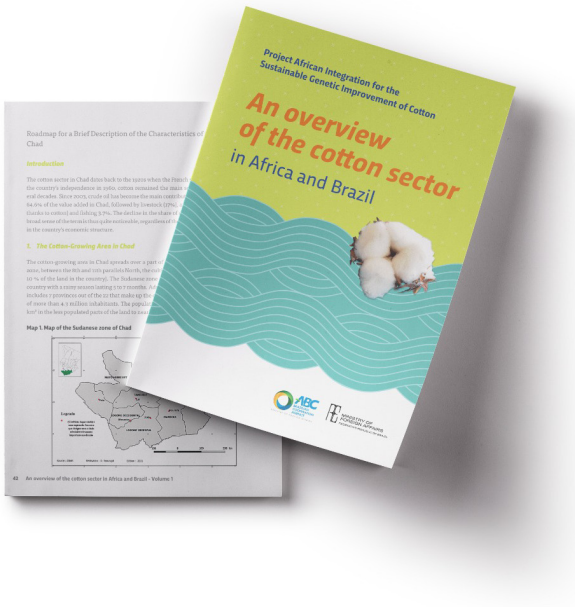
Zimbabwe

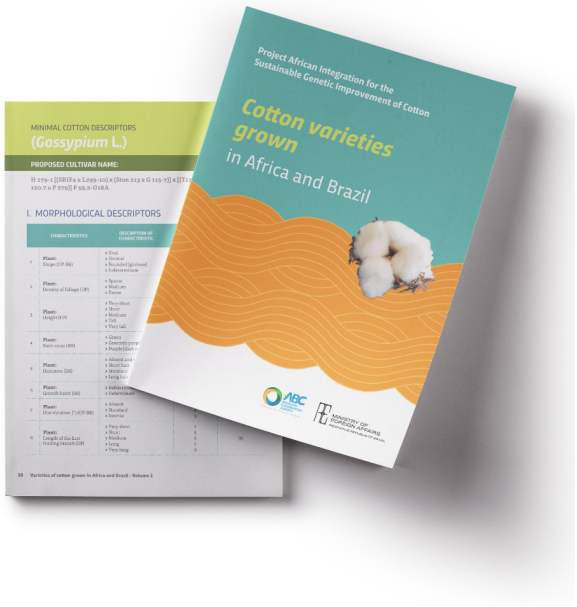
Cotton Research Institutions

About the publications

The publications **Overview of the Cotton Sector in Africa and Brazil" and "Cotton Varieties Grown in Africa and Brazil** are the result of the collective effort of 15 African countries and Brazil, under the coordination of the Brazilian Cooperation Agency (ABC).

In this first volume, the context of this production sector in each participating country is detailed, bringing together a set of descriptions of the cotton sector prepared by the cooperating institutions themselves. In the second volume, fact sheets describing the characteristics of the cotton varieties available in each partner country are made available.





Country roadmaps

Benin

Seed production has a dual objective: to maintain the variety in all its characteristics through conservation breeding and to disseminate the variety to farmers who wish to cultivate it through seed multiplication. In general, seed alone contributes 40% to cotton production improvement.

Among the most important inputs that justify the good performance of the cotton sector in Benin, seeds play a key role. Recent reforms within the Beninese cotton sector have established the Cotton Research Institute (IRC - *Institut de Recherche sur le Coton*) as a technical instrument of the Interprofessional Cotton Association (AIC - *Association Interprofessionnelle du Coton*), responsible for research, innovation and development activities for the benefit of the sector. As such, the IRC is the operational arm of the AIC in the organization of cotton seed production and development in Benin.

Seed production chain and cotton seed categories

In the seed production implemented system in recent years, three (03) seed chains have been set up, each leading to the production of seeds of one of the three disseminated varieties (ANG 956, OKP 768 and KET 782).

Each chain includes different production stages essentially grouped into five different seed categories[1]: breeder seed (G0), pre-basic seeds called Zone 000 and Zone 00 (G1 to G2), basic seeds called Zone 0 (G3), first generation certified seeds called Zone 1 (R1) and second-generation certified seeds called Zone 2 (R2).

The Cotton Research Institute (IRC, acronym in French) is in charge of growing varieties and ensuring pre-basic seed production, which is then supplied to Zone 0 seed producers to ensure basic seed production. IRC and AIC, in collaboration with various other bodies, are responsible for producing other seed categories.

Organization of the production of the different cotton seed categories

Breeder (G0) and pre-basic seed (G1 and G2) production is IRC's responsibility. The production of seeds from other categories (G3, R1 and R2) is entrusted to the farmers organized in Local Cotton Farmer Cooperatives (CVPC) under the responsibility of IRC and under the control of the public structure in charge of seed control and certification, i.e. the Vegetable Production Directorate (DPV - *Direction de la Production Végétale*).

For each variety, pre-basic seeds are produced by IRC on plots ranging from 0.25 ha (G1) to 4 ha (G2). Basic seeds (G3) are produced on approximately 60 to 350 ha depending on the variety, by seed producers. It is then delivered to other carefully selected seed producers in villages within the variety's growing area for the production of the first generation of certified "R1" seed. This stage is carried out on an area ranging from 1,500 to 8,000 ha depending on the variety. Depending on the

1 Translator's note: OECD's seed classification was used for translating into English the equivalent seed classes in the Beninese system. Please access https://www.ams.usda.gov/rules-regulations/fsa/oecd-users-guide-section-b-policy for more information and a comparison with the U.S. seed classification system.

demand for seed concerning the following crop season, 'R 1' seeds is multiplied in a commune in the variety's growing area by carefully selected seed producers. This last step consists of second generation of certified 'R 2' seeds, which often covers the entire demand for seeds in the variety's growing area.

IRC's roles in the production system

In the seed production system that has been put in place, IRC's main role is to contribute qualitatively and quantitatively to the production of seeds from the three (3) varieties that have been disseminated. Specifically, the IRC, is responsible for:

- ✓ Producing G1 and G2 seed categories every year for the varieties being disseminated (ANG 956, OKP 768 and KET 782), and the basic seeds supplied to individual farmers dedicated to seed production;
- ✓ Ensuring follow-up on the establishment of G2, G3, and R1 seed multiplication fields in their respective production zones. To this end, seed multiplication zones have been well defined in a participatory manner with members of the Cotton Interprofessional Association (AIC, acronym in French), ginning facilities and farmers to avoid any varietal mixing;
- ✓ Participates, alongside the DPV, in the three seed field inspection operations, during the cotton crop cycle, to identify plots in the seed production zones whose production may be characterized as that of a raw cotton farmer;
- ✓ Ensuring varietal purity, and ginning of basic seeds. For that purpose, it uses a 20-saw micro ginner located in one of its research units (Parakou);
- ✓ Ensuring the follow-up on the ginning of basic seeds carried out in ginning facilities;
- ✓ Assessing the quality of seeds coming from ginning facilities by setting up a seed quality self-monitoring system. A germination test is carried out on the samples of seed lots produced;
- ✓ Organizing the use of seeds produced, at the farmer's level.

Brazil

Today, cotton is one of the most important fiber crops in the world. Cotton farming takes up about 35 million hectares of land across the planet every year.

World cotton demand has been gradually increasing at an average annual growth of 2 % since the 1950s. Cotton trade around the world generates US$ 12 billion every year and its production involves more than 350 million people throughout the chain from farming to logistics, ginning, processing and packaging. Cotton is currently produced in more than 60 countries on the five continents [2].

In this scenario, Brazil stands out as an important producer and exporter of this commodity. Cotton is the fourth most important crop in Brazilian agriculture, after soya, sugar cane and maize[3]. Last year, **the Gross Value of Agricultural Production (GPV) was R$ 34.95 billion**, which represents **9.10% of the total GPV of crops**. Over the past three years, cotton farming has performed spectacularly, **increasing by 131%**. Currently, lint production is concentrated in the Brazilian State of **Mato Grosso, reaching 64% of the total GPV, while the production in the Western part of the State of Bahia represents 25% of the total GPV, both thereby account for almost 90%** of the cotton farmers' revenue. In the last 10 years, the average yield has increased by **around 20 %, reaching the level of 1,700 kg/ha** in the last two seasons[4].

In 2019, the Brazilian cotton production and exports generated revenues of **US$ 2.6 billion**, surpassing the previous year by almost US$ 1 billion. This achievement is thanks to the quality of Brazilian cotton — 85% of all the production is certified by the Responsible Brazilian Cotton (ABR, acronym in Portuguese) Program; the favour climate also contributes to high yields; not to mention adapted plant varieties and regular supply of raw materials, which makes textile industries rely on the production sector [5].

It should also be noted that Brazil produced 2.9 million tons of **lint (cotton fiber)** in the 2019-2020 season (CONAB, 2020). In the last 44 years, **lint yields** has have increased 12 times while the **seed-lint** ratio has increased from **33%** to 40% (CONAB, 2020). This increase in **lint yields** and the **seed-lint** ratio is largely due to the genetic improvement of **cultivars**[6].

1 *Algodão no Mundo [Cotton in the World]*, ABRAPA, 2021, https://www.abrapa.com.br/Paginas/dados/algodao-no-mundo.aspx

2 *Algodão no Mundo [Cotton in the World]*, ABRAPA, 2021, https://www.abrapa.com.br/Paginas/dados/algodao-no-mundo.aspx

3 *Aumento da Produção de Algodão no Brasil Traz Novos Desafios para a Pesquisa [Increased Cotton Production in Brazil Brings New Challenges for Research]*, EMBRAPA, 2019, https://www.embrapa.br/busca-de-noticias/-/noticia/43931817/aumento-da-producao-de-algodao-no-brasil-traz-novos-desafios-para-a-pesquisa-aponta-documento-da-embrapa

4 *Aumento da Produção de Algodão no Brasil Traz Novos Desafios para a Pesquisa [Increased Cotton Production in Brazil Brings New Challenges for Research]*, EMBRAPA, 2019, https://www.embrapa.br/busca-de-noticias/-/noticia/43931817/aumento-da-producao-de-algodao-no-brasil-traz-novos-desafios-para-a-pesquisa-aponta-documento-da-embrapa

5 *Como está o Mercado de Produção de Algodão do Brasil [How is the Brazilian Cotton Production Market?]*, FEBRATEX GROUP, 2020, https://fcem.com.br/noticias/mercado-de-producao-de-algodao-no-brasil/

6 *Importância do Desenvolvimento de Cultivares de Algodão [The Importance of Cotton Cultivar Development]*, BASF, 2020, https://blogagro.basf.com.br/importancia-do-desenvolvimento-de-cultivares-de-algodao-1037/n

Currently, Brazilian exports correspond to **134,010.39 MT**[7]; Brazil therefore ranks fifth in terms of planted area with a total of 140,428.10 **(ha x 1,000) in 2021**[8].

Thanks to this increase in yields, 2019-2020 season was marked with a record harvest of cotton in Brazil. 2019-2020 harvest was completed across the country in September. When you look at the breakdown by state, the two largest national producers, that is the **States of Mato Grosso and Bahia produced 2.1 MMT and 615,000 MT**, respectively[9]. According to the National Supply Company (CONAB), in 2019, the total cotton producing area grew by 37.8%, resulting in a production of **1.61 million metric tons, an 36% increase** compared with the previous season[10].

With regard to cotton farming by State, it is worth highlighting:

The astimated area and production by state in 2019-2020:

	PLANTED AREA (1000 HÁ)	TOTAL PERCENTAGE OF PLANTED AREA	PRODUCTION (MT)	TOTAL PRODUCTION PERCENTAGE
Total	1665	-	3020	-
Mato Grosso	1140	68%	2100	70%
Bahia	320	19%	615	20%
Goias	42	3%	65	2%
Mato Grosso do Sul	40	2%	60	2%
Minas Gerais	45	3%	65	2%
Maranhão	28	2%	45	1%
Piauí	20	1%	30	1%
Others	30	2%	40	1%

Source: FAS Forecast Brasilia

It is worth noting that around 80% of the cotton currently sown in the Midwest takes place during the 2nd harvesting period, almost at the same time as the soya harvest. Late sowing has the advantages of showing a lower incidence of boll rot in the lower third part of the plant and a reduction in its cycle; this can lead to reducing the use of pesticides and thereby turn cotton more profitable than other crops as a second crop option. Late sowing also has some disadvantages however: some regions have shown a drop in lint quality of the second cotton crop along with a lower yield potential compared to the cotton sown in the first crop season[11].

7 *Algodão no Mundo [Cotton in the World]*, ABRAPA, 2021, https://www.abrapa.com.br/Paginas/dados/algodao-no-mundo.aspx
8 *Algodão no Mundo [Cotton in the World]*, ABRAPA, 2021, https://www.abrapa.com.br/Paginas/dados/ranking.aspx
9 *Cotton Products Update*, USDA, 2020, Cotton%20and%20Products%20Update_Brasilia_Brazil_11-30-2020%20(2).pdf
10 *Como está o Mercado de Produção de Algodão do Brasil [How is the Brazilian Cotton Production Market?]*, FEBRATEX GROUP, 2020, https://fcem.com.br/noticias/mercado-de-producao-de-algodao-no-brasil/
11 *A Cultura do Algodão [Cultivating Cotton]*, 2020, Daniel Ferreira, EMBRAPA.

As to the total cotton production, the Brazilian Midwest Region stands out with around 7,089,939 tons (that is 73.38% of all national production)[12]. It is worth noting that these results were obtained after structuring the entire production chain and adopting very large cultivation areas together with high technology[13]. In most cases, however, these results were only made possible with a high use of inputs leading to an increase in production costs[14].

Some important data about the cotton sector in Brazil[15]:

- ✓ In recent years, Brazil has remained among the five largest world producers alongside countries like China, India, the USA and Pakistan;
- ✓ Brazil ranks first in yields of cotton grown in drylands
- ✓ Brazil is among the world's largest exporters;
- ✓ This domestic scenario is promising, as the country is among the world's largest consumers of cotton lint.

Cotton area, production and yield in Brazil

CROP SEASON	AREA	LINT PRODUCTION	LINT YIELD
2006/07	1.096,80	1.524,00	1.389,50
2007/08	1.077,40	1.602,20	1.487,10
2008/09	843,20	1.213,70	1.439,40
2009/10	835,70	1.194,10	1.428,86
2010/11	1.400,30	1.959,80	1.399,56
2011/12	1.393,40	1.877,30	1.347,28
2012/13	894,30	1.310,30	1.465,17
2013/14	1.121,60	1.734,00	1.546,01
2014/15	976,20	1.562,80	1.600,90
2015/16	954,70	1.288,80	1.349,95
2016/17	939,10	1.529,50	1.628,69
2017/18	1.174,70	2.005,80	1.707,50
2018/19	1.618,20	2.725,90	1.684,53
2019/20	1.665,60	3.001,60	1.802,11
2020/21	1.378,50	2.441,90	1.771,42

Source:CONAB 04/06/2021

12 *A Cultura do Algodão [Cultivating Cotton]*, 2020, Daniel Ferreira, EMBRAPA.
13 *A Cultura do Algodão [Cultivating Cotton]*, 2020, Daniel Ferreira, EMBRAPA
14 *A Cultura do Algodão [Cultivating Cotton]*, 2020, Daniel Ferreira, EMBRAPA
15 *Algodão no Brasil [Cotton in Brazil]*, ABRAPA, 2021, https://www.abrapa.com.br/Paginas/dados/algodao-no-brasil.aspx

The Main challenges of Brazilian production:

Despite the excellent performance of Brazilian cotton on the world market, the production of this commodity still faces a series of challenges, among which the following are worth mentioning [16]:

- ✓ Competition with the synthetic fiber market and especially polyester in the textile industry;
- ✓ High production costs on the farm, such as those related to the use of pesticides, heavy machinery and transport to ports;
- ✓ Huge arrivals on the domestic market of clothing iems produced outside the country.

It should also be noted that all production systems and regions of Brazil face further challenges, such as: the development of more productive cultivars, resistant to biotic and abiotic factors, with higher technological characteristics and higher lint yields; more sustainable and efficient production systems in terms of inputs, labor and integration with other crops, by using and cover crops so as to reduce the environmental impact of farming activities[17].

16 *Como está o Mercado de Produção de Algodão do Brasil [How is the Brazilian Cotton Production Market?]*, FEBRATEX GROUP, 2020, https://fcem.com.br/noticias/mercado-de-producao-de-algodao-no-brasil/

17 *A Cultura do Algodão [Cultivating Cotton]*, 2020, Daniel Ferreira, EMBRAPA.

Burkina Faso

1. Public policies implemented to strengthen cotton growing

Cotton, commonly known as "white gold", is Burkina Faso's leading agricultural export and the second most important export after gold. It contributes with over 5% of the GDP and directly supports 4 million people. To this end, it has been included in the National Economic and Social Development Plan (PNDES) as one of the levers for Burkina's development.

The cotton sector in Burkina Faso is one of the best organized in the sub-region, where several players work in close collaboration. The main players in this sector are the farmers (National Union of Cooperative Societies of Cotton Farmers of Burkina Faso), the three cotton companies (SFITEX, SOCOMA and FASO COTON), cotton research (INERA/Cotton Program), banks and other private players (transporters, input suppliers, oil millers, spinners, craftsmen, etc.).

The government plays a cross-cutting role in the cotton sector and intervenes above all in the establishment of a legal and regulatory framework adapted to the development of the sector, as well as in creating infrastructures. The government participates in the development of the cotton sector through (i) the Ministry of Industry, Trade and Handicrafts (MICA), which houses the Permanent Secretariat Monitoring the Liberalized Cotton Sector (SP/SFCL, , acronym in French), (ii) the Ministry of Agriculture, which is in charge of managing most of the programs and projects for the development of the cotton sector, and (iii) INERA, which is responsible for conducting cotton-related research.

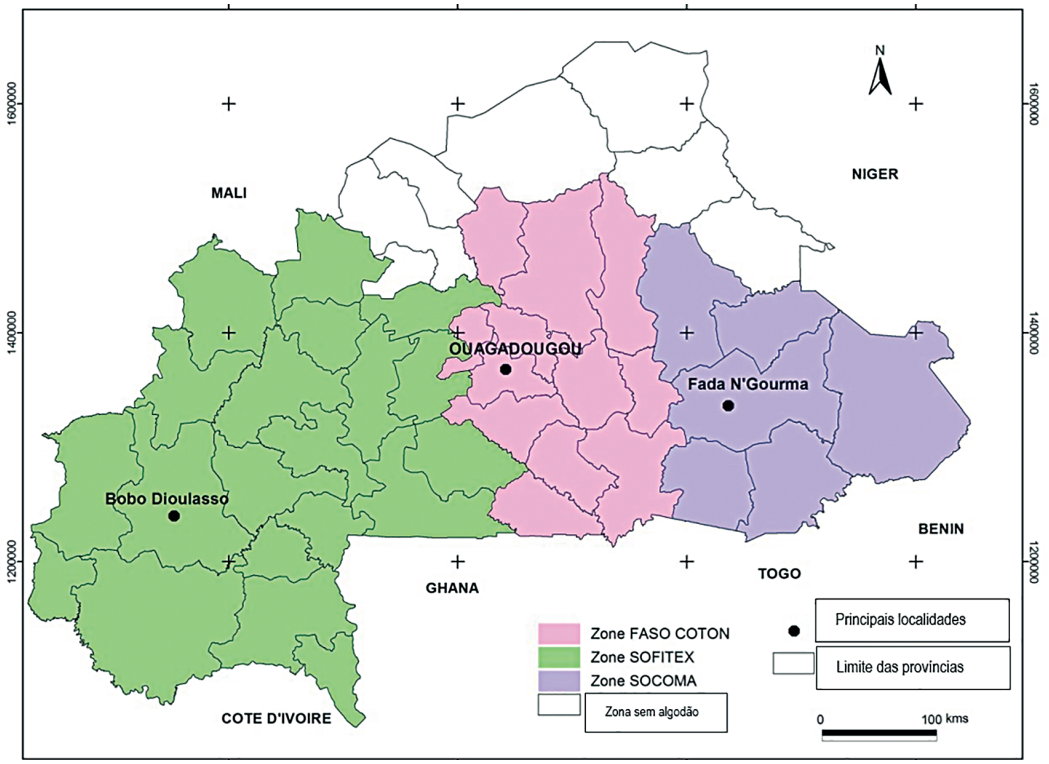
Until the end of 2005, the management of the Burkinabe cotton sector was governed by an interprofessional agreement signed in 1998 by the government, SOFITEX, and the *Union Nationale des Producteurs de Coton du Burkina* [the National Union of Burkinabe Cotton Farmers] and implemented by a management committee made up of representatives from farmers, the government and SOFITEX.

Within the framework of this liberalization movement, the sector management committee has given way to the Interprofessional Association of Cotton of Burkina (AICB, acronym in French), regrouping the professional category of farmers (UNPC-B, acronym in French) and that of cotton companies (APROCOB, acronym in French). The missions of AICB are (i) management of the Interprofessional Agreement by ensuring the application of the mechanisms contained therein, in particular, by establishing the purchase price of seed cotton, the definition of standards for seed cotton, the management of the buffer fond, as well as the financial instruments and mechanisms which the Association would work with; (ii) negotiations with the government regarding reducing the resources allocated to the Buffer Funds for the sector; (iii) determination of conditions for transfering agricultural inputs to the producers; and, (iv) management of common functions such as cotton research, production and distribution of seeds, approval of new seed varieties, formulation of specifications on the technical characteristics of inputs within the framework of calls for input supplies, training and supervision of farmers, determination of cotton standards, fiber classification and maintenance of roads in cotton producing zones.

2. Characteristics of the cotton sector in Burkina Faso

Following the liberalization of the cotton sector in September 2004, national cotton production is now carried out by three companies: SOFITEX in the Western zone, covering about 80% of the national territory; FASO COTON in the central zone covering about 7% of the national territory; and finally SOCOMA, in the Eastern zone, covering about 13% of the national territory (Figure 1).

Figure 1: Cotton growing areas of Burkina Faso



Cotton is grown on 500,000 to 600,000 hectares in Burkina Faso. It is grown on more than 250,000 farms, comprising more than 350,000 cotton farmers. These are generally small-scale, family-type farms. For example, in the West of Burkina Faso, the main characteristics of farms are as follows:

- ✓ Population: 11.9 persons on average;
- ✓ Number of rural workers: 8 on average;
- ✓ Literacy: an average of 2.6 literate people per farm;
- ✓ Total area planted: average of 8.41 hectares with extremes reaching from 2.94 to 62.83 hectares (all crops combined).

Cotton is therefore grown by small holder farmers (2 tons of seed cotton per farmers), who devote part of their land to growing cotton and the other part to growing cereals, legumes and tubers, etc. The average crop rotation on a cotton farm is:

- ✓ 45% for cotton;
- ✓ 46% for cereals (mainly maize);
- ✓ and 9% for other crops.

The level of deployment of agricultural equipment on farms is generally low and almost all work is not yet mechanized. Mechanization, when it exists, is generally limited to soil preparation and often to crop maintenance work. The situation is as follows:

- ✓ 35% of cotton farms are not equipped and the work is still done by hand;
- ✓ 40% are in the process of being equipped and have at least one hitch, i.e., a plow and a pair of oxen or a donkey;
- ✓ Slightly more than 24% of them have complete equipment (plow, weeder and/or ridger, cart, etc.);
- ✓ Less than 1% have a tractor and its plowing equipment in addition to a complete set of plowing equipment.

Barely 1% of cotton lint is processed locally by traditional, semi-artisanal spinners. At the industrial level, the only spinning mill, FILSAH, can process about 5,000 tons of lint per year, 60% of which is processed by local textile craftsmen. Almost all of the remaining cotton lint production is therefore exported without any substantial transformation, thus limiting its contribution to the national economy.

With such meager structures in place, the players of the textile craft industry operate mainly in the informal sector. They have limited technical, organizational, and entrepreneurial capacities. FASOTEX was created in 2005. It is a limited company with a capital of 100 million CFA francs held by private national investors and employs 75 people. It should be remembered that the former FASO FANI became FASOTEX. Since its recovery, the factory no longer processes local fiber. Only the printing/dyeing workshop is functional, using FILSAH yarns. In addition, the factory imports cretonne for printed pagnes [traditional Africa cloths]. Its production is essentially intended for the national market. Today, FASOTEX aims at the local market with a production geared towards making fabric for work clothes, uniforms etc. However, the company is strongly handicapped by the obsolescence of the existing equipment which has a negative impact on the environment in terms of waste disposal and inability to respect environmental standards during the production process.

The handicraft sector comprises more than 110 trades, classified into nine trade guilds (textile and clothing trades). Grouped within the National Federation of Craftsmen of Burkina Faso (FENABF, acronym in French), these players are organized around associations, groupings, and cooperatives. Women or their organizations predominate here. In Burkina Faso, there are about 49,900 weavers (29,400 men and 20,500 women) and 2,700 dyers (2,200 men and 500 women) with an average of 3 to 5 apprentices. As for sewing, it is highly developed in urban and semi-urban centers and a city like Ouagadougou has more than

10,000 dressmakers. With these data, the informal sector represents more than 80% of the cotton processing sector.

