



COTTON

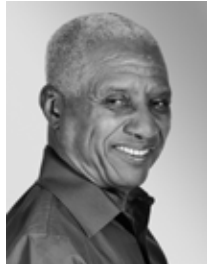
Export Market Potential for Smallholder Farmers in Haiti



smallholder
farmers
alliance



DEDICATION



Gérard Nozine

1946 - 2016

This study is dedicated to one of its three principle authors, Gérard Nozine, who passed away prior to publication.

An agronomist by training, Gérard 's professional life was in service to Haiti's agricultural community. Early in his career he was involved in cotton—both growing it and providing various forms of support to other farmers who were growing it.

Gérard had an encyclopedic memory of what many thought to be the lost legacy of cotton production in Haiti. Now his own legacy will include an invaluable contribution to reintroducing cotton to once again become an important cornerstone of the country's agricultural community.

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This is an independently drafted study and consequently all views expressed are those of Impact Farming and do not necessarily represent the views of the study's sponsors.

ACRONYMS

- ABRAPA** Brazilian Cotton Growers Association
- AbTF** Aid by Trade Foundation
- BCI** Better Cotton Initiative
- BCSS** Better Cotton Standard System
- CIRAD** International Cooperation Centre of Agricultural Research for Development
- CmiA** Cotton made in Africa
- CNCRC** China National Cotton Reserves Corporation
- COMPACI** Competitive African Cotton Initiative
- COAPCL** Chetna Organic Agriculture Producer Company Ltd
- COROS** Common Objectives and Requirements of Organic Standards
- CRDC** Cotton Research and Development Corporation
- FAO** Food and Agriculture Organization of the United Nations
- FiBL** Swiss Research Institute of Organic Agriculture
- FLO** Fairtrade Labeling Organizations International
- FT** Fairtrade
- GADC** Gulu Agricultural Development Company
- GHG** greenhouse gas
- GIZ** German Agency for International Cooperation
- GOTS** Global Organic Textile Standard
- ICAC** International Cotton Advisory Committee
- ICCO** Interchurch Cooperative for Development Cooperation (Netherlands)
- LDCs** Least Developed Countries
- IDH** Sustainable Trade Initiative (Netherlands)
- IFOAM** International Federation of Organic Agriculture Movements
- ILO** International Labor Organization
- IPM** Integrated pest management
- ITC** International Trade Center
- NCC** National Cotton Council of America
- NORAD** Norwegian Agency for Development Cooperation
- NPMi** Non-Pesticide Management Initiative
- OE** Organic Exchange
- OECD** Organisation for Economic Co-operation and Development
- SIDA** Swedish International Development Cooperation
- TE** Textile Exchange
- UN** United Nations
- WTO** World Trade Organization
- WWF** World Wild Fund for Nature

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EXECUTIVE SUMMARY



Cotton was once the fourth largest agricultural export from Haiti before it all but disappeared by the late 1980s. Its demise was due largely to external pressures and internal politics, not climate or environmental concerns.

This study begins with a global overview of cotton production and markets, and then sets out to address three fundamental questions:

- what are the current best practices in the production of sustainable smallholder-grown cotton?
- why did cotton production stop in Haiti and what are the key lessons from that experience?
- is it feasible to reintroduce cotton to Haiti by building on the sustainable, smallholder-driven agroforestry model developed by the Smallholder Farmers Alliance (SFA)?

The social and economic importance of cotton on a global scale is self-evident: it is grown on approximately 33 million hectares (2.5% of global arable land) in over 75 countries with more than 250 million people involved in its production and processing. Sixty percent of the world's cotton is grown in developing countries by, among others, more than 100 million smallholder farmers whose livelihoods and wellbeing depend on the crop.

Conventional cotton production has traditionally relied on highly intensive farming methods. Consumer and manufacturer con-

cerns about the resulting pollution and its contribution to climate change have led to several standards being developed in order to improve sustainability in the cotton sector. Key among these are 1.) Better Cotton Initiative (BCI), 2.) Cotton Made in Africa (CmiA), 3.) organic cotton, and 4.) Fairtrade cotton, with BCI being by far the largest in scope.

Along with the development of sustainability standards in the cotton sector, demand for more sustainable cotton has seen a strong increase: major brands and retailers like Adidas, C&A, H&M, IKEA, Nike and Timberland have committed to sourcing 100% of their cotton from more sustainable sources by 2020. On the production side, supplies of more sustainable cotton have increased significantly in the last few years, reaching unprecedented volumes and accounting for about 8% of global production in 2014 (projected to be around 13% in 2015).

Market pressure for sustainable cotton has coincided with significantly increased awareness and support for smallholder farming in developing countries—across all categories of agriculture—in recent years. As a result there is an unprecedented body of new best practice experience from smallholders in Africa and Asia who are producing cotton in a more environmentally friendly and ethical way.

Most of these new best practices aim to lower or eliminate completely the use of chemical pesticides and at the same time decrease farmers' dependence on other costly inputs. They

also seek to improve working environments and improve health issues commonly associated with conventional cotton production methods. The organic approach in particular is interesting for smallholders as it relies on an integrated approach that uses locally available inputs, incorporates natural methods to control pests, and requires less water. Other best practices not specific to cotton, but widely used by smallholders, include soil fertility management, crop rotation and intercropping, utilizing green manure to build soil, and pest control regimens that use locally available, natural resources.

Despite promising growth, the market for sustainable cotton is still facing several challenges. Principle among these is that the gap between purchase and supply is widening as production grows faster than demand. The result is that the bulk of sustainable cotton ends up on the conventional market. Another big problem is that a large part of more sustainably produced cotton is not properly traced throughout the value chain: only 17% of all sustainably farmed cotton is actually traded and recognized as sustainable cotton at the consumer end of the value chain. The remaining 83%, as a consequence of poor traceability, gets mixed and “lost” with regular cotton.

So why consider reintroducing cotton to Haiti? In summary, there are six principle reasons:

- there is an opportunity to build an entirely new farming model that incorporates the recent body of developing country best practices—including adjustments for climate change—that address smallholder cotton cultivation;
- this new model can incorporate the social enterprise principles already developed by the SFA over the past seven years, including creating a cotton value chain that maximizes efficiency and benefits smallholder farmers;
- by starting from scratch, the model can be designed so that the training, support and research system for cotton is based on combining production for export and local markets through an emphasis on a combination of rotation and intercropping;
- the fact that cotton grows well in Haiti (noting that changes in rainfall and temperature there are within the range of those faced by best practice examples from Asia and

Africa) and there are large numbers of smallholder farmers interested in cultivating this crop again;

- the reality that most farmers in the country are already organic by default, and so certification will not be as onerous as on chemically-treated land; and
- with the introduction of 3 anchor operations of 500 smallholder farms each, and with a conservative projected catalytic impact of 5,000 additional farms per operation, the projected output within 5 years could be 8,185 US tons annually (based on a maximum of half of any one farmer’s land being assigned to cotton) with a total value conservatively estimated at between US\$11.5 million and \$14.3 million depending on market fluctuations and organic vs conventional.

It is the conclusion of this study that the reintroduction of cotton to Haiti is a viable agricultural and economic proposition if undertaken by smallholder farmers and balanced by consideration of a set of recommendations outlined in detail on page 64 and summarized here:

- utilize an integrated social enterprise model;
- start with purchase orders;
- support women farmers;
- develop a brand;
- establish exporting and marketing capacity;
- go organic;
- balance export and local crops;
- use centralized ginning;
- explore additional cotton processing capacity;
- partner with Ministry of Agriculture;
- enlist best practice advisors;
- build local research capacity; and
- incorporate tree planting.



