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The Cotton Supply Chain in Ethiopia

A country-focused commodity analysis
in the context of the Bio-Macht project

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List of Abbreviations

BC	Book & Claim
BCI	Better Cotton Initiative
bn	billion
CmiA	Cotton made in Africa
ECPGEA	Ethiopian Cotton Producers, Ginners and Exporters Association
ELS	Extra Long Staple
ETB	Ethiopian birr
ETIDI	Ethiopian Textile Industry Development Institute
FFL	Fair for Life
FFS	Farmer Field Schools
FLO	Fairtrade Labelling Organizations International
GMO	Genetically modified organism
GOTS	Global Organic Textile Standard
GRS	Global Recycling Standard
GWP	Global Warming Potential
ID	Identity preserved
IFOAM	International Federation of Organic Agriculture Movement
IPM	Integrated Pest Management
ISCC	International Sustainability & Carbon Certification
IVN	Internationaler Verband der Naturtextilwirtschaft
JAS	Japanese Agricultural Standard
lbs	pound
LUI	Length Uniformity Index
MB	Mass Balance
mio	Million
MT	Metric ton
N	nitrogen
NCDS	National Cotton Development Strategy
NOP	National Organic Program
NPOP	National Program for Organic Production
OECD	Organisation for Economic Co-operation and Development
OHCHR	United Nations Office of the High Commissioner for Human Rights
CU	Control Union

PGR	Plant Growth Regulators
POP	Persistent Organic Pollutant
pph	plant per hectare
RED	Renewable Energy Directive
RSB	Roundtable on Sustainable Biomaterials
SG	Segregated
t	Tonnes
USD	US-Dollar
USDA	United States Department of Agriculture
WHO	World Health Organization
WWF	Worldwide Found for Nature

Abstract

The overall aim of this study is to trace the current supply chain of the commodity cotton in Ethiopia. Furthermore, a special focus of the study is placed on the local impact and role of certification and due diligence schemes. In the first section, the study elaborates on fundamentals on cotton regarding its life-cycle and cultivation characteristics such as seed germination, growth, outputs, quality and processing. This is followed by insights into the economic embedding of the Ethiopian cotton value chain into the world cotton markets. In the following section various schemes are analysed and evaluated according to their environmental and social ambition levels. Against this backdrop, the focus on the current Ethiopian cotton value chain is illustrated by the results of intensive field research conducted between 16 and 28 July 2018 in Addis Abeba, the Gamo Gofa Region (Southern Ethiopia) and in the Amhara Region (North-Western Ethiopia). Especially, the role of the first cotton cooperative certified according to the EU organic regulation (Organic Crop Producer Association) near Arba Minch was examined in detail. By the prominent combination of the educational approach of “Farmer Field Schools” (FFS) together with the establishment of a strong smallholder cotton cooperative this project will become a blueprint of best practice for the development of Ethiopia’s cotton sector in the future. Especially, the possibility to significantly increase yields and sales prices at the smallholder’s level in combination with a complete abandonment of pesticides is remarkable. The study is complemented by information on process steps further down the cotton value chain and includes the documentation of good practice downstream company examples.

Acknowledgments

This study is also based on extensive field research in Ethiopia from 16 – 28 July 2018. During this time, the research team visited and interviewed numerous public and academic institutions, cotton cooperatives in the field, private companies as well as non- governmental organisations (NGOs), in particular

- The Shele Mela Organic Cotton producers Cooperative, Arba Minch
- Arba Minch Plant Health Clinic, Arba Minch
- Amibara ginnery, Arba Minch
- Arba Minch Textile Factory, Arba Minch
- Ethiopian Textile Industries Development Institute (ETIDI), Addis Ababa
- Enterprise Partners (EP), Addis Ababa
- Bahir Dar University; Ethiopian Institute of Textile and Fashion Technology, Bahir Dar
- Bahir Dar Textile Factory, Bahir Dar
- Bees for Development Ethiopia, Bahir Dar

In this context very special thanks go to Samson Asefa Negash (Cotton Development Directorate Director), Mesele Mekuria (Cotton Quality Research & Inspection Directorate Director), Mulualem Mersha Ayele (Arba Minch Plant Health Clinic head), Shambel Boku (PAN Ethiopia), Bazezew Gebremarian (PAN Ethiopia), Tewodros Yilma Belachew (EP), Tirsit Mamuye (EP), Addisu Ferede Tesema (Scientific Director Ethiopian Institute of Textile and Fashion Technology – Bahir Dar University), Abera Kechi (Postgraduate studies & Project Development Director, Ethiopian Institute of Textile and Fashion Technology – Bahir Dar University), Tiliksew Desta (Cotton Researcher and instructor, Ethiopian Institute of Textile and Fashion Technology – Bahir Dar University), Mr. Mekoya (Manager of the Arba Minch Ginnery), Ms. Kalkidan Wubie (CU), Mr. Tadele Mengist, the general manager of the CMiA certified Ginnery in Genda Wuha, Mr. Zewdu Getahun, our friend who guided us in Bahir Dar and Mr. Tilahun Gebey, Director of Bees for Development Ethiopia. The research team was always received very generously and is therefore very thankful for the engaged, cordial, sincere and open collaboration.

1. Introduction

This report is part of the research project “Bio-economic Power in Global Value Chains – Approaches, Impacts and Perspectives for Certification and Due Diligence Schemes for Biomass” in cooperation with University of Freiburg (Prof. Dr. Lena Partzsch, Sustainability Governance) on behalf of the German Federal Ministry of Education and Research (BMBF).

Whereas the overall project also covers the commodities palm oil from Indonesia and timber from the DR Congo, this report focusses on the cotton value chain in Ethiopia. By this, it forms part of work package 3 of the project that aims at analysing impacts of certification and due diligence in the upstream part of supply chains. Therefore, the research team from Oeko-Institut visited Ethiopia from 16 to 28 July 2018 for intensive field research in Addis Ababa, Arba Minch and Bahir Dar including detailed interviews with stakeholder along the value chain of cotton in the country.

In particular, the team visited and interviewed the Ethiopian Textile Industry Development Institute (ETIDI, Addis Ababa), Entreprise Partners Ltd. (Addis Ababa), Ministry of Agriculture (Arba Minch), PAN-Ethiopia (Arba Minch), Organic Crop Producer Association (Arba Minch), Arba Minch Ginnery, Arba Minch Textile Factory, Ethiopian Institute of Textile and Fashion Technology of the University of Bahir Dar and the CEO of the ginneries in Genda Wuha and Chagni.

The resulting report at hand is structured as follows. Firstly, chapter 2 focuses on general characteristics of the commodity cotton cultivation, especially with regards to its life cycle and production, seed germination and planting, growth and development, maintenance, harvesting, fertilizing, herbicides and pesticides, outputs, quality and further processing.

This part is followed by chapter 3 that focuses on cotton markets and trade, especially with regards to trade balances, world market prices, actors and alternative approaches to cotton trade. This is followed by chapter 4 on certification and due diligence schemes in the cotton and textile sector. The presented method for the analysis and comparison of certification schemes as well as the results were elaborated in work package 1 of the project. However, based on substantive connections, the research team decided to publish the results within this report as well.

Chapter 5 is the heart of the report focusing on the cotton supply chain in Ethiopia. In addition to providing general information and a policy background, this chapter analyses the cotton production in Ethiopia in detail with particular regard on environmental, social and economic aspects. The role of local traders and intermediaries (“middle men”) as well as ginneries is also covered. However, all steps further down the supply chain such as trade and the local textile industry are out of scope of this study. As the team, also had the chance to gain insights into these parts of the chain, however, some issues of specific interest were highlighted in this report as well.

In chapter 6 relating to the downstream part of the cotton supply chain, selected examples of good practice companies from Germany are given. They originally result from work package 2 of the project which contains an extensive analysis of downstream actors within the value chain of cotton in Germany.

Finally, the report is completed by the concluding chapter 7.

2. About cotton

Cotton, in its very nature, is a very unique and omnipresent commodity. Cotton is a material encountered by each of us in our daily lives, not only in the form of textile products. It also plays an important role in other sectors such as the automotive industry (e.g. car seats) or home furnishing (e.g. curtains). It has been one of the most relevant trade commodities pushing industrialization, the establishment of capitalism as world economic system, as well as globalization in all its various steps from the 16th century until today. For a long time, Europe hardly had access to the rare commodity, which can only be cultivated in regions of the 'Global South', leaving the continent with the need to rely on wool and linen instead. This situation rapidly changed with the appearance of the British East India Company in South Asia from the beginning of the 17th century, witnessing a sharp increase of cotton and textile exports to Europe (Beckert 2015).

After centuries of high raw cotton imports into Europe for a vivid yarn, textile and garment industry, globalisation, open markets, structural change and competitive advantages since the mid-20th century, more and more production steps of the value chain have shifted to Asian countries like China and Bangladesh. Today, China is by far the biggest cotton and yarn importer with an annual trade value of 7.4 bn $ (3.3 million tonnes) in 2016 followed by Bangladesh (2 bn $, 0.975 million tonnes) and Turkey (1.8 bn $, 1 million tonnes). Altogether, with a world market share of more than 80%, cotton is the most important natural fibre today (FNR 2014). In the 2017/18 season (Johnson et al. 2018), the world cotton production reached 121.4 Million bales (each of which at around 500 lbs).

2.1. The life-cycle of cotton and cotton plantations

2.1.1. Seed germination and planting

Cotton plants are directly sown on the field. There, the seed germination is favoured by high soil oxygen concentration, adequate soil moisture and soil temperatures above 18°C. Under these favoured conditions, it takes 5-10 days until the seedling breaks the surface. Generally germination can start at temperatures of 15°C or slightly lower at seedling depth, however, the growth rate will be slower than at warmer temperatures. In addition to lower temperatures, poor seed quality, pre-emergence seedling disease, flooding, soil crusting, salinity, and herbicide residue hinder the germination process (Oosterhuis & Jernstedt 1999). In order to protect seedling plants from fungal diseases, most seeds which are commercially available are treated with some sort of fungicide (Silvertooth et al. 1999).

Cotton plants are able to compensate the fruiting patterns in response to plant population, which is why satisfactory yields can be achieved with a broad range of plants per hectare (pph). The optimal range for cotton varies between 62 000 and 127 000 pph. If fewer crops are planted, the yield per hectare becomes unfavourable, and at the same time more weed will be growing. Additionally, fruits tend to grow lower, which will alter conditions for harvesting (and can be a problem for mechanical picking). If the plant population is too high, shading effects will diminish the yield per hectare (Silvertooth et al. 1999).

The final plant population is determined by three factors:

- Seeding rates, which are commonly described in kilograms of seed per hectare (kg/ha)

- The seed size which determines the number of seeds per kilogram and varies between different cultivars
- The loss of seeds which normally varies between 10 and 25%

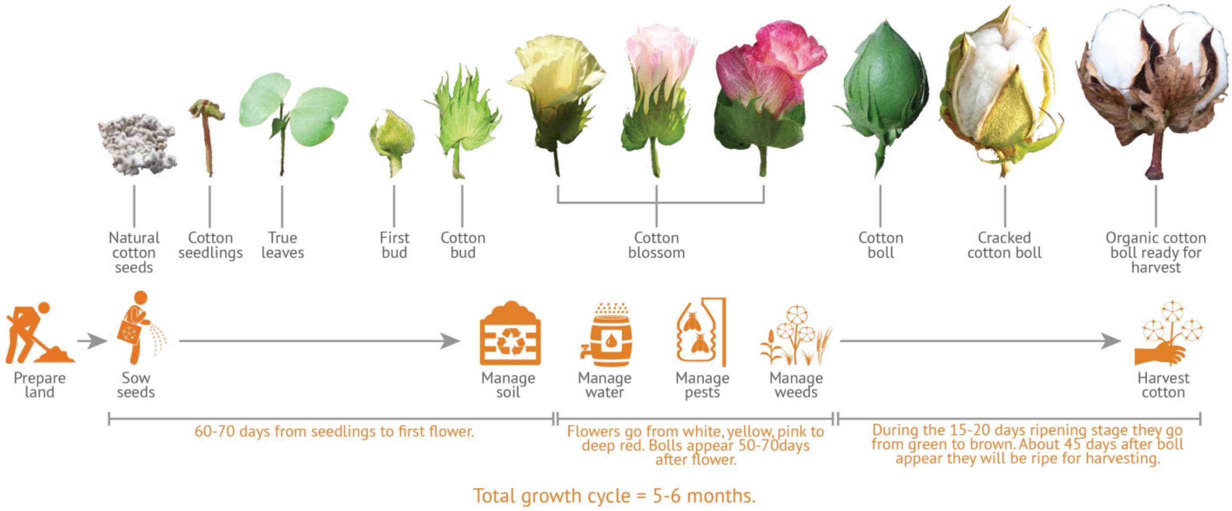
In order to prevent unexpected losses and to minimize the risk of too small populations, growers often plant higher rates of seed. In order to optimize final stand population, thinning might be necessary at a later stage. The space between the cottons rows (row spacing) varies approximately between 76 and 102 cm (Silvertooth et al. 1999). In Ethiopia, farmers used to sow cotton by broad casting. Today, there are trainings and other educational schemes such as Farmer Field Schools (see chapter 5.3) where farmers learn how to sow cotton in rows and keep space between the plants and the rows (Amera 2017).

Besides suitable temperatures (see above), the availability of sufficient water supply is crucial for plant growth. In contrast to industrialized cotton plantations based on irrigations systems, some plantations in Sub-Sahara Africa are rain-fed (see chapter 5.3). In these cases, the planting of cotton has to be aligned with precipitation patterns. In West Africa, the sowing time lasts from May to July, and harvest from October to December. In Tanzania, sowing takes place in October and November, harvesting from May until August (Ferenschild 2014). Rain-fed cotton cultivation always imposes the risk of losses due to dry periods and droughts (see chapter 5.3.1). In the irrigated cotton fields situated in the Middle Awash Valley in Ethiopia, land preparation begins in the middle of January, followed by planting in early April. Then, cotton is harvested in September (Girma & Awulachew 2007).

2.1.2. Growth and development of cotton plants

The early development of the cotton plant is focused on the root system, during that time the growth above ground is relatively slow. The roots continue to grow and increase until maximum plant height is achieved after flowering. After that the plant's resources are increasingly directed towards the fruits. Florals buds, which appear as small, green, pyramidal structures known as squares, grow four to five weeks after planting. Flowers are produced upwards and outwards and are continuously produced on an actively growing plant until defoliation or frost (Oosterhuis & Jernstedt 1999). For the development from squares to the white flower stage it takes approximately another 25 days (Oosterhuis & Jernstedt 1999). The white flower stage is the first day a flower opens, as the name suggests in white colour. The following days the colour changes from white to pink to red. After about five to seven days the flower dries up and falls from the plant, exposing the developing cotton fruit (Ritchie et al. 2007). Cotton pollination usually takes place during the first day of bloom, and can either be performed by insects or self-pollination. When other pollinators such as Bamboo are present, cross-pollination can be as high as 50-80%. The first mature fruits (cotton bolls) split open after 40 – 45 days of pollination. The boll itself consists of three parts: the capsule (the bur), the seeds, and the fibre (Oosterhuis & Jernstedt 1999).

Figure 2-1: The cotton cycle



Source: Textile Exchange (2018a)

Cotton plants have an indeterminate growth habit (Wells & Stewart 2010) and could theoretically be grown over several years. In praxis, they are mostly cut down after one season in order to keep harvesting efficient and simple and to maximize output.

2.1.3. Maintenance of cotton plantations

Stand establishment and monitoring of plant development is the first important step in crop management (Silvertooth et al. 1999). Therefore, the development of branches, squares and flowers should be checked on a regular basis. If any abnormalities (for example square loss) occur, the reason (e.g. related to insects, weather, water, disease, or nutritional status) should be identified and corresponding actions should be taken (Silvertooth et al. 1999). If earliness of crop maturity is important (for example in higher elevations where the growing season is relatively short), the early development of the plants should be monitored extra carefully, the occurrence of certain branches etc. can be used as indicator to calculate if the plant development is on time (Silvertooth et al. 1999).