If in terms of transformation, the techniques of weaving, dyeing, cutting, and sewing are mastered, giving rise to the recognition of an indisputable know-how at the professional level, efforts remain to be made for the benefit of this category of players, so that they have scientific knowledge on the history of weaving, traditional textile production and sewing, with a view to improving their contribution to the promotion of Faso Dan Fani (FDF). Indeed, many interesting initiatives have been developed to promote the fabrics manufactured and processed in Burkina Faso by Burkinabe players at the national and international levels, but without any substantial, objective, and reliable support. Thus, in a process of deconstructing prejudices inherited from colonization concerning "the ability of Africans to dress themselves" or "to fit well in history", it is important to know that, like ironwork and writing, fabric represents an indicator of the presence of civilization within a given community.

3. Research institutions involved in the cotton sector

The "integrated sector" approach to cotton production in Burkina Faso commits cotton companies to supporting, among other things, research/development, and financing cotton research. The cotton sector has always benefited from agricultural research support. This support is provided by the Cotton Program of the Plant Production Department of the Institute of Environment and Agricultural Research (INERA, acronym in French) under the National Center for Scientific and Technological Research (CNRST, acronym in French). Topics for research are determined in consultation with cotton sector stakeholders and are translated into research activities that are scientifically validated by the Program Committee. As a reminder, the CNRST 2015-2024 Strategic Plan considered the current challenges in its ten (10) strategic axes, notably the degradation of natural resources, the reappearance of pests, low competitiveness of the sectors and climate change. The cotton sector, through the interprofessional cotton association (AICB) ensures financing for research activities that have been agreed on during consultations with the INERA Cotton Program.

4. The main areas of research

The Cotton and Textile Fibers Program is one of the 6 programs of INERA's Plant Production Department (DPV). The Cotton and Textile Fibers Program is currently organized in 04 thematic sections to accomplish its mission. These are:

- ✓ The Cotton Genetics and Improvement Section, which is in charge of developing new cotton varieties and supporting seed production for cotton companies;
- ✓ The Agronomy and Cultivation Techniques section, which deals with soil fertility management for cotton and cereal crops and technical roadmaps;
- ✓ The Cotton Defense section which is in charge of the fight against the main pests that affect the cotton plant;
- ✓ The Agricultural and Socioeconomics section, which deals with technology development, assessment of the level of technology adoption, organizational aspects, and cohesion analysis.

5. Number of researchers involved

The Cotton Program has a staff of 78 people, consisting of 14 researchers and 64 technical and support staff.

6. The main players in the cotton sector

The main players in this sector are farmers, the three cotton companies, cotton research, banks, and other private parties (transporters, input suppliers, oil millers, spinners, craftsmen, etc.).

The AICB, which is now the most important management body for the industry, has set itself the following missions:

- ✓ Management of the Interprofessional Agreement by ensuring the application of the mechanisms contained therein, in particular, setting the purchase price of seed cotton, determining seed cotton standards, and managing the Buffer Fund, as well as the financial instruments and mechanisms which the Association would be equipped with;
- ✓ Negotiation with the government regarding reducing resources allocated to the Buffer Funds for this industry;
- ✓ Determination of conditions for transferring agricultural inputs to producers;
- ✓ Management of common functions such as cotton research, production and distribution of seeds, approval of new seed varieties, formulation of common specifications concerning the technical characteristics of inputs within the framework of open calls for input supplies, training and supervision of farmers, determination of cotton standards, fiber classification and road maintenance in the cotton producing zones.

AICB thus brings together cotton companies (APROCOB) and the farmers (UNPCB).

The other players are: research (INERA, acronym in French), the Permanent Secretariat of the Liberalized Cotton Sector (SP-FCL acronym in French), and banks. Local and foreign banks play a role in i) providing agricultural credit (for farmers to purchase cotton seedsm as well as, inputs, and pieces of equipment) and ii) financing industrial investments (construction of factories, purchase of trucks for the transport of seed cotton).

7. Descriptions of marketing systems

The supply of inputs to farmers is twofold: the acquisition and implementation of inputs and credit.

Acquisition of inputs: this is carried out by the cotton companies which, based on the needs stated by the producers, proceeds with an international invitation to tender for the supply of the various inputs intended for cotton growing (fertilizers, pesticides). To do this, they mobilize resources for funding by using the local banking pool and/or foreign banks.

Implementation of inputs and credit: implementing physical inputs is done by the cotton companies, and they are transferred to the farmers on credit by the agricultural banks, in particular the BACB and the *Caisses Populaires* network which take over the financing. The settlement of these credits is

done by direct recovery on the cotton receipts during the season for marketing seed cotton. It should be added that for several years, UNPC-B and other private players have also been involved in the supply of certain specific inputs (fertilizers, herbicides for cereal, etc.).

Seed cotton is harvested by the *Groupements de Producteurs de Coton* (GPC, acronym in French) (Cotton Farmers Groups) and their unions through self-managed markets, which are paid by the cotton companies through the payment of seed cotton purchase commissions (4,250 CFA francs per ton of seed cotton). The transport of seed cotton is ensured to a large extent by private service providers. It should be noted that the transport of the totality of the lint towards the loading ports and seeds towards the local oil mills is ensured by private companies.

The produced fiber is 99% exported to Asian and European countries. Only 1% of this production is processed locally for the production of threads that are mainly re-exported to the sub-region. The by-products, notably the seed, are sold to local oil mills for oil extraction and the manufacture of soap and animal feed.

8. Farmers' organization

In order to improve management of their production activities, farmers have grouped together in associations called Cotton Farmers Groups (GPC). These GPCs, which were set up in 1996, are professional organizations that grow cotton whose main functions are:

- ✓ Input distribution;
- ✓ Management of short- and medium-term credit (grants and recovery);
- ✓ Organization of the collection and marketing of their members' seed cotton (cotton weighing and payment, etc.)
- ✓ Other related activities such as the management of membership fees and socioeconomic activities, etc.

Today, there are 9247 functional SCoopS-PCs in Burkina Faso that have come together as federations since 1998, creating cotton farmers' unions.

Thus, 170 unions were set up at the departmental level; 28 unions at the provincial level; and the umbrella structure, the National Union of Cotton Farmers of Burkina (UNPCB) at the national level.

The establishment of UNPCB has considerably changed the institutional landscape of the cotton sector in Burkina Faso with the acquisition of shares in the cotton companies.

The cotton growers, who are now directors of the companies, hold shares in capital (30% SOFITEX, 20% SOCOMA and 10% FASO COTON) and have thus positioned themselves as privileged and essential partners in the management of the cotton sector at all levels.

9. Number of ginning plants

For the ginning of seed cotton, the industry has a total of 18 ginning plants with an addition of two new facilities at Léo and Bondokuy in the SOFITEX zone, bringing the total daily ginning capacity up to 6,300 tons. There are two plants for delinting and treatment of cottonseeds.

10. Number of cottonseed oil mills

The main oil mills are SN-CITEC, SOFIB-*Huilerie, Huilerie* Bâ Mariam. The other oil mills are grouped within three associations: the Group of the Processors of the Oilseed Products of Burkina Faso (GTPOB , acronym in French), the Group of the Oil Millers of Houet (GHH) and the Cooperative of the Producers of Oilseed Products and Others (CPPOD, acronym in French).

Cottonseed oil production showed an upward trend between 2003 and 2006 due to the establishment of new oil mills in the sector during this period. Between 2007 and 2011 production almost stabilized before experiencing an exceptional annual increase of 62.17% from 48,062.22 tons in 2011 to 77,940.22 tons in 2012 (CCIB, 2014). The turnover volume of oil mills is mainly made up of sales of edible oil, seedcake, and animal feed. For oil mills with production capacities between 1,500,000 and 2,000,000 liters/year, the average turnover increased by 34.55% between 2011 and 2012. Over the 2010-2012 period, the average contribution of oil to the turnover was estimated at about 42%. This shows that seedcake supports balancing oil mills accounts, and revenues from this product make up an average of 58% of the turnover (CCIB, 2014). However, the results of report analyses made by the National Forum of Cottonseed Oil Mills (MCIA, 2018) presented an unfavorable situation regarding the functionality of oil mills in Burkina Faso. Out of a total of 96 processing units, only 65.6 remain functional. About 34.4% are non-functional or closed, and this is due to recurrent problems in the oil mill sector. These difficulties are the following: unavailability of cottonseeds during the oil mills' production period, drying up of financing for the units by banking institutions, unfair competition from imported oils and poor sales of local edible oils.

Analysis of national consumption shows that edible oil consumption is estimated to average 6 liters of oil per year per person (SPAAA, 2013). The ratio of production to consumption needs shows that Burkina Faso must necessarily import edible oil to meet the consumption needs of the population. Palm oil, a perfect substitute for cottonseed oil, is imported to meet this need. Between 2008 and 2012, local production of cottonseed oil represented an average of 69.83% of national needs.

11. Socioeconomic aspects of the cotton sector

Cotton production generates a certain number of positive effects, in particular, an increase in cereal production (maize production benefits from inputs initially intended for cotton), advisory support for farmers, development of microfinance in rural areas, access to credit for food inputs, development of movements to professionalize and structure rural agricultural players, and Burkina Faso's active participation in debates of international economic interest (the Cotton Dispute at the WTO). Cotton has led to the development of road infrastructure (particularly rural roads) and thus contributes to the opening up of the rural areas.

Almost all the empirical work on the intersection of cotton production and poverty reduction has produced rather mixed results. Analysis of data relating strictly to cotton growers shows a drop in the proportion of the poor (62.1% in 1994, 58.2% in 1998 and 47.2%

in 2003). However, the analysis according to production zones does not show a net decrease in the proportion of the poor in the cotton-growing zones. The drop between 2003 and 2007 is also perceptible among cotton farmers when the analysis is done via the monetary approach, but is meager according to the subjective approach, i.e., according to food insecurity. The analysis using the shock simulation approach reveals that a 25% increase in the price of cotton would result in a reduction in the poverty rate of cotton farmers of around 9% in the short term and 12.6% in the long term. At the national level, the effect is smaller: 1.5% in the short term and 2.1% in the long term.

12. Cotton ginneries

Three cotton ginneries have been operating in Burkina Faso since September 2004 (SOFITEX, SOCOMA and FASOCOTON). They play a role in the promotion of cotton cultivation, each in its own zone, as determined by the Protocol of Agreement on Specifications and the Book of Responsibilities, including 20 provinces for SOFITES in the West of the country, 12 provinces for FASOCOTON in the center and 6 provinces for SOCOMA in the East: The functions taken over by the cotton ginneries include:

- ✓ Supply of inputs to farmers;
- ✓ Support and advice to farmers;
- ✓ Purchase, collection of seed cotton;
- ✓ Ginning of seed cotton;
- ✓ Value addition to finished products (fiber) and by-products (cottonseeds, residues, and fiber waste).

13. International cooperation programs and projects

INERA's Cotton Program has a rather diversified partnership range. The Program works in collaboration with the three cotton companies, as well as, UNPCB, SAPHYTO, BUNASOLS, CIPAM, AGRODIA, PR-PICA, universities, and vocational training schools. It has also collaborated with the USAID-WACIP Project which covered Benin, Burkina Faso, Chad and Mali. It is part of the "Improvement of cotton production" axis of the Multinational Program to improve the competitiveness of the cotton-textile sector in West and Central Africa (WCA), This program was designed following numerous initiatives undertaken with the support of the international community, including those of the Conference of Ministers of Agriculture of West and Central Africa (CMA/AOC) and the West African Economic and Monetary Union (WAEMU) relating to the Agenda for the Competitiveness of the Cotton-Textile Sector, in order to address the difficulties encountered by the African cotton sectors. The 5-year project covered the cotton-growing areas of these four countries with funding from the African Development Bank (ADB). The overall objective of the project was to contribute to poverty reduction in rural areas and its specific objective was to contribute to securing and increasing the incomes of the stakeholders in the sector by improving the productivity of the cotton sub-sector in a sustainable manner. The project had four components: (i) improvement of production and productivity; (ii) support

to marketing and artisanal processing; (iii) capacity building; and (iv) project coordination and management. The Cotton Program has collaborated with the *Projet d'Appui à la Filière Coton-Textile* (PAFICOT) (Project for the Support of the Cotton-textile Industry), a multinational project implemented in four countries by the Sectoral Initiative on Cotton (ISC, acronym in French). The project, which started in December 2006, was implemented by the International Fertilizer Development Center (IFDC).

14. The strengths and weaknesses of the cotton sector

Strengths:

From the point of view of cotton's contribution to household income, it can be said that cotton production generates a certain number of positive effects, particularly the increase in cereal production, advisory support for farmers, the creation of microfinancing in rural areas, access to credit for food inputs, the development of movements for the professionalization and structuring of rural agricultural actors, and the active participation of Burkina Faso in international debates of economic interest (the Cotton Dispute at the WTO). Cotton has led to the development of road infrastructure (particularly rural roads) and thus contributes to the opening up of rural areas.

Weaknesses:

For the third consecutive year, cotton production has fallen to 436,000 tons of seed cotton in 2018/2019, i.e., a drop of around 30% compared to the previous season, while farmers were expecting a harvest of 800,000 tons, which now makes Burkina Faso take the fourth place among producers of the African "white gold".

Current challenges:

The main current challenges of the cotton sector are:

- ✓ Climate variability and change;
- ✓ Land degradation and low soil fertility;
- ✓ Low yield of current varieties;
- ✓ Low profitability of the sector;
- ✓ Cotton lint characteristics do not meet the needs of the market;
- ✓ Fluctuations in input supply and market prices of cotton;
- ✓ Sustainable research funding;
- ✓ Giving value to research results.

15. Policies on assistance and technical support to farmers

Following the implementation of the process of government disengagement from various production sectors, including cotton, specialized advisory support to cotton producers is essentially provided by the cotton ginneries, which are setting up an advisory support system. This system allows for regular training of farmers according to technical innovations and research recommendations.

Burundi

1. History of cotton growing in Burundi

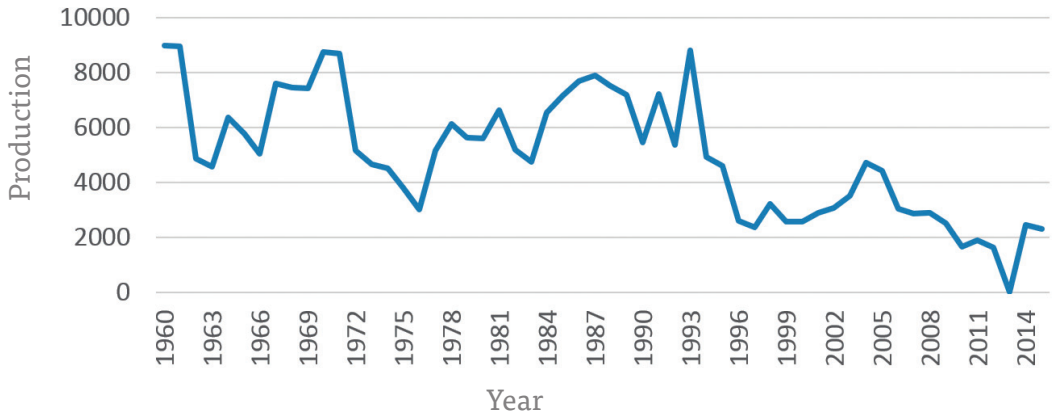
Cotton farming was introduced in Burundi in 1920 in the Imbo plain in the Western part of the country. The production was ensured by small producers cultivating between 40 and 20 acres. In the 1980s, cotton farming was extended to the Moso Region in the Eastern part of Burundi. As part of a policy to increase cotton production nationwide cotton farming was extended to areas less suitable for its cultivation.

In 1984, the Cotton Management Company (COGERCO, acronym in French) was created with the following mission:

- ✓ to promote cotton farming;
- ✓ to oversee cotton farmers;
- ✓ to process seed cotton into cotton lint;
- ✓ to market cotton lint and its by-products.

2. Evolution of cotton farming

Until 1992, cotton production fluctuated between 5,000 and 9,000 tons. However, from 1993 on, production dropped below 3,000 tons. Likewise, the area occupied by cotton crops dropped from 11,500 ha in 1961 to 4,000 ha in 2014 (see chart below).



To cope with this reduction in the national cotton production, the Government of Burundi has put into place the National Strategy to Reactivate the Cotton Sector, which integrates a public-private partnership and the strengthening of research.

3. Varieties currently cultivated

The number of varieties used is very limited. Two varieties are currently cultivated: the Stam and GIZA varieties. The GIZA variety is found in almost all cotton plantations. In addition to these two varieties, 5 varieties introduced from Mali are currently being assessed: NTA 93, NTA MS-334, NTA 88, NTA 90 and NTA L 100. These varieties are in the second year of assessment.

The limited number of varieties is the cause of the interest shown by Burundi in diversifying the genetic heritage by introducing other varieties to set up a cotton breeding program.

Cameroun

1. Public policies implemented to strengthen cotton cultivation

The public policies implemented to strengthen cotton growing are defined by the State through the Ministry of Agriculture and Sustainable Development and the Ministry of Trade.

2. Geographical characteristics of area/number of farmers/annual cotton production/productivity per hectare/ lint and seed cotton production

- ✓ Most of the geographical characteristics of the cultivated areas are marked by sandy-clay or ferruginous soils.
- ✓ The number of farmers is approximately 175,000.
- ✓ About the figures related to production:
  - ✓ Productivity per hectare: 1,500 kilograms/hectare;
  - ✓ Lint production of approximately 145,000 tons;
  - ✓ Seed cotton production of approximately 350,000 tons.

3. Cotton research institutions

The research institutions in the cotton sector are the following:

- ✓ IRAD (acronym in French): Institute of Agricultural Research for Development (Cameron);
- ✓ CIRAD (acronym in French): Center for International Cooperation in Agricultural Research for Development, based in Montpellier, France.

4. Main areas of research

- ✓ Genetics;
- ✓ Entomology;
- ✓ Agronomy;
- ✓ Mechanization.

5. Number of researchers

Twelve (12) researchers involved.

6. Ongoing international partnerships

With CIRAD and PR-PICA (Regional Program for Integrated Cotton Production in Africa).

7. Main players in the cotton chain

SODECOTON (Cotton Development Company) and CNPCC (National Confederation of Cotton Farmers of Cameroun) (both acronyms are in French).

8. Description of marketing systems

The marketing systems are the systems integrated by SODECOTON.

9. Public-private partnerships to produce cotton by-products

None.

10. Status of farmers´ organizations

Farmers are organized under the National Confederation.

11. Existing farmers associations

There are groups and joint surety circles.

12. Number of ginning plants

There are nine (09) ginning mills.

13. Number of oil industries

There are two (02) oil mills.

14. Agricultural Mechanization Status

It is currently undergoing tests.

15. Socioeconomic aspects of the cotton sector

- ✓ Construction of health units to provide attention to groups of farmers;
- ✓ Hiring and remuneration teachers on a temporary-basis contract;
- ✓ Implementation of water supply spots;
- ✓ Training and support to farmers in the implementation of income-generating activities (IGA, income-generating activities).

16. Farmers' organization

Only one: SODETOCON (acronym in French).

17. International cooperation programs and projects

At the moment, the ongoing cooperation with the Brazilian Cooperation Agency, ABC (acronym in Portuguese).

18. Strengths, weaknesses, potentials and threats faced by the sector

a. Strengths of the sector:

- ✓ The production level in volume and yield in the field (1,500kg/ha), highest yield in West and Central Africa;
- ✓ Only sector that provides credit (for cotton and food crops) to all farmers, with a repayment percentage of approximately 99.99%;
- ✓ Perfect partnership between growers and cotton ginning companies;
- ✓ Emergence of large cotton growers, who alone account for 30% of total production;
- ✓ Cotton research through IRAD and technical roadmaps established.

b. Weaknesses of the sector:

- ✓ Reduced seed cotton processing capacity (280,000 tons in 06 months, compared to a production of 350,000 tons), which generates losses for the sector. This deficit of 70,000 tons is processed during the rainy season, causing lint and seed quality to deteriorate;

- ✓ Lack of equipment and resources for the maintenance of distribution channels. The network is dense and SODECOTON cannot take care of 8,000 kilometers a year.

c. Threats faced by the sector:

After the closure of the border with Nigeria, to where part of the cotton production was illegally drained, the main threat is climate change. Climate variations, reflected in late starts and sometimes early interruptions, cause the agricultural calendar to be totally impaired, thus generating losses for the sector.

19. Policies on rural extension and technical assistance to farmers

As regards technical assistance, the sector receives significant monitoring from the State (MINADER - Ministry of Agriculture and Rural Development, MINEPAT, IRAD), and SODECOTON´s and CNPCC´s technical departments, with more than 250 employees in the field.

The extension component is very active, thanks to a few press outlets, such as "*La Voix du Paysan*" (The Farmer's Voice), and CNPCC-INFO newsletter, as well as extension workers spread throughout all the cotton growing regions. These players provide dissemination of all the progress made in the sector (opportunities, technical roadmaps, capacity building, input distribution), and also take care of the organization and structuring of the communities.

Chad

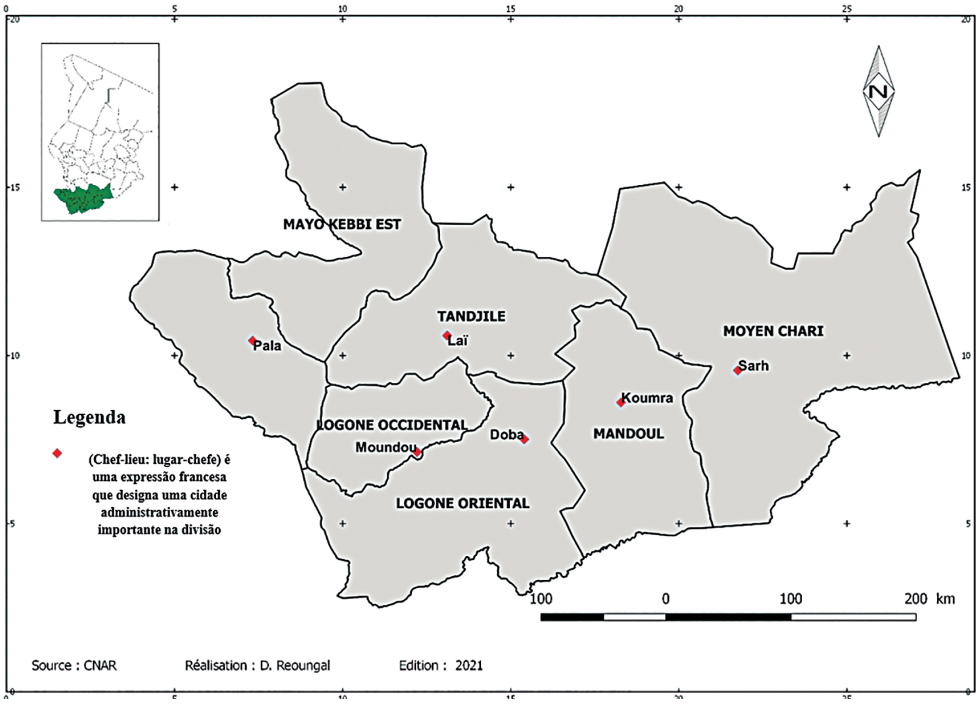
Introduction

The cotton sector in Chad dates back to the 1920s when the French were present in the country. After the country's independence in 1960, cotton remained the main source of foreign currency for several decades. Since 2003, crude oil has become the main contributor to national value added reaching 64.6% of the value added in Chad, followed by livestock (17%), agriculture reaching 15.3% (especially thanks to cotton) and fishing 3.7%. The decline in the share of cotton in the agricultural sector in the broad sense of the term is thus quite noticeable, regardless of the effects of crude oil production on the change in the country's economic structure.

1. The cotton-growing area in Chad

The cotton-growing area in Chad spreads over a part of the territory located South in the Sudanese zone, between the 8th and 11th parallels North, the cultivation area representing 127,000 km² (about 10 % of the land in the country). The Sudanese zone is one of the three agro-climatic zones of the country with a rainy season lasting 5 to 7 months. Administratively, the cotton-growing area of Chad includes 7 provinces out of the 22 that make up the country (see Map 1); this area holds a population of more than 4.3 million inhabitants. Population density varies from less than 15 inhabitants/km² in the least populated parts of the land to nearly 100 inhabitants/km² in the densest areas.