CHAPTER 1: International Cotton Production and Trade

Introduction to Cotton

Varieties: Cotton (*Gossypium*) is a shrub that belongs to the mallow (*Malvaceae*) family like okra and hibiscus. There are four species of cotton that are grown for commercial purposes:

- *G. hirsutum*: also known as “upland cotton”, is a high-yielding variety with long fibers, native to Central America, the Caribbean and Southern Florida.
- *G. barbadense*: also known as “extra-long staple (ELS) cotton”, “creole cotton” or “sea island cotton”, is very demanding in terms of irrigation and climatic conditions and only grows in a few countries (e.g. in Egypt and the United States). It is native to tropical South America.
- *G. arboreum*: also known as “tree cotton”, native to India and Pakistan.
- *G. herbaceum*: also known as “levant cotton”, native to southern Africa and the Arabian Peninsula.

The first two species in this list are referred to as New World Cotton and take up the vast majority of modern cotton production: upland cotton alone accounts for 90% of the total production in the world.¹ *G. arboreum* and *G. herbaceum* are together

known as ‘Desi cottons’ (or Old World Cotton²) and each take up less than 2% of global cotton production. One of the reasons for this is the lower yields these species provide. That said, small farmers may prefer local varieties of these species because they tend to be more robust and more tolerant to pests.

Each species may have many different varieties: for example, varieties of ELS cotton include American Pima, Egyptian Giza, Indian Suvin, Chinese Xinjiang, Sudanese Barakat, and Russian Tonkovoloknisty, just to name a few.

Hybrids: Hybrids are created by cross-pollinating two different, but related plants over several generations, eventually creating a new plant variety. By selectively cross-pollinating related plants, farmers and breeders create varieties that have better properties: cotton hybrids tend to be more productive, more pest resistant, and have a more uniform fiber quality than ‘straight’ varieties.³

India and China are the only two countries in which hybrid cottons are being cultivated on a large scale. In India, the pioneer country for commercial cultivation of cotton hybrids, these hybrids cover more than 50% of total cotton area while

¹ International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

² Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

³ Central Institute for Cotton Research Nagpur (CICR), Hybrid Seed Production in Cotton, (CICR TECHNICAL BULLETIN NO: 35, 2008), www.cicr.org.in/pdf/hybrid_seed_production.pdf

contributing to about 60% of the national cotton production.⁴ Although hybrids tend to have higher yields, they may also require higher inputs (water and nutrients) in order to sustain their growth, making them less suitable for environments where these inputs are scarce.

Genetically modified (GM) cotton and Bt cotton:

Genetically modified (GM) traits for cotton specifically target yield reductions caused by weeds and/or fruit-feeding pests of the Lepidopteran species (e.g. bollworm). A much discussed GM cotton is Bt cotton, a genetically modified (GMO), insect-resistant cotton variety developed by Monsanto. 'Bt' comes from *Bacillus thuringiensis*, a bacterium that produces toxins that kill different insects—the genetic coding of which has been inserted into the cotton. Much has been made of Bt cotton: proponents say that it has much higher yields than traditional varieties and, given its 'built in' pest resistance, requires less application of pesticides.

While some studies have found that the use of Bt cotton has indeed reduced pest problems, there is growing evidence that secondary pests are countering the perceived benefits of Bt cotton in terms of pesticide reduction.⁵ Moreover, Bt cotton seeds are considerably more expensive and usually require high inputs of fertilizer, thus increasing the financial risk of farmers. Results from a study conducted by Greenpeace in 2010 clearly showed that non-Bt organic farmers, "by engaging in ecological and economically efficient farming, diversifying their cropping system and relying more on their community, achieve a better, more secure economic livelihood than Bt cotton farmers. Bt cotton farmers, with very high cost of cultivation, high-chemical low-diversity farming and high debt are vulnerable and under high risk of household financial collapse."⁶

In general, the sustainability outcomes of GM cotton cultivation have been widely discussed, and empirical evidence exists that either supports or challenges GM cotton as a sustainable practice. It is fair to say that the supporting data is limited and prevents a comprehensive review of the sustainability impact of GM cotton under various conditions.⁷

Varieties and fiber quality: Fiber quality factors such as length, uniformity, strength, and short fiber content may differ dramatically for varieties grown under nearly identical conditions.

⁴ Central Institute for Cotton Research Nagpur (CICR), Hybrid Seed Production in Cotton

⁵ Zhao JH, Ho P, Azadi H., Benefits of Bt cotton counterbalanced by secondary pests? Perceptions of ecological change in China. (*Environ Monitor Assess.*, 2010) 173(1–4):985–94

⁶ Greenpeace, Picking Cotton - The choice between organic and genetically-engineered cotton for farmers in South India, (UK, 2010), http://www.greenpeace.org/international/Global/international/publications/agriculture/2010/Picking_Cotton.pdf

⁷ Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), *Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework* (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

Except for color and leaf grade, differences in fiber quality characteristics are greater than the differences caused by ginning systems: in fact, variety and excessive weathering have a far greater effect on fiber quality than do the most rigorous of gin processes. Thus, variety selection is the key to meeting fiber quality demands.⁸

Cotton characteristics: Cotton is grown in a wide range of climatic conditions in temperate, subtropical and tropical regions of all the continents (see Figure 1). The basic conditions required for the successful production of cotton include a long frost-free period, a temperature range of 18–32°C (ideally around 30°C), ample sunshine and a rather dry climate. It requires a minimum of 500mm water from rain or irrigation between germination and boll formation (between 600–1200 mm over the whole growing cycle, which typically lasts 125–175 days).⁹ Cotton is very sensitive to waterlogging, which usually reduces yields, even when the plant appears to be unaffected. It prefers deep, well-drained soils with a good nutrient content (cotton uses a lot of nutrients to grow). Clay-rich vertisols (so-called 'black cotton soils') are ideal.¹⁰ With their long tap roots penetrating up to three meters in such soils, cotton plants can sustain short periods of drought. It is also grown on less ideal sites including sites with shallow and sandy soils, and arid areas where salt levels may be higher. However, higher and consistent yield and fiber quality levels are generally obtained with irrigation or sufficient rainfall, and growing cotton under harder conditions may require adapting the selection of varieties and management practices.^{11 12}

Cotton is normally grown in annual cultivation. Only in a few regions in South America (Peru, Brazil) does cotton still grow on perennial bushes. Depending on how it is cultivated, cotton grows 25 cm to over 2 meters high. The time from planting to flowering is about three months, with an additional two-month maturation period for the cotton boll to be ready for harvest.

Cotton flowers are white or yellow when they open, turning pink after pollination. The pods of the pollinated flowers open after a couple of weeks and the hairy cotton seeds spring up.