In modern cotton plantation, Plant Growth Regulators (PGR) are used in order to optimize the ratio between vegetative and reproductive growth. The chemical PGRs (e.g. mepiquat chloride) are used for well-fertilized and irrigated cotton to prevent rank growth (Ritchie et al. 2007). In optimum conditions, the plantations have sufficient plant structure (vegetative growth) as a basis for reproductive growth. If not enough plant structure is available in the first place, square and flower loss could trigger undesired rank growth (Silvertooth et al. 1999).

Nutrient management is also very important, as specific needs vary depending on type and nutrient status of the soil. For cotton production, especially the availability of the right amount of nitrogen is important. The so-called “N-status” of plants can be tested in the petioles. But not only the amount, also the timing of fertilization has great influence on the development of the plants. Nutrient demand (like water demand) follows the plant development. It increases until peak squaring and blooming, and decreases afterwards. Accordingly, nitrogen should be added during the so-called N application window between early squaring and peak bloom (Silvertooth et al. 1999).

As indicated before, water demand varies throughout the growing cycle, which is why adequate water management can be used to optimize cotton production. In most of the cases where irrigation systems are used, water itself represents the largest share of input costs and should therefore be subject to sound management. In Sub-Sahara Africa, irrigation systems only partly exist; for some sites rain-fed-agriculture is used (Ferenschild 2014). In these cases, the planting cycle is adjusted with precipitation patterns (see chapter 2.1.2).

Furthermore insect, pest and weed control is practiced in order to avoid losses and to optimize growing and harvesting conditions for cotton. All of them can be executed in different manners, varying from cultural control (crop rotations etc.), biological control (in some cases geese were used for weed control, natural enemies for insect and pest control), chemical control (herbicides and pesticides) and tillage systems (destroys weed and overwintering insects) (Bryson et al. 1999; Leonard et al. 1999).

For information on a good practice example on organic pest control in so-called Farmer Field Schools in Ethiopia, see chapter 5.3. Further information on the use of fertilizer, herbicides and pesticides can be found in chapter 2.1.5.

2.1.4. Harvesting

Harvesting processes vary significantly between different cultivation regions. In the industrialized cotton production, different harvesting aids are used, including defoliants, regrowth inhibitors, boll openers and weed desiccations (Faircloth et al. 2009). The chemical components are used to speed up and control the natural process (plant cycle) and to optimize harvest efficiency. If they are not applied with the right timing, their use can have negative impacts and the cotton quality might suffer (Silvertooth et al. 1999). Harvesting machines are used to collect cotton bolls in the fields.

In the cotton production in Sub-Sahara Africa, typically no machinery is available for the harvest. Instead, most processes in cotton production are done manually or with the help of draught animals. The harvesting of cotton is done by hand picking, with the help of seasonal workers (Ferenschild 2014). Since flowers develop as long as cotton plants grow (see chapter 2.1.2), not all of the corresponding cotton bolls develop simultaneously. In order to produce high quality cotton, several rounds of harvesting are necessary in order to avoid the harvesting of overripe and unripe cotton. When cotton harvest is delayed, the quality of cotton linter in open bolls can be influenced by weather conditions (for example rain during harvest season may reduce cotton yields). Also the timing during the day is important, as harvest too early or too late during the day increases the moisture content (Faircloth et al. 2009).

2.1.5. Fertilizers, herbicides and pesticides

The right management of fertilizers strongly depends on soil properties (see chapter 2.1.1). Therefore, the right choice and amount of added nutrients can vary between different plantation sites. Generally, nitrogen (N) is the nutrient with the highest impact on plant development, especially in western soils, as organic matter is usually low. The right dosage of nitrogen is especially important, as not only deficiencies have an impact on the crop development, but also excess nitrogen, which is much harder to identify and adjust, can be damaging to final crop productivity or delay maturity (Silvertooth et al. 1999). In order to apply the appropriate amount of nitrogen, nitrogen management should ideally begin with a soil test. Normally, there is enough residual N to start the plant growing process, hence pre-season applications of N are least efficient. Instead, two to three applications during the early fruiting cycle, between early squaring and peak bloom (see chapter 2.1.2), have been found to be most efficient (Silvertooth et al. 1999).

Herbicides and pesticides are used preventively for conventional middle or large-scale cotton plantations. In big monocultures, around 80% of the harvest would be depraved without chemicals, which is why cotton plants are sprayed 14 to 30 times during one season (Bundesverband - Die VERBRAUCHER INITIATIVE e.V. 2018).

Pesticides represent a significant share in the cost structure of cotton production. A case study in Kenya found that 0.7% of all costs account for seeds, more than 40% for pesticides, 56% for the workforce and 3% for borrowing work equipment (Gitonga et al. n.y.). Another study analyzing Uganda, Kenya, Tanzania, Zambia and Egypt found that pesticides and spray sum up to 10.5% of total costs in Kenya and 50% in Zambia (Mulwa et al. 2013). For organic farming, ecologic pest management techniques are available, inter alia the so-called food spray technique (see chapter 5.3). Hence, by spraying specific substances, natural enemies are attracted to the cotton field and feed on insect pests (Amera 2017).

2.2. Output

In general, world-wide production output of cotton is at an average of 576 kg per hectare. The worldwide yield variation is between 140 kg/ha in Somalia and 2,487 kg/ha in Australia. In general, the Sub-Sahara Africa average is at 329 kg/ha with 140 kg/ha in Somalia and 957 kg/ha in South Africa (Ferenschild 2014). Whereas the global average yield per hectare was increased over the last years, the Sub-Sahara Africa average slightly decreased (Ferenschild 2014). The specific yields for Ethiopia can be found in chapter 5.3.1.

2.3. Quality

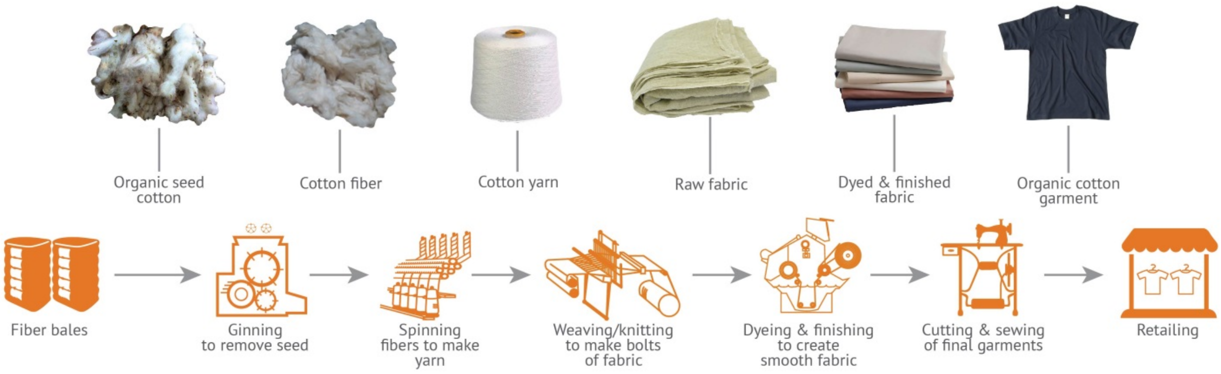
Cotton quality strongly depends on the length of the fibres. The standardized cotton fibre classification refers to the so-called staple length. Generally, there are four typical staple measures that characterize the quality of the fibres in a way that the longer the staple, the better the quality. The lowest quality refers to “short” fibre lengths < 25 mm, followed by “medium” lengths between 25-30 mm, “long” fibres at 30-35 mm and the so-called “extra-long” fibres at >35 mm (also called Extra Long Staple, ELS) (Textile Exchange 2017a).

Fibre length depends on the variety of cotton, but also the plants’ exposure, very high temperatures, water stress and nutrient deficiencies can shorten the length. The longer the fibres, the stronger and more even the yarn as well as the spinning process itself (see chapter 5.3). Other quality measures for cotton are the so-called “length uniformity” (Lengh Univormity Index, LUI) and the “Micronaire” measuring cotton fineness and maturity as well as colour. The most important quality measure for yarn is the so-called “yarn count” that characterizes the fineness of the yarn (Textile Exchange 2017a).

2.4. Processing

Once raw cotton is harvested, it needs to be ginned (see chapter 5.5), a process were the seeds are separated from the lint cotton. In the following, lint cotton is baled in standardized packages at a length of 54-55 inches (1.37-1.40 m), a width between 20 and 21 inches (0.51-0.53 m) and a thickness of max. 33 inches (0.84 m). The net weight of a cotton bale is at 500 pounds (lbs.) which corresponds to 226.8 kg.[1] In many cases, cotton is only baled for trade after the ginning process (see chapter 5.5) (Textile Exchange 2018a).

Figure 2-2: Cotton processing from fibre to fashion



Source: Textile Exchange (2018a)

Hence, Figure 2-2 illustrates systematically the processes from raw cotton to a final textile fashion product. The simplified steps cover (1) the ginnery, (2) spinning of the fires to yarn, (3) weaving and knitting in order to make bolts of fabric, (4) dyeing and finishing for a smooth fabric, and finally (5) cutting and sewing of final garments before the products (e.g. a t-shirt) go into retail. For more information on the process steps from cotton bales to the final product, see the example of the textile value chain of Ethiopia in chapter 6.

[1] According to the National Cotton Council of America, see http://www.cotton.org/tech/bale/bale-description.cfm

3. Markets and Cotton Trade

3.1. Trade Balances

Cotton is one of the most extensively traded commodities worldwide. In the year 2016, cotton and yarn were traded internationally at a total value of 26.3 bn USD (Chatham House 2018). This reflects a share of 27% of all globally traded agricultural products and a weight of 12.8 million tonnes.

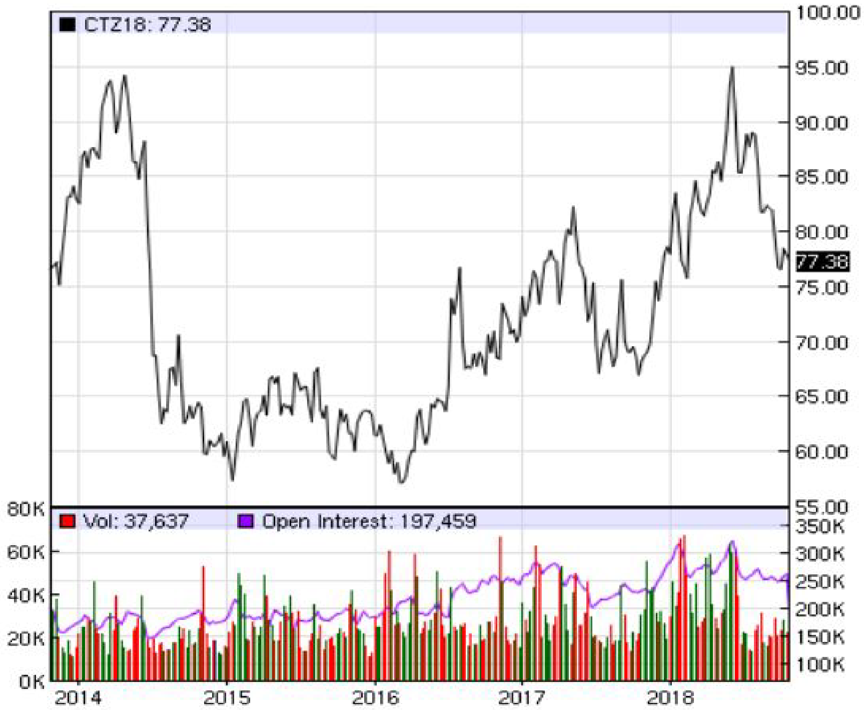
Major exporter of cotton and yarn in 2016 were the USA (5.1 bn $), India (4.6 bn $), Vietnam (2.1 bn $), China (1.7 bn $) and Pakistan (1.4 bn $). In turn, the biggest importers were China (7.4 bn $), Bangladesh (2 bn $), Turkey (1.8 bn $), Vietnam (1.7 bn $) and Indonesia (1.2 bn $). The biggest direct trade flows are from Vietnam to China of 1.7 bn $, from India to China of 1.3 bn $, from India to Bangladesh of 1.1 bn $, from Pakistan to India of 861 mio $ and from the USA to Vietnam of 793 mio $ (all numbers from 2016).

According to Textile Exchange (2017b), the global market for organic cotton is highly fragmented, with an estimated global market share of 5%.

3.2. Prices & Subsidies

Cotton, as many other biomass commodities, is traded on international spot markets that reflect large prices variations over time. Figure 3-1, for example, shows the large fluctuations of cotton spot market prices between 2014 and 2018 at the US Stock Exchange NASDAQ in New York.

Figure 3-1: Commodity Price for Cotton at NASDAQ, NY (2014-2018)



Source: www.NASDAQ.com

Reflecting world supply and demand, but also speculations on financial markets, cotton trade prices are highly volatile with a potential impact for all upstream actors such as farmers growing cotton and local traders (see chapter 5.3). In years of low cotton world market prices, smallholders in many developing countries cannot make a living with cotton and tend to change their agriculture towards other crops (e.g. towards banana in the Arba Minch region in Ethiopia, see Amera (2017) and section 5.3).

On the other hand, it has also been repeatedly reported that subventions for cotton in industrial countries (mostly USA) have a decreasing impact on world market prices, leaving smallholders and producers in other world regions in a state where they cannot compete with the subsidized cotton (Fairtrade Germany 2018). According to Gro Intelligence (2018), the average per acre cotton subsidy doubled in the USA between 2009 and 2018.

3.3. Actors

While cotton can be traded at almost every larger financial spot market worldwide, the number of actors actually trading the commodity at a larger scale is depicted in Table 3-1. As this report has a special focus on Ethiopia, the table summarizes those cotton traders which are active in Africa. Furthermore, the table lists trading companies which have own ginneries in African countries.

Table 3-1: International Trade Companies of Cotton on the African Market

Trade Company	Headquarters	Ginnery in Africa
Louis Dreyfus Commodities	The Netherlands	
Cargill Cotton	UK	Yes
Olam International	Singapore	Yes
Paul Reinhart	Switzerland	Yes
Ecom Agroindustrial	Switzerland	
Plexus Cotton	UK	Yes
Toyoshima	Japan	
Otto Stadtlander	Germany	
Devcot	France	
Mambo Commodities	France	
Noble Resources	Singapore	
ICT (International Cotton Trading)	Switzerland	
Capaco	France	Yes
Agrocorp International	Singapore	
Glencore	Switzerland	
CDI (Cotton Distributors Incorporated)	Switzerland	

Source: Ferenschild (2014)

3.4. Approaches to Organic Cotton Trade

According to Textile Exchange (2018c), there is no general standardized price mechanism for organic cotton trade. However, there are various approaches and models that shall be illustrated in the following.

The organic premium model

In this model, the regionally or nationally quoted commodity price is increased by a certain percentage which is called "price premium". Typically, this premium ranges from 5-50 % depending on influences such as general market conditions, price elasticities (degree of price response to changes in the demand), certain arrangements between the actors within the value chain and product quality. Generally, the premium is meant to cover production cost for the farmers, costs of certification, trainings as well as investments for farming operations.

Also, related to the organisation of farmers or smallholders, it is typical that a share of the premium goes to community needs such as schooling, health care or housing. The basic idea of the premium model is to guarantee prices for the smallholders/famers, which reflect the production costs of cotton, while at the same time contributing to the viability of the farmers' businesses. Nevertheless, also in this model, the famers are still faced with volatility risks of world market prices (Textile Exchange 2018c).

The business-as-usual model

This model is the one most frequently used by stakeholders of the cotton supply chain. Brands, retailers or downstream manufacturers typically send out buying teams or subcontractors responsible for making contracts to purchase the cotton fibre on the "open market". In some cases, the ginners are in the role of such intermediary traders (see chapter 5.5). The organic certificate can be traced to the ginnery in these cases; however, end consumers might not be aware of the plantation where the cotton actually grew. The deal between the actors is highly influenced by market conditions, especially by the necessity of the grower to sell the cotton (see also chapter 5.3; Textile Exchange (2018c)).