Map 1: Map of the Sudanese zone of Chad



Around 300,000 farmers grow cotton each year throughout the 5,000 Village Associations (AV, acronym in French) they have grouped into. Over 3 million people derive most of their income from this activity, directly or indirectly (ECCAS, 2011). Farms that cultivate cotton are family based (5 to 6 individuals per farm) and are small in size (generally between 1 and 2 ha) (Hauswirth and Djinodji, 2006). The level of equipment of farmers is also low. The proportion of farms with a full plouwing set (plow and draft oxen) is around 30% and only 10% have all the animal traction equipment (Djinodji and Djondang, 2009). The government attempt to introduce motorization in rural areas has yielded meager results. Cotton production is predominantly based on manual work, the use of animal traction is limited to plowing and transport.

2. Main players in the cotton sector

2.1.1 COTONTCHAD SN

The cotton company COTONTCHAD SN is the main player in the Chadian cotton sector; its mission is to:

- ✓ Plan, put into practice and monitor seed cotton production activities;
- ✓ Buy, collect and transport seed cotton from villages to ginning facilities;
- ✓ Gin seed cotton and market the lint

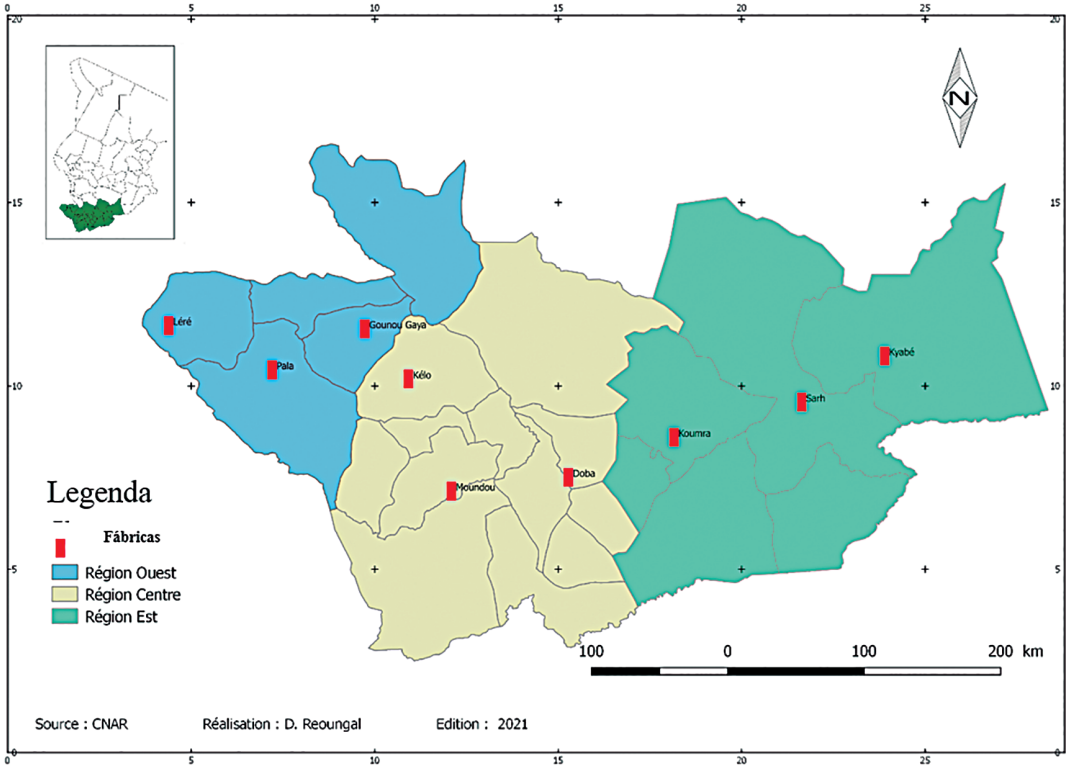
.

After several deferrals, the process of privatization of COTONTCHAD SN was initiated in 1997 and was completed in April 2018. The Chadian Government, which was the sole shareholder, withdrew by releasing part of its shares in the Company. The share capital of CFA francs 5,010,000,000 was divided between the firm Olam International (60%), the Chadian Government (25%) and the National Union of Cotton Farmers of Chad (UNPCT, acronym in French) which graciously benefitted from 5% offered by the state.

Cotton production is structured by COTONTCHAD SN in the three regions, each of which has three ginning facilities (see Map 2). The company also owns a soap and oil mill in Moundou in the Central Region of the country.

In terms of tonnage of seed cotton produced annually, the West Region, albeit the smallest in Chad (26,000 km²), generally ranks first followed by the production of the Central Region. The relatively low production of the West Region is due to the low density of the population in the Northern part of the region ("Department" of Lake Iro) which is the least populated area in the entire cotton-growing area with an average density of 15 inhabitants/km², in opposition to that in excess of 100 inhabitants/km² in certain areas of the Central Region. Part of the Central Region ("Department" of Tandjilé) is located in flood plains that are unsuitable for cotton crops.

Map 2: Map of the Cotton Area



The roads and routes conditions, not to mention the current situation in the country, are factors that are a hindrance to the competitiveness of the Chadian cotton sector. In addition to the isolation from the outside world that Chad experiences from being a landlocked country, it also suffers from isolation inside the country itself since some of its villages in the cotton-growing areas are totally isolated and cut out from the rest of the world during the rainy season, which makes the issue of picking and collecting seed cotton all the more complicated (Djinodji and Djondang, 2009). Chad has the highest costs when it comes to seed cotton picking and lint removal in comparison with other cotton producing countries, especially those in West Africa (Angé, 2004).

In 1985, the collapse of the price of cotton lint on the international market resulted in a crisis in the Chadian cotton sector which caused great operating problems to COTONTCHAD and made production conditions all the harder for farmers.

Despite the government state support and numerous recovery measures, COTONTCHAD had been struggling over a long period of crisis which lasted some years and resulted in difficulties in providing inputs and in a chaotic management of its marketing campaigns. (Angé 2004).

In 2014, COTONTCHAD SN obtained a loan of CFAfrancs 30 billion from the Development Bank of Central African States (BDEAC , acronym in French) for the strengthening of the following capacities: rehabilitation, repair and modernization of the industrial equipment and machinery; fleet renewal;

revamping of the road maintenance service etc. (BDEAC, 2018). The process, which proved difficult to take place, seems to have found a new impetus since the privatization. We can therefore hope that the operating capacities of COTONTCHAD SN will improve in the years to come.

2.1.2 Cotton farmers

Cotton farmers are represented by the National Union of Cotton Producers of Chad (UNPCT, acronym in French) in the Chadian cotton sector; UNPCT is the umbrella organization created in 2007 to federate the Local Coordination Committees (CCL , acronym in French) which had been created to replace the bodies of the Peasant Movement in the Sudanese Zone (MPZS, acronym in French), the very first representative institution of the peasantry to be acknowledged and recognized in the cotton-growing area (Gadjibet, 2009). The UNPCT is currently a shareholder of COTONTCHAD SN and holds 5 % of the shares which were transferred to the Union by the Chadian State during the privatization of the company in April 2018. It ensures the interface between cotton farmers and the company for all aspects relating to the production and marketing of seed cotton. To this end, it represents the farmers in the joint committees when setting the purchase price of cotton to the farmers, and when ordering and receiving the inputs delivered by the suppliers. UNPCT is a member of the African cotton farmers' organizations.

Starting from the village that is the grass-root scale of representation, the UNPCT structure is organized and incorporated into five levels: the Grouping, the Village Association (AV), the Cantonal Delegation, the Local Coordination Committee (CCL), and the National Union of the Cotton Producers of Chad (UNPCT).

The Village Associations correspond to a collective of cotton farmers usually structured at the level of a village settlement. They take on: a) the local management of input supplies (centralization of input requests and orders with COTONTCHAD SN, and local distribution) and b) the local marketing of seed cotton through a technical team appointed by the members of the VA (AV in French) (Hauswirth, 2006).

Although the annual average number of Village Associations involved in cotton growing has been 2907 representing 216,517 cotton farmers over the past 10 years, the annual variations are quite significant because the number of VAs may vary between two agricultural seasons; for example: from over 300,000 (2016-2017 crop) to around 150,000 (2017-2018 crop) (CTD 2017). In comparison with other organizations of cotton farmers in the sub-region, the UNPCT has not yet succeeded in establishing itself among the other players of the Chadian cotton sector, and the absence of inter-professional associations is not likely to make things easier for the union. The low level of income and current level of organization do not allow the union to be a true counterweight when it comes to defining strategic approaches or making decisions concerning farmers. Moreover, the Union low income makes it dependent on the cotton company when it comes to participating in the various meetings and monitoring missions of its bodies in the field.

Improving cotton growers' production conditions and obtaining attractive profit margins can therefore only be achieved with a well-structured representative organization with the material and financial means for its ambitions.

2.1.3 Rural extension services

Created in 1965, the National Office for Rural Development (ONDR, acronym in French) is an institution that reports to the Ministry of Agriculture and whose statutory mission encompasses rural extension services and technical support to professional agricultural organizations. It was the ONDR that disseminated the use of mineral fertilizers, phytosanitary products and animal traction. Initially created for the dissemination of innovations to improve cotton yields, the ONDR was, from its very creation until the mid-1990s, one of the main links in the Chadian cotton chain. The ONDR ensured the granting of cotton-crop input credit lines and credit recovery. It also assisted the farmers' organizational structuring and follow up (Village Groups and Associations). The ONDR was financed jointly by the State, with public resources, and by the cotton company who would retrocede CFA francs 12.00 for every kilogram of lint that it traded.

From the end of the 1960s to the middle of the 1980s, the number of agents within the institution allowed for a satisfactory coverage of the Sudanese zone. In 1983, the ONDR had 985 rural-extension agents, that is to say 1 agent for 2,100 inhabitants. In 1986, the Chadian State decided to suspend the subsidy paid by the cotton company as part of the recovery measures in the sector. The number of agents then began to decrease, and did not stop decreasing causing the number of rural extension workers to fall from 481 in 1989 to 209 in 2000; this represents one extension worker for 7,500 inhabitants in 1989 dropping to one for 15,000 inhabitants by the year 2000 (Nuttens F., 2001). The National Agency for Rural Development in Chad (ANADER, acronym in French), which replaced the ONDR in 2012, is no better off in terms of human resources, nor does it have the capacity to take on its role in supervising farmers.

The current rural extension system is one of the weaknesses of the Chadian cotton sector, as not only is it understaffed, it is lacking terribly in work resources. Among the cotton sectors of the cotton-producing countries of French-speaking Africa, Chad is the only country whose rural extension services to cotton growers are entirely provided by the State without there being any close relationship with the cotton company. Yet, the example of other African cotton sectors shows that improving the yields of cotton crops and the efficiency of cotton growers' organizations necessarily entails an operational and efficient rural extension system.

2.1.4 Research

After the departure of CIRAD from the Sudanese zone of Chad in 1998, the Chadian Institute of Agronomic Research for Development (ITRAD, acronym in French) was created to conduct the Chadian agronomic research. The organizational structure of ITRAD follows a geographical logic (Regional Agronomic Research Centre) as well as a thematic logic (thematic research programs).

ITRAD is COTONTCHAD SN's main partner when it comes to cotton research. It thus functions and takes over the duties previously performed by the Cotton and Textile Research Institute (IRCT, acronym in French) between 1946 and 1984, and later by the French Agricultural Research Centre for International Development (CIRAD, acronym in French) between 1984 and 1997. Cotton research is carried out by the Regional Centre for

Agronomic Research in the Sudanese Zone whose head office is at the Bébédjia Station. The Bébédjia Station is built on a 400-ha area which holds a base camp (300 ha) and agricultural land (300 ha). It relies on a network of five Support Locations all over the Sudanese zone.

After the departure of the IRCT and then of the CIRAD, followed by the handover of the Bébédjia Station to ITRAD, the research on cotton was financed exclusively by the Chadian State. Unfortunately, budget allocations of the Ministry in charge have fallen to very low levels. And so, no major innovations have been made in the cotton sector over this period in Chad. As to varietal selection and genetic breeding for plant improvement, the varieties currently cultivated were created over thirty years ago. The same applies to the main recommendations on the technical roadmap for cotton crops (fertilizer formulas and doses to be applied, sowing dates for cotton, etc.).

Currently, the partnership between ITRAD and COTONTCHAD SN is exercised through an agreement which formalizes the framework for the provision of services and for the carrying out of expert appraisals for the benefit of COTONTCHAD SN. These services include the contribution to the establishment of the seed production plan, the production of pre-basic and basic seeds in order to maintain varietal purity, and the training of COTONTCHAD SN field agents, of the staff working on the seed multiplication farm of Békamba and of the seed producers on issues relating to cotton seed production.

They also include devising scientific and technical recommendations and participating in meetings regarding the calls for tenders for agricultural inputs.

Olam International, the new majority shareholder of COTONTCHAD SN, has already expressed its desire to enter into a partnership that will go far beyond the current framework and will formally support other segments of cotton research (varietal improvement, entomology, methods of cultivation, etc.). Discussions are currently underway for the design of a multi-year partnership framework.

The number of researchers, in particular in specialties of interest to cotton production, is very low and should be increased to allow ITRAD to effectively support other players, if necessary.

It should also be noted that the institutional link between research and rural extension has been very weak since the discontinuation within ONDR of the service in charge of the pre-extension demonstration of research results.

2.1.5 Private companies

a. Input Suppliers

These are national and international companies that supply fertilizers and plant protection products (PPP) for each agricultural season. They are selected at the end of an international call for tenders, which is launched during the last quarter of each year for the procurement of the inputs required for the agricultural season of the following year.

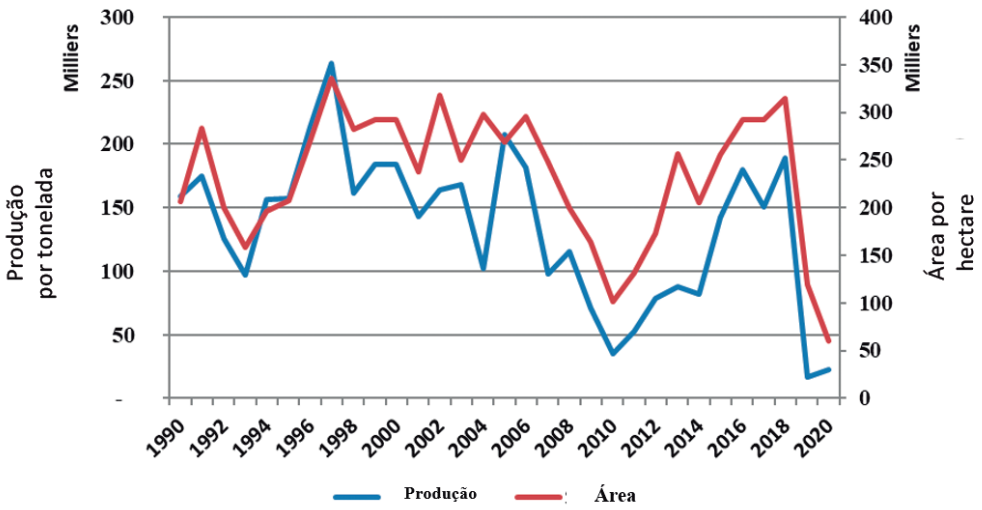
b. Carriers

The transport of the seed cotton production from the villages to the ginning facilities is shared between COTONTCHAD SN and national private carriers.

3. Evolution of cotton production

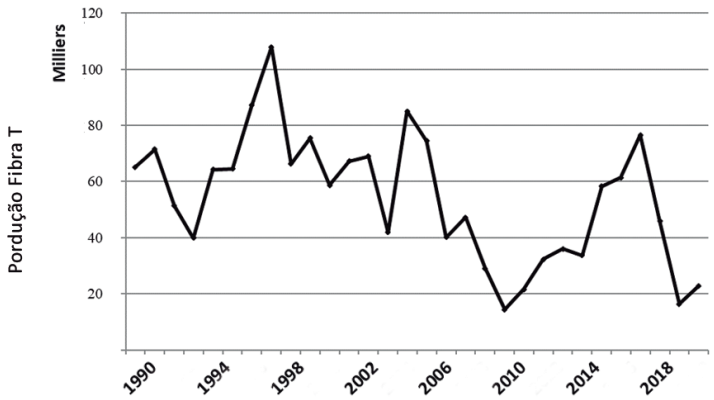
Chad was the leading producer of seed cotton in the 1960s among the French-speaking countries of Africa. It later lost this rank at the end of the 1970s to the benefit of the main cotton-producing countries of West Africa (Djondang et al., 2008). The drop in production was made sharper by the successive crises that occurred within the sector from the mid-1980s. Despite state support and numerous recovery measures, COTONTCHAD, the company in charge of purchasing the seed cotton from farmers, did succeed in bringing the cotton sector out of the crisis. After the seed-cotton production record of 263,476 tons obtained in 1997, the evolution of production was chaotic regardless of the price paid to farmers, and reached a floor level of barely 25,000 tons in 2018 (See Chart 1 and 2).

Chart 1: Evolution of cultivated areas vs. Raw Cotton Production



Source: COTONTCHAD SN

Chart 2: Evolution of cotton lint production

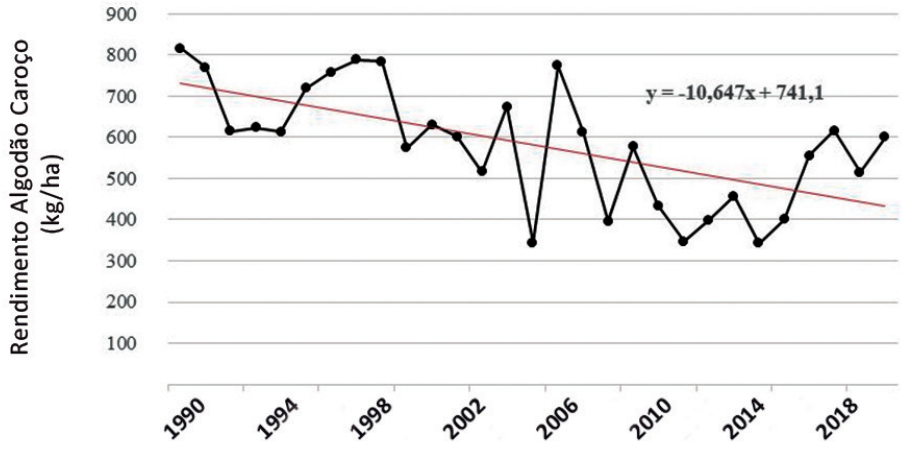


Source: COTONTCHAD SN

The cotton crop yield is low in Chad (507 kg/ha over the period 1998-2018) and far lower than those obtained in other cotton-producing countries in West and Central Africa where the average yield exceeds 1 t/ha (UEMOA, 2015). The low level of mineral fertilization is the main cause of the low productivity of the cotton grown in Chad. This is mainly the result of the strategy adopted by cotton farmers to adapt in response to an unfavorable external context due to the absence of other sources of mineral fertilizer supply. Fertilizer dosages remain on average lower than the recommendations; this is particularly due to the strategies adopted in the absence of solutions for the supply of inputs for crops other than cotton: under-dosing of inputs, limitation in the quantities ordered individually to reduce the financial risk linked to joint surety, transfer to other crops or sale of fertilizers received at the start of the production cycle to meet cash flow requirements (Hauswirth, 2006).

Yields are low and random, and show a clear downward trend (See Chart 3). The recurring crises of recent years disrupted the schedules of inputs and brought additional difficulties which have contributed to the under-dosage of fertilizers.

Chart 3: Evolution of seed yields in Chad



Source: COTONTCHAD SN

4. Marketing of seed cotton

The marketing of seed cotton is organized around the "Self-Managed Markets" (MAGs, acronym in French) mechanism set up along with the village associations. In a context of cotton reform aimed more specifically at reducing the cotton company costs, the MAGs made it possible to transfer all the management and organization of seed cotton marketing to the farmers. This method of organization of MAGs devised in 1988 by the Agricultural Vocational Training Centers (CFPA, acronym in French) was promoted by ONDR and became popular very quickly, to such an extent that all the cotton produced in the Sudanese zone has been marketed by the farmers themselves on 3,445 MAGs ever since 1992 (Nuttens and Youlé, 2007).

Self-Managed Markets (MAGs) are a primary seed cotton marketing activity managed by a Village Association governed by a charter which specifies the organizational methods. Joint sureties appeared along with the creation of the MAGs; a joint surety is a method of sharing accountabilities on the risks entailed in cotton production. This system allows for farmers to act no longer on their own but as a group, represented by the Village Association (AV) which is collectively responsible for the sale but above all for the reimbursement of the inputs granted on credit by the cotton company. The associations buy the inputs collectively, sell the cotton, receive the payments from COTONTCHAD, and distribute them among the cotton farmers. Their members are just as responsible for the proper use of inputs as for the reimbursement of those purchased on credit, regardless of the level of efficiency of the self-employed farmers. When inputs have not been used, or the output (production) has not been sold by the association, all VA members are expected to bear the costs together (Verardoand Ezemani, 2002).

In theory, the principle of joint surety translates into a shared risk on the production at the level of the VAs. It allows COTONTCHAD to reduce the risk on the input-credit recovery while alleviating any isolated production problem at the village level. However, this system is insufficient in the event of a generalized production incident (flooding, water shortage) for it amounts to making only the cotton farmers bear the full cost and the risk related to such a phenomenon (Hauswirth, 2006). The amounts of debts due to unpaid input credits by the farmers have increased to such an extent that all the income from the sale of cotton would not cover the amount of debts in some situations (Verardo et al. Ezemani, 2002).

Fortunately for the cotton farmers, a solution was found with the new shareholder Olam International and the debts resulting from the dysfunction of COTONTCHAD were integrated into the liabilities of the company and managed globally during the privatization process.

5. Strengths and weaknesses of the cotton sector

Strengths

- ✓ Environmental conditions (climate and soil) favorable to cotton cultivation;
- ✓ Cotton farmers long experience in cotton growing practices;
- ✓ Presence of farmers´ organizations;
- ✓ Control of seed cotton marketing by farmers;
- ✓ Main shareholder with strong fundraising capacity;
- ✓ Political will to support the cotton sector.

Weaknesses

- ✓ Land pressure competition among farmers and between farmers and herders;
- ✓ Extensive farming practices (without following technical recommendations);
- ✓ Low level of equipment of farmers;
- ✓ Difficulties accessing inputs outside COTONTCHAD SN;

- ✓ Delay in the implementation of inputs;
- ✓ Poor condition of rural roads;
- ✓ High transport cost for the lint;
- ✓ Absence of interprofessional systems;
- ✓ Ineffective agricultural extension system;
- ✓ Low power of cotton farmers organization;
- ✓ High costs of inputs.

Conclusion

Since the mid-1980s, the Chadian cotton sector had been stuck in a crisis which has had profound repercussions on all segments of the sector. Despite numerous support measures, the cotton company operations no longer managed to recover a balance. Campaigns for the implementation of inputs and marketing became chaotic. The amount of debt owed to farmers for purchased but unpaid seed cotton production amounted to more than CFAfrancs 6 billion in 2017. The majority of farmerswere so disillusioned that they gave up on growing cotton; this caused the production to drop to its lowest level in 2017: below 25,000 tons of raw cotton. This context led to the privatization of the cotton company COTONTCHAD SN in April 2018, when the State, the majority shareholder, transferred 60% of its shares in the company to the international firm Olam.

The information used for the drafting of this roadmap comes mainly from sources written before the takeover of COTONTCHAD SN by Olam. An agreement between Olam and the Chadian State, in 2020, made it possible to pay back all the farmers' debt. Signs of recovery of the industrial estate and administration structure are perceptible. The situation in the sector is probably different from that described above. Although substantial improvements are undoubtedly already in place or in the process of being implemented, we were unable to obtain further information.

Bibliography

Angé AL, 2004, *Chad - Cotton sector reform support program. Section 1*, Cirad - tera. 86 p.

BDEAC, 2018. *Annual Report, 42nd Financial Year 2018*. BDEAC, 76 p.

ECCAS, 2011. *Stratégie de développement de la filière coton-textile-confection en Afrique Centrale* [Development Strategy for the Cotton-Textile-Clothing Industry in Central Africa]. 115 p.

Damien HAUSWIRTH Djinodji REOUNGAL, 2009. Le coton, vecteur de développement des exploitations agricoles en zone soudanienne du Tchad ? [Cotton, a Vector for the Development of Agricultural Holdings in the Sudanese Zone of Chad?] L. SEINY-BOUKAR, P. BOUMARD (scientific editors), 2010. Actes du colloque *Savanes africaines en développement : innover pour durer [Minutes of the Colloquium "African Savannahs in Development": Innovating to* last], April 20-23, 2009, Garoua, Cameroon. Prasac, N'Djaména, Chad; Cirad, Montpellier, France, CD-ROM

Djinodji and Djondang, 2009, Adaptation des exploitations agricoles familiales à la crise cotonnière dans la zone soudanienne du Tchad [Adaptation of Family Farms to the Cotton Crisis in the Sudanese Zone of Chad]. In l. Seiny-Boukar, Ph. Boumard (editors), *Actes du colloque « Savanes africaines en développement : innover pour durer » [Minutes of the Colloquium "African Savannahs in Development": Innovating to last"]*, April 20-23, 2009, Garoua, Cameroon. Prasac, N'Djaména, Chad; Cirad, Montpellier, France, CD-ROM

Djondang K, et al., 2008. Cotton Sector Reform in Chad: On the Move or Stuck? In: *International Cotton Conference, justifications and developments in cotton policies in the main producing countries around the world*. ISS. Montpellier: ISSCRI Project, 14 p. ISSCRI International Conference, Montpellier, France, May 13, 2008 - May 17, 2008.