⁸ International Trade Center (UNCTAD & WTO), *Cotton Exporters Guide* (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

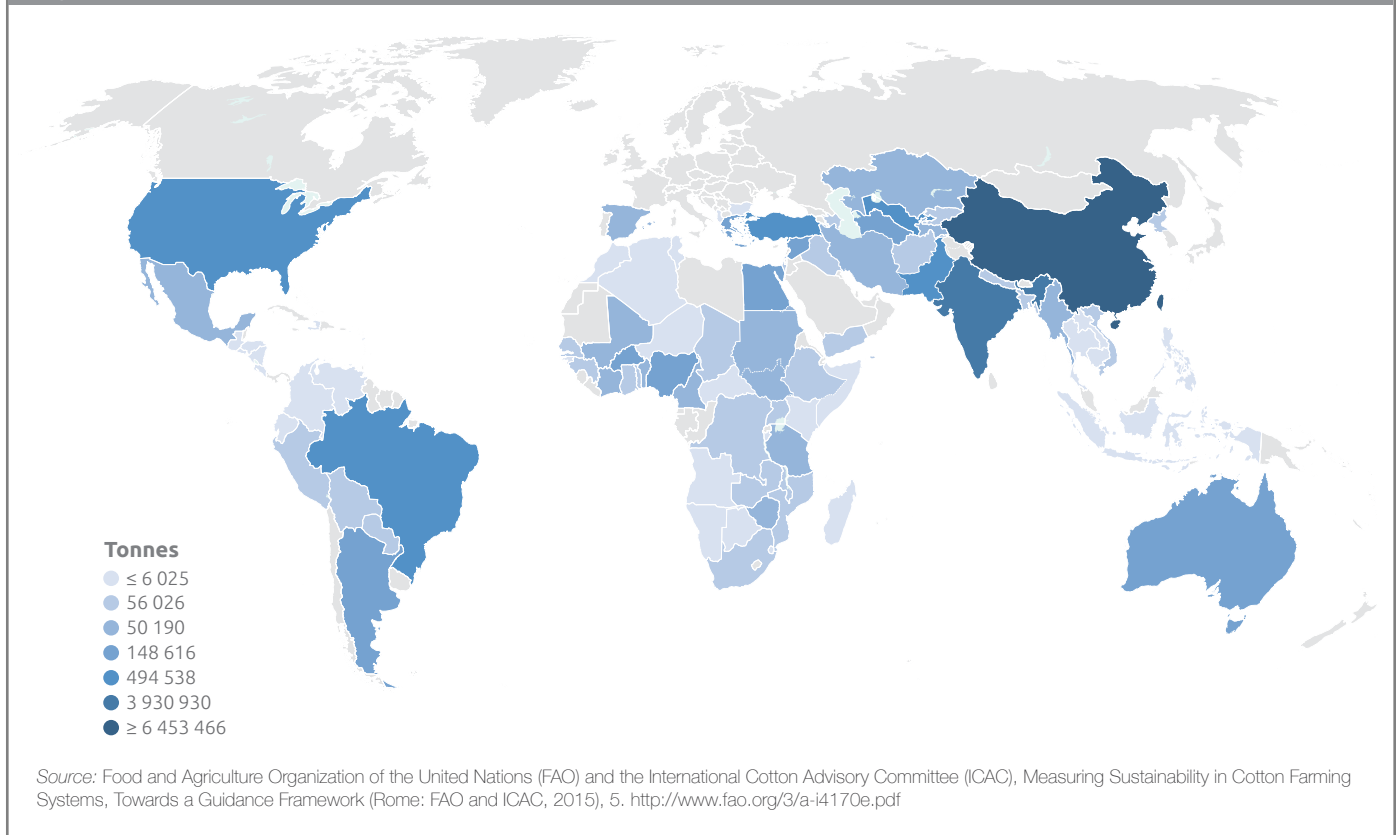
⁹ Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), *Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework* (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

¹⁰ FiBL, *Organic Cotton Crop Guide – A Manual for Practitioners in the Tropics*, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

¹¹ Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), *Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework* (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

¹² FiBL, *Organic Cotton Crop Guide – A manual for Practitioners in the Tropics*, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

Figure 1: Cotton-Producing Countries (metric tons of cotton lint produced), 2003–2013 average



This 'cotton boll' contains the seeds (about 30 per boll) as well as cotton fibers, called lint. Before the two are separated, the harvested cotton is referred to as seed cotton. By weight, seed cotton is composed of roughly one-third cotton lint and two-thirds cottonseed. The cotton lint is separated from the cottonseed using a cotton gin ("ginning").

Brief overview of the cotton value chain:

- **Production:** the cotton value chain begins with the farmer, who grows cotton and harvests seed cotton from the bolls of the cotton plant. Production begins with clearing and planting fields followed by cultivation of the plants.
- **Harvesting:** the cotton can be picked manually or mechanically. About 70% of the bales of cotton produced globally are harvested ('picked') by hand. Although 40 countries harvest some cotton by machine, only three (the United States, Australia and Israel) harvest 100% by machine. A normal healthy person can pick 25-30 kilograms of seed cotton in one day.¹³ However, increasing labor costs are forcing more countries to consider machine picking. Once collected, the seed cotton is stored and subsequently sent to cotton ginneries.
- **Ginning:** once at the ginnery, the seed cotton is fluffed, foreign matter is removed, and cotton lint is separated from the cottonseed using a cotton gin. Ginning is usually done in the same country where the cotton is produced. The cotton lint is usually graded based on the purity of the whiteness and the reflectivity of cotton. It is also evaluated based on average fiber strength (g/tex), length uniformity, and staple length. It is then packaged into bales and sold to spinners who produce yarn. While the commonly used statistics typically refer to a bale as a unit of 480lb (218kg), bale weights often differ among countries due to variation in the pressing units.¹⁴
- **Spinning:** most spinning mills are located in Asia, and specifically in China and India. The quality of the spun yarns depends on the staple length of the cotton and the spinning technique used.
- **Textile Manufacturing:** textile manufacturers transform yarns into fabric by knitting or weaving the yarns and applying dyes and finishes. End-consumer products are designed and produced from the fabrics.

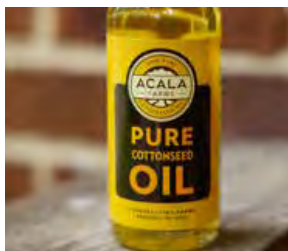
13 International Cotton Advisory Committee (ICAC), (2016), <https://www.icac.org/tech/Overview/100-facts-about-cotton>

14 Ibid.

Figure 2: Secondary Cotton Products



Cottonseed



Cotton Oil



Cotton Noils



Cotton Linters

While cotton is mainly grown for its fibers (cotton lint) used in the textile industry, other secondary co-products can be gained as well: cottonseed, which is obtained after ginning the seed cotton, is used for oil, animal feed, cosmetics, and fertilizer. Cotton combing prior to spinning creates a co-product, noils, which are short fibers with an economic value that is about half that of cotton lint. 'Linters' are very short fibers used in the production of rayon, acetate, cellophane, fingernail polish, and methylcellulose.

- *Retail (marketing/sale of final product)*: the final product is sold under a variety of brand names.

Value addition in the cotton value chain: The cotton value chain is long and complex and manufacturing costs at the industrial stage are high. As a consequence, the total value added throughout the cotton chain (from farm to retail) is several times the value of cotton at the production stage. On average, the retail price of a pair of jeans during the fourth quarter of 2010 in the United States was 12 times the value of the cotton lint used in its production; the corresponding ratios for t-shirts, polo shirts and woven shirts exceeded 27 times the value.¹⁵

Sustainability issues in conventional cotton production:

Cotton production comes with a set of serious problems and challenges: it relies on highly intensive farming methods that often require a tremendous amount of water, pesticides and other input. Cotton accounts for more than 3% of the total global water consumption used for all crop production.¹⁶ To put that into perspective: according to the Better Cotton Initiative, it can take about 10,000 liters of water to make one kilogram of cotton. This translates to about 2,700 liters of water to make just one t-shirt; the same amount of water the average person drinks during the course of three years.¹⁷

Conventional cotton production typically requires intensive use of agricultural chemical inputs. Although it represents less than 3 per cent of the world's agriculture, about 16% of global

insecticide and 7% of pesticide consumption are attributable to cotton crops.¹⁸ Chemical use includes fungicides for seeds, pre-emergent herbicides, post-emergent herbicides, insecticides and related pest control chemicals, growth regulators, and defoliant. It is estimated that only 0.1 per cent of these chemicals reach the targeted pests, with 99.9 per cent dispersing into the soil, water and air. Moreover, many of the chemicals used can cause cancer, birth defects and/or nervous system damage or are known carcinogens.