The value chain model

In comparison to the business-as-usual model, trade relations within the value chain are improved in this model. This allows the brands/retailers to establish closer, more intensive and longer-term trade relationships with a group of producers (e.g. an association). By this, agreements and contractual conditions can be negotiated to the mutual benefit of both parties (Textile Exchange 2018c).

Benefits for upstream producers

There are four major benefits for cotton producers of organic pricing. Firstly, this often includes prefinancing, implicating support for famers and smallholders to start their business. For this purpose, they need suitable seeds, but most of all appropriate education and skill development, as organic cotton faming is highly knowledge-based (Amera 2016; Textile Exchange 2018c). Secondly, trade relations with farmers and smallholders can include price guarantees ("forward contracting"). This allows farmers to plan their scale of production thoroughly. Thirdly, a certain time of payment shall be agreed, helping producer groups, smallholder cooperatives or company managers to manage their risks and to renumerate farmers on time and on a reliable basis. This allows for maintaining the farmer's loyalty and commitment. Finally, direct payment to the farmers, also under partnership agreements with ginners, spinners or even on the manufacturer level, increases the probability that price premiums reach the farmers (Textile Exchange 2018c).

Benefits for downstream retailers

Benefits of long-term organic trade relations for downstream retailers are (1) a certain security of supply, (2) less vulnerability from the volatility of the open markets (see chapter 3.2), (3) inclusion of upstream actors in the value chain into strategic planning of organic cotton, leading to (4) loyalty of employees, rural communities as well as customers. This, in consequence, has an influence on the reputation of the downstream retailers. The approach is typically summarized under the "Trade not Aid Principle" for sustainability (Textile Exchange 2018c).

4. Certification schemes and due diligence for cotton and textiles

4.1. General information

In the following section, a selection of existing certification and due diligence schemes for cotton is introduced and analysed. As approximately 60% of the worldwide cotton production is used to make textiles (Cotton Australia 2016), also selected textile standards are presented. Furthermore, their criteria regarding cotton are analysed in the following.

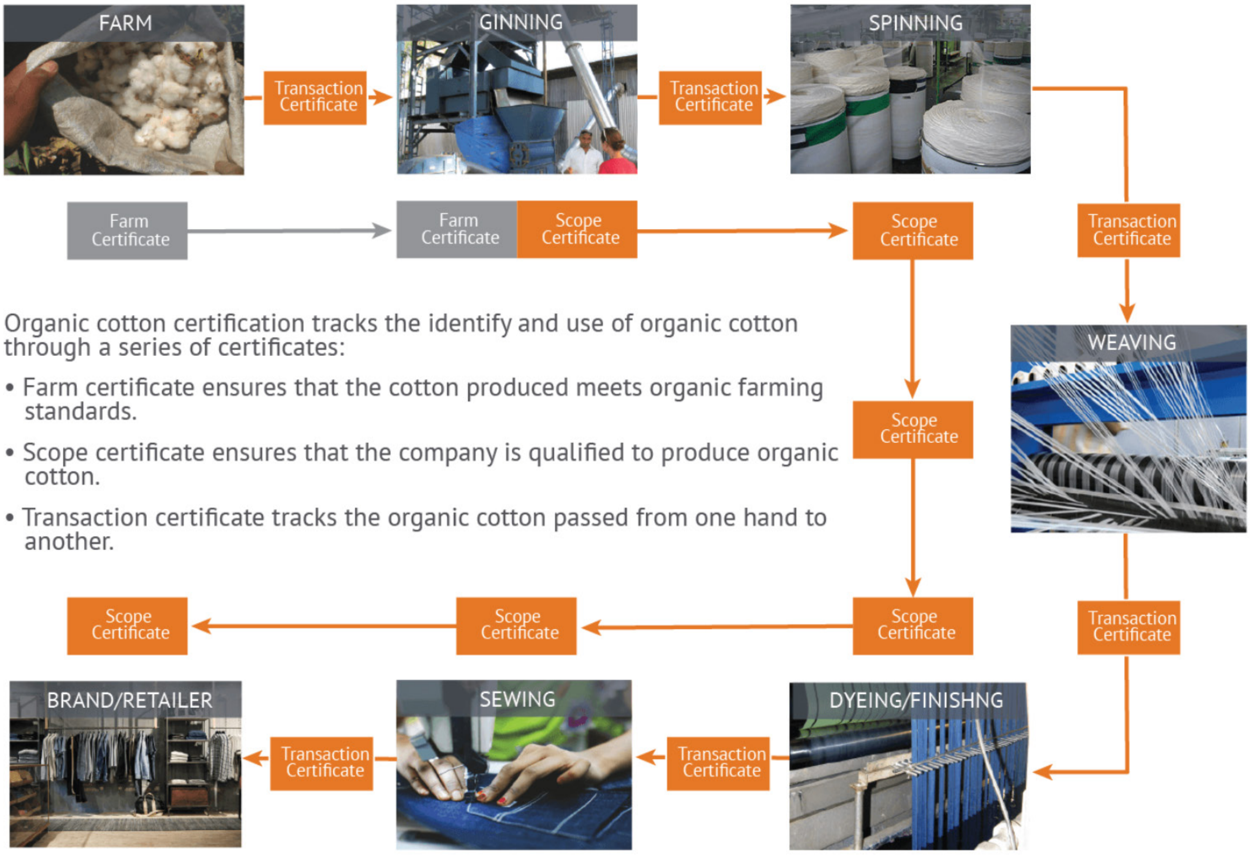
In order to understand cotton and textile certification processes, it is necessary to know the process steps and stakeholders in a typical supply chain. The supply chain comprises of farmers, which pass the produced cotton to the ginning factories (see also section 5). The interaction between producers and buyers is typically performed by brokers, who trade cotton at the world market. They typically sell cotton to the spinners, who themselves sell the yarn to fabric mills. The fabric is then sold to manufactures, who deliver the produced textiles to the brand and to the retailer. Besides this linear supply chain structure, different relationships and interactions are possible. Farmers and Ginners might work cooperatively, or brands and retailers might have direct (purchasing) contracts with spinners und fabric mills. Furthermore, integrated production systems are possible.

In general, certification schemes for cotton and other biogenic raw materials are based on different supply chain management options:

- Identity preserved (ID): In this option, all sustainably produced resources, e.g. certified organic cotton, have to be traded separately from conventionally produced raw materials and other certified cotton. This holds true for all steps of the value chain, from the cotton field to transportation, the ginnery and further downstream. Basically, the certified raw material is fully traceable along the chain. For certified and conventionally produced raw materials, there are two completely separated value chains. While transparency is very high in this option, corresponding transaction costs likewise are particularly high.
- Segregated (SG): Unlike in the case of the identity preserved option, a mix of certified raw materials is allowed in the segregated supply chain management option. However, a mix between conventional and certified raw materials is not allowed. Hence, there are still two closed supply chains, one for conventional raw materials and another one for certified raw materials.
- Mass balance (MB): Contrary to the two preceding supply chain management options above, in the mass balance option, a mix of certified and non-certified (conventional) raw materials is allowed. However, at every step of the value chain, the respective shares have to be documented. Hence, even when there are mixtures of certified and non-certified raw materials along the value chain, the documentation shall guarantee transparency over the respective shares.
- Book & claim (BC): Finally, the book& claim supply chain management option does not require traceability of the raw materials or documentation of mixing ratios. Instead, a certificate at the end of the value chain states the ratio of certified and non-certified raw materials. By this, the whole supply chain is bridged (bypassed). This leads to very little transparency within the supply chain. However, the specific advantage is reflected by comparably low transaction costs as the supply chains do not have to be closed. Additionally, this option is used for smallholders who cannot participate in separated supply chains. Neither documentation nor physical separation is necessary.

The certification of cotton which is identity preserved (IP), for example organic cotton, works via scope and transaction certificates. The scope (and farm) certificates are issued for the institutions which produce or process the certified cotton. The transfer of certified cotton is documented by transaction certificates. If brokers trade cotton between different parties, they also work with transaction certificates[2]. Figure 4-1 shows where the different certificates for organic cotton are used along the supply chain.

Figure 4-1: How organic certification works



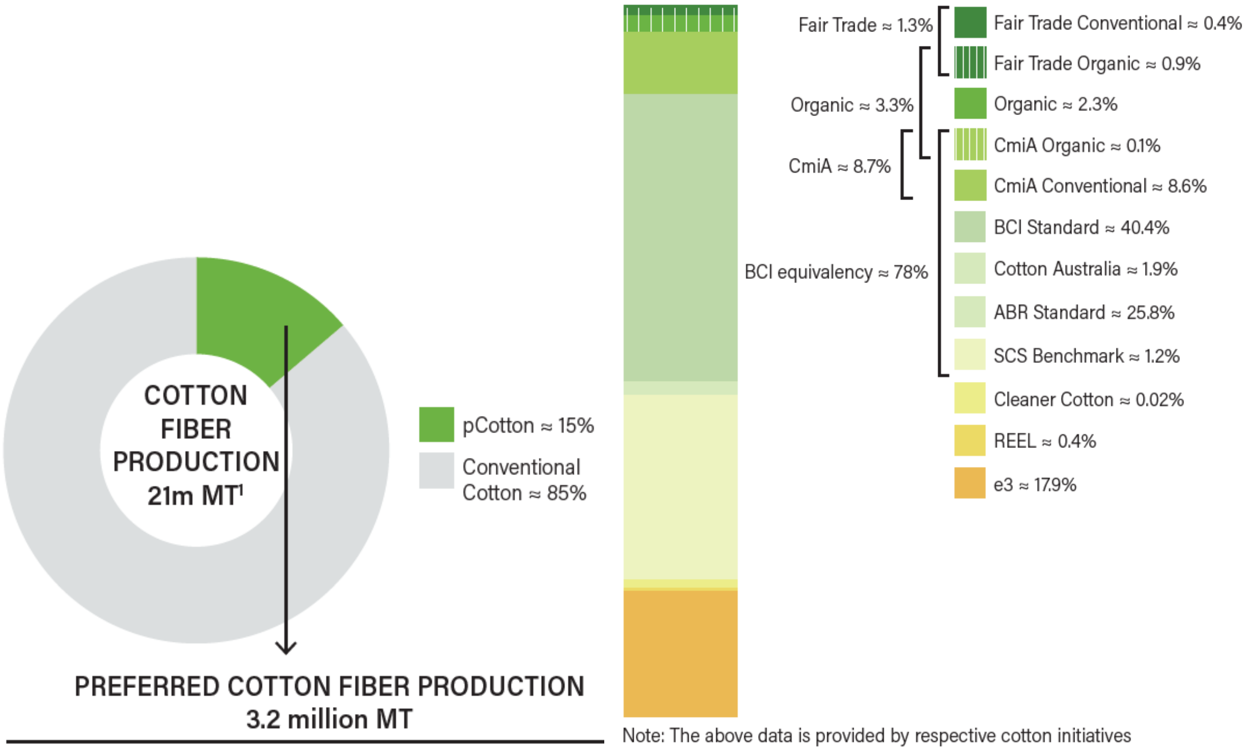
Source: aboutorganiccotton.org, an initiative by Textile Exchange

4.2. Cotton certification schemes

In 2016, approximately 15% of the world-wide cotton production accounted for so-called preferred cotton fibre production (see Figure 4-2). Compared to 9% in 2015, this is a significant increase. In 2016, the 3.2 million metric tonnes (MT) of certified cotton fibre was made up of 3.3% Organic, 1.3% Fair Trade, 8.7% CmiA, 78% BCI equivalency, 0.4% REEL, 0.02% Cleaner Cotton and 17.9% e3 (Textile Exchange 2017b). In 2016, only just over a fifth (21%) of this amount was actively sourced as more sustainable cotton by companies. The remaining amount was traded as conventional cotton (PAN UK, Solidaridad, WWF 2017).

[2] According to personal communication with Dr. Ferenschild, Researcher with Südwind e.V., 06.02.2018

Figure 4-2: Preferred cotton fibre production in 2016



Source: Textile Exchange (2017b)

While Organic, Fair Trade, CmiA- and BCI certified cotton is produced in a variety of countries, e3, REEL and Cleaner Cotton are country specific. Within the project, only the cotton certification schemes which are not limited to certain countries are taken into account. The following sections include a short presentation of the selected cotton standards and their priorities, an in-depth analysis of their criteria can be found in chapter 4.4.

Organic Cotton

Cotton can be produced and certified according to a huge variety of existing organic agricultural standards. The IFOAM Family of Standards is a list of all standards, which are officially endorsed as organic by the international organic movement[3]. These include, but are not limited to, the following standards:

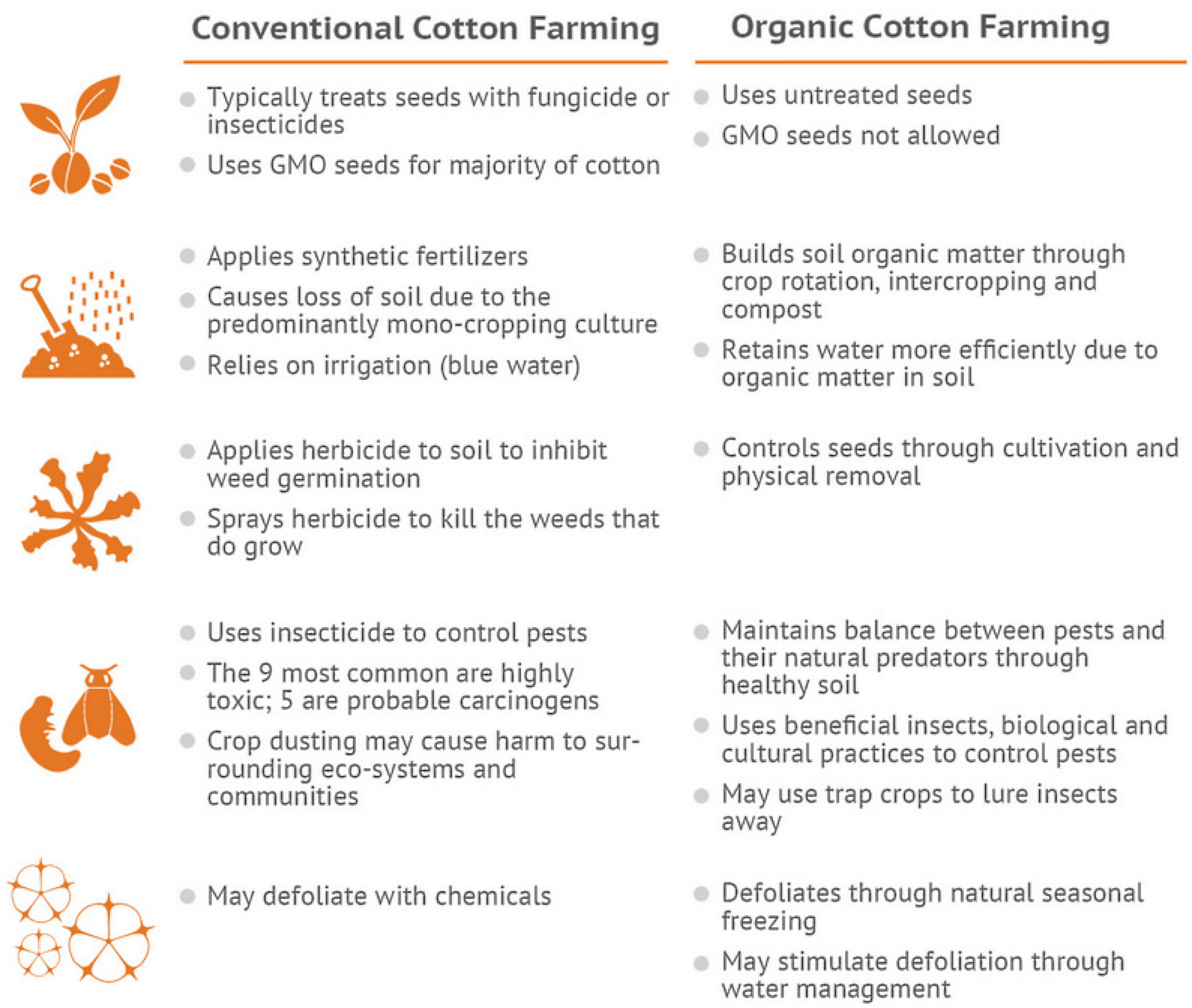
- The EU regulation 834/2007
- the USDA National Organic Program (NOP)
- the Indian National Program for Organic Production (NPOP)
- the Japanese Agricultural Standard (JAS)

The stringency of the criteria varies depending on the certification scheme, but all of them promote the use of natural processes rather than artificial inputs. This includes the ban of toxic chemicals or

[3] https://www.ifoam.bio/sites/default/files/familyframe_web_0.pdf, as of 03.09.2018

GMOs. A comparison between conventional and organic cotton farming practices can be found in Figure 4-3.