Gadjibet N., and Tobdé A. *Les organisations paysannes de la zone de savanes du Tchad: dynamiques d'émergence et modes de fonctionnement* [Farmers' Organizations in the Savannah Zone of Chad: Dynamics of Emergence and Methods of Operation]. Savanes africaines en développement : innover pour durer [African Savannahs in Development: Iinnovating to Last], Apr. 2009, Garoua, Cameroon. 7 p. cirad-00471539v2

Hauswirth D. and Djinodji R., 2006, *Dynamics of Cotton Production Systems and Producer Organization in the Sudanese Zone of Chad*. Synthesis, SCAC, ITRAD-PRASAC, N'Djaména, 73 p.

Hauswirth D., 2004, *Gestion Intégrée des Écosystèmes : Modes de gestion de la fertilité en zone soudanienne du Tchad, Rapport d'étude [Integrated Ecosystem Management: Fertility Management Practices in the Sudanese Zone of Chad*, Research Report, ITRAD/World Bank, French Cooperation. [Online] URL: http://agroecologie.cirad.fr/content/keyword/tchad. Accessed on February 13, 2013.

Hauswirth D., 2006, *Diagnostic de la filière coton au Tchad : Perspectives et privatisation [Diagnosis of the Cotton Sector in Chad: Outlook and Privatization], research report*, N'Djamena, ITRAD/SCAC, 75 p.

Nuttens, F. and Youlé T., 2003. *Tchad : coton, environnement, société*: des producteurs en difficultés [Chad: Cotton, Environment, Society: Struggling Producers]. 15 p.

Padacké F., 2012. *La filière cotonnière du Tchad. Historique, Evolution et Perspectives [Chad's Cotton Sector. History, Evolution and Outlook]*, COTONTCHAD SN, 27 p.

UEMOA, 2015, *Coton de l'UEMOA. L'or blanc d'Afrique de l'Ouest à la conquête du marché mondial. [UEMOA Cotton: The White Gold of West Africa Conquers the World Market]*. UEMOA, 20 p.

Verardo B. and Ezemani K., 2002, Poverty and Social Impact Analysis Chad Cotton Sector Reform Ex-ante Qualitative Analysis - First Phase, Worldbank. [Online] URL: http://siteresources.worldbank.org/INTPSIA/Resources/490023-1120841262639/14668_ChadCotton_PSIA.pdf. Accessed on November 03, 2013.

Côte d´Ivoire

Commonly known as “white gold”, cotton is grown in the Northern and Central regions of Côte d’Ivoire, and in 2019-2020 season, approximately 117,700 farmers were involved in growing this crop. It is the 4th largest agricultural export product, only coming after cocoa, cashew nuts, and rubber.

With a seed cotton production of 490,442 tons in 2019-2020, Côte d’Ivoire is the 3rd largest cotton producing country in Africa, only coming after Benin (712,000 tons) and Mali (700,000 tons), and before Burkina Faso (464,000 tons).

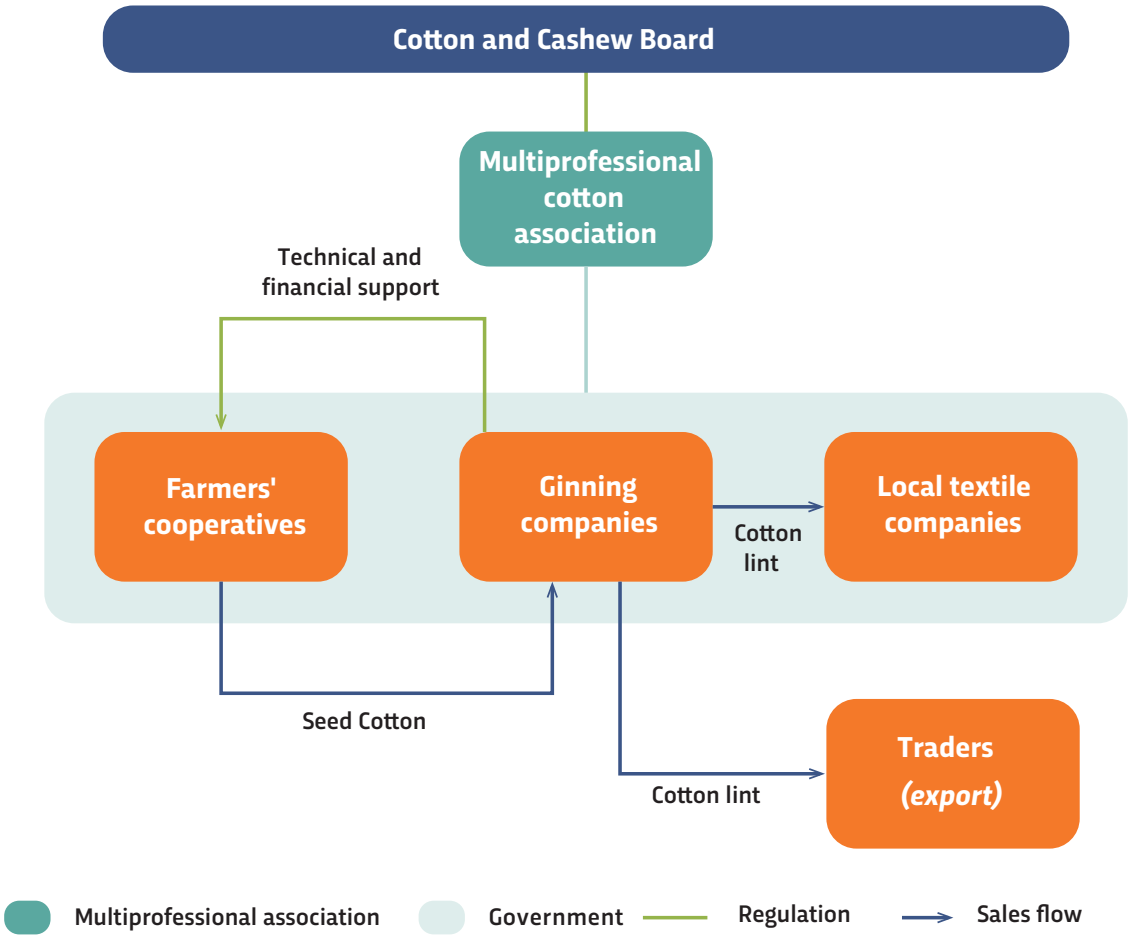
In Côte d’Ivoire cotton is produced by smallholder farmers, and there are roughly 100,000 farmers working with this crop. They work on farms of about two hectares on average (70% with animal-drawn plows) and share cotton plots with food crops (50-60%) which benefit from cotton inputs. These family farms are spread over more than 4,000 villages and camps in 23 departments.

Cotton cultivation contributed to modernizing farms due to mechanization and the escalation of production. This also allowed for an improvement in the living conditions of the population and led to the beginning of the industrialization of these regions.

Côte d’Ivoire’s industrial network consists of 15 ginneries which are capable of ginning 630,000 tons of seed cotton. In 2019, the local industry consumed about 15% of the seed cotton that was produced, compared to less than 1% of cotton lint.

Organization of the cotton sector in Côte D'Ivoire

Graph 1: Organization of the cotton sector



The Role of the CCA in the cotton sector

The Cotton and Cashew Board (CCA, acronym in French) plays the role of a liaison in the cotton chain, linking the industry's professionals and the government. It determines and implements the industry's regulatory framework, and is particularly responsible for:

- ✓ Certifying players across different levels of the value chain;
- ✓ Ensuring traceability and product quality control (seed cotton and lint);
- ✓ Monitoring and controlling exports of all cotton by-products;
- ✓ Supporting fund-raising and the development of projects that are in the industry's interests.
- ✓ Representing the nation in international cotton sector fora;

- ✓ approving and enforcing interprofessional agreements between the players.

Main challenges of the sector:

- ✓ Improving cotton varieties and increasing seed cotton yields in the field in the context of climate change;
- ✓ Improving knowledge through information gathering, analysis and dissemination;
- ✓ Promoting a sustainable revival of the secondary processing industry (spinning and weaving, crushing);
- ✓ Supporting reciprocity in the production and distribution of basic seeds;
- ✓ Supporting local processing of cotton link and seed;
- ✓ Improving pest management;
- ✓ Fostering a strengthened cooperative movement.

Ethiopia

Historically, research on cotton started in 1964 at Werer Agricultural Research Center (WARC) by the research department under the Ministry of Agriculture of the Ethiopian government and finally through the assistance of the Food and Agricultural Organization of the United Nations (FAO). In 1989, the cotton crop was considered important and raised to commodity level in related research undertakings.

Nowadays, the organizational structure for cotton research is centered around a commodity-based and team-led multidisciplinary approach coordinated from WARC specifically on breeding, protection (pest, disease and weed management), agronomy, irrigation, salinity, extension and socioeconomics. In 2016, the EIAR management decided that the national rainfed cotton research was to be coordinated from Assosa Agricultural Research Center (AsARC) along with Pawe Agricultural Research Center(PARC) but still not functional as separate on cotton research. Moreover, other regional research centers, namely Humera Agricultural Research Center and Gonder Agricultural Research Center, have been conducting research on adaptation trials with genotypes from WARC. Additionally, there are eight fulltime researchers at WARC (five in cotton breeding and three in cotton protection). It is worth mentioning that no other institute conducts research on cotton rather than the Ethiopia Institute Agricultural Research (EIAR). On the other hand, there are not sub-centers and strong collaborating centers located in different agroecological zones working with this important commodity (as six major agroecological zones are suitable for cotton cultivation in Ethiopia, which spread over low-lying plains of the country across regional states).

The importance of cotton for Ethiopian agriculture can be described in terms of the vast suitable agroecological zones available in the low-lying plains of the country. In Ethiopia, the crop is grown on various types of soil, in different weather zones and based on several agricultural practices both under irrigated and rain-fed conditions by private commercial farms and smallholder farmers. Approximately, 40% of Ethiopia cotton is produced under irrigated conditions and the remaining 60% is rain-fed. In Ethiopia, traditional cotton production is practiced in altitudes between 300m and 1800m above sea level (m.a.s.l.). Commercial cotton production is carried out by private farmers in different agroecological zones, ranging in altitude from 300 to 1200 m.a.s.l.

The main cotton growing areas in Ethiopia used to be the Awash valley, where production was over 64.4% of the total national cotton production in the recent past. Despite favorable conditions of production and productivity prevailing in the Awash Valley, cotton farms in this area were largely replaced with sugarcane plantations, and farmers relocated to the Southern regional state. Other cotton growing areas in Ethiopia include Arbaminch, Weyto, Omorate in the South; Gambela and Beles in the West; Metema and Humera in the North and North West and Gode in the Eastern part

of Ethiopia. Large potential areas for cotton production also exist in the Western, Northern, Southern and Eastern part of the country. In most of these areas, there are small holdings of rain fed and irrigated cotton run by smallholder farmers but mostly in agroecological zones ranging between 500m to 1500m. Traditional cotton cultivation is also widely practiced in the medium altitudes regions ranging from 1,000m to 1,800m usually under a biannual or perennial production system.

In addition, Ethiopia is greatly endowed with suitable a resource base for cotton production (agroecological features, land and water resources, available labor, strategic location close to potential markets — Middle East and EU countries —, tradition in cotton cultivation and processing, availability of regular and dependable air transport to potential market destinations of cotton products, etc) that helps the country benefit from production and value addition of cotton products and byproducts. A report from the then Ministry of Agriculture (MoA) and the South Nations and Nationalities People Regional State (SNNPRS) that dates back to 2010 indicates that there is about 3,000,810 hectares of land that are potentially suitable for cotton production in the country. Conversely, the current area used for growing cotton in Ethiopia is estimated to be only about 100,000 hectares (60,000ha of commercial irrigated crops and 40,000ha of small scale production, being 70% rain-fed and 30% irrigated). In 2016, the total annual production was about 90,000 metric tons of raw cotton and 33,447 MT (37.16% of GOT) of lint. Of this total cotton production, the share commercial cotton farmers is about 60% and the remaining 40% is the share of the small-scale farmers. The country's cotton lint production increased from a meager 6,200 MT in 1961-62 to a record production of 30,000 MT in 1980-82 and an all-time highest record of 38,850 metric tons in 2012-13. In comparison, the estimated global cotton production in 2014-15 was 25.96 million metric tons (152.7 million bales of 170 kg/each) harvested from 34.14 million hectares. These levels were practically not reached again, and, on the other hand demands have increased due to the fast expansion of the textile and garment manufacturing industries, a situation that causes alarms in the cotton sector in Ethiopia.

The organization and implementation center for cotton production is ministry of Agriculture (extension and research) along with the Ministry of Industry (Ethiopia Institute of Textile Industry-ETIDI). However, there is no formal linkage between research (EIAR), extension (Ministry of Agriculture) and the Ministry of Industry (ETIDI) despite their goals to improve cotton production and productivity in Ethiopia using public money. These institutions have clear mandates and feed each other without their proper vertical or horizontal integration as no international partnerships support cotton research.

Ethiopia is one of the African countries that produce and export cotton, with long tradition in cotton cultivation and an estimated area of 2.6 million hectares suitable for growing cotton. Of this potential, 65% are found in 38 cotton producing areas with high potential levels, where as the remaining 0.9 million ha or 35% are in 75 districts with medium potential levels. Of the total land under cotton cultivation, 33% are cultivated by small-

holder farmers, 45% by private commercial farms, and 22% refer to state-owned farms. It is worth saying that only 3% of the total land suitable for cotton production have been recently being put to use. Ethiopia produced an average of 33,842.11 metric ton during the years 2000 to 2018. However, production has been showing a downward trend since 2012. Natural and technological constraints have been hampering the increase of cotton production in Ethiopia.

Ethiopia has also been participating on the export market and has been having average gains of US$ 14,336,667, especially in the last decade. Currently, national exports have an average price of US$ 1.45. The cotton market also poses some constraints, like price disincentives, and lack of market information. Despite its inefficiency, the cotton sector still has its own vital economic role in the textile industry and employment creation. It employs about 52,754 smallholder farmers.

Market channels and relationship between players are based on value chain mapping. Four market channels have been developed and listed below:

1. Input suppliers – small-holder farmers – textile factories;

2. Input suppliers – small-holder farmers – cooperative unions – Ethiopian industry input supplier enterprise - textile factories (ginneries);

3. Input suppliers – medium-size commercial farmers – Ethiopian industry input supplier enterprise - textile factories (ginneries);

4. Input suppliers – large-scale commercial farmers – textile factories (export market).

Currently, there are 21 ginneries operating in the country. Out of these, two of them are not functional, while the rest remain functional. Among these ginning facilities, nine have their own farm, and the rest are service providers. All the factories are private limited companies. Today, the ginning capacity is estimated at 133,067 MT of raw cotton. Unfortunately, these ginneries are currently not operating at full capacity because of the low national cotton production. The total raw cotton production of the country in the past five years was limited to a maximum of about 79,452 metric tons, while the processing capacity of ginneries remains about 133,067 metric tons. Thus, the capacity of ginneries is underutilized. To utilize the spare ginning capacity of these facilities, the country's raw cotton production has to be doubled. This can be achieved either by doubling the presently cultivated cotton area or intensifying the use of improved crop management practices and agricultural technologies to increase the yield per hectare twofold in all cotton farms across the country. Ginneries supply about 5% of cottonseeds to commercial farmers, and 95% to oil mills for crushing and producing edible oil and cottonseed cake.

It has been decades of challenges faced by commercial cotton farmers, and the cotton sub-sec- tor has never been truly mechanized in Ethiopia. Most of cotton production costs in Ethiopia goes into labor (weeding and harvesting) and insect pest management. Labor costs for weeding and harvesting take up a huge amount of cotton production costs. Most

of farm operations and post-harvest handlings are done manually. Under poor handling and packaging circumstances, both quantitative and qualitative losses are certain to happen. Therefore, modernizing the cotton sub-sector through mechanization is indispensable. In effect, agricultural mechanization research focuses on the development of farm implements used for farm operation and post-harvest handling. More importantly, it gives due emphasis to collaboration in this field of research so as to mechanize cotton harvest operations in Ethiopia. On the other hand, there is around 37 oil mills in different regions of the country. Ethiopian Cotton Producers, Ginners and Exporters Association (ECPGEA) a private-sector business membership organization, which provides in- technical training to its members. Its Board is made up of 11 representatives from members of the six main cotton producing regions, ginneries, cooperatives, commercial farms, and middle-level unions. Nonetheless, the organization's influence has been low recently.

Current available figures show that Ethiopia is receiving negligible benefits from its exports of cotton and textile products, partly on account of low production at the farm level. The size of land allocated for cotton production, productivity per hectare, and access to credit were significant factors affecting a marketable cotton supply at the farm level. Based on the study, policy interventions required to increase the supply of cotton were suggested.

Cotton production costs in middle Awash is estimate at 20,572.17 Birr/ha. Moreover, break- up costs of irrigated cotton cultivation per hectare is 34.88% (7,173.9 Birr), which refer to manual operation costs (land clearing, sowing, weeding, spraying of agrochemicals, field irrigation, picking/harvesting, weighing and packing); 32.54% (6,695.6 Birr) to material costs (seeds, chemicals/pesticides, and packing materials); 17.51% (3,602 Birr) to machinery operation costs (plowing, disking, and ridging), and 15.07% (3,100.6 Birr). The average price of seed cotton (12.53 Birr/kg) and quantity of seed cotton produced per hectare (2463.4 kg/ha), with returns on every Birr invested was Birr 1.49, meaning that gains were of one Birr and for-ty-nine cents for every Birr invested in irrigated cotton production, which evidences the profitability of irrigated cotton. On the other hand, break-even analysis of cotton production under irrigation shows a total production cost of 16.42 qt/ha, as it refers to a total production at which a farmer will have a no-profit no-loss situation in terms of quantity of seed cotton.

In Ethiopia, the number of cotton companies is 73, encompassing the textile and garment industry, and hand-woven textile factory. Extension and technical assistance services to farmer are provided by the Extension Department of the Ministry of Agriculture, being the research institute focused on pre-extension of new technology and information.

Table 2: Strengths and weaknesses of cotton research

ITEM OF ASSESSMENT	INTERNAL ENVIRONMENT	STRENGTH	POTENTIAL	WEAKNESS	THREAT
Resources	Human resources	The presence of four researchers holding a MSc Diploma in cotton research.	The only potential that can be mentioned is the strength of the cotton research team in terms of human resource capacity currently available nationwide to do research on cotton.	The cotton research team is very much underrepresented in having senior researcher in all disciplines. Some of the core disciplines of cotton have no fulltime researcher(s) or no researcher at all. Poor hands-on skill training was provided to existing researchers and they need skills training to revitalize the human resources program.	Turnover of researchers.
	Financial resources	Regular allocation of capital budget from the government (for research activities and operational costs).	The program conducts different research and pre-extension work though it has been facing financial problem.	Budget allocated for cotton research is insufficient.	
Intra-disciplinary integrations, complementarities and synergies		Availability of experienced researchers and equipped research and analytical facilities in different centers and programs of EIAR and ETIDI accessible to the cotton research team. Availability of facilities such as HVI for grading cotton based on quality at ETIDI.	Even with lack of coordination of inter-institution/sector integrations the institute works together.	Lack of a formal mechanism to coordinate inter-institution/sector integrations and synergism which currently are implemented on the basis of personal goodwill. Absence of a single institution that leads the cotton sub-sector taking in to account the experiences of other similar countries, like Israel (Israel Cotton Board), India (Cotton Corporation of India) and Pakistan (Pakistan Cotton Corporation).	

ITEM OF ASSESSMENT	INTERNAL ENVIRONMENT	STRENGTH	POTENTIAL	WEAKNESS	THREAT
Technologies		Suitable agronomic recommendations on seed rate, date of sowing, fertilizer rate, crop water requirement, harvesting stage appropriate for the released varieties were established.	Full package for end user of cotton were conducted.	No technologies specifically developed for certain environmental challenges such as moisture stress, drought, frost, salinity, nutrient deficient soils, pests and other factors especially attributable to climate change. The conventional method of developing varieties is so lengthy that it needs 8-10 years to develop and register a variety.	
		Economically important insect pests of cotton (boll worms, cotton aphid, whitefly, thrips, jassid, mealy bug, cut worm, etc), diseases (bacterial blight and wilt) and weeds (broad leaf weeds and grasses) were identified, documented and control options developed.	Chemical Screening was conducted for major economic importance pest.	Due to climate change and associated favorable factors for pests, new emerging pests are devastating Novel pest management methods such as the use of Bt cotton is not practiced more in Ethiopia. Lack of IPM for key pests (Insects, diseases & weeds) of cotton Cotton protection studies are limited to the Awash valley mainly middle Awash Very limited studies on cotton germplasms Studies on pesticide resistance management studies and related handling is limited.	Incidence of new pests in the country.

ITEM OF ASSESSMENT	INTERNAL ENVIRONMENT	STRENGTH	POTENTIAL	WEAKNESS	THREAT
Organization and geographic coverage at center level		The establishment of WARC in the most suitable geographic locations for cotton production, testing technologies and disseminating the most convenient ones;	The center were conduct different research interest.	Limited coordination among the key stakeholders (MoA, ETIDI, and EIAR-WARC).	
		The presence of the Crops Research Directorate to facilitate and reinforces to smoothens the national coordination at EIAR;	Even if the collaborations is personal good will there is good collaboration of Ministry of Agriculture and Industry underrepresented in having senior researcher in all disciplines. Some of the core disciplines of cotton have no full time researcher (s) or totally no researcher. Poor hand-on skill training were provided to the existing researchers and they need skill training to revitalize program human resource.	Less favorable budget allocation for national coordination of cotton research.	
		Cotton is considered as a national strategic commodity and import substitution crop for the fact that it provides raw materials for textile industries. This makes cotton a crop of primary attention.		Lack of feedback and reports on results of collaborative research due to absence of staff mandated to research on cotton.	
		Through strong and responsive collaborations with regional research institutes/centers, MoI/ETIDI, MoA, and input suppliers, it is possible to strengthen the reach of cotton to end users.		Limited practical support to cotton production at all levels; Limited linkage between the main players in the cotton chain, both nationally and internationally which could have created and strengthened through the support of the government.	
				Weak or no formal linkages among regional research institute/ centers, ETIDI, MoA extension directorate and input suppliers because there are no formal mechanisms to foster collaborations and linkages other than personal good will .	

Checklist summary for the description of the cotton sector

S/N	DESCRIPTION	CURRENT STATUS
1	Public policies to promote cotton farming	Strategy was developed for different agricultural and Industry sectors
2	Geographical area characteristics	Endowed with suitable cotton production resources
3	Research institutions in the cotton sector	Different federal and regional research centers under Ethiopia Institute Agricultural Research
4	Main areas of research	Breeding, agronomy, protection and irrigation Scheme
5	Number of researchers	Eight full-time researchers at WARC(five for breeding and 3 for protection)
6	Ongoing international partnerships	There are no partnerships that support cotton research
7	Main players in the cotton chain	Farmers, ginneries, textile industry and oil factory
8	Description of marketing systems	The most common approaches in marketing are small-scale farmers-cooperative unions - Ethiopian industry input supplier enterprise - textile factories/Ginneries
9	Public-private partnerships to produce cotton by-products	Mostly cotton is produced for consumption of textiles as by products are not target and there are no public-private partnerships in Ethiopia for by products
10	Existing cotton farmers associations in the country	No farmer associations
11	Number of ginneries	21 ginneries
12	Number of oil factories	37 oil factories
13	Situation of agricultural mechanization	Never been truly mechanized
14	Socio-economic aspects of the cotton chain	Great impact on livelihood of different farmers in Ethiopia
15	Farmer organizations	Private sector like Ethiopian Cotton Producers, Ginners and Exporters Association (ECPGEA) which provides technical support to farmer, but at recent years the influence of the organization is low gear
16	Cotton companies	Ethiopian Textile Industry Development Institute is the most prominent company working on the development of cotton sectors
17	International cooperation programs	No international cooperation for research
18	Policies for rural extension and technical assistance to farmers	Ministry of Agriculture establishes the approaches on the extension and technical assistance to farmers

Compiled by National Cotton Research Project

Malawi

1. Public policies to promote cotton farming

Malawi Growth and Development Strategy (MGDS III) – This is the overarching development strategy for Malawi, wherein Agriculture is the first focus area. The goal of the Agriculture component of MGDS III is to achieve sustainable agriculture transformation and water development in Malawi. Cotton is a suitable crop to contribute to the vision of MGDS III since it offers agricultural diversification and has linkages with value-added activities, such as textile and garment manufacturing.