Global Cotton Market and Trends

Global cotton production: Cotton is primarily produced for its fiber, which is used as a raw material in the textile industry. Grown on an approximate 33 million hectares (2.5% of global arable land) in around 80 countries, and with more than 250 million people dependent on its production, the social and economic importance of cotton on a global scale is self-evident.¹⁹ Annual global cotton production amounted to approximately 21.4 million metric tons over 2015/16.²⁰ About 80% of all cotton is produced in six countries. In 2015/16, India took over China as the world's leading producer with 5.8 million metric tons, followed by China (4.9 million metric tons), the United States (2.8 million metric tons), Pakistan (1.5 million metric tons), Brazil (1.4 million metric tons) and Uzbekistan (0.8 million metric tons). In 2015/16, India and China accounted for around half of world cotton production,

¹⁵ Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

¹⁶ Ibid.

¹⁷ Cotton Connect, More Crop Per Drop - Water Report On The Cotton Industry - Working with smallholder farmers to increase yield and maximise water efficiency in the cotton industry, (2014), http://www.cottonconnect.org/media/25968/cottonconnect_more_crop_per_drop.pdf

¹⁸ Textile Exchange, Material Snapshot BCI Cotton, (2016), http://textileexchange.org/wp-content/uploads/2016/03/TE-Material-Snapshot_Cotton-BCI.pdf

¹⁹ Pesticides Action Network UK, Solidaridad, and WWF, Mind the Gap: Towards a More Sustainable Cotton Market (April 2016), <http://www.solidaridadnetwork.org/sites/solidaridadnetwork.org/files/publications/Mind%20the%20Gap%20-%20Towards%20a%20more%20Sustainable%20Cotton%20Market.pdf>

²⁰ Cotton Inc. Monthly Economic Letter June 2016: Cotton Market Fundamentals & Price Outlook (US, 2016), <http://www.cottoninc.com/corporate/Market-Data/MonthlyEconomicLetter/pdfs/monthlyEconomicLetter-English.pdf>

Figure 3: Cotton Value Chain



Source: FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

while the United States, Pakistan, Brazil and Uzbekistan accounted for an additional 30%.²¹

While the global area devoted to cotton production has remained relatively stable over the past three decades, regional changes have occurred. Australia, China, Francophone Africa and South Asia have experienced a significant increase in the area under cotton cultivation, whereas the cultivated area in countries like Brazil and the United States has shrunk by 40–50%. Overall, the advent of new production technologies and better management practices has given rise to an almost 100% increase in average global yields over 30 years, up from 411 kg/ha in 1980/81 to 790 kg/ha of cotton lint in 2013/14.²²

²¹ Cotton Inc. Monthly Economic Letter June 2016: Cotton Market Fundamentals & Price Outlook (US, 2016), <http://www.cottoninc.com/corporate/Market-Data/MonthlyEconomicLetter/pdfs/monthlyEconomicLetter-English.pdf>

²² Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

Cotton market overview: The cotton market is a complex and dynamic one, having gone through many changes in price levels and trade patterns over the past decades. By the 1990s, the consumption of cotton had grown to well over 40 percent of the world's fiber consumption. Growth continued in the early 2000s, with the world cotton market going through a period of rapid growth as a result of increases in cotton yields, the phasing out of textile quotas under the Multifibre Arrangement, and sustained world economic growth.

In the second half of the opening decade, change started to take place: stagnant cotton yields, the 2008 economic crisis and increasing competition from synthetic fibers—with polyester leading the way—resulted in a reduction of the world cotton market. Inflated production as a result of major subsidy programs (mainly in developed countries) led to a gap between world cotton production and world cotton consumption between 2010/11 and 2013/14, amounting to 11.6 million tons of surplus production. Most of these additional carrying stocks

Figure 4: World Cotton Production

million metric tons	2012/13	2013/14	2014/15	2015/16	2016/17 May	2016/17 June
India	6.2	6.7	6.4	5.8	6.1	6.1
China	7.6	7.1	6.5	4.9	4.9	4.7
United States	3.8	2.8	3.6	2.8	3.2	3.2
Pakistan	2.0	2.1	2.3	1.5	2.0	2.0
Brazil	1.3	1.7	1.5	1.4	1.4	1.4
Uzbekistan	1.0	0.9	0.8	0.8	0.8	0.8
Turkey	0.6	0.5	0.7	0.6	0.7	0.7
Australia	1.0	0.9	0.5	0.5	0.6	0.6
Turkmenistan	0.4	0.3	0.3	0.3	0.3	0.3
Burkina	0.3	0.3	0.3	0.3	0.3	0.3
Greece	0.3	0.3	0.3	0.2	0.3	0.3
Mali	0.2	0.2	0.2	0.2	0.2	0.2
Mexico	0.2	0.2	0.3	0.2	0.2	0.2
Rest of World	2.2	2.1	2.1	1.8	1.9	1.8
African Franc Zone	0.9	0.9	1.0	0.9	0.9	0.9
EU-27	0.3	0.3	0.4	0.3	0.3	0.3
World	27.0	26.2	25.9	21.4	22.7	22.5

Source: Cotton Inc. Monthly Economic Letter June 2016: Cotton Market Fundamentals & Price Outlook (US, 2016), <http://www.cottoninc.com/corporate/Market-Data/MonthlyEconomicLetter/pdfs/monthlyEconomicLetter-English.pdf>

Figure 5: Cotton Production Systems



Cotton production systems vary globally and range from labor-intensive systems in Africa and Asia to highly mechanized systems in Australia, Brazil and the United States. Among the major cotton-producing countries, most cotton in China, India and Pakistan is picked by hand.

were absorbed by the China National Cotton Reserves Corporation (CNCRC) as part of its efforts to maintain domestic farm prices.²³ Responding to a decrease in demand, world production has gone down from 27 million metric tons in 2012/13 to 21.4 million metric tons in 2015/16.²⁴

One of the major shifts that has taken place on the global cotton market over the past decade is the increasingly important role of developing countries in the production, movement and processing of cotton into a finished product. In 2015/16, developing countries accounted for most of global cotton mill use (96 percent), imports (98 percent), and production (85 percent).²⁵ That said, developing countries themselves are not a homogeneous group, with economically powerful China, India, Brazil and Turkey playing a greater role in the market than most LDCs (Least Developed Countries)—African cotton producers and a few Asian cotton consuming countries. For example, India and China between them accounted for 51% of world cotton mill use, with Pakistan, Turkey, Bangladesh, Vietnam and the United States accounting for an additional 28%.²⁶ In sum, the smaller

23 Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), *Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework* (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

24 Cotton Inc. Monthly Economic Letter June 2016: Cotton Market Fundamentals & Price Outlook (US, 2016), <http://www.cottoninc.com/corporate/Market-Data/MonthlyEconomicLetter/pdfs/monthlyEconomicLetter-English.pdf>