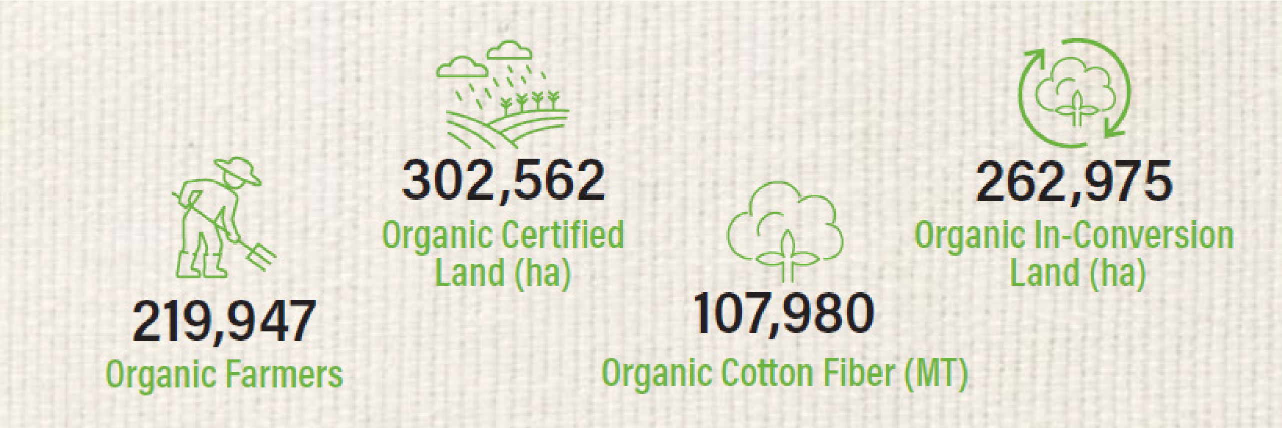
Figure 4-3: Comparing conventional and organic farming practices



Source: aboutorganiccotton.org, an initiative by Textile Exchange

Besides organic cotton, there is also so-called “cotton in conversion”. Once a conventional cotton field is transformed into an organic cotton field, it takes a few years before residues of chemical pesticides and synthetic fertilizer are gone. Therefore, the produced cotton is not yet organic, and for around 2-3 years “cotton in conversion” is grown. In 2016, 107,980 MT of organic cotton were produced, representing approximately 0.5% of the overall cotton production worldwide (see Figure 4-4, Textile Exchange (2017b), Textile Exchange (2017a)).

Figure 4-4: Organic cotton in numbers 2016



Source: Textile Exchange (2017b)

Better Cotton

The Better Cotton Initiative (BCI) was originally funded by the WWF in 2005. After a preparation time of four years an independent non-profit organization was established. The Better Cotton Standard features criteria for sustainable cotton production including reduced use of pesticides, reduction of water consumption, conservation of soil fertility and natural habitats, and decent working conditions (Better Cotton Initiative 2013). It does not contain any request concerning GMOs and farm size. Companies which are buying BCI certified cotton have to pay volume-based fees which are used to fund farmers support programs (PAN UK, Solidaridad, WWF 2017). In 2012, the market penetration of BCI certified cotton was around 2% of the world-wide cotton production (Ferenschild 2014); in 2016, it increased to 6.1%. Altogether, BCI equivalent standards had a world market share of 11.7% (Textile Exchange 2017b). In 2017, BCI cotton lint was forecasted to sum up to 1.8 million MT (see Table 4-1).

Table 4-1: Global Portfolio of Better Cotton: 2016 summary and 2017 outlook

Unit	2016 Portfolio Summary	2017 Portfolio Outlook
Euro mobilised	8.39 Mio	11 Mio
participating farmers	0.61 Mio	1.1 Mio
Better Cotton hectares	1.07 Mio	2.2 Mio
MT of Better Cotton lint produced	1.08 Mio	1.8 Mio

Note: Numbers are given for the international cotton calendar (August-July). Numbers for 2016 are non-final.

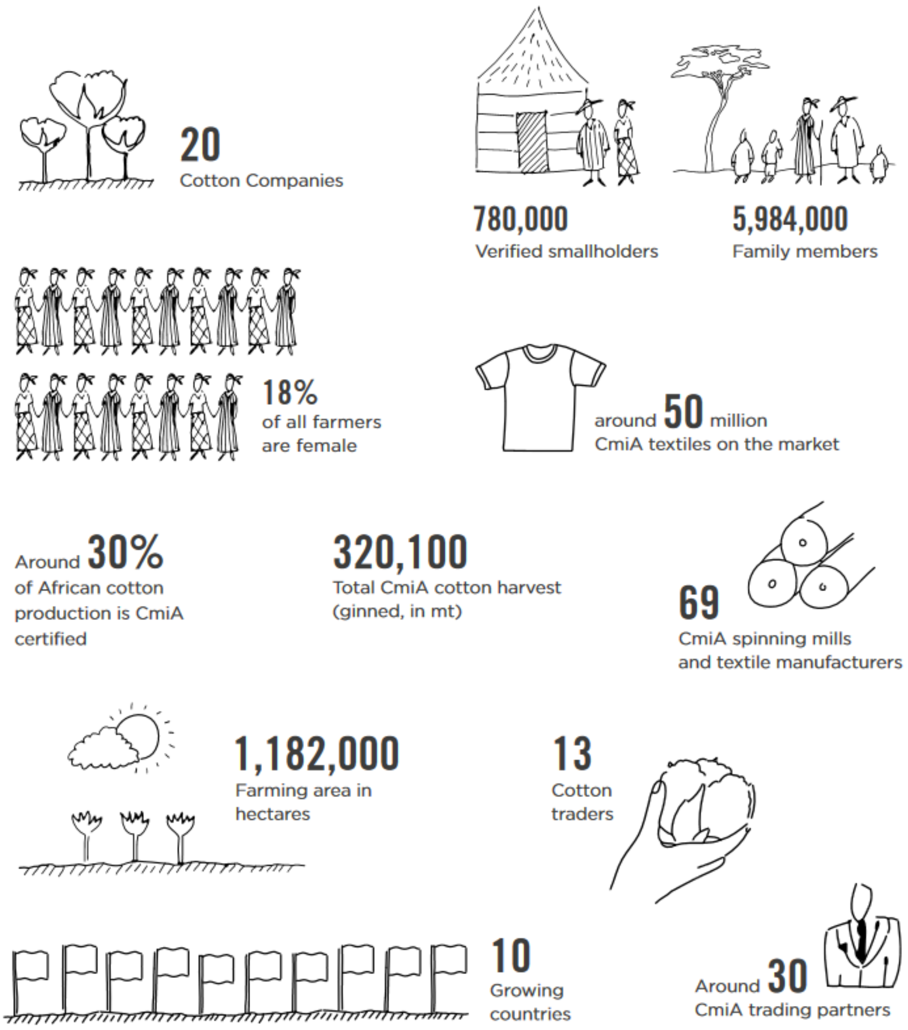
Source: Better Cotton Initiative (2017)

Since 2013, BCI and CmiA have a strategic partnership agreement. After an independent study had compared the two standards, a benchmarking agreement was signed according to which CmiA cotton can be sold as Better Cotton in the majority of cases, but not vice versa. Thus, no parallel scheme was introduced in the African countries where CmiA was already implemented. BCI operates directly in Mali, Senegal, and Mozambique (Better Cotton Initiative 2018). Furthermore, BCI recognises the following regional standards as equivalent: Responsible Brazilian Cotton (Algodão Brasileira Responsável; ABR) and myBMP from Australia (PAN UK, Solidaridad, WWF 2017).

Cotton made in Africa

Cotton made in Africa (CmiA) is an initiative by the Aid by Trade Foundation. AbTF was founded in 2005 by Michael Otto, but is independent of the Otto Group (Siegelklarheit 2017). In May 2017, cotton companies in Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Mozambique, Tanzania, Uganda, Zambia and Zimbabwe were CmiA certified (CmiA 2017). The certified cotton is sold to a demand-side alliance, a group of companies explicitly asking for CmiA certified cotton. These companies are paying a volume-depending licensing fee, which is reinvested in the form of local trainings and projects in the producing regions. As indicated in the name, CmiA certifies only cotton which is produced in Africa. The criteria prohibit the use of GMOs, artificial irrigation, farm sizes over a certain threshold, exploitative child labour, human trafficking, forced labour and the use of pesticides, which are listed in the Stockholm Convention, the WHO list and the Rotterdam Convention. There are further requirements whose realization is visualized by a traffic light system (Ferenschild 2014). In 2012, CmiA certified cotton had a market penetration of 0,6% of the world-wide cotton production (Ferenschild 2014). In 2016, around 30% of all cotton produced in Africa was CmiA certified, equivalent to around 50 Million CmiA textiles in the world market. The certified cotton was produced by 20 cotton companies and traded by 13 cotton traders (see Figure 4-5).

Figure 4-5: Figures and volumes of Cotton made in Africa in 2016



Source: Aid by Trade Foundation / Cotton made in Africa (2016)

Fairtrade fibre crop (cotton) and Textile standard

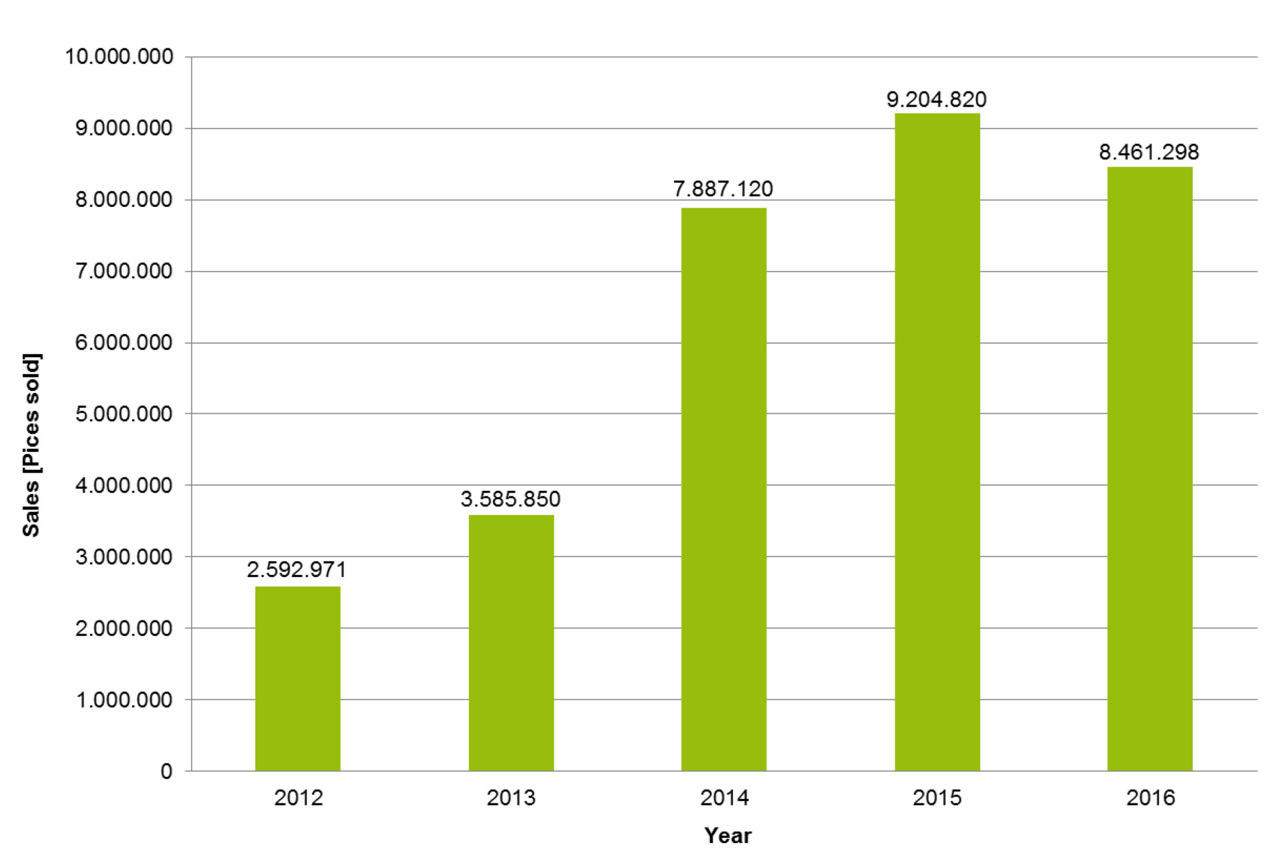
In contrast to the other selected certificates, Fairtrade is offered as a standard for cotton and textiles. Both standards are managed by TransFair e.V., the German membership organization of Fairtrade International (Transfair e.V. 2018). The Fairtrade fibre crops standard which is applicable for cotton addresses organic and conventional cotton. In case conventional cotton is certified, an environmental-friendly production is promoted. In all cases, the improvement of working conditions and the exclusion of GMO is requested (Ferenschild 2014). The Fairtrade Textile Production Standard addresses all processing steps after the cotton fibre production, including ginning, spinning, knitting or weaving, wet finishing and tailoring. The cotton which is used for certified textiles has to be Fairtrade certified or to be certified by other comparable standards. For both standards, the certification audits and controls are conducted by FLOCERT, the certification body for Fairtrade International. Since Fairtrade audits cannot be conducted by any other institution, they cannot be combined with the audit for any other standard[4]. Besides the two described standards, Fairtrade offers a cotton and a textile programme, the criteria of both of which are less strict than of the Fairtrade standards above. There is also a difference in labelling. Farmers which produce Fairtrade certified cotton are paid a premium in order to finance and deliver a positive impact (PAN UK, Solidaridad, WWF 2017).

In 2012, Fairtrade certified cotton had a market penetration of 0.1% of the world-wide cotton production (Ferenschild 2014), in 2016 the share in the world- market increased to 0.2% (Textile Exchange 2017b). Although the overall share is still very small, the sales of textiles made from Fairtrade cotton within Germany increased over the last years (see Figure 4-6). The highest share was purchased by public authorities[5].

4 According to personal communication with Britta Ungruh, Auditor at PCU Deutschland GmbH, 11.01.2018

5 According to personal communication with Charlotte von Essen, Key Account Manager with Fairtrade, 11.01.2018

Figure 4-6: Sales development of textiles made from Fairtrade cotton in Germany



Source: Oeko-Institut; data from TransFair e.V. (https://www.fairtrade-deutschland.de/produkte-de/baumwolle/hintergrund-fairtrade-baumwolle.html)

Biomaterial standards

In addition to the above-listed cotton-specific standards, there are further standards available for a broader range of biomaterials. The ISCC plus and RSB are both theoretically applicable for cotton.

The ISCC standard addresses ecological and social sustainability requirements, greenhouse gas emissions savings and traceability throughout the supply chain. So far, the ISCC standard is only applied for cotton (seeds) produced in Greece and Spain. Altogether, 40 certificates have been issued (as of 21 February 2018)[6]. The RSB feedstock standard is theoretically applicable for cotton as well. It addresses 12 principles, including but not limited to human and labour rights, greenhouse gas emissions, water, conservations and land rights. According to RSB themselves, the standard is currently not used to certify cotton (as of 21 February 2018).