- ✓ National Agriculture Policy (2016) - The National Agriculture Policy (NAP) provides guidance to achieve transformation of the agriculture sector in Malawi. Specifically, the policy provides harmonized guidance for increased production, productivity and real farm incomes in the agriculture sector. Cotton being one of the strategic cash crops for the Nation, holds the potential to significantly contribute to the aspirations of NAP. The strategy is consistent with the NAP to the extent that it also aims at achieving increased production and productivity in the Cotton Sector;

- ✓ National Agriculture Investment Plan (2018) - The National Agriculture Investment Plan (NAIP) provides a harmonized framework to operationalize the National Agriculture Policy (NAP) by guiding investment focus in the sector to accelerate agriculture transformation, economic growth, and poverty reduction;

- ✓ Cotton Act (2013) - The Cotton Act consolidates all laws and regulations relating to the production, processing and marketing of cotton and matters incidental thereto;

- ✓ Textile and Garments Strategy (2017) - The strategy provided a roadmap to revive the textile and garment industry in Malawi by among others defining clear approaches to improve competitiveness and recommends critical interventions to stimulate inclusive growth within the industry. The MCDS relates to the Textile and Clothing Value Chain strategy in that it substantially dwells on a roadmap for increasing supply of raw materials for the textile manufacturing industries;

- ✓ National Seed Policy (2018) - The Seed Policy was developed to provide for the regulation and control of all seed issues, protection of consumers and dealers and also promotion of a responsible and productive seed industry in Malawi. Cotton is one crop that will benefit from the National Seed policy in areas of enforcement of standards and quality of seed;

- ✓ National Irrigation Policy (2016) - The National Irrigation Policy provides a guidance and a roadmap to all stakeholders in Malawi for the implementation and provision of irrigation-related goods, works and services in Malawi. It is the desire of the MCDS to intensify cotton production through irrigation;

- ✓ National Export Strategy (2012) - the National Export Strategy (NES) provides a framework and roadmap on how Malawi may build its productive capacity and diversify its economy away from traditional commodities;

- ✓ National Contract Farming Strategy (2016) - Provides a framework for ensuring that all contracts meet stipulated minimum standards and provide support for dispute resolution and promote commercialization of small holder farming. The National Contract Farming Strategy provides useful guidelines for managing cotton production and marketing contracts;

- ✓ Draft National Agribusiness Strategy - The National Agribusiness Strategy (NAS) was formulated to guide all sector players on the key activities that they should implement to develop the agribusiness sector in Malawi within the next five years (2019-2024). The NAS therefore acts as the overall agribusiness policy framework to provide policy, technical and advisory guidance on implementation for agribusiness development initiatives in Malawi;

- ✓ Trade Policy (2016) - The Trade Policy succeeded the Integrated Trade and Industry Policy (1998) and is entwined with National Export Strategy (NES) and the National Industrial Policy (NIP) in terms of their priorities and implementation structures. The Trade Policy was developed to solve the structural challenges of concentrated export base which has been creating volatility in Malawi's export earnings.

2. Geographical area characteristics/ number of cotton farmers/annual cotton production/productivity per hectare/cotton fiber and cotton seed production.

Characteristics

Shire valley: below 100 m above sea level, maximum average temp 32.4ºC, minimum average temp 20.6ºC, rainfall: 500 mm - 800 mm, relative humid ity: 47.5%.

Number of cotton farmers

Refer to table below.

Annual cotton production

Refer to table below.

Productivity per hectare

700kg - 900kg per hectare.

Cotton is a major cash crop for over 200,000 farm families in the country. Family farming is the main system used in cotton production who grow cotton in an area of about 30,000 hectares every year, in land sizes ranging from 0.4 to 0.7 hectare. The major cotton growing areas are the Lower Shire Valley lying at an altitude of 100m above sea level (Chikwawa, and Nsanje), Lakeshore areas lying between 500m and 700m above sea level (Mangochi, Salima, Nkhota-kota and Karonga); and the medium altitude areas lying between 800m and 1,000m above sea level (Machinga, Phalombe, Blantyre, Mwanza, Neno, Henga/ Kasito valley in Rumphi district. And lately it has been reported that some parts of Kasungu, Mzimba and Mchinji are also growing cotton.

In some of these areas cotton is the only reliable cash crop.

The annual production is about 30,000 tons of cotton lint and is concentrated in the Shire Valley. This region has the adequate climatic conditions for cotton farming, at 1,200 m above sea level with annual rainfall patterns of more than 1,100 mm.

SEASON	Nº. OF GROWERS	AREA PLANTED	YIELD (KG/HA)	PRODUCTION (MT)
2009/10	102,761	30,785	947	29,165
2010/11	147,500	59,000	1000	52,000
2011/12	418,000	252,130	400	100,000
2012/13	362,000	187,000	225	42,000
2013/14	341,926	149,259	308	46,000
2014/15	389,003	123,019	406	50,000

3. Research institutions in the cotton sector

- ✓ Makoka Agricultural Research Station;
- ✓ Lilongwe University of Agriculture and Natural Resources.

4. Main areas of research

- ✓ Cotton Breeding;
- ✓ Cotton Pathology;
- ✓ Cotton Entomology;
- ✓ Cotton Agronomy;
- ✓ Cotton Technology Transfer;
- ✓ Agricultural Economics (Cotton);
- ✓ Soil Engineering;
- ✓ Seed Technology.

5. Number of researchers

- ✓ 7 cotton researchers.

6. Ongoing international partnerships

- ✓ Shire – Zambezi Cotton Project;
- ✓ Indian Cooperation.

7. Main players in the cotton chain

- ✓ Cotton Council of Malawi;
- ✓ Makoka Research Station;
- ✓ Quton Seed Company;
- ✓ AICC;
- ✓ Department of Agricultural Extension;
- ✓ Crops Department;
- ✓ Cotton Farmers Association;
- ✓ Cotton Ginners Association;
- ✓ ADMARC.

8. Description of marketing systems

- ✓ Liberalised marketing.

9. Public-private partnerships to produce cotton by-products

- ✓ Malawi China Textile Company;
- ✓ Mapeto David Whitehead;
- ✓ CORI Oil Company.

10. Existing cotton farmers associations in the country

- ✓ Only one, COFA;
- ✓ There are also several small farmer cooperative societies involved in cotton.

11. Number of ginning plants

GINNER	GINNERIES
Mapeto	1
Malawi China Cotton	2
Agri. Value Chain Ltd (AVC)	1
ADMARC	3
Afrisian	1
	8

- ✓ There are also small mini ginneries installed for farmer cooperatives by OVOP across the country.

12. Number of oil extracting industries

- ✓ Only two;
- ✓ Cooking Oil and Refining Industries (CORI);
- ✓ Malawi Cotton Company.

13. Situation of agricultural mechanization

- ✓ Very low mechanization.

14. Socioeconomic aspects of the cotton chain

15. Farmer organizations

- ✓ Cotton FA.

16. Cotton companies

- ✓ Malawi Cotton Company;
- ✓ China – Africa Cotton;
- ✓ ADMARC;
- ✓ Afrisian;
- ✓ AVC;
- ✓ Mapeto.

17. International cooperation programs

- ✓ Shire – Zambezi Cotton Project;
- ✓ Cotton Technical Support for Africa – Government of India.

18. Strengths, weaknesses, potentials and threats faced by the industry

Weaknesses

- ✓ Low technology level of production systems in use;
- ✓ Lack of skilled human resources and means to carry out activities of technical assistance and technology transfer;
- ✓ Limited capacity to provide training and to develop technologies (laboratories, facilities, etc.);
- ✓ Inadequate supply of certified seeds and other inputs;
- ✓ Inefficient communication system for technology transfer;
- ✓ Low prices offered by cotton buyers;
- ✓ Limited access to agricultural loans;
- ✓ Inadequate information support (extension services);
- ✓ Weak farmers organization.

Potential

Cotton has, among the cash crops, high potential to expand particularly in the small-holder subsector. The crop has the immediate potential to impact Malawi's overall growth for several reasons including the creation of more jobs if the integrated cotton textile and garment chain is revamped. Secondly, there is capacity for the country to produce over 200,000MT of seed cotton by more than 400,000 farmers if there is a conducive production and marketing environment. This has already been demonstrated twice through government effort under cotton input subsidy in 2007/8 season and special funding to the cotton program of 2011/12 growing season where production increased from 30,000MT in 2001/02 to 97,000MT in 2007/08, and 100,000MT in 2011/12.

Strengths

- ✓ There is political will;
- ✓ Conducive public policies;
- ✓ Conducive climate for cotton production;
- ✓ High yielding cotton varieties available;
- ✓ Cotton Research team available;
- ✓ Extension systems are available.

19. Policies on rural extension and technical assistance to farmers

- ✓ Refer to point 1 above.

Mali

1. Public policies implemented to strengthen cotton production

Cotton sector development in Mali is undertaken by the Malian Textile Development Company (CMDT, acronym in French). An open-stock private-public limited company created in 1974, CMDT is a key link in Mali's cotton production chain. It is managed by a Board of Directors made up of 11 members, 08 representing the Malian Government, 02 the cotton farmers and 01 GEOCOTON (French Company).

CMDR main mandates are:

- ✓ Agricultural consulting for seed cotton farmers;
- ✓ Primary seed cotton commercialization;
- ✓ Seed cotton transportation and ginning;
- ✓ Cottonseed sales to local oil mills;
- ✓ Cotton lint sales for exports and to the textile industries in Mali.

To strengthen cotton farming in all or part of its areas, and also (in the areas) of its partners, CMDT has been developing Strategic Development Programs for the Cotton Sector (SDP-FC, acronym in French) since 2013. After the completion of the first project, which lasted from 2013 to 2018, a second project was formulated targeting the 2020-2025 period.

2. Geographic characteristics of the cultivated areas/number of farmers involved in the sector/cotton production numbers/productivity per hectare/lint production and seed cotton production/among others

In Mali, cotton is grown under adverse climatic conditions with low rainfall in the Southern and Western parts of the country and annual averages ranging from 650mm to 1200-1300mm. The cotton production area is home to more than 4 million people, or a quarter of the country's population, and the crop is grown directly on more than 200,000 farms.

Seed and lint cotton production varies from one year to another, depending on socio-political events in the country, and on the prices of inputs and lint cotton on the world market. Regarding this last point, it should be noted that the trading price of one kilogram of seed cotton for the farmer depends on the lint's international market price.

Although it has a relatively low national production yield, Mali ranks high in seed cotton production on the African scene thanks to its larger cultivated areas. Thus, in 2019-2020, the areas planted with cotton represented 738,193 ha compared to 698,158 ha in 2018-2019.

In 2020-2021, according to farmers, there was a boycott of cotton cultivation due to the drop in selling price caused by the COVID-19 pandemic; as a result, out of the planned 810,000 ha, only 174,666 ha were actually planted, only 164,833 ha of which proved productive.

Regarding seed cotton productivity, the national average varied over this period as follows: 940 kg/ha in 2018-2019, 963 kg/ha in 2019-2020 with a projected count of 893 kg/ha in 2020-2021.

3. Research institutions involved in the sector

All research on the development of the cotton sector is conducted by the Institute of Rural Economics (IER, acronym in French) through its specialized departments, namely the Cotton Thematic Studies Program, while ESPG-RN and ECOFIL are in charge of studies on the socioeconomic aspects.

4. Main areas of research

The thematic studies conducted under the cotton program focus mainly on the following areas:

- ***Breeding for varietal improvement***, creating more productive varieties with high fiber ginning out turn, excellent fiber qualities, and high-potential seed;
- ***Fertilization and cropping systems*** for conservation and even soil fertility improvement; and
- ***Cotton crop phytosanitary protection*** in order to reduce the effects of pests.

The ultimate goal pursued in all these activities is the maximization of revenues and consequently of corresponding profits.

5. Number of Researchers Involved

As of December 31, 2020, there were five (05) researchers in the cotton program, including 02 Research Directors, and 03 Research Associates. These are supported by 06 'A' executives, 04 of which hold a Master's degree. However, this personnel is not part of the hierarchical structure.

In addition to these executives, the program is supported by three (03) Senior Agricultural Technicians, six (06) Technical Agents, five (05) Permanent Contract Agents, five (05) Drivers, and about ten (10) observers during the agricultural campaign.

6. Ongoing international research partnerships

As part of the research conducted by the cotton program, there are several ongoing collaborations with international institutions, including CIRAD (France); the FiBL Organic Agriculture Research Institute (Switzerland); the Swiss Foundation, IFDC; agro-pharmaceutical companies, etc. And for almost a decade (from 2009 to 2017), the cotton program has enjoyed a fruitful cooperation with EMBRAPA (Brazil).

7. Main players in the cotton sector

In addition to the Malian government and its French partner, among the main players in the cotton sector, mention should be made of the farmers, the CMDT and the Office of the Upper Niger River Valley (OHVN - *Office de la Haute Vallée du Niger*), the banking pool (BDM, BNDA, Kafo Jiginew), input suppliers (fertilizers,

herbicides, pesticides), and transportation companies. Seed processors are also important partners for the cotton sector.

Within the CMDT, the Training and Technical Innovations Department was created to better support research and contribute to considering the gender dimension. This department actively participates in the pre-extension of innovative technologies through tests and demonstrations on the ground. This Department includes 5 executives from the Holding (headquarters) and 15 from the Subsidiaries.

8. Detailed descriptions of all marketing systems

Post-harvest, CMDT organizes the primary marketing of seed cotton in the cooperatives. Seed cotton is collected, sorted, and weighed before being sent to the ginning plants according to a consensual schedule adopted together with the Regional Federations of Cotton Growers' Cooperatives (FR-SCPC, acronym in French).

After ginning, the cottonseed is sold exclusively to domestic oil mills.

98% of the lint is exported, about 2% is processed by domestic industries.

9. Existing public-private partnerships in cotton by-product production

CMDT sells cottonseed and short cotton fiber to Mali private sector industries. In return, CMDT buys cretonne boxes from private sector companies that are used for packing cotton bales.

Bale transportation to the ports of Abidjan, San Pedro, and Dakar is done exclusively by private trucks.

In addition, about 50% of the seed cotton produced is transported in private trucks from the cooperatives to CMDT's ginning units.

10. Status of farmers' organization

Since July 2001, the restructuring of farmers' organizations has begun in the cotton-growing areas. The Cotton Growers' Cooperative Societies (SCPC , acronym in French) have been created (more than 7,000 today).

CMDT's coordination works with the SCPCs.

11. Existing farmer associations in the country

- ✓ Association of Professional Farmers' Organizations - AOPP (acronym in French);
- ✓ National Coordination of Farmers' Organizations - CNOP (acronym in French).
- ✓ Confederation of Cotton Growing Cooperative Societies - C-SCPC (acronym in French).

12. Number of ginning plants

CMDT has 18 ginning units, including the one in Kadiolo, which opened in 2018.

13. Number of cottonseed oil mills

Cottonseed crushing units are mostly small to medium-sized industrial units; there are approximately 100 units, more than half of which are based in Koutiala and Ségou. These units produce oil, rarely refined, as well as soap and animal feed.

14. Agricultural mechanization status

According to the October 2019 census, the CMDT area has:

- ✓ 4.937.374 inhabitants;
- ✓ 222.725 agricultural production units, 204,532 of which produce cotton in a typical year.

Machinery status is as follows according to the survey conducted in October 2019:

- ✓ Number of agricultural units with at least one tractor: 2,342;
- ✓ Number of agricultural production units with at least one animal-powered implement: 186,136;
- ✓ Number of agricultural production units with incomplete coupling implement: 15,208;
- ✓ Number of manual agricultural production units: 3,317.

Currently, tractors are used to transport organic fertilizer and for harvesting. Only tillage is performed with the use of a tractor. All other cultivation operations (sowing, weeding, ploughing, harrowing) are accomplished with draft traction equipment or manually.

15. Socioeconomic aspects of the cotton sector

The cotton sector is very strategic for the socio-economic and cultural development of Mali. It ensures: (i) the creation and redistribution of a secure and significant income for cotton growers; (ii) food security and self-sufficiency; (iii) the financing of basic social infrastructure in the areas where the CMDT/OHVN operates; (iv) the revitalization of various segments of the economy, including transport, the supply of agricultural and industrial inputs, oil products, contributing to tax and customs revenues as well as to bank balances, and stimulating the hospitality sector, small itinerant businesses, and the creation of jobs (4. 058 permanent and 11,158 seasonal workers at CMDT and oil refineries).

The cotton sector accounts for 15% of the GDP and ranks second, after gold, in export revenues.

16. Cotton companies

The Malian Textile Development Company (CMDT) is the company responsible for fostering the cotton sector in Mali.

17. International cooperation programs and projects

The cotton sector in Mali benefits from the support of two projects:

- The South-South Cooperation project with the Brazilian Cooperation Agency entitled "Maintenance of the productive potential of soils in the cotton-growing areas of Mali - *Cotton Sols*". This project, started in July 2019, almost stopped with the onset of the COVID-19 pandemic. Discussions are underway for the resumption of activities.
- Project to Support the Agroecological Transition in the cotton-growing areas of Mali, funded by the French Development Agency. The implementation of this project started in June 2020.

18. Strengths and weaknesses of the cotton sector in Mali and threats faced

Strengths

- Availability of land for cultivation;
- Adequate supervisory structures with competent personnel;
- Adequate research structures;
- Good collaboration between CMDT and the research structure;
- Adequate supervisory and research structures;
- Experience in cotton cultivation acquired by a large number of growers;
- Farmer's good equipment level;
- Organization of farmers into cooperatives;
- Mechanism of supply of inputs to farmers;
- Well integrated sector (harmonious integration between agriculture and industry);
- Pricing mechanism and support fund to farmers.

Weaknesses

- Continued decline in the fertility of cultivated soils;
- Insufficient erosion control activities;
- Low number of women (the "gender" aspect is not sufficiently considered);
- Insufficient financial resources for women's (gender) activities and large-scale erosion control (mechanical and biological measures and large-scale production of organic fertilizer)
- Low diversification of agricultural income sources other than cotton;
- Poor surface water management;
- Very little processing of agricultural products, including cotton lint;

- Lack of cotton varieties adapted to the diverse agroecological zones in the cotton-growing area of Mali;
- Insufficient financial resources and measures to adapt or mitigate the effects of climate change;
- Insufficient number of women on the staff responsible for supervising women farmers;
- Insufficient number of staff in charge of solving the phytosanitary control and erosion control problems;
- Low seed cotton yield;
- Lack of control of sucking pests;
- Poor conservation of rural roads in the cotton-growing area.

Opportunities

- Existence of a national fund for rural development;
- State subsidization of mineral and organic fertilizers for the cotton growing system;
- Government willingness to develop the cotton sector;
- ABC/UFLA support in soil erosion control and fertility;
- ABC support in the integration of sustainable genetic improvement of African cotton;
- Project to Support the Agroecological Transition in cotton growing areas in Mali, financed by the French Development Agency;
- Potential area for irrigated cotton cultivation;
- Development of crop diversification sectors.

Threats

- State subsidization of mineral and organic fertilizers for the cotton growing system;
- Insecurity in the country;
- Pandemics;
- Political instability;
- Production is overdependent on climatic risks;
- Proliferation of mining sites in agricultural production areas;
- Lack of control over cotton lint international prices;
- Proliferation of pests such as sucking insects.

19. The status of policies implemented on technical assistance and rural extension

CMDT's supervisory board provides agricultural technical assistance to cotton growers, and it consists of:

- ✓ 520 grassroots agents (head of agricultural production area) responsible for rural extension in the grassroots cooperatives;
- ✓ 65 Heads of sector and their substitutes in the municipalities or "circles" (set of smaller municipalities);
- ✓ 35 researchers for monitoring and evaluation;
- ✓ About 60 executives in the Subsidiaries responsible for rural assistance;
- ✓ 15 executives in the Holding responsible for coordinating and managing agricultural production activities
- ✓ A network of trainers at all of CMDT's organizational levels (Divisions, Subsidiaries, Holding Company trainers)
- ✓ Three women managers for the promotion of women's activities (gender)

Rural extension messages (campaigns) are backed by the results of research produced by the Cotton Program of the Institute of Rural Economics (IER, acronym in French).

Mozambique

1. Public policies to promote cotton farming

To boost agriculture, the Mozambican government has invested in policies that aim to advance its development. In 2020, it launched the SUSTENTA Policy, which aims to integrate family farming into productive value chains, in order to improve the quality of life of rural households by fostering sustainable agriculture (at the social, economic and environmental levels).

This policy falls under the Government's Five-Year Program (PQG 2020-2024), in the priority aimed at boosting economic growth, productivity and employment generation. It was preceded by other instruments, most notably, the Agricultural Sector Development Strategic Plan (PEDSA 2011-2020) and the Agricultural Development Operational Plan (PODA 2015-2019).

SUSTENTA is in line with the Agricultural Sector Development Strategic Plan (PEDSA 2011-2020) whose scope of intervention comprises 07 components, namely: 1) Technology Transfer, 2) Financing for agricultural production, processing, and commercialization; 3) Establishment of market linkages and promotion; 4) Production planning and organization; 5) Intervention in infrastructures (access roads, irrigation, agro-processing, and storage); 6) Environmental and social safeguards; and 7) Farmer subsidies.

Overall, the SUSTENTA Policy anticipates that these interventions will positively impact several aspects, most notably, the improvement in rural family income, expected to increase from the current MT 36,600/year to MT 73,500. As well as positive impact on job availability in agriculture that is expected to grow from the current 240,125 jobs to about 1.6 million jobs.

Within the SUSTENTA policy, the initiative SUSTENTA Cotton was created, which aims to intensify the production of oilseeds (soya and sunflower) through the cotton promotion system already established decades ago in the country, in a model in which an agricultural company integrates smallholder family farmers into its production system.

In the fostering of cotton farming in Mozambique, 7 companies currently operate under contract and are characterized by having an area under concession by the State, investment in ginning plants, storage facilities, offices, means of transport and equipment for agricultural production, and a network of promotion and technical assistance to farmers.

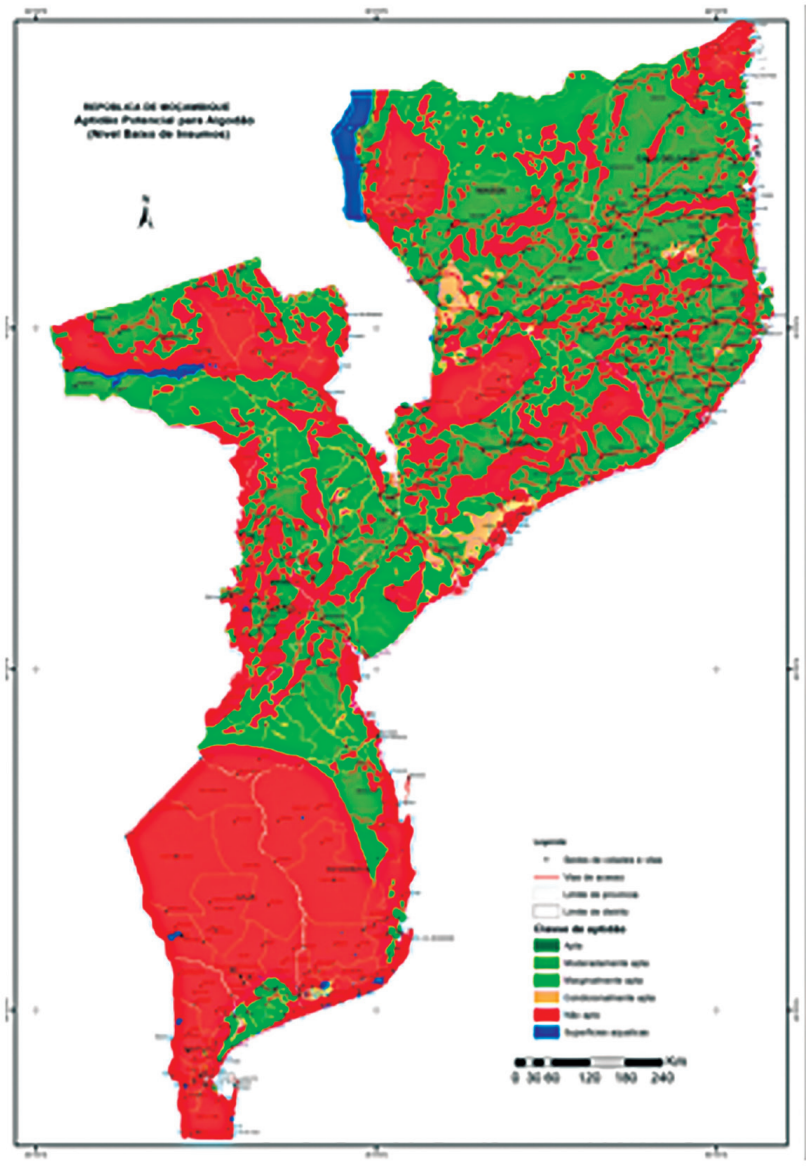
2. Geographical area characteristics/ number of cotton farmers/annual cotton production/productivity per hectare/cotton seed and lint production

In Mozambique, cotton production occurs under the model of concessions granted to concessionaires on an exclusive basis for the purchase and sale of seed cotton and involves about 250,000 small farmers, who benefit from credit on inputs (seeds, pesticides and bags), technical assistance and credit for critical crop operations (sowing, thinning, hoeing, spraying and harvesting), which is deducted by the sponsors when the seed cotton is sold, observing the minimum seed cotton purchase price approved by the State.