25 Ibid.

26 Ibid.

Figure 6: World Cotton Imports 2016/17 **

million 480 lb. bales	2012/13	2013/14	2014/15	2015/16	2016/17 May	2016/17 June
Bangladesh	5.0	5.3	5.4	5.6	5.9	5.9
Vietnam	2.4	3.2	4.3	4.8	5.2	5.2
China	20.3	14.1	8.3	4.5	4.5	4.5
Turkey	3.7	4.2	3.7	4.0	3.6	3.7
Indonesia	3.1	3.0	3.3	2.8	2.8	2.8
Pakistan	1.8	1.2	1.0	3.1	1.7	1.7
South Korea	1.3	1.3	1.3	1.3	1.3	1.3
Thailand	1.5	1.5	1.5	1.4	1.3	1.3
Mexico	1.0	1.0	0.8	1.0	1.2	1.2
Taiwan	0.9	0.9	0.9	0.7	0.8	0.7
India	1.2	0.7	1.2	0.9	0.7	0.7
Egypt	0.2	0.4	0.3	0.5	0.4	0.5
Malaysia	0.9	0.4	0.3	0.2	0.3	0.3
Rest of World	4.3	4.0	3.4	3.6	3.6	3.6
African Franc Zone	0.0	0.0	0.0	0.0	0.0	0.0
EU-27	0.9	0.9	0.9	0.8	0.8	0.8
World Total	47.7	41.2	35.7	34.4	33.1	33.3

Figure 7: World Cotton Exports 2016/17 **

million metric tons	2012/13	2013/14	2014/15	2015/16	2016/17 May	2016/17 June
United States	2.8	2.3	2.4	2.0	2.3	2.3
Brazil	0.9	0.5	0.9	0.9	0.9	0.9
India	1.7	2.0	0.9	1.3	0.8	0.9
Australia	1.3	1.1	0.5	0.6	0.6	0.6
Uzbekistan	0.7	0.6	0.5	0.5	0.5	0.5
Burkina	0.3	0.3	0.2	0.3	0.3	0.3
Greece	0.2	0.3	0.3	0.2	0.2	0.2
Mali	0.2	0.2	0.2	0.2	0.2	0.2
Turkmenistan	0.2	0.4	0.3	0.3	0.2	0.2
Cote d'Ivoire	0.1	0.2	0.2	0.1	0.2	0.2
Benin	0.1	0.1	0.1	0.1	0.1	0.1
Argentina	0.1	0.0	0.1	0.1	0.1	0.1
Cameroon	0.1	0.1	0.1	0.1	0.1	0.1
Rest of World	1.4	1.0	0.9	0.8	0.8	0.8
African Franc Zone	0.8	0.8	0.9	1.0	0.9	0.9
EU-27	0.3	0.3	0.4	0.3	0.3	0.3
World	10.1	8.9	7.7	7.5	7.2	7.3

** Source for Figures 6 - 7: Cotton Inc. Monthly Economic Letter June 2016: Cotton Market Fundamentals & Price Outlook (US, 2016), <http://www.cottoninc.com/corporate/Market-Data/MonthlyEconomicLetter/pdfs/monthlyEconomicLetter-English.pdf>

Figure 8: World Cotton Mill-Use **

million 480 lb. bales	2012/13	2013/14	2014/15	2015/16	2016/17 May	2016/17 June
China	36.0	34.5	33.0	32.5	33.5	33.5
India	21.8	23.3	24.5	24.3	24.5	24.3
Pakistan	10.8	10.4	10.6	10.3	10.5	10.5
Turkey	6.1	6.3	6.4	6.5	6.4	6.5
Bangladesh	4.7	5.3	5.5	5.7	6.0	6.0
Vietnam	2.3	3.2	4.1	4.7	5.1	5.1
United States	3.5	3.6	3.6	3.6	3.6	3.6
Brazil	4.1	4.2	3.4	3.2	3.1	3.1
Indonesia	3.1	3.1	3.3	2.8	2.8	2.8
Mexico	1.8	1.9	1.9	1.9	1.9	1.9
Uzbekistan	1.5	1.5	1.6	1.6	1.6	1.6
South Korea	1.3	1.3	1.3	1.3	1.3	1.3
Thailand	1.5	1.5	1.5	1.3	1.3	1.3
Rest of World	10.3	9.9	9.6	9.3	9.3	9.2
African Franc Zone	0.1	0.1	0.1	0.1	0.1	0.1
EU-27	0.9	0.8	0.9	0.8	0.9	0.9
World	108.5	109.8	110.1	108.8	110.8	110.6

Figure 9: World Cotton Consumption **

million metric tons	2012/13	2013/14	2014/15	2015/16	2016/17 May	2016/17 June
China	7.8	7.5	7.2	7.1	7.3	7.3
India	4.7	5.1	5.3	5.3	5.3	5.3
Pakistan	2.3	2.3	2.3	2.2	2.3	2.3
Turkey	1.3	1.4	1.4	1.4	1.4	1.4
Bangladesh	1.0	1.2	1.2	1.2	1.3	1.3
Vietnam	0.5	0.7	0.9	1.0	1.1	1.1
United States	0.8	0.8	0.8	0.8	0.8	0.8
Brazil	0.9	0.9	0.7	0.7	0.7	0.7
Indonesia	0.7	0.7	0.7	0.6	0.6	0.6
Mexico	0.4	0.4	0.4	0.4	0.4	0.4
Uzbekistan	0.3	0.3	0.3	0.3	0.3	0.3
South Korea	0.3	0.3	0.3	0.3	0.3	0.3
Thailand	0.3	0.3	0.3	0.3	0.3	0.3
Rest of World	2.2	2.2	2.1	2.0	2.0	2.0
African Franc Zone	0.0	0.0	0.0	0.0	0.0	0.0
EU-27	0.2	0.2	0.2	0.2	0.2	0.2
World Total	23.6	23.9	24.0	23.7	24.1	24.1

** Source for Figures 8 - 9: Cotton Inc. Monthly Economic Letter June 2016: Cotton Market Fundamentals & Price Outlook (US, 2016), <http://www.cottoninc.com/corporate/Market-Data/MonthlyEconomicLetter/pdfs/monthlyEconomicLetter-English.pdf>

economies represent only 5 percent of global cotton production, 11 percent of exports, 5 percent of mill use and 10 percent of imports.²⁷

About one-third of world cotton production is traded internationally. Over the last decade, the destination of cotton exports has switched from Europe to Asia, and in particular to China. As a result, the previous relative advantage of African countries regarding freight time and cost, compared to exporters such as India, Central Asia and Australia, has disappeared. Currently Africa is one of the farthest providers of cotton to Asia. Moreover, China, the largest destination for African cotton, imposes import duties from 5 percent up to 40 percent on cotton imported outside of the annual 894,000 ton-import quota related to WTO obligations. However, as of January 2016, following a global deal sealed in Nairobi at the World Trade Organisation (WTO) ministerial conference, the Least Developed Countries (LDCs) can now export their cotton to developed countries duty- and quota-free.

Based on a cotton price of about 65 USD cents/lb, the yearly global cotton production has a raw material value of over 32.5 billion USD. In terms of export value, cotton is one of the world's most important agricultural commodities with a market size of USD 17.4 billion in 2013/14.²⁸ In 2015/16 United States, India and Brazil accounted for 44% of world cotton exports, with Australia, Francophone Africa and Uzbekistan accounting for an additional 27%. Overall, developing countries, having to compete with developed countries such as the United States, Australia and Greece for export markets, accounted for approximately a 52 percent share of global cotton exports in 2015/16.²⁹

Figures 6 to 9 on previous pages provide an overview of the latest data on world cotton imports, exports, mill-use and consumption.