6 All ISCC certificates can be found online: https://www.iscc-system.org/certificates/all-certificates/

4.3. Textile certification schemes

In the course of the project, the following textile standards were chosen to be taken into account:

- Global Organic Textile Standard (GOTS)
- IVN-Best
- Fair for Life

The selection is based on a broad application and ambitious criteria of the standards. As the standards do not include own criteria regarding cotton production, they are not included in the standard evaluation in the following chapter 4.4. Instead, they were addressed in interviews with good practice companies regarding their practical experiences with different standards and certification schemes. Collected results will be published in an extra report at a later time. In the following section, a short description of the scope of the standards as well as their references concerning cotton production will be presented.

Global Organic Textile Standard (GOTS)

The Global Organic Textile Standard is managed by the International Association of Natural Textile Industry, and covers the processing, manufacturing, packaging, labelling, trading and distribution of textiles. As regards the production of cotton, the standard does not include own criteria, but requests a minimum of 70% organic natural fibres for achieving GOTS certification. It approves natural fibres that are certified “organic” or “organic in conversion” according to any standard for the relevant scope of production and which are approved in the IFOAM Family of Standards (examples see chapter 4.2). Products made of fibres which are “organic” or “organic in conversion” to a share of at least 95% can be sold, labelled or presented as “organic” or “organic in conversion”. For products with a less certified fibre content (but a minimum of 70%), the percentage of corresponding fibres has to be stated (GOTS 2017).

IVN BEST

The IVN BEST standard is also managed by the International Association of Natural Textile Industry. Comparable to the GOTS, it addresses the whole textile supply chain except the production of cotton-containing fibres. IVN certified textiles are requested to consist of 100% natural fibre, originating either in certified organic farming or certified organic animal husbandry (if relevant for the scope of production). It is promoted as being more ambitious than the GOTS (see above) (IVN BEST 2015).

Fair for Life

The Fair for Life (FFL) standard is managed by the BIO Foundation Switzerland, and allows the certification of products which are derived from either natural raw materials or materials used in handicraft. Textiles, which are certified according to the category “Fair Trade Products” must contain at least 70% certified fibres, textiles in the category “Made with Fair Trade ingredients” at least 20%. The fibres can be either certified according to the general Fair for Life criteria (not cotton-specific), or, if applicable, by the internationally recognized fair trade schemes: FLO, FairWild, SPP, Fair Trade USA, Naturland Fair (FAIR FOR LIFE 2017).

4.4. Standard evaluation

Whereas in the precious section the different standards and certificates were introduced, in this section they shall be evaluated in order to receive comparable information on the ambition levels. Generally, different standards have different scopes and focuses, resulting in varying strengths and weaknesses regarding environmental and social sustainability aspects. The aim of the following evaluation is to compare several cotton standards by means of a transparent evaluation method based on the meta standard ISO 13065 “Sustainability criteria for bioenergy” in combination with criteria given in the Renewable Energy Directive (RED 2009, see method below). Following a first screening of standards applicable for the certification of cotton, the following six standards were selected for an in-depth evaluation:

- Better Cotton Initiative (BCI)
- Cotton made in Africa (CmiA)
- Fairtrade Fibre Crops Standard (Fairtrade)
- EU organic label (example for the IFOAM Family of Standards)
- Roundtable on Sustainable Biomaterials (RSB; biomaterial standard)
- International Sustainability & Carbon Certification Plus (ISCC-Plus; biomaterial standard)

Textile certification schemes like GOTS, IVN BEST and FairForLife (see Section 4.3) are ‘umbrella standards’ that, regarding cotton criteria, require compliance with another standard from a list of referenced ones. Therefore, the applied evaluation approach is not applicable to these umbrella standards, but the referenced standards (or conservatively the referenced standard with low requirements) should be evaluated (e.g. EU organic label for GOTS and IVN BEST).

Evaluation Method

The applied evaluation method is primarily based on ISO 13065 “Sustainability criteria for bioenergy”. This international standard specifies principles, criteria and indicators for bioenergy supply chains to facilitate the assessment of environmental, social and economic aspects of sustainability. However, ISO 13065 is not a standard of its own. Rather, it defines the framework conditions in which bioenergy standards should be developed. Because ISO 13065 focusses on agricultural bioenergy production, it can also be applied to standards that certify the cultivation of cotton.

The evaluation method used here asks to what extend the criteria, as well as given examples for indicators given in ISO 13065 for environmental and social aspects, are covered in a standard. Furthermore single aspects that are covered in the European Renewable Energy Directive (RED 2009), but are missing in ISO 13065, are included (compare Table 4-2).

Accordingly, each aspect was evaluated between 0 and 100, whereby a score of 100 means that the indicators and requirements in ISO 13065 or RED 2009 are 100% fulfilled. A rating of 0 indicates, that the aspect is missing in the evaluated standard.

In addition to environmental and social aspects systematic requirements are evaluated. They cover the applied type of supply chain monitoring (see chapter 4.1), if the reliability has been proven by the EU Commission or if the standard has the membership of ISEAL[7], and to what extend data collection requirements given in ISO 13065 are covered.

[7] ISEAL Alliance is a global membership association for credible sustainability standards: https://www.isealalliance.org/

Table 4-2: Standard evaluation method: Applied criteria

Criterion	Source
Environmental aspects	
Biodiversity outside of protected areas	ISO 13065
Soil quality and fertility	ISO 13065
Soil erosion	ISO 13065
Water withdrawals	ISO 13065
Water contamination	ISO 13065
Air emission	ISO 13065
Waste management	ISO 13065
Obligation to lable GMO	ISO 13065
Additional environmental aspects from RED 2009	
Biodiversity within protected areas	RED 2009
GHG-balance	RED 2009
Land with high carbon stock	RED 2009
Social aspects	
Human rights	ISO 13065
Labour rights	ISO 13065
Land use rights and land use change	ISO 13065
Water use rights	ISO 13065
Food security	ISO 13065
Systematic requirements	
Supply chain monitoring	RED 2009
Reliability of certification systems	RED 2009, ISEAL
Requirements for data collection	ISO 13065

Source: Oeko-Institut, based on ISO 13065 and RED 2009

Results

The evaluation of the cotton and biomaterial standards is summarized in Figure 4-7.

Figure 4-7: Evaluation of cotton standards

Certification system	RSB	ISCC-PLUS	CmiA	BCI (core)	BCI (all)	EU-Bio	Fairtrade (core)	Fairtrade (all)
Version	Version 3.0 (2016)	Version 3.0 (2016)	Version 3.1 (2015)	Version 2.0 (2018)	Version 2.0 (2018)	EG 834/2007 (2007)	Version 1.1 (2011)	Version 1.1 (2011)
Product	all products	all products	cotton	cotton	cotton	all products	fibre crops	fibre crops
Geographic context	global	global	Africa	global	global	global	global	global
Particular assumptions	--	--	--	large farms, core criteria	large farms, all criteria	--	core criteria	all criteria
Systematic requirements (RED)								
Supply chain monitoring	Segregation, Mass balance	Segregation, Mass balance	Book and Claim / Content Ratio Accounting	Segregation, Mass balance	Segregation, Mass balance	Segregation	Mass balance	Mass balance
Reliability of certification systems	100	100	0	100	100	100	100	100
RED requirements								
Biodiversity inside protected areas	100	100	100	100	100	0	0	0
GHG-balance	100	100	0	0	0	0	0	0
Land with high carbon stock	100	100	0	22	22	0	0	0
Environmental aspects								
Mean value of environmental aspects	91	59	20	22	37	9	0	0
Biodiversity within the area of operation, outside protected areas	88	60	0	33	67	11	0	0
Soil quality and productivity	94	88	40	33	73	15	0	0
Soil erosion	100	100	0	17	17	8	0	0
Water withdrawals	100	38	100	42	42	0	0	0
Water contamination	88	45	0	24	57	19	0	0
Air emission	94	0	0	0	0	8	0	0
Waste management	75	83	0	6	6	0	0	0
not included in the mean value								
Obligation to lable GMO	33	100	100	0	0	100	0	0
Social aspects								
Mean value of social aspects	91	54	11	44	48	0	12	17
Human rights	100	100	0	0	0	0	0	0
Labour rights	87	100	57	63	83	0	60	83
Land use rights and land use change	100	17	0	42	42	0	0	0
Water use rights	100	22	0	17	17	0	0	0
Food security	67	33	0	100	100	0	0	0
Systematic requirements								
Requirements for data collection	83	0	0	8	8	50	0	0

Source: Oeko-Institut e.V.

The following points can be highlighted:

- The RSB certification system, originally developed for the certification of biomaterials and bioenergy, achieves very high ratings for the various requirements and aspects, with scores usually exceeding 80.
- The ISCC-Plus certification system can also be regarded as ambitious. However, there are weaknesses for individual requirements. For example, the ISCC-Plus standard is evaluated with less than 50 points for three environmental aspects (water withdrawals, water contamination, air emission) and for three social aspects (land use rights and land use changes, water use rights, food security).
- The two original cotton standards CmiA and BCI receive a rating of less than 50 percentage points for most environmental and social aspects. BCI covers almost all evaluation criteria, but only with low scores. The exceptions are food security and labour rights, where 100 and over 60 scores respectively are reached. A slightly better assessment is achieved for BCI under the assumption that not only the mandatory criteria (BCI (core)), but all criteria are met (BCI (all); the assessment was made only for the catalogue of criteria for large farms).
- Compared to the evaluation criteria, CmiA's list of criteria is not sufficiently complete, covering only biodiversity inside protected areas, soil quality and fertility, water withdraw and labour rights. In addition, CmiA uses Book and Claim (see section 4.1) only for conventional supply chain monitoring and is poorly rated for reliability, because CmiA is not a member of ISEAL.
- The evaluation of the EU organic label is comparably poor. All social requirements and the RED 2009 criteria are missing and all environmental aspects are rated below 20 scores. However, aspects such as the elimination of the use of mineral fertilizers and pesticides, on which the EU organic label focuses, are only indirectly considered in the evaluation criteria.
- The Fairtrade Fibre Crops Standard especially takes into account requirements listed for labour rights. Here, it achieves an average rating of 60 scores, if the minimum requirements are met (Fairtrade (core)). If all requirements for labour rights are considered (Fairtrade (all)), the rating rises to 83 scores. All other environmental aspects and social aspects besides labour rights are missing in the Fairtrade Fibre Crops Standard.

Interim Conclusion

In sum, it should be noted that the standardized assessment based on the ISO 13065 standard in combination with RED 2009 clearly shows that the extent to which environmental and social aspects are covered in a standard can vary considerably between different standards. The two biomaterial standards RSB and ISCC-Plus show a high degree of compliance with the requirements set out in the evaluation, showing that an ambitious design of standards is possible. Although the market share regarding the use of RSB/ISCC in the cotton sector is very low, the standards are successfully applied for other raw materials as palm oil.

In contrast, the design of the original cotton/fibre standards CmiA, BCI and Fairtraide is comparatively low according to the above-described method. These standards are setting a focus on protected areas, water withdraw (CmiA), labour rights and food security (BCI). Fairtraide, however, only covers labour rights in its certification. Thus, this label cannot guarantee compliance with any environmental or additional social criteria.

The EU organic label is evaluated with low scores for three environmental criteria and no scores for social aspects. Despite this very low performance, the practice of cotton cultivation in Ethiopia analysed within section 5 has shown that the effects of controlled organic cultivation (including certification according to the EU Organic Regulation) have very positive effects on local people and the environment. However, when applying more ambitious standards like RSB and ISCC-Plus, benefits for local people and the environment are supposed to be much higher.

The analysis of cotton and textile standards revealed, that there is a gap between the different scopes of certification: cotton standards do not address the further production process of textiles, whereas textile standards are often focusing on the part of the supply chain that are downstream to cotton production. In textile standards, the requirements concerning the production of cotton are mostly limited to the use of organic cotton, which leaves out possible additional risks, including most social risks.

4.5. Due diligence

In addition to the instrument of voluntary certification (see chapters 4.1-4.4), this chapter is about the concept of due diligence with a focus on the cotton supply chain. Generally, the concept of human rights 'due diligence' for companies that are active in international complex value chains was triggered by the UN process on "businesses and human rights" after 2005. This process in turn resulted in the "United Nations Guiding Principles on Business and Human Rights" in 2011 (OHCHR 2011). As illustrated in Figure 4-8, the basic approach of the guiding principles reflects the idea that it is no longer the only responsibility of executive institutions of nation states to protect human rights, but that also global enterprises shall respect them. Thirdly, access to remedy for affected persons shall be guaranteed.

Figure 4-8: The three pillars of the UN Guiding Principles

Source: Own illustration based on OHCHR (2011)

Based on the UN Guiding Principles (OHCHR 2011), the OECD started to develop sector-specific guidelines that describe how 'due diligence' shall be realized by companies facing human right risks in their supply chains. The first guidelines referred to the so-called conflict minerals tantalum, tungsten, tin and gold (3TG) from high risk areas in the DR Congo and neighbouring countries in 2011. These guidelines are available in their 3rd edition (OECD 2016).

In the context of the same process, in 2017, the OECD launched the *OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector* (OECD 2017). Also these guidelines are the result of a multi-stakeholder dialogue, and are intended to establish a common understanding of 'due diligence' in the sector. According to the OECD, the guidance is based on the principles, recommendations and standards contained in the OECD Guidelines for

Multinational Enterprises. It was not intended to create any additional expectations: “In relation to human rights, the guideline is intended to align with the UN Guiding Principles on Business and Human Rights (UNGPs) and the relevant ILO Conventions and Recommendations” (OECD 2017). As indicated in the name *guidelines*, the application for enterprises is voluntary.

The OECD Due Diligence Guidelines address risks and problems, which are particularly relevant for the garment and footwear sector:

- Bribery and corruption
- Child labour
- Forced labour
- Greenhouse gas emissions
- Hazardous chemicals
- Occupational health and safety
- Responsible sourcing from homeworkers
- Sexual harassment
- Trade unions and collective bargaining
- Wages
- Water
- Working Time

Regarding the proposed ‘due diligence’ process, the OECD Guidelines (OECD 2017) furthermore specify six steps to face human right risks in international supply chains of garment and footwear products:

- Embed responsible policies
- Identify actual and potential harm
- Cease, prevent or mitigate harm
- Track performance
- Communicate
- Enable remediation

In Germany, the German Partnership for Sustainable Textiles (Textilbündnis) together with members of the textile industry restructured the roadmaps that participating companies have to write (and publish, starting in 2018) according to the OECD Due Diligence Guidelines. As part of the roadmap, until 2025, the participating companies are aiming to use 75% sustainable cotton. In the context of this roadmap Fairtrade, BCI, CmiA and organic cotton will be acknowledged as sustainable cotton (see chapter 4.2).[8]

[8] According to personal communication with Dr. Ferenschild on the 30.01.2018, the standards are aligned with the “Siegelklarheit”-platform where 14 out of 18 criteria listed on the website have to be met.

Legal requirements concerning garment and footwear due diligence

Beyond voluntary due diligence, there is a certain number of legally binding instruments that refer to ‘due diligence’ requirements in the garment and footwear sector (OECD 2017):

- 2010 – California Transparency in Supply Chains Act
- 2015 – UK Modern Slavery Act
- 2016 – French Duty of Care Law
- 2016 – Dutch Covenant on Sustainable Garment and Textile
- 2017 – Update of the Tariff Act of 1930
- 2017 – Child Labour Due Diligence Bill (Netherlands)
- Australia – Moderns Slavery in Supply Chains Reporting Requirement

It is especially the interplay between these mandatory, legally binding instruments together with voluntary instruments such as certificates (see section 4.2) that is crucial for transforming the global cotton and textile markets towards more sustainability, both in terms of the environment and human rights.