About 180,000 hectares of land are destined for sowing cotton and currently have an average yield of 550 kg of seed cotton per hectare. The sowing is carried out between the months of November and January and the harvest is done between the months of April and May each year.

In Mozambique, cotton is one of the most important agricultural products for the country's export portfolio and a favorable agroclimatology, particularly in the North and Central regions (Figure 1), where the crop is mostly conducted in rainfed regime, provides it with the 4th place in the ranking of agricultural products for export and the 7th place in general, contributing positively to the balance of payments of the country.

Figure 1: Zones favorable to cotton growing in Mozambique



3. Cotton research institutions

The agricultural research network in Mozambique is managed through the Mozambique Agricultural Research Institute (IIAM, acronym in Portuguese). IIAM-HQ implements its research agenda through four regional, zone-specific research centers. The four regional research centers are established in: Niassa, Manica, Gaza and Nampula, covering broad agroecological zones over a wide geographic area. Each regional center has a network of agronomic research units (27) specialized in specific products (mainly for rice, cashew, maize, cotton, tropical fruits and livestock) or specific needs of agronomic areas.

The research platform is coordinated by IIAM and is represented by CGIARs (Consultative Group on International Agricultural Research), extension officers, commodity representatives, farmer representatives (National Union for Small Farmers - UNAC). At the regional centers, a similar research platform structure exists to draft a demand-driven agenda for local microecological research. Zonal center directors feed their specific research agenda into central planning by being members of the central research platform.

IIAM is establishing specific research centers of excellence to meet commodity specific research needs (cotton, cashew, fruit crops, rice, vegetables, etc.) creating flexibility in conducting market-oriented research and establishing partnerships with international institutes.

In addition to the research systems, agricultural knowledge is generated by a large number of academic institutes, including about ten higher education institutes, mainly universities (Bachelor and Master´s programs) and ten mid-level agricultural institutes (certificate - mainly for extension officers). Research institutes coordinate and partner up with academic institutes, involving them and supervising the research conducted by the students. Research centers provide supervision over field work and provide support by immersing them in various research programs. Academic institutes are linked to the research centers primarily. IIAM works with the universities within the agricultural research system to do joint work not only in research, but also in curriculum preparation and review.

Research centers connect with end users through the extension system and adaptive research. The technology transfer directorate within IIAM coordinates strongly with the technology transfer extension directorate of the Ministry of Agriculture and Rural Development (MADER, acronym in Portuguese). IIAM also works directly with farmers through demonstration plots, on-farm trials, and participatory breeding programs.

Each extension officer is linked to the research center in their zone. Dissemination of agricultural knowledge occurs through the training of extension officers from the research center, who eventually train farmers.

The cotton innovation system in Mozambique is organized as a well-coordinated and systematic network managed mainly by the IAOM (acronym in Portuguese. The main player in the innovation system is the Namialo Cottonseed Research and Multiplication Center (CIMSAN, acronym in Portuguese), which is responsible for research in the cotton value chain. The

center is located in Nampula Province, Meconta District, Namialo Administrative Post and is administratively integrated in the Northeast regional center and mainly conducts the IIAM cotton program. CIMSAN is currently a research unit that receives funding for its activities from the regional research center. CIMSAN implements its plan through IIAM's experimental units throughout the country, providing its research program and funding to various units. The center also works in coordination with IAOM technicians to conduct region-specific experiments (evaluation of variety adaptability and stability).

Agricultural research and stakeholder coordination are mainly done through IAOM. The effectiveness of the research center in proposing viable solutions to stakeholder needs remains very limited. The main issue relates to (i) CIMSAN's lack of capacity (researchers and facilities); (ii) lack of funding to focus on viable programs to address value chain constraints; (iii) lack of international partnerships with regional and international research systems. In addition, IIAM's broad governance limits its ability to specifically broker useful partnerships with the private sector or solicit independent funding to implement the cotton research agenda.

Currently CIMSAN is operating below its full potential due to lack of resources in terms of funding, means, equipment and personnel, and it is necessary to carry out institutional strengthening of CIMSAN and improve cotton research in the country. Existing assets in terms of personnel and facilities are incipient, and lack laboratories, greenhouses, and irrigation schemes to conduct research and extension at the current demand level in the sector. CIMSAN has about 300 ha available for research. There is no irrigated land available. Equipment and machinery are grossly inadequate to carry out and meet the research needs of the sector.

4. Main areas of research

The core functions of the cotton research center in Namialo (CIMSAN) are to conduct seed research and multiplication, as well as research on cotton management practices that are then transferred to farmers through the concession extension networks.

5. Number of researchers

CIMSAN is managed by the cotton program coordinator, who is responsible for both field management activities and cotton program coordination (field manager and cotton program coordinator).

The key personnel of the program include: 1 MSc researcher specialized in breeding (program coordinator and head of the research center); 4 at the graduate level in agricultural sciences. Additional specialists are needed specializing in entomology, plant pathology, seed specialists, and laboratory staff with Master's and Doctoral degrees.

6. Ongoing international partnerships

Two international partnerships are underway, with:

1st - Brazilian Cooperation Agency (ABC, acronym in Portuguese) in the scope of the materialization of two initiatives, namely: Promoting decent work in the cotton value

chain, and Project "Beyond Cotton", which aim to promote decent work for farmers and contribute to increase family income, as well as food and nutritional security, respectively.

2nd - FAO (Technical Assistance) - technical assistance project that allowed the undertaking of 4 studies. The first was on the competitiveness of Mozambican cotton on a global scale, the second was on sisal in order to identify the Government's role in this sub-sector, then the formulation of a cotton production econometric model, and finally a study on the oilseed sub-sector is in progress.

7. Players in the cotton sector

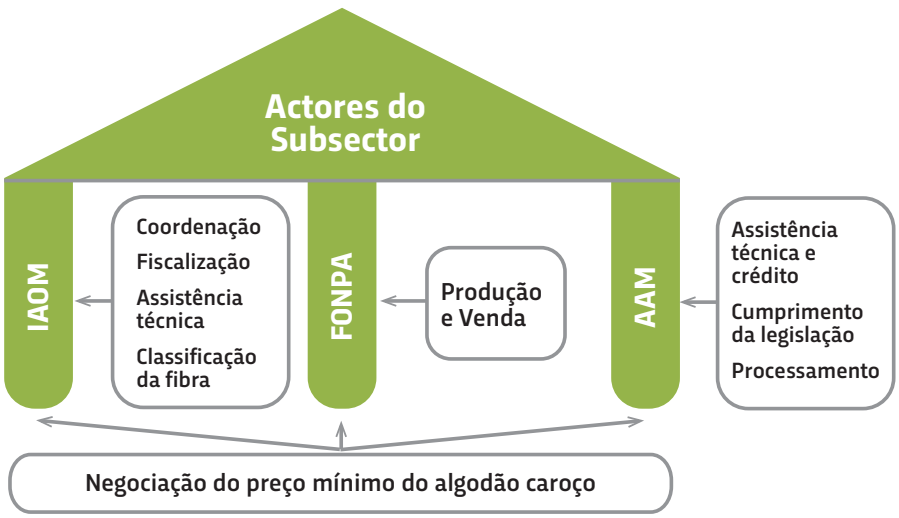
In the cotton value chain, three main players intervene, namely, the IAOM, a public institution created by Decree No. 49/2020 of 1st of July, the National Forum of Cotton Farmers (FONPA, acronym in Portuguese) and the Cotton Association of Mozambique (AAM, acronym in Portuguese), both from the private sector.

The IAOM, subordinated to MADER, represents the State and its role is to stimulate, foster, regulate, supervise and otherwise foster the cotton value chain and its by-products.

FONPA is an entity whose objective is to meet the needs of farmers and to serve as an interlocutor between the various social actors involved in the cotton production. It involves farmers associations and cooperatives, but mainly family farmers, around 250 thousand families (about one million people).

The Cotton Association of Mozambique (AAM) represents the interests of cotton-related companies in the country, which own processing plants and concessions for cotton production through fomentation, an activity outsourced by the State through fomentation and rural extension contracts.

Figure 2: Cotton sub-sector players



8. Description of marketing systems

The marketing season begins after the cotton harvesting period (April - May) and ends on September 30th of each year. Marketing is regulated and supervised by the IAOM.

The purchase of the production (seed cotton) is undertaken by the companies that, at the time of commercialization, deduct from the amount paid to farmers referring to inputs made available, on credit, at the sowing period – always observing the minimum price pre-established in each crop season by the main players (Government, FONPA and AAM) for each category, which may be 1st or 2nd. The company is also responsible for seed cotton logistics.

The commercialization campaign is preceded by the creation of markets, which should not be located more than 5km away from the farmer's residence or warehouse. Each market is composed of a brigade (01 classifier, 01 weigher, 01 payer and 01 clerk). To oversee the commercialization process, the IAOM designates an inspector and the farmers designate a farmer representative. It should be emphasized that the buying and selling process must be carried out in daylight.

Regarding the commercialization of lint, it is important to note that the regulatory instruments in force for the commercialization and export of lint ensure the sale of domestic lint at prices no lower than the A index, an indicator agreed upon as an international reference. However, it represents the average of the five lowest price quotes for cotton lint in a group of 18 commodity exchanges that price cotton in the world.

About 6% of the cotton lint is consumed internally by a spinning mill and the remaining fiber is mostly exported to Asian countries, after being classified by IAOM laboratories. It should be noted that the fiber is only traded by operators registered with the IAOM for this activity.

9. Public-private partnerships to produce cotton by-products

There are two public-private partnerships underway for cotton by-product production:

1st - With SNV, a Dutch development organization. Partnership activities have been taking place since the year 2020 in Cabo Delgado Province, Motepuez District and will end in 2022. It consists of promoting cotton value addition through the processing of handmade textiles using locally produced cotton, thereby benefiting local farmers.

2nd - With SAN/JFS, a cotton company, located in Niassa Province, Northern Mozambique, which in partnership with IAOM is fostering the production of handmade textiles in its cotton concession in cotton fiber spinning and weaving.

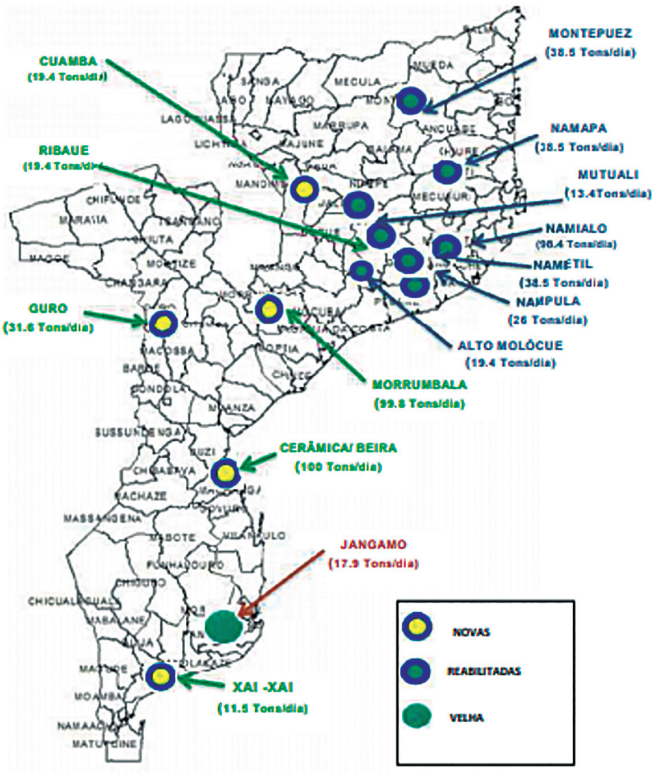
10. Existing cotton farmer associations in the country

In the cotton sector, there are currently 67 cotton farmer associations in the priority cotton producing districts.

11. Number of ginning plants

The country has 14 ginning plants, as illustrated in the map below.

GINNERIES AND THEIR GINNING CAPACITY



12. Number of vegetable oil mills

Currently the country has 24 plants producing and refining vegetable oils and fats from various raw materials, namely: soy, sunflower, cotton, palm and coconut. It should be noted that most of these companies are dedicated to refining imported crude oil.

Regarding cotton seed oil processing, there are currently four processing plants, the *Sociedade Algodoeira de Namialo Ltda* (SANAM, acronym in Portuguese) established in 2004 in Monapo, which despite having capacity to extract oil from cottonseed, is currently dedicated only to refining imported crude oil from other oilseeds, due to insufficient seed supply to fully exploit the available capacity.

The Plexus plant in Montepuez, with a processing capacity of 16.5 thousand liters/day of crude oil. The João Ferreira dos Santos plant in the city of Cuamba, with capacity to produce 10,000 liters of oil/day from cottonseed, sunflower seeds and soya and the OLAM plant in Beira both recently established and yet to start operations.

13. Agricultural mechanization status

Mozambique has over 22 Agricultural Service Centers (ASC), public-private organizations, for the provision of inputs and services for soil preparation, sowing, irrigation, harvest, and post-harvest to family farmers distributed throughout the different provinces.

However, these are not yet sufficient in number to benefit all farmers. Cultivation techniques, in particular soil preparation (tillage), are done manually with intensive use of labor using hand tools, resulting in the difficulty of expanding the cultivation areas.

This reality is common for the cotton sub-sector, where many farmers do not have the financial resources to acquire machinery and explore the use of animal traction as an alternative. This farming method is common in some provinces of the country, which makes technical capacity available in order to transfer technology to some other areas.

14. Socioeconomic aspects of the cotton sector

The cotton sector in Mozambique is organized under a concession scheme, where 9 ginning companies have the exclusive right to purchase

cotton from farmers under their designated concession area.

The concession system involves Public-Private Partnerships (PPP), where the ginning companies engage in extension and promote activities that are the responsibility of the government. Ginning companies play a central role in the cotton concession system in Mozambique, functioning practically as input suppliers, extension agents, research facilitators, credit providers, processors, and exporters.

This is a functional system with duties and obligations on both sides. Ginning companies are obligated to provide input and extension packages to the small-holder farmers in their production areas and recover the cost when buying seed cotton from the farmers. Due to their involvement in the entire value chain, concession holders (ginning companies) have and continue to face various risks, resulting in many companies entering and exiting the cotton market. The concession system has allowed for the gradual development of the industry in the absence of solid input supply systems and production markets.

It supports the government by outsourcing extension services; allows for control by the concession holders of the quality of the cotton being produced and access to a consistent cotton supply for the ginning process; and assists farmers by providing access to inputs, markets, extension and production in a relatively underdeveloped agricultural environment.

Cotton ginning in Mozambique is carried out by the 9 ginning companies who have the right to purchase cotton from the designated concession area, in exchange for providing inputs and extension to the small producers in their domain. The ginning companies are composed of national and international entrepreneurs.

Cotton is bought from farmers contracted by the ginners, at designated outlets/markets, classified by the IAOM and exported through international traders. The price is established through a collaborative two-step process, primarily taking into account the current and future international price of cotton, the ginning rate, exchange rate adjustment, cotton seed price, and transportation costs.

The ginning sector in Mozambique is currently characterized by underutilized capacity and low productivity. With over 70 percent spare capacity due to low production yields, fixed costs are disproportionately high. The Ginning Out Turn (GOT), or the percentage of lint obtained from a sample of seed cotton, has improved significantly, from 33% to 38% due to the adoption of more productive varieties from breeding programs.

Mozambique exports almost all of its cotton as lint due to the insufficiency of a textile industry. Only four spinning and weaving mills and approximately 10 garment factories dating from pre-independence remain in the country's major cities, and many of these factories have been out of operation for several years. The textile sector collapsed after the 16-year civil war and has failed to recover significantly due to a shortage of working capital, spare parts, restrictive labor laws, and poor local management. Textile exports fell from US$6.7 million in 2005 to US$0.77 million in 2011.

The consequences of this are that the country's cotton sub-sector is highly vulnerable to world

price fluctuations and that all manufactured cotton products have to be imported, despite the country's shortage of hard currency. The government has aggressively undertaken marketing strategies to attract investors from the SADC region and other countries specializing in textile production. These efforts have led to the revitalization of some textile projects, however, which are operating at a very low scale. These include: Nova Texmoque, which is engaged in the production of white fabrics, and Mozambique Cotton Manufacture (MCM, acronym in Portuguese), which has started local yarn production and plans to expand its operations with dyeing and finishing in Mozambique in the future.

15. Farmers´ organization

The cotton sector in Mozambique has a National Forum of Cotton Farmers (FONPA, acronym in Portuguese), created in 2005, which is an entity whose objective is to meet the needs of farmers and serve as an interlocutor between the various social players involved in cotton production. It involves farmer associations and cooperatives, but mainly family farmers, around 250 thousand families (about one million people).

It is estimated that 91.6% of the cotton produced in the country comes from family farmers, 6.5% from associated farmers, 1.8% from independent farmers, and 0.09% from the concession-holding companies.

16. Cotton farmers associations

Mozambique has only one cotton association, the Mozambique Cotton Association (AAM, acronym in Portuguese), which currently has seven member companies operating in various areas of cotton production. Some of them are international companies, while others are local family businesses.

17. International cooperation programs

The then IAM has developed a strong partnership with several international (multilateral and bilateral) organizations, including: African Development Bank, African Cotton Institute, World Bank, Bremen Fiber Institute, CAB international, ACP-EU Center for Agriculture and Rural Cooperation, International Cotton Advisory Committee (ICAC), European Union and others.

The institute has coordinated/supervised and contributed to several studies funded by various development institutes, specialized cotton agencies and other bilateral research agencies. Most recently the institute has implemented the following programs: (i) Development of the National Cotton Classification System with support from the Common Fund for Commodities (CFC) and OPEP; (ii) Regional Project for Strengthening the Cotton Sector in the Shire and Lower Zambezi Basins with the Brazilian Cooperation Agency, which involves seed production; (iii) Cotton Lint Improvement Project through European Union funds; and (iv) Capacity Building of the then IAM by improving the infrastructure of its facilities.

Currently underway are: Project "Cotton with Decent Work"/ILO – Mozambique; the Alternative Production and Disposal of Cotton By-Products Cotton and Intercropped Species in Mozambique - Project "Beyond Cotton"; and the Project for implementing the Mozambique

Cotton Innovation Center (CIAM, acronym in Portuguese) – Project "Cotton Pathways", all of which financed by the Brazilian government through the Brazilian Cooperation Agency (ABC).

18. Strengths, weaknesses, potentials and threats faced by the sector

Strengths

- ✓ There is potential for developing cotton and oilseed value chains (favorable agroecological regions, availability of arable land);
- ✓ Tradition in cotton production among Mozambican farmers;
- ✓ Well organized and infra-structured cotton sector, with capacity to grow seed cotton, buy, process and commercialize the lint;
- ✓ There is a research center focused on cotton crop (CIMSAN , acronym in Portuguese);
- ✓ There is an overseeing institute (IAOM, acronym in Portuguese) and research center;
- ✓ There is a cotton technology transfer center (Guro) that can incorporate oilseeds.

Weaknesses

- ✓ Low productivity in relation to the production potential;
- ✓ Poor use of inputs, technology, and mechanization without irrigation;
- ✓ Volatility in terms of adherence due to the wear it causes on the soils, the hard work required for growing and harvesting;
- ✓ In the international market, cotton is not sold directly to the destination countries but to international traders, affecting the concession holders' profit margins;
- ✓ Low level of investment (low processing of the cotton seed and the cotton lint);
- ✓ Cotton ginning plants operate at less than 40% of installed capacity, due to lack of raw material.

Potentials

- ✓ Opportunities of increasing the value of the cotton seed, for the edible oil market and for animal feed (ruminants);
- ✓ Opportunity to use the cotton fibril for producing hospital cotton;
- ✓ Stable legal framework - cotton concession system, with the IAOM even launching international tenders to attract new investors to the potential areas already mapped out but not yet exploited;
- ✓ Potential for significant expansion of the cotton sector.

Threats

- ✓ Climate change;
- ✓ Socio-political instability (Cabo Delgado);
- ✓ Domestic oil price volatility caused by unregulated palm oil imports;
- ✓ International price volatility.

19. Rural extension policies and technical assistance to farmers

According to the national policy of integrating family farming into productive value chains, SUSTENTA, a rural extension model is adopted, based on the rural development agent, that privileges demonstrative technique and transfers multidisciplinary knowledge to the beneficiaries, while providing a wide range of services with emphasis on:

i. Ensuring the implementation of technology charters;

ii. Demonstrations of methods and results in productive fields;

iii. Follow-up on the production process;

iv. Implementation of good agricultural practices and restoration of degraded areas;

v. Marketing support;

vi. Nutritional education for families.

SUSTENTA extension workers are hired on a temporary basis with the commitment to becoming an INTEGRATING entrepreneurs (Emerging Small Commercial Farmer - PACE, acronym in Portuguese) as soon as they achieve the goals in the first two years for the productive block under their responsibility. The State guarantees land (area up to 50ha) and financing for this purpose.

In total, there are about 2,000 extension agents, of which 500 are employed by NGOs or the private sector. These agents barely cover 600,000 farming families, and since more than 70% of the population is engaged in agricultural activities, extension coverage is extremely low.

In the cotton sector specifically, the responsibility of extension has been outsourced by IAM to the ginning companies. Since ginning companies are obliged to collect the cotton produced from the farmers in their concession, they are also obliged, under the terms of their contracts, to provide extension services to the farmers. The extension of the ginning companies is headed by the Production Manager, who is supported by supervisors and then extension helpers. The extension capacity of the ginning company is weak and inadequate to cover all the farmers in their areas. Ginning companies usually work with extension helpers, who are temporary employees hired to support production and logistics activities.

The extension network of ginning companies is extremely weak, both in terms of technical capacity and coverage, with one extension agent covering about 700-1,000 farmers in most cases. The main issues in extension include: (i) lack of investment in extension given the risk due to international price fluctuations; (ii) returns on extension investments are low due to lack of quality seed, (iii) technical capacity of extension staff is weak and many Production Managers lack cotton agronomy knowledge; and (iv) use of extension staff as registration manager and cotton buying agents by ginning companies.

Kenya

1. Public policies to promote cotton farming

2. Geographical area characteristics/ number of cotton farmers/annual cotton production/productivity per hectare/cotton fiber and cottonseed production

3. Research institutions in the cotton sector

a. KALRO Kibos in the Western side of the Rift Valley;

b. KALRO Mwea in the Eastern side of the Rift Valley.

4. Main areas of research

a. Variety improvement;

b. Production practices (agronomy);

c. Crop protection;

d. Socio economic issues in cotton production;

e. Soil and water management;

f. Germplasm maintenance.

5. Number of researchers

a. One in Kibos and 2 in Mwea giving a total of 3.

6. Ongoing international partnerships

a. One, Cotton Victoria.

7. Main players in the cotton sector

a. Ministry of Agriculture (National and county government levels);

b. Kenya Agricultural and Livestock Research Organization (KALRO);

c. Agriculture and Food Authority, Fibre Crops Directorate;

d. Ginners (Salawa, Kitui, Meru and Makueni);

e. Millers (Rivatex East Africa Limited);

f. Farmers;

g. Input providers;

h. Transporters.

8. Description of marketing systems

a. The market is regulated as follows, 'A person who intends to buy, sell, dispose, fiber and fiber products across the Counties and export or import fiber and fiber products shall apply for fiber marketing agent license from Fiber Crops Directorate. On the other hand cotton farmers sell to the license holders (ginneries or their intermediaries) as groups or individuals. The minimum seed cotton price is fixed by the government and this is reviewed from time to time. Farmers sell seedcotton. Farmers carry their produce to collection centers which are usually the physical office of the Society At the centres, officials collect and weigh the product and keep it

until the buyer comes for it. Farmers are paid through *m-pesa*. The society takes some money from the sales to cover for its operating expenses. Non society farmers can also bring their product but the society takes a little more from them.

9. Public-private partnerships to produce cotton by-products

a. There is no public- private partnerships to produce cotton by- products. However private individuals/ companies produce cotton seed cake (animal feed).