Cotton prices: When people in the cotton market speak of prices, they are usually referring either to the Cotlook A Index or to the latest prices quoted for the nearby futures contract on ICE Futures U.S., Inc. in New York. However, on any day there is a constellation of cotton prices determined by quality, location and delivery schedules, and relationships between prices in the supply chain change constantly.

The Cotlook A Index is the most frequently quoted indicator of the average level of international prices. The 'A Index' is

compiled by employees of Cotlook Ltd, a private company in Liverpool, United Kingdom, who receive price information from both buyers and sellers of cotton from many origins. Often the price quotes reported to Cotlook vary by wide margins, especially for cottons from origins with little volume. In these cases, the Cotlook employees must exercise their own judgment to determine the prevailing offering rate for cotton from each origin. To calculate the A Index, Cotlook averages the offering values of the cheapest five origins delivered to East Asia for nearby shipment for middling grade cotton of 1–3/32" in length. It is widely understood that actual transaction prices could be lower than the offering values quoted by Cotlook, but the A Index is still respected as a valid indicator of average price levels.

Mill-delivered prices and prices received by farmers can vary substantially from quoted international values. Prices for cotton delivered to mills include the costs of transportation, storage, insurance and interest costs, along with the loading and unloading required to deliver bales directly to mill warehouses. Some mills buy an entire year's worth of cotton at the start of each season and incur the costs of storage, interest and insurance internally. Other mills buy and schedule delivery week-to-week, and prices for services are negotiated in each contract. Farm prices in developing countries are usually quoted to farmers on the basis of seed cotton delivered to collection points. In such cases, prices paid are lower than prices paid for lint to account for the cost of ginning, and delivery of lint and seed to markets. In some countries, farmers are paid on a lint basis after ginning. In all cases, prices for individual lots of cotton will reflect discounts or premiums for quality different from the base qualities quoted in international markets.

Similar to other commodities, cotton prices can be volatile depending on supply and demand factors and on governmental subsidies and policies (see following section). Prices have declined in recent years due to increased cotton production. At the time of writing, the price for cotton was 64.26 US cents per pound, having fluctuated between 65 – 75 US cents per pound for most of the past 2 years.

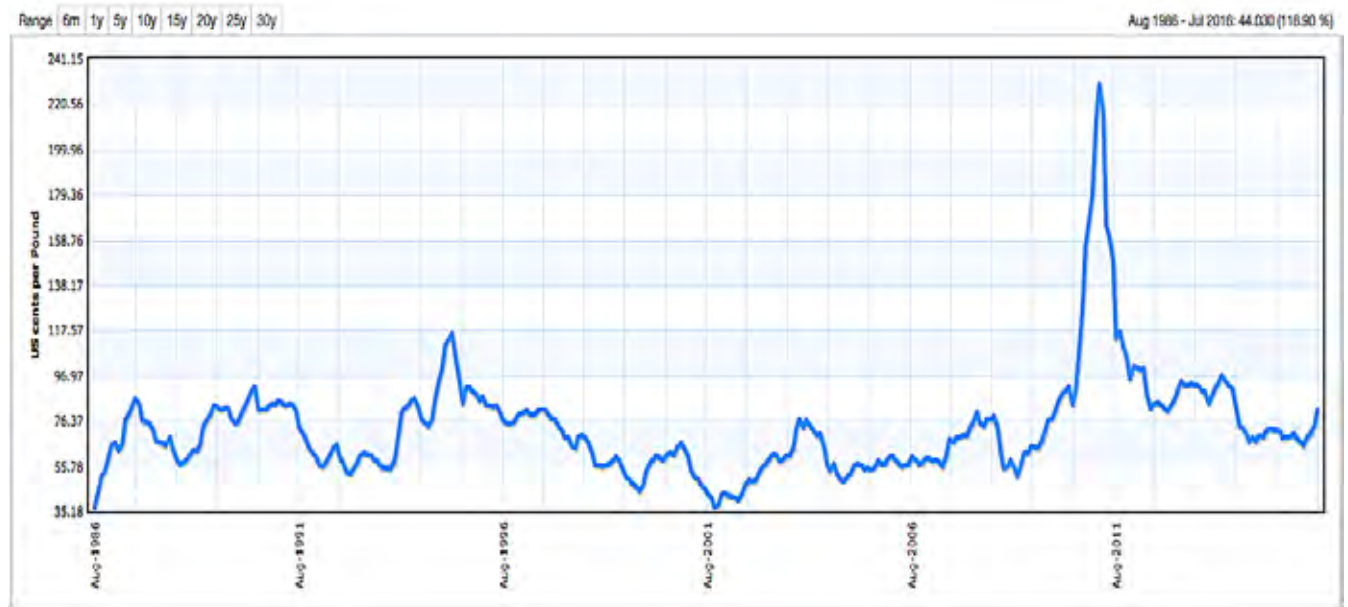
Between 2000 – 2016 a price low was reached in October 2001, when cotton was sold for 37.22 US cents per pound. In 2010/11, a perfect constellation of events fueled an historic price rise: a combination of farmers having switched to more lucrative crops, gradually tightening stocks, an unexpected freeze in China's cotton producing areas, a historic flood in Pakistan and a ban on exports from India, caught buyers off guard. The result was an historically high cotton price of 229.67 US cents per pound, reached in March 2011.

27 ICTSD, Cotton: Trends in Global Production, Trade and Policy; Information Note, (International Centre for Trade and Sustainable Development, Geneva, Switzerland, 2013), www.ictsd.org

28 Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

29 Ibid.

Figure 10: Cotton Monthly Price – US Cents per Pound



Source: Indexmundi, *Cotton Monthly Price – US Cents per Pound*, (September 2016), <http://www.indexmundi.com/commodities/?commodity=cotton&months=360>

For the period 2015 – 24 cotton prices are expected to be relatively stable, as the volatility surrounding the 2010/11 spike in cotton prices subsides. The shift in China from building stocks to reducing them is one of the major factors behind a drop foreseen in world cotton prices during the early years of the outlook period. By 2024, world cotton prices are expected to be lower than in 2012-14 in both real and nominal terms. The world price in 2024 in real terms is expected to be 23% lower than in the base period (2012-14), and 9% lower than its 2000-09 average.³⁰

Subsidies and other factors affecting global cotton

prices: Other than climatic factors and regular supply and demand factors, major factors affecting global cotton prices are the regulations and subsidy programs created by governments of various countries. Overall it is estimated that ten countries provided subsidies to their cotton industry during the year 2011/12, including China, the US, Turkey, Greece, Spain, Colombia and some Francophone African countries (Mali, Cote d'Ivoire and Senegal).³¹

The US in particular has been criticized for its continued subsidy program to farmers: from 2000 - 2010 US government

subsidies averaged \$3.5 billion annually on an average annual production worth \$4.3 billion.³² In June 2003 the so-called Cotton-4 (Benin, Burkina Faso, Chad and Mali) introduced the Sectoral Initiative on Cotton (Cotton Initiative), which established a connection between the low and declining price of cotton in the global market and developed country trade-distorting subsidies. In 2004, following a year in which an estimated 68% of US cotton was sold internationally below production costs, they were joined in their cause by Brazil, which launched a formal complaint with the World Trade Organization (WTO). The following year the WTO sided with Brazil, arguing that US subsidies were illegal.