5. The cotton supply chain in Ethiopia

5.1. General Information

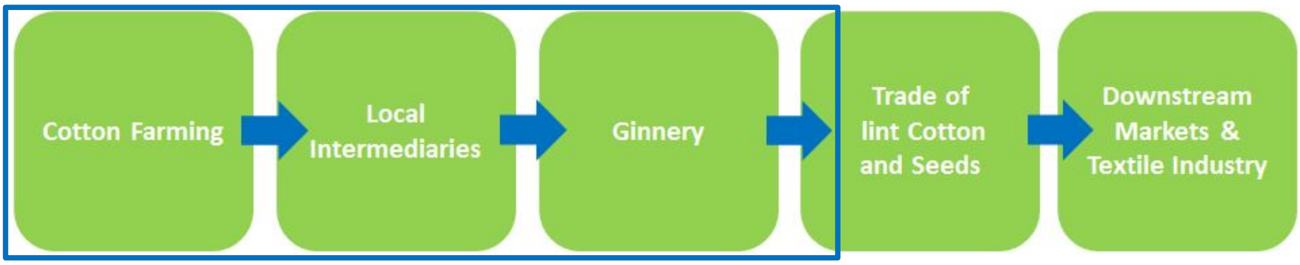
The main goal of this chapter is to summarize the findings of the Oeko-Institut project team, which were collected during a two-week field research in Ethiopia in July 2018. Although a total number of 10 very comprehensive, qualitative interviews were conducted, and most of the supply chain steps were visited and inspected thoroughly, the report does not claim to be all-encompassing.

Generally, Ethiopia is still a relatively small actor in Africa's cotton production and market. However, the estimated potential as well as average yield (lint per hectare) is very high (SOFRECO 2017). This is due to the fact that many plantations are irrigated as compared to only rain-fed agriculture in many Sub-Sahara countries. The National Cotton Development Strategy (NCDS) refers to a theoretical potential of land suitable for cotton cultivation of 3 million hectares, reflecting 10% of the world cotton cultivation in 2016/17 (SOFRECO 2017). Currently, less than 3% of this potential is under cotton cultivation.

In terms of cotton farming, there are two major types of farms: (1) smallholder farms that cultivate their own land on a very small scale (see section 5.3) as well as (2) commercial farms that are owned by private companies. In terms of farming systems, there are (1) irrigated as well as (2) rain-fed cultivation systems.

The following sections are structured according to the various process steps and stakeholders of the cotton supply chain in Ethiopia (see chapter 4.1).

Figure 5-1: Simplified supply chain of cotton and downstream markets



Source: Oeko-Institut e.V.

However, it should be kept in mind that the scope of this report rather applies to cotton than to the complete value chain of textiles in Ethiopia. Hence, the detailed description refers to the steps (1) cotton farming, (2) local intermediaries as well as (3) ginneries. The other steps further downstream of the value chain are sketched but not assessed in full detail within this report.

5.2. Policy Background

The development of the cotton sector in Ethiopia is currently one of the main focuses of the Ethiopian government. Therefore, a "National Cotton Development Strategy" (NCDS) and a corresponding roadmap have been developed, addressing the time period from 2017-2032 (SOFRECO 2017). The increasing demand for cotton is affiliated with the developing local textile industry, for which cotton is one of the most important resources. The government aims at satisfying the cotton demand of the Ethiopian textile industry by an increasing share of locally produced cotton. By today, Ethiopia is the second largest consumer of cotton in Africa (after Egypt) and a net importer of cotton lint.

Beyond that, the NCDS has a focus on increasing productivity, value addition and marketing. The vision shared by all stakeholders participating in the development of the NCDS 2017-32 is "An internationally competitive, equitable, prosperous and sustainable cotton sector contributing to economic growth of the country" (SOFRECO 2017). By 2032, accordingly, the NCDS aims at establishing a status of worldwide acknowledged cotton brand comparable to that of coffee from Ethiopia that exists already today. Hence, the strategic cornerstones of the NCDS by 2032 are:

- To improve "the policy and institutional environment to raise the efficiency and the competitiveness of the cotton value chain",
- To "increase transparency along the cotton value chain",
- To "promote and manage environmentally and socially sustainable cotton supply chains",
- To "raise the competitiveness and the profitability of cotton production",
- To "strengthen Ethiopia's focus on investment as a vector for growth and integration in the cotton value chain"

A special target of the NCDS is, by 2032, to be "among the top producers of sustainable quality cotton in the world".

According to the Ethiopian Textile Industry Development Institute (ETIDI), the aim of the Ethiopian Government to produce certified cotton is triggered by the increasing demand on world markets (Amera et al. 2018a). As many international companies which are sourcing and producing in Ethiopia are asking for certified cotton, the government has a strong interest in promoting more sustainable cotton ("pull-effect").

5.3. Cotton Production

In Ethiopia, currently around 90,000 hectares are used for the cultivation of cotton, resulting in approximately 42,000 t of raw cotton in the cotton season 2015/2016 (SOFRECO 2017). Over the next years, the production is planned to increase to 200 000 to 350 000 t (Negash & Mekuria 2018). The suitable land is spread over different areas. In Ethiopia, cotton is grown in irrigated lowlands and in warmer mid-altitudes under rain-fed farming (Hiwet n.y.). Approximately 70% of the land which is currently used for cotton cultivation is owned by commercial farms, the remaining 30% by smallholders (Belachew & Mamuye 2018). The area which is cultivated by a single smallholder has an average size of 0.5 ha (Amera et al. 2018b). The commercial farms in Ethiopia are owned privately and are much bigger in size. In 2018, the cotton sector provided a livelihood for almost 500,000 households in Ethiopia (Belachew & Mamuye 2018).

In the course of the field research, the project team was able to visit two different initiatives which are aiming to support more sustainable cotton production in Ethiopia: (1) an organic crop producer association in Gamo Gofa Zone in Southern Ethiopia and (2) the management of a ginnery, which is processing CmiA cotton in Genda Wuha, Metema area in the North-Western region.

The organic crop producer association is the result of a project which was established in 2013 and is funded by Textile Recycling Aid for International Development (TRAID)-UK. The original aim of the project was to reduce the use of pesticides in cotton production by Integrated Pest Management (IPM), focusing on alternative plant protection mechanisms. Over the last years, the project team consisting of PAN-Ethiopia employees conducted a pilot project on the effectiveness of food spray (see chapter 5.3.1) in smallholder cotton production. As the food spray was found to work effectively, and pesticides were no longer used, it was decided to aim for organic certification. In December 2017, a first share of the cotton from this project was certified organic according to the EU regulation. It is the first certified organic cotton from Ethiopia.

The Aid by Trade foundation, which is implementing Cotton made in Africa, is active in Metema in the North-Western part of Ethiopia. CmiA works together with the Ethiopian Cotton Producers, Ginners and Exporters Association (ECPGEA) which is an autonomous non-governmental, non-political and non-profit organization. As in other countries, the initiative is aiming to create a secured sales market for farmers, and to help them to increase the cotton yield per hectare by providing workshops and trainings. Furthermore, the involvement of the Better Cotton Initiative (BCI) is currently discussed. So far, either CmiA or BC can be used in a country. As CmiA excludes cotton cultivation on largescale farms, Ethiopia is aiming to produce BC cotton on the local commercial farms.

A detailed description and analysis of the impacts of the two local initiatives can be found in the following chapters.

5.3.1. Environmental aspects

The production of conventional cotton is associated with a broad range of environmental aspects. According to (Jungmichel et al. 2017), the production of cotton is the stage of the value chain with the highest environmental impacts in the categories of greenhouse gas emissions, water consumption and land use in the textile supply chain.

The Global Warming Potential (GWP) of conventional cotton, which is a result of the greenhouse gases emitted during the production, adds up to 1,808 kg of CO_2 equivalent per 1,000 kg cotton fibre (PE International 2014). The global average water footprint for cotton cultivation sums up to 10,000 l of water per kg produced cotton, including the volume of water used from surface or groundwater (blue water), the volume of rain or soil moisture (green water) and the volume of fresh water which is polluted (grey water) as a result of cotton production (Safaya et al. 2016). In regions with high water stress levels, cotton production then increases the scarcity problem. One of the most prominent examples is the Aral sea region, where a large-scale irrigation campaign for cotton production resulted in the dramatic decline of the level, area and volume of the sea (Saiko & Zonn 2000). In Ethiopia, the described risks are most relevant for the irrigated lowland fields. But also for the cotton fields situated in mid-altitudes, where rain-fed cotton production is normally possible, water security is a permanent risk. Recurrent droughts impose a great problem and make cotton cultivation difficult. Discussing risks of water stress caused by cotton production, it should be kept in mind that also alternative field crops would imply additional water consumption for the ecosystem. Currently, around 1 Mio ha are used for cotton production in Ethiopia. The Ethiopian Government has plans to increase the production of cotton over the next years, and estimates that around 3 Mio ha of land would be suitable (see above) (Negash & Mekuria 2018). If significant increases are implemented, conflicts concerning land use as well as land rights might arise.

Besides these indicators, further impacts on the environment have repeatedly been associated with the production of cotton. One of them is the use of genetically modified cotton. In most cases, a gene of the bacterium Bacillus thuringiensis is inserted. The so-called Bt-cotton is supposed to become resistant to the cotton boll worm, one of the most relevant pests for cotton (Teufel et al. n.d.). Although a short-term reduction in pesticide use can be observed, there is a renewed increase, as more problems with secondary pests occur and the cotton bollworm develops resistance over time (Tappeser et al. 2000). Furthermore, it was found that genetically modified cotton consumes at least three times more water than conventional cotton (Transfair e.V. 2009). At the same time, the use of genetically modified species always carries the risk of invasive species formation (Teufel et al. n.d.). So far, genetically modified cotton is not used in Ethiopia, but its introduction is discussed controversially on a national level. An increased competitiveness on the world market is named as main argument in favour of Bt-cotton, while the high costs for corresponding cotton seeds are seen as a major obstacle[9]. Furthermore, the necessity to buy new genetically modified seeds every year and the resulting dependency are evaluated negatively (Negash & Mekuria 2018). Although the use of crop protection chemicals on cotton peaked in the 1990s, in 2008, pesticides used for the worldwide production of conventional cotton still summed up to 7 % of the overall consumption, compared to sales for all crops. In the same year, the share of insecticides, a subset of pesticides, used for cotton production accounted for 16 % (SEEP 2010). This topic is especially critical, as some of the pesticides widely used in Ethiopia are not registered (prohibited) in European countries. It was reported that some pesticides which are listed Persistent Organic Pollutants (POPs) under the Stockholm convention are still used and produced in Ethiopia (Amera 2016). Furthermore, the production of cotton in monocultures is reported to have a negative impact on biodiversity, which offer habitats only for a few species (Teufel et al. n.d.).

The project around the established organic crop producer association addresses some of the above-mentioned aspects, and offers at least for some aspects a more sustainable alternative for the cultivation of cotton. As the use of non-registered pesticides is still common in Ethiopia, and at the same time the use of any chemical pesticide is linked to severe environmental and health problems, the project originally focused on the introduction of Integrated Pest Management (IPM). IPM does not exclude the use of pesticides, but uses them as a last option (Kechi et al. 2018). By the implementation of good farm management, the amount of weed and insect pests is kept in balance, and the use of pesticides is minimized. In the case at hand, besides further measures, a food spray trial was implemented, aiming to reduce insect pests by natural predators (beneficial insects). In the course of the project, altogether six different food sprays were tested, including different natural ingredients as maize, neem and brewers' yeast (see Table 5-1).

Table 5-1: Food sprays tested in Gamo Gofa zone in Ethiopia

Type of food spray	Ingredients	
Benin Food Spray (BFS) alone	Maize	Soap + Sugar
Benin Food Spray + Neem extract	Maize + Neem	
Ethiopian Food spray alone	Brewers' Yeast	
Ethiopian Food spray + Neem extract	Spent Brewers' Yeast + Neem	
Neem extract only	Neem	
Untreated (control)	No food spray used	

Source: Amera (2016)

9 Whereas conventional cottons seeds are sold for around 1 $ per kg, Bt-cotton seeds were reported to cost around 27 $ per kg. This means that around 25-30% of the production cost for farmers would be caused by BT cotton seeds (Negash & Mekuria 2018).

Additionally, all treatments contained soap and sugar. The soap is used to make the food spray stick to the plants, the sugar as food for beneficial insects. As a result of the investigation, it was found that, compared to the untreated fields, the ones with food spray had a significantly higher number of beneficial insects. The combination of good farm management like customized irrigation, weeding, growing maize as shelter for beneficial insects and the application of food spray increased the average cotton yield per hectare from 800 kg to 2 300 kg per hectare (Amera 2016). Figure 5-2 illustrates two examples of good farm management.

Figure 5-2: Organic cotton cultivation in Ethiopia: Making use of beneficial insects (left) and a simple test to evaluate irrigation needs (right)

Right: If the bended stem breaks, the plant needs water

Source: Oeko-Institut

As no significant difference between the effectiveness of the tested food sprays was found, the association now uses the Benin food spray, which is the easiest and cheapest to produce (Kechi et al. 2018).The effectiveness of the food spray was high enough to permit a complete renunciation of pesticides. As a consequence, the project team in collaboration with the farmer association decided to aim for organic certification. After an audit by Control Union (CU) in Ethiopia, the first farms were officially declared to produce organic cotton according to the EU regulation. In order to broaden sales options and possible markets, an additional organic certification according to the National Organic Program of the USA (NOP) is currently discussed.

Figure 5-3: The inspection of an organic cotton plantation during the field research trip

Source: PAN-Ethiopia (2018)

As a result of the organic production of cotton in Ethiopia, pesticides are no longer used, and, thanks to good farm management, less water is consumed. It was found that generally (not Ethiopia-specific), the production of organic cotton reduces emissions of greenhouse gases by 46 % in comparison to the conventional production (PE International 2014).

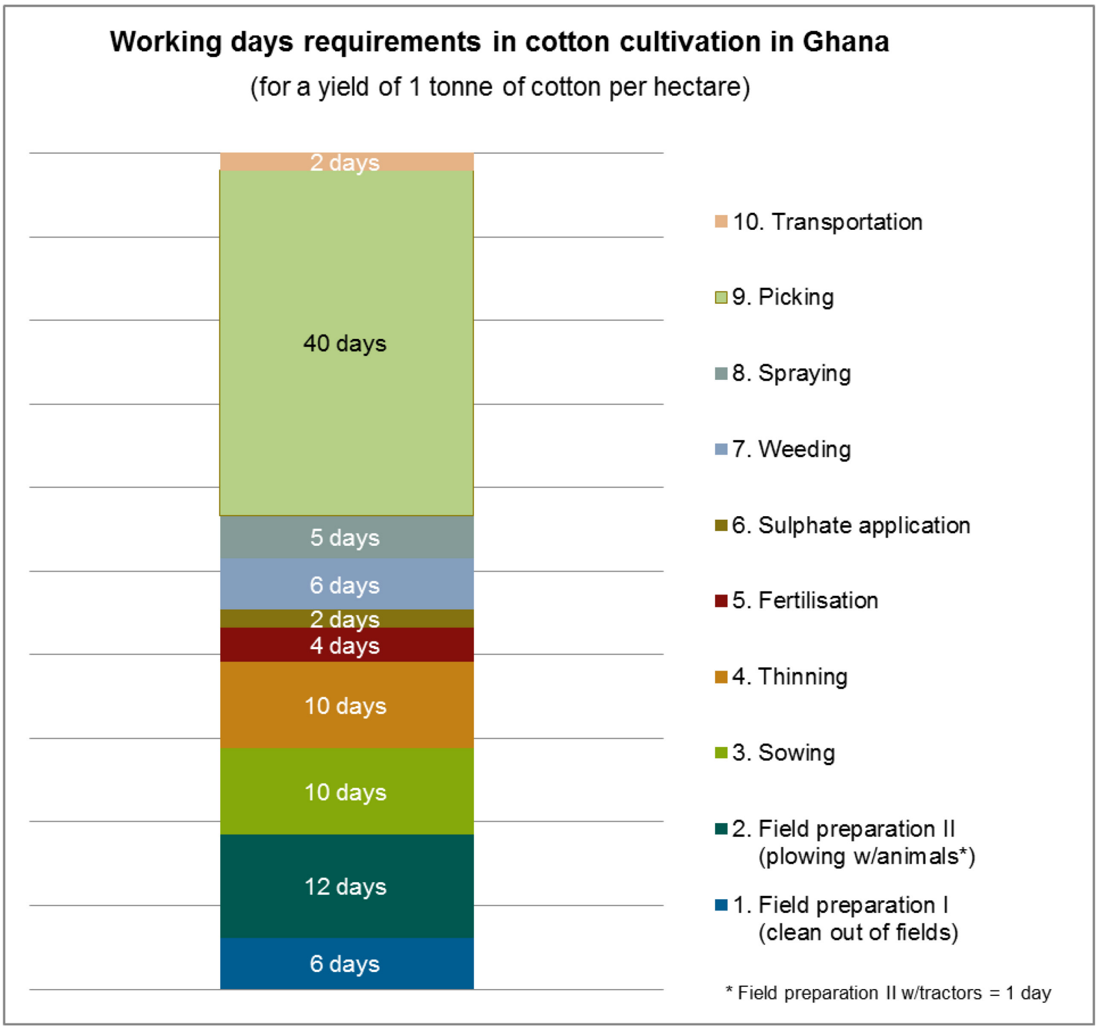
In turn, the environmental impact of the Cotton made in Africa certificate cannot be described in such detail, as a visit of the plantations and farms was not possible. Instead, an interview with the management of the Genda Wuha CMiA ginnery was conducted. CmiA does not exclude the use of pesticides, but instead focuses on the education of smallholders. Field agents are included in the projects to teach good farm management and increase the yield per hectare. In the case of Ethiopian CmiA, it was reported that 12 field agents are responsible for around 20,000 registered smallholders. The number of additional smallholders in the region, who are unregistered, is not yet included. Based on the ratio between field officers and smallholders, the effectiveness of the trainings and the reduction of negative environmental impacts can be questioned.