10. Existing cotton farmers associations

a. Cotton societies at ward or cluster of villages level;

b. Cotton Union at county level;

c. Kenya Farmers' Association at national level.

11. Number of ginneries

a. Four (Salawa, Kitui, Meru and Makueni)

12. Number of oil mills

a. Many (Unilever, Bidco, Ufuta, Bahari, Elianto etc), but none processing cotton seed oil.

13. Situation of agricultural mechanization

a. Only during land preparation do very few farmers (0.1%) use tractor while the majority use oxen plow, and a few others use hand hoes. The rest of the operations, planting, weeding, pesticide application, harvesting and sorting are all done manually.

14. Socioeconomic aspects of the cotton sector

a. Most cotton farmers are resource poor and cannot afford inputs such as fertilizers and insecticides, or to weed the number of times as required. This scenario leads to low yields and reduced quality, further perpetuating poverty among cotton farmers. Credit facilities are accessible to many of these farmers. Farm ownership is by men and family labor do most field operations. The education level of most farmers is low.

15. Farmers´ organizations

a. The organizations are registered at the cooperatives department. They have elected officials. A cluster of villages belong to a society and a cluster of societies form a union. There is one union per county. Most farmer organizations are not well managed so they don't attract the majority of farmers who remain nonmembers.

16. Cotton companies

One, (Rivatex East Africa Limited).

17. International cooperation programs

Cotton Victoria which financed by the Brazilian Cooperation Agency.

18. Strengths, weaknesses, potentials and threats faced by the sector

a. The climate is favourable, the land is available and the human resource is there to provide labor.

b. There is no formal seed system and farmers use recycled seed. The prices are low and farmers lack bargaining power to increase prices beyond the minimum. There are no funds allocated to research and development. The flooding of the Kenya fabrics and textiles market with second hand clothes from the West depressed growth in the cotton sub-sector. There are no credit facilities and the insect pest problem is alarming. The cost of production is high for many farmers.

c. The potential is huge in terms of productivity (tons) and acreage (hectares). During the good days of cotton in Kenya, there were 24 ginneries and now there are 4 (after structural adjustment of the 1990s). The ginneries and the collapsed mills can be revived.

19. Policies on rural extension and technical assistance to farmers

a. Extension is devolved to the counties while the national government is providing policy guidelines and regulation. However with the structural adjustments of the 1990s, the government put on hold employment. With very little or no new employment in some cadres, the staff-farmer ratio is abnormal and some wards have no officers.

Senegal

1. Public policies implemented to strengthen cotton farming

The purpose of the current strategic plan was to increase cotton production to 40,000tons from 2016 and to 60,000 tons by 2020 with an average agronomic yield per hectare of 1,150 ton; and also to enhance the quality of thefiber to promote its value on the extremely competitive international market.

Although the strategic plan was put into practice, it revealed difficult to attain the goals set due to the persisting crisis and challenges faced by all main players in the cotton sector: SODEFITEX - the National Federation of Cotton Farmers of Senegal (FNPC, acronym in French), and the Government of Senegal must therefore pool their efforts and create some synergy in their actions to vigorously and sustainably revive and boost the cotton sector.

The National Federation of Cotton Farmers, SODEFITEX (acronym in French) and the research sector have made an uncompromising diagnosis of the situation of the cotton sector in Senegal and put forward effective strategies to reverse the downward trend once and for all in the use of increasingly smaller areas, yields and production, and thereby place the cotton sector in a dynamic of revival and continuous improvement of results.

2. Geographic characteristics of cultivated areas/ the number of farmers involved in the sector/ cotton production figures/ productivity per hectare/ lint production and seed cotton production/ among others

The underperformance of the cotton sector in Senegal has revealed alarming over the last seven (7) seasons, from 2012 to 2018, the seed cotton production having fallen from 32,250 tons to 15,121 tons that is a 53% drop. The number of cotton growers has dropped from 41,084 to 25,510 that is a 38% decrease. With some of the farmers giving up on cotton farming, the areas sown with cotton have been reduced by 35%, going from 33,694 ha to 21,735 ha. Agronomic yields, the main determinant factor of farmers' income, have collapsed, going from 957 kg/ha to 696 kg/ha.

3. Research institutions involved in the sector

Institut Sénégalais de Recherches Agricoles (ISRA) - The Senegalese Agricultural Research Institute.

4. Main areas of eesearch

Improving seed cotton yield and production.

5. Number of researchers involved

02 researchers involved at ISRA.

6. International Partnerships in the field of research

- ✓ Brazilian Cooperation (ABC, acronym in Portuguese);
- ✓ Turkish cooperation;
- ✓ Chinese cooperation.

7. Main players in the cotton sector

- ✓ FNPC - The National Federation of Cotton Producers of Senegal;

- ✓ SODEFITEX - The Textile Fiber Development Company;
- ✓ ISRA - The Senegalese Agricultural Research Institute;
- ✓ DRDR - The Regional Directorate for Rural Development;
- ✓ ANCAR - The National Agricultural and Rural Advisory Agency.

8. Detailed description of the marketing system

SODEFITEX purchases the greatest share of the cotton production sold by producers.

9. Public-private partnerships in the production of cotton by-products

- ✓ Stockbreeders;
- ✓ Economic interest groups of processing units (GIEs in French);
- ✓ Carriers;
- ✓ Consumers.

10. Farmers' organization

As the first and main strategic partners of SODEFITEX, cotton farmers associated into a national federation in 1998. The National Federation of Cotton Farmers (FNPC, acronym in French), a member of the National Council for Rural Dialogue and Cooperation (CNCR, acronym in French), was created in June 1998 closing a long negotiation process which had started with the "1989-90 Cotton Strike".

It was set up following a democratic election by secret ballot of the various officials of its bodies: the Sector Unions of the Cotton Farmers' Groups (US-GPC , acronym in French), as well as the Regional Unions of GPCs and the National Federation of GPCs. The National Federation is divided into 13 sector unions which include nearly 1,783 Cotton Farmers' Groups (GPCs).

Its purpose is to strengthen farmers' skills and capacity to improve their production and defend their interests. Its groups have the status of a GIE (Economic Interest Grouping) bringing together only cotton producers.

Since 2002, it has been directly in charge of financing the cotton production season (with credits for agricultural inputs and equipment). For this purpose, it negotiates the annual amount of nearly four billion CFA francs to fund the seasonal loans and agricultural equipment directly with the Agricultural Bank of Senegal (LBA). The LBA acts as an observer on the Board of Directors of SODEFITEX. The National Federation of Cotton Farmers of Senegal (FNPC) appointed a rural development executive as its Executive Director. The FNPC is managed by a Board of Directors of 15 members, one of whom is a woman who was invited to join in as a member of the Board. This female board member has already been re-elected twice, democratically by secret ballot, to renew her mandate in 2003 and in 2012. This tradition of choosing leaders democratically is actually a distinctive aspect of the FNPC. This allows it to have legitimate leaders from the village level to the Executive Bureau of the Board of Directors by a secret ballot vote.

The 15 Union Chairpersons constitute the National Board of Directors (BD), which elects the BD members who will be part of the National Executive Board made up of the National Chairperson and the Chairpersons of the Committees.

Three representatives of the FNPC take part in the work conducted by the Management Committee of the Support Fund, which brings the players of the cotton sector into inter-professional groups to ensure the payment of a price floor that guarantees minimum earnings for the farmers up to their endowment in the event of low cotton prices and a distribution of rebates in the event of positive results from the sector.

11. Farmers' Associations

FNPC.

12. Number of ginneries

02 factories (01 in Tambacounda and 01 in Vélingara).

13. Number of cottonseed oil mills

None.

14. Situation of agricultural mechanization

Small family farms, which ensure the entire cotton production, are notoriously under-equipped; this limits their capacity to put the cotton season plan into practice when the rainy season fails to arrive on time or when continuous daily rainfalls along with a low density of cotton plants make it difficult for them to stop weed from covering in plots.

15. Socioeconomic aspects of the cotton sector

As the company name *Société de Développement et des Fibres Textiles* says: SODEFITEX is responsible for the development of the cotton agro-industry in Senegal. Given the strong requirements of cotton crops in terms of maintenance and inputs, the company has adopted a value-chain approach, which entails a strong organization of cotton farming, upstream and downstream. This organization is based on overseeing cotton growers in structuring activities, research and development, as well as the production of certified seeds, the supply of inputs and agricultural equipment purchased on credit, farming and trading advice, literacy and training, seed-cotton picking, as well as its processing and the marketing of its by-products. These activities aim to set the right conditions for farmers to grow cotton by providing them with the material means and endowing them with technical and organizational skills to guarantee their true interest through an easy and sustainable access to agricultural credit loans. SODEFITEX aims to continuously improve the yield and competitiveness of Senegalese cotton, as well as the farmers' income.

16. Cotton companies

SODEFITEX.

17. International cooperation programmes and projects

- ✓ Brazilian Cooperation (ABC, acronym in Portuguese);
- ✓ Turkish Cooperation;
- ✓ Chinese Cooperation.

18. Strengths and weaknesses, as well as the threats faced by the cotton sector in Senegal

We decided to point out the weaknesses above all, as these are the most crucial aspects to be dealt with in our view:

- ✓ Difficulty in changing the cotton growers' mindset and their socio-economic rationale: the strenuous farming tasks are becoming more and more unacceptable;
- ✓ Insufficient resources to ensure a proper community life within the GPCs and Unions;
- ✓ Labor shortage for the harvest, which has a negative impact on the quality of crops, causing to increase the size of plots within the farms;
- ✓ Agricultural input and equipment trafficking;
- ✓ Insufficient inputs for other crops and difficult access to inputs;
- ✓ Lack of a well-structured and functional interprofessional association;
- ✓ Difficulties in managing/ aligning agricultural inputs with the lines of credit;
- ✓ Strong land pressure along with a difficult access to land.

19. Policies on technical assistance and rural extension

Noticeable drop in the number of technical/ sales advisers, which have fallen from 111 in 2011-2012 to 71 in 2019-2020; added to this is the recruitment in 2017 in the civil service of 33 supervisory staff from SODEFITEX. These departures have strongly affected the agricultural advisory extension service system.

Tanzania

Public policies to promote cotton farming

The followings are policies in force in Tanzania for promoting cotton farming.

a. National Five-Year Development (FYDP II) (2016/17-2020/21)

The theme of FYDP II "Nurturing Industrialization for Economic Transformation and Human Development" incorporates the main focus of the two frameworks, namely growth and transformation (FYDP I) and poverty reduction (MKUKUTA II). FYDP II outlines new interventions to enable Tanzania industrialize in a way that will transform its economy and its society.

It also incorporates unfinished interventions from the predecessor Plan and Strategy, respectively, deemed critical for realization of the aspirations of FYDP II. More importantly, and in tandem with the two predecessor frameworks, FYDP II also implements aspects of Tanzania's Development Vision (TDV) 2025 which aspires to have Tanzania transformed into a middle income and semi industrialized nation by 2025, characterized by the year 2025:

a) High quality and sustainable livelihoods;

b) Peace, stability and unity;

c) Good governance and the rule of law;

d) Educated and learning society;

e) Strong and competitive economy.

b. The Tanzania Development Vision (Vision 2025)

The vision aims at improving crop production and productivity levels; promoting wealth creation for the benefit of all stakeholders; and spearheading increased domestic processing of goods to enhance value addition and manufacturing industrialization.

c. The Agricultural and Livestock Policy and Cooperative Development Policy

Both these policies delineate the roles of various institutions in dealing with crops; as well as in advocating for enhancing stakeholder organizations.

d. The National Strategy for Growth and Reduction of Poverty - NSGRP (MKUKUTA)

This is the Second National Strategy for Growth and Reduction of Poverty (NSGRP II) to be implemented between 2010/11 and 2014/15. It seeks to address constraints to rural growth, improving productivity on the farm and enhancing human capacities and efficiency.

e. The Agricultural Sector Development Strategy and Programme

The Agricultural Sector Development Strategy and Agricultural Sector Development Programme laid down the framework for sustainable agricultural production

by defining obtaining opportunities and advocating for enhanced incrementally key programmes financing.

f. The Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs), also known as the Global Goals, are an inter-governmentally agreed set of targets relating to international development. They will follow on from the Millennium Development Goals and build on the sustainable development agenda that was finalized by member states during the Rio Summit. The SDGs were first formally discussed at the United Nations Conference on Sustainable Development held in Rio de Janeiro in June 2012.

Up to 2015, the development agenda was centered on the Millennium Development Goals (MDGs), which were officially established following the Millennium Summit of the United Nations in 2000. The MDGs encapsulated eight globally agreed goals in the areas of poverty alleviation, education, gender equality and empowerment of women, child and maternal health, environmental sustainability, reducing HIV/AIDS and communicable diseases, and building a global partnership for development.

The MDGs were supposed to be achieved by 2015, so a further process was needed to agree and develop development goals from 2015-2030. Discussion on the post-2015 framework for international development began well in advance. Formal debate concerning the SDGs first occurred at the 2012 United Nations conference in Rio de Janeiro. The 192 UN member states agreed at the Rio summit to start a process of designing sustainable development goals, which are "action-oriented, concise and easy to communicate, limited in number, aspiration, global in nature and universally applicable to all countries while taking into account different national realities, capacities and levels of development and respecting national policies and priorities".

This included the following goals:

1. End poverty in all its forms everywhere;
2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture;
3. Ensure healthy lives and promote well-being for all at all ages;
4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;
5. Achieve gender equality and empower all women and girls;
6. Ensure availability and sustainable management of water and sanitation for all;
7. Ensure access to affordable, reliable, sustainable and modern energy for all;
8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

10. Reduce inequality within and among countries;

11. Make cities and human settlements inclusive, safe, resilient and sustainable;

12. Ensure sustainable consumption and production patterns;

13. Take urgent action to combat climate change and its impacts;

14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development;

15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;

16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;

17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Sustainable Development measures were incorporated into TCB strategies, particularly the 5-year plan 2016/17-2019/20. The 5-year plan for cotton sector development mainly aims to arrange key issues in improving production and quality as well as improving capacity of the sector in effecting national development agenda.

Geographical area characteristics/ number of cotton farmers/annual cotton production/productivity per hectare/cotton lint and cottonseed production

Cotton is grown by 350,000 – 500,000 mostly smallholder farmers located in 46 districts from 15 regions. The number of farmers varies depending on weather conditions and cotton market price trends. Droughts and downward shifts in cotton prices in the international market place compel some of the farmers to switch to alternative crops; adversely affecting production volumes of both seed and lint cotton.

Cotton yields are still very low from 500 to 700 kg/ha of seed cotton which is equivalent to about 260 kg/ha of lint.

1. Research institutions in the cotton sector

There are two Cotton research institution in the country. These are TARI- Ilonga and TARI- Ukiriguru.These research stations are continuing with the overall objectives of increasing the productivity and profitability of cotton farming through the development of new varieties, seed multiplication , the release of appropriate production technologies such as new cotton spacing and new different doses of mineral fertilizer and application rate of pesticides.

2. Main areas of research

Main areas of research include; seed multiplication, evaluation of new candidates, research on new cotton spacing and new different doses of mineral fertilizer and application rates of pesticides.

3. Ongoing international partnerships

Tanzania is a member of African Cotton association

4. Main players in the cotton chain

Main players in the cotton chain include:

a. Farmers

Cotton is grown by 350,000 – 500,000 mostly smallholder farmers located in 46 districts from 15 regions. The number of farmers varies depending on weather conditions and cotton market price trends. Droughts and downward shifts in cotton prices in the international market place compel some of the farmers to switch to alternative crops; adversely affecting production volumes of both seed and lint cotton.

b. Cotton research institutes

Currently, there are two institutes which directly deal with cotton research - the Lake Zone Agricultural Research Development Institute (LZARDI); and the Ilonga Agricultural Research Institute (IARI). Both are government owned. LZARDI is in WCGA; while IARI is in ECGA.

These institutes are constrained by limited funding for research and training; poor research infrastructure and other facilities; a staff ageing problem which is accentuated by difficulties in recruitment and retention of researchers due to poor remuneration and inadequate incentive packages.

c. Cooperatives

Currently, there are four area-based cooperatives with multifaceted problems which make them unable to compete effectively in the liberalized seed cotton procurement, processing and marketing of cotton. Their market share which was 100% before liberalization in the early 1990's progressively dwindled and currently accounts for less than 3.0% of the market share for seed cotton.

d. Cotton oil millers

Most ginners have oil mills as important integral components of their cotton business operations. Currently 12 ginners have installed oil mills at their business premises, capable of processing 16,121MT of cotton oil; representing only 14% of installed capacity which stands at 115,150MT p.a. These oil mills also produce around 52,000MT, of cotton seed annually.

e. Textile, Garments, Manufacturers Association of Tanzania

(TEGAMAT)

This Association was formulated in 2015 and is comprised of Cotton Spinners, Weavers, Knitters and Textile Millers. Tanzania has 20 mills both old and new which are privately owned; annually producing 110m sqm of fabrics exclusively *khanga* and *vitenge*; dyed drill; linen and bed sheets. They utilize only about 20% of domestic lint, preferring to import the rest due to unfavorable prices and unacceptable quality levels of local fibers. They operate at 40-50% of installed capacity; and employ around 18,000 workers.

f. The Government

The cotton sub-sector is under the Ministry of Agriculture Food Security and Cooperatives. This is the parent body that has the ultimate responsibility of ensuring the cotton sub-sector is a success and contributes well to the nation's GDP. The Government provides minimum subsidies for procuring cotton inputs and for funding the promotional and regulatory functions of TCB.

Other ministries that contribute to the cotton sub sector through cross-cutting issues include the Vice President's Office, the Prime Ministers' Office, Ministry of Finance, Ministry of Works, the Ministry of Lands and Human Settlements, the President's Office Planning Commission, the Ministry of Industries and Trade and the Ministry of Internal Affairs. Others include Local Government Authorities (LGA's) which play a key role in the implementation stage at the district level.

g. Government institutions

There are a number of Government institutions in the agricultural sector, which play a critical public role in various sectors, including the cotton sub-sector, which include the Tanzania Official Seed Certification Institute (TOSCI), Tropical Pesticides Research Institute (TPRI), the National Environment Management Council (NEMC), Tanzania Bureau of Standards (TBS), Agricultural Seed Agency (ASA), Weigh and Measures Agency (WMA), Tanzania Revenue Authority (TRA) Tanzania Police Force and the Judiciary.

h. Development partners

The development partners include bilateral and multilateral organizations and agencies that support Government and community in the agricultural sector in general and the cotton sub-sector in particular, through grants and soft loans. These development partners such as TGT/GCF; EU, International Trade Centre (ITC), DFID and FAO also provide technical support in the implementation of agreed programs.

i. Tanzania Cotton Association (TCA)

The TCA is an apex association for ginners that was established in 1997. The association was established with a wider aim of protecting ginners' interests while participating actively in the cotton sector development alongside other key players like TCB and the government. However in practice it has remained largely an association of ginners, traders and exporters. The TCA has more influence when it comes to crucial cotton issues like setting prices and governance of the whole subsector.

5. Description of marketing systems

Out of the four products that can be produced from seed cotton (lint, seed, cake and oil), Tanzania is a net exporter of all four products, i.e., lint, seed, seed oil, and seedcake, but also imports some cotton seed. Lint is mostly exported, amounting to about 56% - 68%. As far as cotton seed cake is concerned, and again the main destination for the product is an export market, with the share of exports to production increasing from 34% in 1996-2007 to 56% in 2008-2019. The available data show that most of these exports go to Kenya, Uganda and South Africa. Seed and oil are much less directed to international trade.

6. Public-private partnerships to produce cotton by-products

Although cotton is primarily grown for lint, several cotton by-products can be derived to increase value added in the sector and benefit players such as farmers, ginners, oil millers and other downstream players. Cotton by-products include: cottonseed oil used for human consumption and soap manufacturing; cottonseed cake used for animal feed; and waste used for industrial applications, such as polishing clothes and wipers. In addition, cotton stalks can be used in the production of: pellets and briquettes for heating; mushrooms; compost; manure; particle board; pulp, paper and corrugated boxes.

7. Existing cotton farmers associations

Currently, there are four area-based cooperatives with multifaceted problems which make them unable to compete effectively in the liberalized seed cotton procurement, processing and marketing of cotton. Their market share which was 100% before liberalization in the early 1990's progressively dwindled and currently accounts for less than 3.0% of the market share for seed cotton.

8. Number of ginning plants

There are 48 ginneries but currently only 25 ginning plants are working.

9. Number of oil industries

Most ginners have oil mills as important integral components of their cotton business operations. Currently 12 ginners have installed oil mills at their business premises, capable of processing 16,121MT of cotton oil; representing only 14% of installed capacity which stands at 115,150MT p.a. These oil mills also produce around 52,000MT, of cotton seed annually.

Almost half of the 79 registered ginners in Tanzania, remained inactive due to various reasons; such as shortage of seed cotton, high processing costs due to low ginning capacity utilization and technological obsolescence. Another challenge that constrained the development of cotton by-products, in particular cottonseed oil, is competition from cheaper imported palm oils and other edible oils produced locally (e.g. sunflower). Other challenges to the development of the cotton by-products sector included lack of linkages between sectors and likely disincentives to invest in the sector.

10. Situation of agricultural mechanization

Farm machinery, implements and equipment are important tools for increasing area under production. Despite its importance, the utilization of farm machinery and implements in the country is very low with about 64% of farmers using the hand hoe, 24% draft animal power and 12% tractors.

Tanzania has seen a slow but steady growth in agricultural mechanization over the past few decades. The country's mechanization growth trend is fairly consistent with patterns elsewhere, with both agroecological and socioeconomic conditions as key determinants of increased mechanization. The private sector has often led the development of machinery markets and service providers to meet mechanization demand, including emerging medium- to large-scale farmers serving as self-financed owners of tractors providing custom hiring services. Despite such progress, several knowledge gaps exist regarding the

roles of various factors in mechanization, including land tenure policy, and regarding identification of the roles of governments in effectively supporting the private sector toward further mechanization growth.

Socioeconomic aspects of the cotton sector

Cotton has been grown in Tanzania for more than 100 years. It is one of the major traditional cash crops; others being coffee, tea, tobacco, cashew nuts, and sisal. Cotton directly and indirectly contributes to the livelihood of about 40% of the population. Cotton links African countries to the international market representing major source of income and employment, offering economic opportunities to more than 500,000 rural households. The highest production of 697,390 standard bales and export of 544,227 bales was achieved in 2005-2006 marketing season contributing US$ 116,102,918.45 in foreign earnings, compared to US$ 89.7m (tobacco), US$ 88.6m (coffee), US$ 42.2m (cashew nuts) and US$ 32.m (tea). The lowest production of only 225,926 bales was recorded in 2016-2017. From 2007/2008 season, production started to increase again and in 2008/2009, over 682,772 standard bales were obtained. Domestically, cotton production averages 460,000 bales per annum, equivalent to 126,000 MT of cotton lint. All cotton is ginned within the country, and (of which previously) approximately 70% was exported as raw cotton and the rest was consumed locally.

The potential of cotton sector to contribute further to socio- economic development is limited by:

- ✓ Low productivity per unit area where the national average yields stand at 750 kg/ha of seed cotton which is far below the world average of 2000 kg/ha;
- ✓ Lack of sustainable scheme of input supplies that is both reliable and affordable to majority farmers;
- ✓ Deteriorating cotton quality;
- ✓ Over-dependence on weather condition. Cotton production is 100% rain fed agriculture;
- ✓ Limited Research and Extension services;
- ✓ Poor infrastructure, particularly feeder roads and limited storage facilities for both seed cotton and lint bales;
- ✓ Limited value addition; and
- ✓ Limited resources for promotion and development.

The envisaged TCB Corporate Strategic Plan seeks to put in place a road map through which every stakeholder (i.e., Cotton Farmers, Cotton Ginners, Research Institutes, Local Government Authorities, Agrochemical companies, Textile mills, Donor Community, Financial Institutions, Collateral companies and others) will play a big role in bringing about increased production, productivity and profitability. Such a unified approach is of vital importance in elucidating a multitude of impediments currently preventing the industry from achieving its objectives.

Cotton companies

The number of cotton companies have been fluctuating from season to season, for 2020-2021 we had 22 cotton company.

International cooperation programs

- ✓ Regional project to to strengthen the cotton sector in the basin of the Lake Victoria (Tanzania, Kenya and Burundi);
- ✓ The *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ, acronym in German) GmbH is supporting organic cotton farming in Tanzania. To this end, they are working with the Swiss development organization Helvetas on behalf of the C&A Foundation. The commission is being carried out by GIZ's International Services business area. The aim is to boost organic cotton production and give the farmers in Tanzania access to the global market;
- ✓ Gatsby Africa's Cotton Sector Development Programme (CSDP) is an important effort to turn this situation around by addressing the principal causes of low productivity in cotton growing and ginning (production of cotton lint) in the Lake Zone in Tanzania.