While much criticism with regards to subsidies in the cotton sector has been reserved for the US, China has overtaken the US as the largest provider of subsidies in recent years. Total government support to the Chinese cotton sector was estimated at around USD 3 billion in 2011/12.³³ With a new minimum support price policy and import quotas, domestic cotton prices in China have been maintained well above international cotton prices. Meanwhile, China, currently a leading importer of cotton, has also been stockpiling its

³⁰ OECD-FAO, *Agricultural Outlook 2015-2024*, (2015), <http://www.fao.org/3/a-i4738e.pdf>

³¹ ICTSD, *Cotton: Trends in Global Production, Trade and Policy; Information Note*, (International Centre for Trade and Sustainable Development, Geneva, Switzerland, 2013), www.ictsd.org

³² ETF.com, *After Roller-Coaster 2010 & 2011, Cotton's Newfound Surplus Weighs On Prices*, (2012), <http://www.etf.com/sections/features-and-news/3665-after-roller-coaster-2010-a-2011-cottons-newfound-surplus-weighs-on-prices?nopaging=1>

³³ ICTSD, *Cotton: Trends in Global Production, Trade and Policy; Information Note*, (International Centre for Trade and Sustainable Development, Geneva, Switzerland, 2013), www.ictsd.org

cotton since 2011, allowing the country to affect global cotton prices depending on the amount of cotton it releases or maintains in its stockpile.

Generally, it is agreed that government measures that boost cotton production have a negative effect on average international cotton prices in the short run. Estimates vary on the size of the impact, but most economists agree that the elimination of subsidies would raise average cotton prices by 5%–20%, and some estimates are higher.³⁴ Cotton production in the United States would decline by an estimated one-third over several seasons, and production in China would probably fall by about one-tenth. Meanwhile, production in other countries would expand within two to three seasons in response to higher prices. As a consequence, between two and three million tons of cotton production would shift from Europe, the United States and China toward lower-cost producing countries if government measures were eliminated.³⁵

The influence of time on prices: There are many other factors that influence the price of cotton. For example, the average cost of storing a pound of cotton lint for one month, including warehouse, insurance and interest costs, works out to between 0.5 cents and 2 cents.^{36 37} Countries with high rates of interest have implicitly higher costs of storage because of the foregone income on sales that cannot be put on deposit in a bank. Consequently, the seller of a bale will need more money for a sale several months in the future than for a sale involving prompt delivery in order to have the same net revenue. In some countries, cotton warehouse costs are treated as 'sunk' or fixed costs, and there are no charges for storage; but in other countries, the cost of warehouse space is charged per month. Likewise, insurance can be purchased in some countries but not in others, and risks of theft, fire, flood or other forms of damage are higher in some regions than in others. Accordingly, insurance costs vary by location. Consequently, prices for a specific bale of cotton at a specific location can vary substantially based on whether the sale is for immediate delivery or future delivery.

Influence of location and quality on prices: Just as time affects costs, and thus prices, location and quality also affect the price received or paid for cotton. It costs money to move a bale of cotton, including the costs of placing a bale into a container at origin and then taking it out at destination, loading and unloading the container onto a ship, rail car or truck, moving

the container, providing documentation, and completing financial transactions for each shipment, ensuring adherence to phytosanitary regulations and insuring against risk during movement and storage while in-transit. The costs of moving cotton can vary from a few US cents per pound of lint for cotton moving by truck or rail a few hundred kilometers within a developed country from producing area to textile mill, or it can cost 10–15 cents per pound for cotton moving from a landlocked developing country by truck, rail and ship to an importing country in a different continent. In general, countries with direct access to ocean ports and better infrastructure have lower transportation costs than countries that are landlocked or have less developed infrastructure. In general, countries with large textile industries (China, India, Pakistan, Turkey, United States, Brazil) will tend to have lower transportation costs than countries that must export or import cotton from long distances.

In most cases, producers or sellers pay the costs of transportation. Importers can choose from varied origins, and so mill-delivered prices for cotton of similar quality tend to be closely matched, regardless of the cost of transportation from the producing area. Producers are able to charge higher prices only to the extent that competing producers cannot supply cotton at a lower price.

Quality differentials also affect prices for each bale of cotton. Cotton grading systems have developed over the last two centuries in each country, and in 2007 there are no truly universal, objective quality evaluation standards in the cotton industry that can be used to map a single international schedule of premiums and discounts. However, there are some basic guidelines that most people in the cotton industry understand intuitively. For instance, the market price for cotton in the extra-fine category (premium cottons from Egypt, Peru, Israel, the United States, the Sudan, China, India and other countries accounting for about 3% of world production) currently has a premium over the Cotlook A Index of about 100%; in other words, prices of extra-fine cotton are approximately double the price of average cotton. Over the last 15 years, premiums for extra-fine cotton have ranged from 35% above the Cotlook A Index to 135% above the A Index.³⁸

While comparisons are not precise, it can generally be noted that prices for cotton in the fine category (cotton that is finer, longer and stronger than the world average, but not as good as extra-fine) are above the Cotlook A Index by 10%–15% in most years.³⁹ Finally, cotton that is classified as coarse cotton (cotton that is shorter, rougher and weaker than average)

34 International Trade Center (UNCTAD & WTO), *Cotton Exporters Guide (2007)*, <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

35 Ibid.

36 Ibid.

37 This amount varies substantially among countries, depending on interest rates, storage costs and insurance costs

38 International Trade Center (UNCTAD & WTO), *Cotton Exporters Guide (2007)*, <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

39 Ibid.

has a discount from the Cotlook A Index of 3%–10%. Within these broad guidelines, the specific premiums and discounts for each lot of cotton bales can vary with the specific characteristics of each producing region, relative tightness of supply in each category, time of year, availability of transportation and other factors.

Trust and reputation as factors that affect cotton

prices: Cotton prices are not solely determined by the intrinsic fiber properties, lint cleanliness, and the other issues mentioned above. Other criteria, such as reputation and other marketing factors generally not included in contracts, have an influence on prices too: trust and reputation matter in the cotton business. Premiums and discounts that are attached to international cotton derive partly from the reputation of national origins, and prices are influenced by the way cotton is marketed and shipped. The market rewards origins and shippers that have strong records of delivering according to quality standards and with consistency, while respecting contract terms. Also, the quality cotton that is classed through visual and manual inspections, rather than by instrument (see section following) might be considered less reliable. This is the case for a substantial amount of the cotton produced in Africa, of which buyers are known to complain about the poor condition and lower quality of bales upon arrival.

Trends in the market for cotton — higher grades and sustainable cotton:

Trade in cotton is expected to continue growing over the next few decades (as in the past six decades). However, the origin and destination of cotton trade will likely experience variations over time, as cotton mill use continues to migrate to regions with the lowest costs of yarn production.⁴⁰

Among different varieties of cotton, the market share for medium and higher grades of cotton is rising, while the share of shorter ('coarse count') Upland cotton is declining. This is a result of the textile industry increasingly demanding cotton with fiber characteristics suitable for processing in automatic high-speed machinery.⁴¹

Sustainable cotton: Corporate social responsibility (CSR) is increasingly shaping the policies of brands and retailers in the textile and clothing industry. As companies become aware of the impacts conventional cotton production has on farmers and farming communities, they consider alternative cottons, to serve consumers and to improve their public image.