5.3.2. Social aspects

Cotton is one of the oldest cultivated fibre crops in Ethiopia (Hiwet n.y.), and its cultivation is seen as part of the Ethiopian tradition (Amera et al. 2018b). Being a cash crop it provides monetary income, which is why cotton production is described as a key sector for poverty reduction in Sub-Sahara Africa (Ferenschild 2014). In Ethiopia, approximately 500,000 families (at least partly) depend on the production of cotton (see above).

At the same time, the cultivation of cotton is associated with a number of negative social aspects. The above-mentioned broad use of pesticides does not only affect the environment, but also the workers and neighbouring communities. The direct contact in cotton fields has negative impacts on human health, and the leaching of pesticides and artificial fertilizer threatens groundwater reserves. At the same time, the high costs of pesticides (see chapter 2.1.5) increase the risk of financial dependency especially for smallholders. The up-front costs for pesticides, fertilizers and cotton seeds imply the risk of a debt trap, and were also reported to impose problems for farmers in Ethiopia (Amera et al. 2018b). Although the issues of forced and child labour are mostly discussed in connection with cotton production in Uzbekistan and Turkmenistan (Responsible Sourcing Network 2018), it is reported that during harvest time in Africa all capable family members help on the fields. As cotton picking is much more labour intensive than any other process in cotton cultivation (see Figure 5-4), hiring additional pickers and unpaid work exchanges with neighbouring families is common (Ferenschild 2014). By law, the minimum age for cotton pickers in Ethiopia is 18. According to local farmers, there is a chance that also younger people aged 16 to 17 are employed, as identification cards are normally not checked for the hiring process (Amera et al. 2018b). Cotton pickers, as all seasonal workers, are especially vulnerable to bad working conditions and low wages because there is no national minimum wage level in Ethiopia.

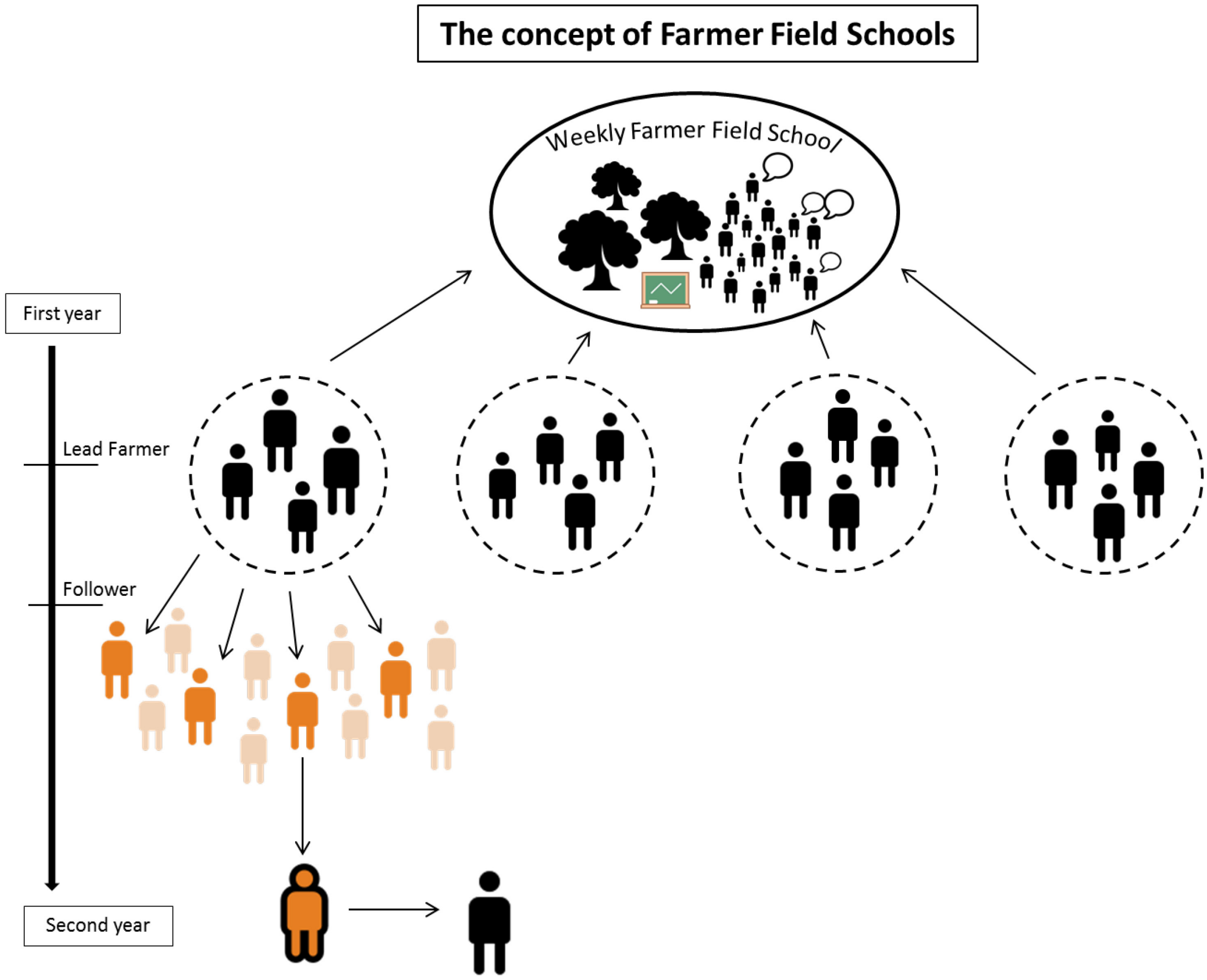
Figure 5-4: Working days requirements in cotton cultivation in Ghana



Source: Own depiction based on data from Ferenschild (2014)

The introduction of the organic association in the Gamo Gofa region was found to improve the situation of cotton farmers in many points. The most obvious one, and the one originally targeted in the project, is the reduction of health problems. Within the project the positive impact was confirmed, and farmers were reporting a significant improvement (Amera et al. 2018b). The replacement of pesticides, based on the introduction of an Integrated Pest Management, is implemented by Farmer Field Schools (FFS). During a close cooperation for one cotton season, the FFS are used to secure participation of many smallholders in the conduction of field studies. Therefore, several groups of lead farmers test farm management practices (including food sprays) and discuss their observations and results amongst themselves. In a weekly meeting, all participating lead farmers come together and exchange their experiences in a guided discussion with agronomic experts. The lead farmers, which are directly involved in the weekly process, share their knowledge with so-called "followers", often during informal events in their villages (e.g. coffee ceremonies). As a result, a greater number of farmers become involved, and often previous followers become lead farmers in the next year (see Figure 5-5).

Figure 5-5: The concept of Farmer Field Schools



Source: Oeko-Institut

In order to include illiterate farmers as well, a lot of pictures are used during FFS (see Figure 5-6). The effectiveness of different food sprays is monitored by counting beneficial and pest insects, each farmer bringing a maize corn for beneficial insects, a small stone for pests.

Figure 5-6: Organic crop producer association – showing some posters from Farmer Field Schools

Source: PAN-Ethiopia (2018)

Within the cooperative, the vulnerability of cotton pickers is addressed as well. Whereas normally a constant wage is paid for one picking season, the cooperative introduced increasing wages for the picking periods on one field. As the lowest cotton bolls mature first, followed by the middle and upper ones, there are normally three picking periods which approximately last for 2-3 days (see chapter 2.1.4). Within the cooperative, the average local wage is paid for the first picking period. When the same pickers come back for the second and third picking period, their wage is increased each time. According to the project management, these increases are not high enough to result in a significant improvement for the seasonal workers.

As already mentioned for environmental impacts, it was also not possible to reconstruct the social impact of Cotton made in Africa in detail. It is assumed that the mediated education by the very few field officers does not allow for comparable empowerment as described for the FFS.

5.3.3. Economic aspects

Over the last years, the economic relevance of the textile sector in Ethiopia, including cotton production, continuously increased. Rising wages and production costs in other countries have resulted in an increased interest in establishing necessary infrastructure and production sites in Ethiopia. Compared to other textile producing countries as Bangladesh and Myanmar, average wages in the Ethiopian textile sector were found to be only one third as high as in the previously mentioned countries (Anner 2015) (SOMO, ARL, LRDP 2017). At the same time, the government is actively supporting investors and the ongoing development of the sector in Ethiopia.

The increasing local demand for cotton is also affecting the prices for cotton farmers. Whereas it was reported that, a few years ago, cotton cultivation was not economic for smallholders and that many farmers shifted to other fruits, it became economically more and more attractive during the last years (Amera et al. 2018b). Still, the high up-front costs for cotton seeds, fertilizer and pesticides (in case of conventional farming) present a major obstacle for smallholders. The threat of a debt trap is reported for cotton farmers from various countries, and also the members of the Organic Crop Producer Association in Arba Minch experienced price dumping by “middle men”, who lent the necessary investment capital at the beginning of a cotton season (see section 5.4). Additionally, the fluctuating world market price represents a financial risks for farmers, as in East Africa the price paid for cotton is mostly not fixed prior to harvest and is therefore affected by volatile markets (Ferenschild 2014).

Thanks to the foundation of the Organic Crop Producer Association, a part of these risks could be eliminated. The members of the association were able to obtain an official government loan for the necessary up-front investments, including transparent and fixed payback rates. Furthermore, selling the cotton as a group allowed for a better position in price negotiations (Amera et al. 2018b).

During the certification process, from a farmer’s perspective, the conversion period from conventional cotton farming to organic cotton production is economically challenging. This period can be difficult, as farmers do not yet obtain premium organic prices for their crops, while the productivity of cotton fields in conversion usually drops compared to the conventional production before (Textile Exchange 2018b). In the case of the Organic Crop Producer Association in Arba Minch, no significant drops were reported for the conversion period[10] (Amera et al. 2018b). It is assumed that, thanks to the introduction not only of Integrated Pest Management, but also of good farm management practices in the course of the project, the farmers were able to avoid the losses that normally occur. In the case at hand, they experienced problems finding a buyer for the organic cotton in the first year. The association stated that, at present, there is no local demand for organic cotton in Ethiopia, and thus had to find a trade partner selling to the international market. An interview with the management of a local textile factory confirmed that, at the moment, the local textile supply chain does not (yet) demand certified cotton (Mamo 2018).

According to several experts[11], the introduction of suitable seed varieties would offer an additional opportunity to improve the economic situation of cotton farmers in Ethiopia. According to their judgement, old seed varieties, which are currently used by Ethiopian conventional and CmiA farmers, are responsible for a relatively low yield per hectare. The seeds would not be suitable for the local conditions (including weather, soil etc.), which is why a shift to cotton seeds that are more suitable for the growing conditions would allow for additional yields.

On an international level, a revision of subsidies could improve the situation of Ethiopian cotton farmers (see chapter 3.2). According to different estimations, the cotton world market price would be 10-13% higher without the US American and EU cotton subsidies. At the same time, Chinese and Indian cotton subsidies, the low competitiveness of ginning factories in Africa, the importance of currency fluctuations and the increasing world production have an impact on the cotton price which is not negligible (Ferenschild 2014).

[10] As the association experimented with food spray and did not use pesticides for a few years, there was no official conversion period once they applied for organic certification.

[11] Such as Tina Stridde, Managing Director of CmiA, personal communication 11.01.2018

5.4. Local intermediaries ("middle men")

The prices paid by cotton traders and processors are ideally determined by the end-use suitability of cotton, estimated by the following parameters: length, strength, fineness, colour, and lack of foreign matter (Calhoun & Bowman 1999). However, field research in Ethiopia in July 2018 revealed that, in many cases, cotton smallholders do not have direct access to downstream markets such as ginneries or further trade activities of lint cotton or seeds. Instead, they sell to local traders ("middle men"), which in turn have access to downstream actors.

In the Amhara Region, for example, one ginnery was certified according to Cotton made in Africa (see section 5.5). In this context, it was reported that the ginnery offered a price of 21 ETB/kg to smallholders. In 2017, the smallholders decided to sell their harvest at 19 ETB/kg to local intermediaries (also called "middle men"), which they had supplied for many years (Tadele Mengist 2018). Hence, not only the price, but also long-term trade relations between farmers and local traders are decisive factors for trust and trade relations.

Furthermore, it was reported that the smallholders typically sell their harvest to a local union acting as a "middle men" at prices of about 5-6 ETB. Hence, in the year 2017 already, smallholders in the Amhara Region generated an additional added value of 13-14 ETB/kg. In the long run, it was reported that smallholders try to organize themselves in associations in order to gain direct access to ginneries. This would allow them to realize increased value added at the first step of the value chain by bypassing local traders and other intermediaries (Tadele Mengist 2018).

In the context of economic dependencies of smallholders, it was repeatedly reported by smallholders that the major problem refers to the monetary liquidity of smallholders. Thus, the basic role of local intermediary traders and middle men is to provide credits to smallholders, which enable them to make up-front investments like purchasing seeds. The credits, however, are related to very poor purchase prices for cotton in the harvest season. Hence, the very profitable business model of middle men refers to the intertemporal necessity of liquidity of smallholders that does not give them sufficient bargaining power. Forward contracts with fixed prices of 5-6 ETB per kilogram of raw cotton leads to strong economic dependencies and a vicious circle.

5.5. Ginning

5.5.1. Arba Minch Ginnery

Ginning represents the mechanical process where raw cotton is separated from cotton seeds that are part of the cotton harvest. Hence, the output of a ginnery is (1) lint cotton on the one hand and (2) cotton seeds on the other hand. Within the context of the field research carried out in Ethiopia in July 2018, the team was able to visit one ginnery in Arba Minch that is described in the following in order to provide key data in a representative way.

The visited cotton ginnery is a saw ginnery (see Figure 5-7) that was installed in 1991. The manufacturer, Lummus, still is "the world's leading supplier of machinery and replacement parts for the cotton ginning industry"[12]. The ginnery was manufactured in the USA and initially exported to Cuba, then forwarded to Ethiopia (Mr. Mekoya 2018).

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[12] http://www.lummus.com/about/

Figure 5-7: Ginnery in Arba Minch

Source: Oeko-Institut

According to the manager (Mr. Mekoya 2018), the key data of the ginnery are as follows:

- The produced shares by weight are: 37% lint cotton, 58% seed cotton and around 5% waste.[13]
- Ginning service costs are between 175 and 200 Birr to gin 100 kg of raw cotton.
- Operating capacity of the ginnery is 800 kg lint cotton per hour.