Strengths, weaknesses, potentials and threats faced by the sector

Strengths

- ✓ It has organized staff, with the required qualifications and skills; knowledgeable and experience in the cotton sector;
- ✓ TCB is the only institution charged with regulating, promoting, developing, facilitating, and monitoring the cotton sector;
- ✓ TCB has developed experience in implementing CSP I & II;
- ✓ TCB is creative and innovative in developing the cotton sector e.g., development of the Cotton Act, creation of the Cotton Development Trust Fund;
- ✓ TCB has established a permanent stakeholder forum for better articulation of cotton sector interests;
- ✓ Significant TCB asset portfolio;
- ✓ Good networks, relationships and partnership e.g. LAGs.

Weaknesses

- ✓ Understaffed in the following areas:

a. Monitoring cotton quality levels;

b. Monitoring and regulating the liberalized cotton sub-sector ;

- ✓ Limited internal capacities – skills gap;
- ✓ Limited staff retention;

a. Training and retraining;

b. Remuneration;

- ✓ Inadequate funding;
- ✓ Inability to access potential external resources for development and trade - related activities;
- ✓ Constrained staffing level inhibits training and retraining workforce and proper succession planning;
- ✓ Lack of performance monitoring and evaluation system
- ✓ Informal cross-border trade.

Opportunities

- The cotton sub-sector has a unique primary producer - the farmers - who are dedicated and hardworking;
- Perpetual demand for cotton fabrics and textiles due to rising populations and increasing incomes everywhere; and changing consumer patterns in preference for cotton fabrics;
- Government policies recognize the potential multiplier effects of cotton in employment creation and income generation throughout the value chain - primary production; procurement and marketing; ginning; spinning, weaving, knitting and textile milling; exporting; and retailing;
- Good sector policies, attractive to development partners;
- Existence of large tracts of fertile soils; numerous and large permanent water bodies suitable for increased acreage and irrigation cotton farming;
- Currently, more than 90% of income generated on cotton and attendant jobs are earned and created abroad as 80% of cotton is exported in lint form. Opportunities exit to retain up to 60% - 100% of such incomes and related jobs if the lint is spun, weaved and processed into textiles and apparel locally;
- Compared with CFA, Tanzanian cotton fairs better - ginning costs are much lower; GOT is higher; transportation and freight rates are lower due to proximity to the largest cotton consuming countries of the Far East and the Indian sub-continent; and it is available to the markets much earlier- between July and September

Challenges/Threats

- Persistent droughts and unpredictable weather;
- Numerous small - scale farmers with limited access to modern agronomic practices and knowledge in application of new and improved technologies on the farm;
- Poor infrastructure for inputs distribution and crop procurement;
- Food insecurity in cotton growing areas;
- Inadequate research and extension;
- Rampant seed cotton and lint contamination reduce the quality of lint, and lower prices and competitiveness of the crop;
- Unstable output volumes and yields of the crop;
- Perpetual exports of raw cotton;
- The emergence of alternative cash crops, which are cheaper to grow but fetch higher incomes than cotton in the major cotton growing districts;
- Expanding acreage, increasing yields and falling production costs in major producing and consuming countries reduce prices and markets for Tanzania cotton;
- High commodity taxes and utility tariffs impinge on the operations of the cotton sector;

- ✓ Production and export subsidies in developed cotton producing countries lead to overproduction, unfair competition and lower cotton prices;
- ✓ Competition from synthetic material reduces the market share for cotton;
- ✓ A historical tendency for cotton prices to decline leads to further reduced prices;
- ✓ Incoherent stakeholders to defend interests of cotton in a unified way;
- ✓ Conflict of interest and political interference in regulatory and monitoring role of TCB;
- ✓ Limited funding for cotton development activities;
- ✓ Inadequate incentive and remunerative packages for employees.

Policies on rural extension and technical assistance to farmers

a. Policies for rural extension

Extension services are crucial in supporting poverty reduction in rural areas and market competitiveness for commercial agriculture in the domestic and global markets. It enables producers to realize increased production and productivity through accessibility to information for marketing and other support services essential for agricultural development. The transformation of agricultural extension services is important in order to impart the right tools, knowledge and skills as well as ensuring farmers´ adherence to Good Agricultural Practices.

However extension service is limited by i) lack of strong research-extension-farmers linkage ii) weak supervision and insufficient manning levels; iii) low participation of private sector in extension services delivery; iv) lack of service delivery performance standard and regulations; v) poor living and working conditions; and vi) insufficient knowledge regarding technological advancements and weak coordination of agricultural extension services.

Policy Statements includes i) extension services shall be transformed to ensure provision of quality services with increased private sector participation; ii) farmers' education and publicity shall be strengthened for effective linkage and dissemination of technologies and information; iii) participatory approaches and gender aspects shall be promoted in the provision of extension services using an integrated single delivery system approach; iv) specific commodity extension services shall be promoted and strengthened; and v) the government shall ensure adherence to performance standards, regulations, supervision and accountability.

Togo

1. Public policies that have been implemented to strengthen cotton cultivation

Cotton is Togo's leading cash crop. As such, the cotton sector contributes significantly to total export revenues (between 1% and 4.3% of GDP, depending on the year) and makes Togo one of the main producers of lint and seeds in Africa.

However, due to a series of issues and a governance problem at the *Société Togolaise du Coton* (Togolese Cotton Society) (SOTOCO, acronym in French) between 2000 and 2005, the sector dove into a deep crisis. This led to its decline, making seed cotton production drop from 174,000 tons in 2004-2005 to 27,900 tons in 2009-2010, besides the dissolution of SOTOCO and the creation of the NSCT on March 29, 2009.

To turn this situation around, the government has taken robust measures to help restore confidence among farmers, particularly through the participation of farmers in NSCT capital (40%) and their involvement in all decision-making bodies.

To continue to strengthen activities in the cottonsector so it remains sustainable when faced with endogenic and exogenic shocks, it has become essential to reflect on the vision to be imparted to the sector, and avoid slipping back into the previous situation, like other countries in the sub-region have done. Thus, the government decided to open the capital of the OLAM Group to inject funds into the industry and modernize equipment. Consequently, the OLAM Group became the majority shareholder in NSCT capital, holding 51%.

The mission of the Togolese cotton sector is to contribute substantially and sustainably to the improvement of cotton farmers' incomes and living conditions in rural areas and to support the national economy.

Based on this vision and its mission, the overall goal of the cotton sector is to develop and improve the cultivation of cotton, in accordance with principles of good governance, to benefit rural communities and the national economy. More specifically, it aims to: (i) strengthen and implement the principles of good corporate governance; (ii) produce at least 200,000 tons of 95% first quality seed cotton, with an average yield of 1600 kg/ha; and (iii) add value to the ginning by-products (seed cotton).

In order to achieve the abovementioned goals, the government has determined five main work pillars:

Pillar 1: Strengthening governance and the institutional framework

The goal is to foster the sustainable development of the sector as a whole and fair sharing of wealth between its many stakeholders. The strategy for the cotton sector in Togo should focuses on, among other things (i) professionalization and loyalty of farmers and their organizations; (ii) a close and individual monitoring of farmers; (iii) management of seed cotton pricing mechanisms; (iv) operationalization of analytical accounting at the NSCT; (v) a communication system among stakeholders.

To this end, the substantial efforts that will be employed shall focus on the following actions: supply and distribution of inputs, monitoring

support, cotton research, agricultural mechanization, and land tenure security.

Pillar 3: Development of infrastructures and equipment

Investment in the cotton sector should focus on (i) rehabilitation and strengthening of the civil engineering equipment pool; (ii) the modernization of the current industrial equipment in factories; (iii) the rehabilitation and strengthening of the cotton-seed transport vehicles fleet; (iv) strengthening the capabilities of maintenance workshops; (v) strengthening the technical staff and their operational capacity; (vi) reinforcement of storage capacities and the improvement of the working environment; and (vii) the management of the Risks related to various activities that are part of the cotton sector.

Pillar 4: Added value and marketing

This Pillar will develop guidelines aimed at guaranteeing better marketing of seed cotton, cotton lint and seeds and promoting local processing. This involves: (i) support for the improvement of seed cotton quality; (ii) development and marketing of seed cotton, (iii) development and marketing of lint by including the Togolese cotton sector in the WAEMU and ACA sub-regional programs; and (iv) development and marketing of seed by committing decisively to the sale of cotton seeds by tender to benefit from the best market price.

Pillar 5: Setting up a financing mechanism for the industry

To attain the targeted production of 200,000 tons of seed cotton, the industry needs to raise funds from financial institutions to ensure its purchases and investments. To this end, an innovative financing mechanism to give producers and companies access to appropriate financing, involving national and international financial institutions will be set up and organized within an institutional framework. This mechanism will focus on the mobilization of traditional resources, the creation of a financing line by a pool of financial institutions, the establishment of guarantee funds, the development of an insurance mechanism, and the development of competitive funds.

2. The geographical characteristics of the cultivated areas/number of farmers involved in this industry/ figures related to cotton production/ productivity per hectare/production of lint and seed cotton/among others

The surface planted with cotton has, in general, varied between 100,000 ha and 200,000 ha depending on the year. It occupies between 130,000 and 250,000 producers, whose production has evolved in recent years to between 66,000 tons and 117,166 tons, and yields have oscillated between 600 kg/ha and 800 kg/ha. Lint production fluctuates at between 40% and 42% of seed cotton produced per hectare.

Recently, cotton production dropped by 15% between 2018 and 2020 and by 43% between 2020 and 2021. From 137,000 tons in the 2018-2019 season, it shrank to 116,000 tons in the 2019-2020 season and to 66,000 tons in the 2020-2021 season due to rainfall deficit issues.

3. Research institutions involved in the sector

In Togo, cotton research is carried out by the *Programme National Coton* (National Cotton Program) (PNC, acronym in French) of the *Centre de Recherche Agronomique de la Savane Humide* (Agronomic Research Center of the Humid Savannah)(CRA-SH, acronym in French).

CRASH is one of the four centers of the Togolese Institute of Agricultural Research (ITRA, acronym in French). The main mission of the National Cotton Program is the development of technology for the cotton sector.

4. The main areas of research

The main areas of research carried out at CNP are grouped into three departments:

The Genetic Department is in charge of developing and improving varieties, producing pre-basic seeds, ginning NSCT pre-basic seeds, monitoring seed production plots, training seed producers and determining lint yields during ginning to monitor ginnery performance.

In the Agronomy Department, the cotton research activities concern development and updating of technical production itineraries (sowing date, density and sowing rate, doses and types of minerals and/or organic fertilizers, herbicide recommendations).

In the Entomological Department, the research pillars concern monitoring of pest populations on site and assessing the effectiveness of protection programs, testing the effectiveness of active ingredients, carrying out tests regarding new protection programs against major and emerging pests, assessing the biological effectiveness of new formulas, updating plant health recommendations (updated lists of registered and effective materials), providing support to DAOI and to the analysis of offers of phytosanitary products.

5. Number of researchers involved

Four (04) researchers are involved in all cotton research projects.

6. Ongoing international research partnerships

The current partnerships in research are CIRAD, ABC and PR PICA.

7. The main players in the cotton sector

In Togo, cotton is grown by the *Nouvelle Société Cotonnière du Togo* (New Togolese Cotton Company) (NSCT, acronym in French), which is 24% owned by the *Fédération National des Groupements de Producteurs de Coton* (National Federation of Cotton Producers' Associations) (FNGPC, acronym in French), 25% owned by the Togolese government and 51% owned by the Singaporean company OLAM.

8. Detailed descriptions of marketing systems

In Togo, cotton lint is sold after ginning on the principle of forward sales on world markets according to stock exchange prices surveyed by the NSCT. A marketing unit of the NSCT studies the evolution of world cotton lint prices for lint market placement.

9. Existing public-private partnerships in the production of cotton by-products

The purchase of seed cotton is ensured by the GPCs purchase teams, under the supervision of a NSCT agent. Once loaded, the seed cotton is transported to the ginnery for ginning. The rfiber residues, estimated at 1,000 tons, is also sold as export. A small amount, estimated at 25 tons, is sold to the country's upholstery industries.

The seeds are sold by sub-regional tender and many countries in the sub-region compete to buy them. Only the *Nouvelle Industrie des Oléagineuses du Togo* (New Togolese Oilseed Industry) (NIOTO, acronym in French) processes a small quantity of seeds into oil and cake for animal feed. Nearly 55,000 tons of seeds are sold to oil mills, and 200 tons are often sold to farmers.

10. Farmers´ organization

Cotton farmers are organized at the grassroots level into simplified cooperative societies within cotton farmers groups (GPCs, acronym in French). The GPCs at the municipal level are grouped into the *Union Préfectorale des Producteurs de Coton* (Municipal Cotton Farmers Association) (UP GPC, acronym in French). The UP GPCs are grouped at the regional level in the *Union Régional des Producteurs de Coton* (Regional Cotton Farmers Association) (UR GPC, acronym in French). The association of all UR GPC results in the *Fédération National des Groupements de Producteur de Coton* (National Federation of Cotton Farmers Associations) (FN GPC, acronym in French). The FNGPC-COOP CA has a board of directors and a supervisory board.

11. Farmers' associations that are already in place

In Togo, all cotton farmers are united in a large association called the National Federation of Cotton Producer Associations, which is an umbrella organization for the Simplified Cooperative Societies, which are the cotton farmers groups.

12. Number of ginneries

Five (5) ginneries are installed in Togo, namely in Dapaong, Kara, Blitta, Atakpamé (Talo) and Notsé. These factories are property of the NSCT.

13. Number of cottonseed oil mills

Only one cottonseed oil industry is installed in Lomé, the *Nouvelle Industrie des Oléagineuses du Togo* (New Togolese Oilseed Industry) (NIOTO, acronym in French).

14. Situation of agricultural mechanization

Mechanization is not well developed in Togo. The sector has made efforts to acquire abaout

100 tractors for large producers. The field of agricultural mechanization is largely occupied by private companies that provide services.

15. Socioeconomic aspects of the cotton sector

As the country's primary cash crop, the cotton sector contributes significantly to overall export revenues (between 1% and 4.3% of GDP, depending on the year), and makes Togo one of Africa's leading producers of lint and seed.

In a normal year, the Togolese cotton sector involves more than 250,000 farmers and provides a living for nearly 3,000,000 people.

In Togo, cotton accounts for about 50% of agricultural export revenues, or an average of 50 billion CFA francs per year.

16. Cotton companies

There is only one cotton company in Togo: the *Nouvelle Société Cotonnière du Togo*, whose shareholders are OLAM, the Togolese Government, and the cotton farmers.

17. International cooperation programs and projects

C4 + Togo project with the Brazilian Cooperation Agency.

Programme Régionale de Production Intégrée du Cotonnier en Afrique (Regional Program for Integrated Cotton Production in Africa) (PR-PICA, acronym in French) involving Benin, Burkina Faso, Cote d'Ivoire, Cameroon, Senegal, Mali, and Togo.

18. The strengths and weaknesses of this sector and the threats it faces

The strong features of the cotton sector are its administrative organization and the involvement of farmers in the decision-making process concerning the sector. The achievements of cotton research, particularly in terms of varieties (STAM) whose yields have increased from 500 kg to 3500 kg per hectare with lint yields of around 44% which are very interesting characteristics for the industry. These varieties are also being disseminated in some other countries in the sub-region, such as Senegal, Mali, Chad, and Ghana. Additionally, technical roadmaps have been determined according to the agroecological zones.

The weaker features of the cotton sector are poor soils, resulting in poor yields, besides non-compliance to technical roadmaps and the deviation of insecticides and fertilizers to other crops.

19. Implemented support policies: status of technical assistance and extension

Extension is provided by the NSCT, through Technical-Commercial Extension Agents (ATCs, acronym in French) located in all cotton growing zones. They monitor farmers from the moment of plot tillage up to the marketing of their seed cotton. The ATCs are supervised by the *Chargés de Programme* (Program Officers) (CPs, acronym in French), who are under the authority of the *Directeur Régionaux de Soutien à la Production* (Regional Production Support Directors) (DRSPs, acronym in French). The DRSPs report to the *Directeur de Soutien à la Production* (Production Support Director) (DSP, acronym in French).

Zimbabwe

1. Public policies to promote cotton farming

- ✓ Presidential Free Input Scheme for Cotton: The scheme is managed through the Cotton Company of Zimbabwe (COTTCO), a parastatal that falls under the Ministry of Lands, Agriculture, Fisheries, Water, and Rural Resettlement.

2. Geographical area characteristics/ number of cotton farmers/annual cotton production/productivity per hectare/cotton lint and cottonseed production

- ✓ In Zimbabwe, cotton is mainly grown in the Middle-veld and the Low-veld areas. The Middle-veld and the Low-veld lie between 600 m and 1200 m above sea level. These areas are hotter than the Highveld and are characteristically drier;
- ✓ Cotton is grown by and is a source of income for 200 000 to 350 000 smallholder farmers;
- ✓ Local cotton varieties achieved an average ginning out turn of 42%;
- ✓ The average area (ha) put under cotton from 2015 to 2019 was 164927. The average seed cotton yield for the same period was 85473 metric tons.

3. Research institutions in the cotton sector

- ✓ **Cotton Research Institute (CRI)**: CRI is a public institution run by the Department of Agriculture Research, Innovation and Development through the Ministry of Lands, Agriculture, Fisheries, Water, and Rural Resettlement;
- ✓ **Quton Seed Company (Pvt) Ltd**: Quton is a private company run by India's leading agri biotech company Maharashtra Hybrid Seeds Company (Mahyco).

4. Main areas of research

- ✓ **CRI:** Cotton Variety Development (Breeding), Cotton Agronomy, Cotton Pathology, and Cotton Entomology;
- ✓ **Quton:** Cotton Variety Development (Breeding);
- ✓ **Number of researchers:** 12 (CRI-9, Quton-3;
- ✓ **Ongoing international partnerships:** Brazil-Zimbabwe Integration Project; South-South Technical Cooperation.

5. Main players in the cotton sector

- ✓ Policy;
- ✓ Cotton Farmers;
- ✓ Cotton Research Institutions;

- ✓ Cotton Seed Inspectorate and Certifying Agency;
- ✓ Cotton Sector Regulation;
- ✓ Cotton Seed Producers;
- ✓ Ginners;
- ✓ Textile Industry;
- ✓ Garment manufacturers;
- ✓ Oil Expressors;
- ✓ Stockfeed industry.

6. Description of marketing systems

- ✓ Marketing of seed cotton is contract based;
- ✓ Disposal of lint and ginned seed is free market based.

7. Public-private partnerships to produce cotton by-products

- ✓ Sustainable Cotton for Women and Youth Empowerment in Southern Africa, a jointly implemented project by Zimbabwe Farmer's Union and We Effect of Swedish Cooperative Centre.

8. Existing cotton farmers associations

- ✓ Cotton Marketers Association of Zimbabwe.

9. Number of ginneries

- ✓ 22.

10. Number of oil industries

- ✓ About 8.

11. Situation of agricultural mechanization

- ✓ Animal drawn equipment for small holder farming;
- ✓ Tractors and tractor drawn equipment for large holder farming;
- ✓ Cotton pickers for large holder farming.

12. Socioeconomic aspects of the cotton sector

- ✓ Covid 19 Pandemic;
- ✓ Low productivity;
- ✓ Unfavorable rainfall patterns;
- ✓ Government support reduced cost of production at farmer level.

13. Farmer´organizations

- ✓ Zimbabwe Farmers Union;
- ✓ Zimbabwe Commercial Farmers Union;
- ✓ Zimbabwe National Farmers Union;

14. Cotton companies

- Cotton Company of Zimbabwe;
- Southern Cotton Company;
- Alliance Ginneries;
- Zimbabwe Cotton Consortium;
- ShawashaAgri (Pvt) Ltd.

15. International cooperation programs

- Brazil-Zimbabwe Integration Project; South-South Technical Cooperation;
- International Cotton Advisory Committee membership.

16. Strengths, weaknesses, potentials and threats faced by the sector

- **Strengths:** government input support, large farmer population, conducive agro-ecology, high ginning capacity, strong contract farming tradition, availability of supportive cotton legislation;
- **Potentials:** production can be upped to meet ginning capacity by good agronomy and attractive return on investment;
- **Weaknesses:** unstable private contracting;
- **Threats:** erratic rainfall (drought and floods), New pests, side marketing of produce.

17. Policies on rural extension and technical assistance to farmers

- Public extension service is available country wide. Mobility has been enhanced;
- Private cotton extension service augments public sector extension.


otton

UN
DP

IBA
Brazilian
Cotton
Institute

ABC
BRAZILIAN
COOPERATION
AGENCY
MINISTRY OF FOREIGN AFFAIRS

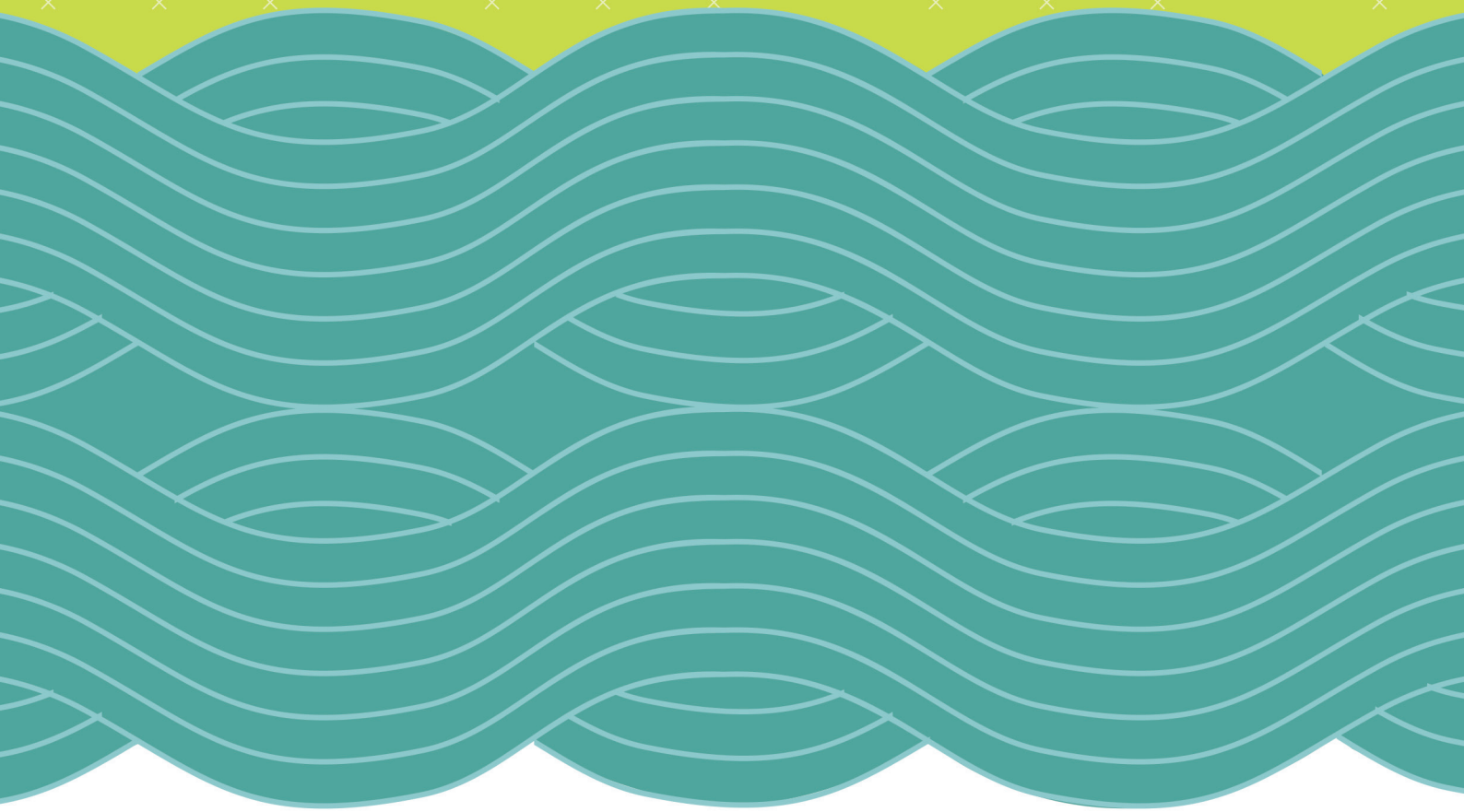
MINISTRY OF
FOREIGN AFFAIRS
FEDERATIVE REPUBLIC OF BRAZIL

Volume 1

An overview of the cotton sector in Africa and Brazil

Volume 2

Cotton varieties grown in Africa and Brazil



Cotton

UNDP

IBA Brazilian Cotton Institute

ABC Brazilian Cooperation Agency
Ministry of Foreign Affairs

Ministry of Foreign Affairs
Federative Republic of Brazil