Typically, cotton harvest in Arba Minch starts around the end of October and is carried out throughout November. At the ginnery, the arriving harvested cotton is first stored in a feeding room, as the ginnery should always run at 100% capacity (see Figure 5-8).

Figure 5-8: Storage of cotton at the Arba Minch Ginnery

Source: Oeko-Institut

[13] The produced waste (leaves etc.) is used as fertilizer for the banana plantations and vegetables.

Once enough cotton has been collected, the ginning process is started around December and continued throughout several months. The cotton seed is either sold for the production of oil or is used as seed for new cotton fields for the next season. In order to prepare the seeds for plantation, they are treated with sulfuric acid at a proportion of 100 kg of cotton to 5 litres of sulfuric acid. In the following, the seeds are separated in a water barrel. According to one employee, the sulfuric acid and the water are left out in the sun for evaporation.

Figure 5-9: Cotton baler and weigh at Arba Minch Ginnery

Source: Oeko-Institut

The output lint cotton is mechanically baled and weighted for further sale and transportation. For more information on ginneries in Ethiopia regarding technologies, quality and volumes see (SOFRECO 2017).

5.5.2. Genda Wuha and Chagni Ginnery

Beyond the ginnery visited in Arba Minch, the research team could interview the CEO of two ginneries operated in the Amhara region, North-Western Ethiopia. However, the ginnery could not be visited. The Genda Wuha Ginnery is the only CmiA certified ginnery in Ethiopia.

The following key data were provided by the Genda Wuha Ginnery in North-Western Ethiopia:

- The capacity of the ginnery is 20,000 t of raw cotton per year
- Cotton is received and transported from 20,000 farms in Metema area, Amhara region
- Staple length of the received cotton is max. 27 mm
- Costs for the CmiA certificate are 5,000 ETB per year

According to information from Mr. Tadele Mengist (Tadele Mengist 2018), the general manager of the CMiA certified Ginnery in Genda Wuha, the first problem the ginnery is facing in the daily business with regards to certification is the poor traceability of the cotton. The identity of the farms cannot be guaranteed, which would make an Identity Preserved (IP) system impossible. Secondly, the ginneries are faced with considerable costs while cleaning the ginnery for certified cotton. Altogether it takes a ginnery around 5 hours to clean the machines from conventional fibres before certified cotton can be ginned. Finally, the ginnery is faced with contradicting information regarding the amount of certified, ginned cotton. The officially reported amount of 1,500,000 metric tons (MT) of CmiA certified cotton per year is much higher than the own ginning capacity.

Furthermore, the CmiA approach focusses on training cotton smallholders in the region. However, it is reported that, for a total number of 20,000 smallholders, the certification scheme only provides a number of 12 trainers (see also chapter 5.3.1 and 5.3.2). In light of this proportion that implies very little training resources, an effective training with regards to quality, harvest, yield and environment can be questioned (Tadele Mengist 2018).

5.6. Trade of Lint Cotton & Downstream Textile Industry

According to Tadele Mengist (2018), the price for ginned cotton sold at the CmiA ginnery is 50 ETB/kg. In the case of the Ginnery in Genda Wuha, the lint cotton is sold on international markets. Thus, all outputs are sold to the Swiss based cotton trader Paul Reinhart AG, Winterthur, Switzerland (see also section 3.3). Typically, such prices of the lint cotton are too high for the Ethiopian Textile Industry, and certified cotton is not used for local production (Mamo 2018).

However, lint cotton is also entering into the downstream textile industry in Ethiopia (which is actually the aim of the current National Cotton Strategy (see section 5.2). As the industry is directly linked to the commodity cotton in Ethiopia, the research team visited two factories (Arba Minch Textile Factory and Bahir Dar Textile Factory). In simple terms, the following steps of the value chain in these two factories are (1) spinning, (2) weaving, (3) dying and printing and finally (4) finishing. They are briefly sketched in the following.

Spinning

Spinning is the process during which lint cotton is further processed into yarn (see Figure 5-10).

Figure 5-10: Mechanical Spinning in the Bahir Dar Textile Factory

Source: Oeko-Institut

The process is highly mechanised. The related machines at the Bahir Dar Textile Factory were mostly manufactured by Sulzer AG, Switzerland. Two steps of manufacturing could be observed: (1) regular yarn (see Figure 5-11) on the left side and (2) yarn of higher tear resistance (see Figure 5-11) on the right side.

Figure 5-11: Yarn as output of the spinning process at the Arba Minch Textile Factory

Source: Oeko-Institut

In the following step, the resulting yarn is winded on big rollers (see Figure 5-13, left side) and treated with starch in order to make it more resistant for the weaving process (see Figure 5-13, right side).

Figure 5-12: Preparatory processes for Weaving

Source: Oeko-Institut

Weaving

The following weaving process interlocks the yarn in order to produce cotton sheets (Figure 5-13).

Figure 5-13: The weaving process

Source: Oeko-Institut

Dying & Printing

After the cotton sheets have been weaved, they are coloured and printed (see Figure 5-14).

Figure 5-14: Dying & printing at the Bahir Dar Textile Factory

Source: Oeko-Institut

Finishing

Finally, the printed and dyed cotton sheets are finished to bedsheets in three shifts, eight hours each, at the Bahir Dar Textile Factory (see Figure 5-15).

Figure 5-15: Finishing of Bedsheets at Bahir Dar Textile Factory

Source: Oeko-Institut

Again, it shall be highlighted that a more detailed assessment of this textile value chain from spinning to finishing is outside the scope of this report. Accordingly, occupational health and safety issues as well as an environmental impact assessment are not considered here.

6. Good practice downstream company examples

6.1. Gebr. Elmer & Zweifel GmbH & Co. KG (E&Z), Bempflingen/Germany

6.1.1. Background

Elmer & Zweifel is a textile company whose headquarters are based in Bempflingen, Germany. E&Z was founded in 1855 and has been working along different steps of the textile supply chain. The company has its own weaving mill which was established in 1993 and is situated in the Czech Republic. Furthermore, it produces and sells fabrics and (cotton) textiles under their brand name Cotonea.

Ecological and social issues have a high priority within the company, which, among other things, is reflected in their supply chain management. E&Z knows all stakeholders in their supply chain, starting with organic cotton associations in Kirgizstan and Uganda. Long-term business relations existing since 2005 and 2009, secured supply contracts as well as regular visits in the growing regions characterize the raw material sourcing strategy of the company. In the following, the cotton is processed in Germany, Turkey and the Czech Republic. The textiles get exclusively bleached and printed in Germany and Switzerland, and are mainly sold on the European market.

Altogether, the company employs 65 people and has an annual turnover of 7 mio €.

6.1.2. Cotton certification

E&Z uses several standards to cover the products of their portfolio. If possible, the IVN BEST certificate is used to verify the integrity of their supply chain. Besides other criteria, the standard requests 100% organic cotton, which E&Z buys from the above-listed associations in Kirgistan and Uganda. Due to specific accessories or material compositions, some products cannot be IVN BEST certified. For these products, GOTS certification is used. As both of these standards have a focus on ecological issues, E&Z additionally uses Fair for Life (FFL) certification to verify their social engagement throughout the supply chains. For the past eight years, all of their products have been FFL certified, even though the FFL labelling of E&Z products only has started this year.

6.1.3. Experiences with certificates

According to the company’s information, E&Z uses the above-mentioned certifications to support the standards in order to verify the company´s claims and to gain credibility.

In general, E&Z highlights that the foundation of cooperatives is a very effective instrument for the support of cotton farmers. Firstly, cooperatives allow groups of farmers to be certified, who, in most cases, would not be able to handle the certification process by themselves. Secondly, the foundation of a cooperative offers easier access to education and also fair and transparent credits for the yearly up-front investment costs in cotton seed or other necessary expenses. It can be argued that the establishment of cooperatives implies many advantages not only for fair trade, but also for organic farming. The list of examples includes, but is not limited to, better access to organic cotton seeds or local ownership in the case of projects funded through premium payments.

As E&Z's practical experiences have shown, it is an advantage if a certification can be issued by several institutions, as the resulting competition increases the quality of auditing and certification processes.

At the same time, E&Z reports on considerable expenditures for the certification process itself, in both temporal and monetary terms. In some cases, the costs for certification would exceed the premiums, which are paid to local farmers or workers, by factor ten. E&Z sees a great need to improve this disproportion and to increase the benefits in the production countries. In E&Z's view, a main problem with regard to certifications lies in the susceptibility to fraud. Therefore, E&Z stresses the importance of active engagement in supply chains. Companies should not rely on certificates themselves, but should always seek to get a first-hand impression of the situation throughout their supply chains. Currently, certification standards often address just a small part of the supply chain, or focus on either social or ecological aspects. E&Z advocates the introduction of a standard which addresses all steps along the textile supply chain. At the same time, they recommend the implementation of criteria regarding the quality of products as one important step to further increase the durability and thereby sustainability of textiles. E&Z reports about a steady deterioration of the textile quality in the German mass market due to a lack of standardized requirements. The price-driven market also represents a main obstacle for the overall effectiveness of certifications. Because of the focus on prices, standards have very little effect on consumers' buying decisions. This implies very limited options to establish new sustainable business models, and represents one of the major obstacles for companies like E&Z at the moment.

6.1.4. Activities beyond certification

As indicated above, E&Z does not rely on certifications according to different standards, but has established a rather integrated supply chain over the last years. Although not all of the suppliers and processing companies are directly included within the company, they are all known to E&Z. The direct and personal connection allows E&Z to monitor their supply chain very effectively, and thus to identify and address problems without complex due diligence tools. According to E&Z, this process was very time-consuming and it has been a high risk for the company to find suitable solutions through adopting a trial & error approach.

From their point of view, predefined methods and costly proof processes for due diligence in textile supply chains are not suitable for most small and medium-sized companies; instead these should rather be designed according to the capacity and characteristics of the individual company.

E&Z supports the empowerment of smallholders through the establishment of organic cotton associations. In their case, the farmers are not only paid the predefined organic premium, but are provided with the organic seed cotton in each cotton season. According to E&Z, this kind of support exceeds the premiums requested for Fairtrade cooperatives. E&Z recommends the establishment of cooperatives also for other regions in order to be able to withstand the price pressure of the textile industry, especially from Asia. Thanks to the underlying principle of cooperatives, local ownership is now developing, and supportive measures for investment in education and healthcare could be established.

Based on the information above, E&Z was selected as one of the good practice examples for sustainability in the supply chain of cotton.

7. Conclusions & Outlook

Cotton is one of the most decisive commodities for the development of Ethiopia's economy in the years to come. Already today, numerous smallholders, farmers, seasonal cotton pickers and employees in the downstream textile industry strongly depend on cotton for their income. Against this backdrop the Ethiopian Government has launched a "National Cotton Development Strategy" (NCDS) for the development of the sector from 2017 to 2032 (see chapter 5.2) including a robust growth of both, cotton production as well as the development of an integrated Ethiopian textile value chain from the field to the end product.

However, there are various pathways for the country to realize this vision. The cultivation of cotton is connected to various complex agronomic characteristics (chapter 2.1), making it a special challenge to increase yields (chapters 2.2 and 5.3) and improve the quality (chapter 2.3) on the one hand while, on the other hand, minimising the environmental (chapter 5.3.1), social (chapter 5.3.2) and other economic (chapter 5.3.3) risks for smallholders and other cotton farmers.

In this context, this study focuses especially on the evaluation of cotton certificates and due diligence schemes (chapter 4). The analysis showed that there are ambitious standards for biomass (e.g. RSB/ISCC)[14] that could be used for cotton cultivation, however, whose market shares are currently very low. On the other hand, there are less demanding standards, such as the CmiA approach, that are used in Ethiopia, however, whose local impact can be questioned today.

With regards to the second standard currently applied in Ethiopia, the EU organic regulation at first sight only covers very few environmental criteria (e.g. use of pesticides) and no social criteria beyond (chapter 4.4). In light of the environmental hot spots in cotton cultivation, however, the study revealed that, especially with regards to the way of pesticide use, the pilot project on organic cotton certification in the Gamo Gofa region in Ethiopia showed highly promising results (chapter 5.3). Beyond the environmental effect of pesticide-free farming methods, better health conditions of local farmers were achieved.

Additionally, another important ecological hot spot was addressed in the course of the project. Currently, the irrigation of cotton plants is optimized by the means of simple farm management techniques (chapter 5.3.1). The installation of modern, efficient irrigation systems should be discussed in light of recurring droughts, and also as a possible opportunity of further increasing cotton yields.

Furthermore, on the social level, the foundation of a cooperative for organic cotton farming in the region showed that the livelihood of smallholders could be improved substantially. This success case is mostly due to the application of an education approach called "Famer Field Schools" (FFS). As shown in section 5.3, Farmer Field Schools are based on a long-term participatory education system (rather than short-term training) where smallholders meet each other on a regular basis for an exchange of experiences together with agronomic experts on cotton cultivation in the field. Furthermore, first generation "scholars" (lead famers) are carrying out their convictions and learnings to other farmers in the region and create a considerable multiplication effect. Generally, the smallholders are free to decide on their cultivation method such as the use of seeds and pesticides. However, as innovative organic approaches (in particular the food spray method, see chapter 5.3) of cotton cultivation succeeded in the region, yields could be increased up to 2,300 kg/ha at very high sales prices of 45 ETB/kg (~1.40 €) of the cooperative. Against this backdrop, farmers partici-

[14] However, both standards are successfully applied for other feedstocks. One example is certified palm oil use for biofuels and as raw material in the chemical industry. In principle, therefore, high-quality standards can also be increasingly used for the certification of cotton. Rather, there are other barriers to this, such as limited experience or higher costs in the absence of additional income.

pating in the Farmer Field Schools, within the project in Gamo Gofa, have completely discontinued the use of pesticides and became organic certified.

Apart from the above-listed environmental, social and economic advantages, the analysed organic cotton pilot project in Gamo Gofa (see chapter 5.3) succeeded in obtaining access to the cotton markets further down the supply chain and to work without the middlemen that had been involved in the past (compare chapter 5.4) and who offered very low cotton prices. In particular, it was reported that smallholders before were at risk of lacking short-term financial resources. This could trap them in a vicious cycle of dependencies of middlemen leaving them with the only option to accept poor credit terms reflected by very low cotton prices. Here, the study shows that the foundation of the cotton cooperative had a strong social impact on the smallholder communities by empowering them to negotiate better prices and cut out middlemen.

Altogether, for the case of Ethiopian cotton cultivation, it could be shown that sustainable development in the cotton sector is possible in light of growing yields by giving up the use of pesticides and empowering social cotton smallholder communities. In this context, the special role of the foundation of cotton cooperatives is to be highlighted, also in the light of the good practice examples experienced by downstream companies (see chapter 6).

Regarding the general role of certification schemes and due diligence for Ethiopia's development of the cotton sector, the analysis of chapter 4 showed that more ambitious standards beyond the EU organic regulation could be used. However, in order to obtain a comprehensive overview, it is necessary to assess how high the overall benefit of a standard can be rated. At first sight, a too ambitious standard that is not demanded or applied on the markets might not have any effect. Nevertheless, ambitious standards show how sustainability requirements can be sensibly designed and thus, set a proper benchmark at which even weaker standards can orient themselves in the event of a revision.

The EU organic certification, a standard described as minimum organic standard (see 4.2), focuses exclusively on ecological issues. However, in combination with other certifications (e.g. Fairtrade) or the foundation of a strong smallholder cooperative (such as in the case of the Gamo Gofa organic cotton cooperative near Arba Minch) social issues can be addressed additionally.

Furthermore, the analysis of cotton and textile standards (see sections 4.2 and 4.3) revealed a gap between the different scopes of certification. As criteria regarding cotton in textile standards are mostly limited to the use of organic cotton, social aspects as well as more ambitious requirements regarding the production of cotton are currently not reflected in textile standards.

Finally, it shall be highlighted that only a dynamic interplay of voluntary certificates and standards together with a broad set of other institutional instruments (e.g. foundation of cooperatives), regulations (e.g. ban of certain pesticides by law) and economic instruments (e.g. innovative business models) has the potential to shape the Ethiopian cotton supply chain towards sustainability.

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