40 Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), *Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework* (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

41 International Trade Center (UNCTAD & WTO), *Cotton Exporter's Guide* (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

As a result, there is an increasing demand for cotton that is produced using more sustainable methods. At least 12 companies⁴², including major brands and retailers like Adidas, C&A, H&M, IKEA, Nike and Timberland, are committed to sourcing 100% of their cotton from more sustainable sources, either by 2015 or by 2020. On the production side, supplies of more sustainable cotton have increased significantly in the last few years, reaching unprecedented volumes and accounting for about 8% of global production in 2014 (projected to be around 13% in 2015).⁴³

Market for Sustainable Cotton

Demand for more sustainable cotton has seen a strong increase following growing awareness about the sustainability issues associated with conventional cotton, and the work of advocacy and pressure groups that have helped promote the ethical and business case for sourcing more sustainable cotton.

The past 30 years has seen the rise of a number of programs and initiatives that aim to help farmers to improve the sustainability of growing cotton. More specifically, a number of sustainable cotton standards have been established, starting with the groundbreaking Organic Cotton in the 1980s, followed by Fairtrade in 2004, Cotton made in Africa (CmiA) in 2005 and the Better Cotton Initiative (BCI) in 2009. All of these standards provide guidance and support for farmers and reassure consumers and retailers that the products they buy are being produced using sustainable farming methods.⁴⁴ It should be noted that 'sustainable' in this context does not imply a fixed criteria or minimum bottom line, but a variety of approaches and practices that all aim to result in 'more sustainable' cotton production.

Production of more sustainable cotton: Supplies of more sustainable cotton have increased significantly in the last few years, reaching unprecedented volumes and accounting for about 8% of global production in 2014 (projected to be around 13% in 2015).⁴⁵

Better Cotton: In 2014 nearly 2 million MT of Better Cotton were produced, including 834,500 MT produced directly in line with the Better Cotton standard, and 1,167,500 MT

42 Adidas, C&A, H&M, IKEA, Kappahl, Kathmandu, Lindex, Migros, Nike, Otto group, RNB Retail & brands, Tommy Hilfiger

43 Pesticides Action Network UK, Solidaridad, and WWF, *Mind the Gap: Towards a More Sustainable Cotton Market* (April 2016), <http://www.solidaridadnetwork.org/sites/solidaridadnetwork.org/files/publications/Mind%20the%20Gap%20-%20Towards%20a%20more%20Sustainable%20Cotton%20Market.pdf>

44 These standards will be addressed in more depth in the following chapter "Regulation & Standards"

45 Pesticides Action Network UK, Solidaridad, and WWF, *Mind the Gap: Towards a More Sustainable Cotton Market* (April 2016), <http://www.solidaridadnetwork.org/sites/solidaridadnetwork.org/files/publications/Mind%20the%20Gap%20-%20Towards%20a%20more%20Sustainable%20Cotton%20Market.pdf>

Figure 11: Volume of More Sustainable Cotton

YEAR	VOLUME OF MORE SUSTAINABLE COTTON FIBER IN METRIC TONNES (MT)
2008	163,000
2009	232,000
2010	332,000
2011	432,000
2012	933,000
2013	1,052,000
2014	2,173,000

Sources: Pesticides Action Network UK, Solidaridad, and WWF, Mind the Gap: Towards a More Sustainable Cotton Market (April 2016), <http://www.solidaridadnetwork.org/sites/solidaridadnetwork.org/files/publications/Mind%20the%20Gap%20-%20Towards%20a%20more%20Sustainable%20Cotton%20Market.pdf>

produced under their benchmarked standards (MyBMP, ABR or CmiA). Better Cotton is now grown in 20 countries, including two benchmarked standards in Brazil and Australia and countries where CmiA cotton is grown.⁴⁶

Organic cotton: After reaching a record level in 2010 with 241,698 MT of fiber, organic cotton production declined for several years. In 2013-14 it grew again by 10% to 116,974 MT of fiber. Organic cotton originates from 19 producer countries, with India accounting for nearly three-quarters (74.25%) of total supply, followed by China (10.46%) and Turkey (6.80%). The remaining production is in the Americas, Africa and Central Asia (8.49%).⁴⁷

Cotton made in Africa cotton: CmiA production reached 399,808 MT of lint cotton in 2015, CmiA cotton is produced in 8 African countries.⁴⁸

Fairtrade cotton: Production of Fairtrade cotton fluctuates at around 15,000 MT of fiber. Fairtrade cotton is produced in 7 countries, predominantly India, but also Africa and Central Asia. 66% of Fairtrade cotton is also organic.⁴⁹

Demand for more sustainable cotton: On the demand side, the sector has seen some major brands and retailers making commitments to source more sustainable cotton, sometimes publicly and with a time-bound target. At least 12

⁴⁶ Ibid.

⁴⁷ Pesticides Action Network UK, Solidaridad, and WWF, Mind the Gap: Towards a More Sustainable Cotton Market (April 2016), <http://www.solidaridadnetwork.org/sites/solidaridadnetwork.org/files/publications/Mind%20the%20Gap%20-%20Towards%20a%20more%20Sustainable%20Cotton%20Market.pdf>

⁴⁸ Ibid.

⁴⁹ Ibid.

companies (retailers or brands) are committed to sourcing 100% of their cotton from more sustainable sources, either by 2015 or by 2020.⁵⁰ That said, while companies may express their commitment to sourcing more sustainable cotton, they can be more reluctant to provide insight in their actual uptake of sustainable cotton.

In the 2016 Sustainable Cotton Ranking, commissioned by Pesticides Action Network UK, Solidaridad, and WWF, the best performing company in terms of actual uptake of sustainable cotton (and sustainable impact overall) is the IKEA Group.⁵¹ By its own criteria, which include counting Towards Better Cotton⁵² and e3 cotton as more sustainable, IKEA Group already sources 100 per cent of its cotton - 140,000 metric tons - from more sustainable sources. Of this, 77.6 per cent met the criteria used in the assessment for the ranking used in the report (57.6 per cent BCI cotton and 20 per cent recycled cotton).⁵³

The second best performing companies for actual uptake are C&A Global and Adidas Group. As of 2015, C&A Global purchased 30 percent of its total cotton uptake – a reported 123.500 metric tons in 2015 - from suppliers that produced in accordance with the organic cotton or Better Cotton standards.⁵⁴ Adidas Group reported a 43 per cent use of Better Cotton in 2015. Adidas Group also states that it uses organic cotton and “any other form of sustainably produced cotton”, but does not specify the percentage share or the standards used.⁵⁵ Next for actual uptake are Marks & Spencer (32%) and H&M Group (31.4%), Nike (26%), although these companies only reported on the percentage share of more sustainable cotton used in their respective supply chains without specifying what the total volume amounted to. Finally, the VF Corporation (which owns Timberland among other companies) reported that it reached its goal of sourcing 1 per cent of the cotton in its clothes, or approximately 1,800 metric tons, from more sustainable sources cotton in 2013, its most recent documentation on cotton use.⁵⁶

When discussing the market for sustainable cotton, and BCI cotton specifically, it is important to note that BCI cotton is traded at the same price as conventional cotton (i.e., no premiums are paid).

⁵⁰ Adidas, C&A, H&M, IKEA, Kappahl, Kathmandu, Lindex, Migros, Nike, Otto group, RNB Retail & brands, Tommy Hilfiger

⁵¹ Pesticides Action Network UK, Solidaridad, and WWF, Sustainable Cotton Ranking, Assessing Company Performance (June 2016), <http://www.wwf.se/source.php/1646743/Cotton%20Ranking%20Report%20-%20June%202016.pdf>

⁵² Towards Better Cotton are company supported projects in countries where BCI is not present.

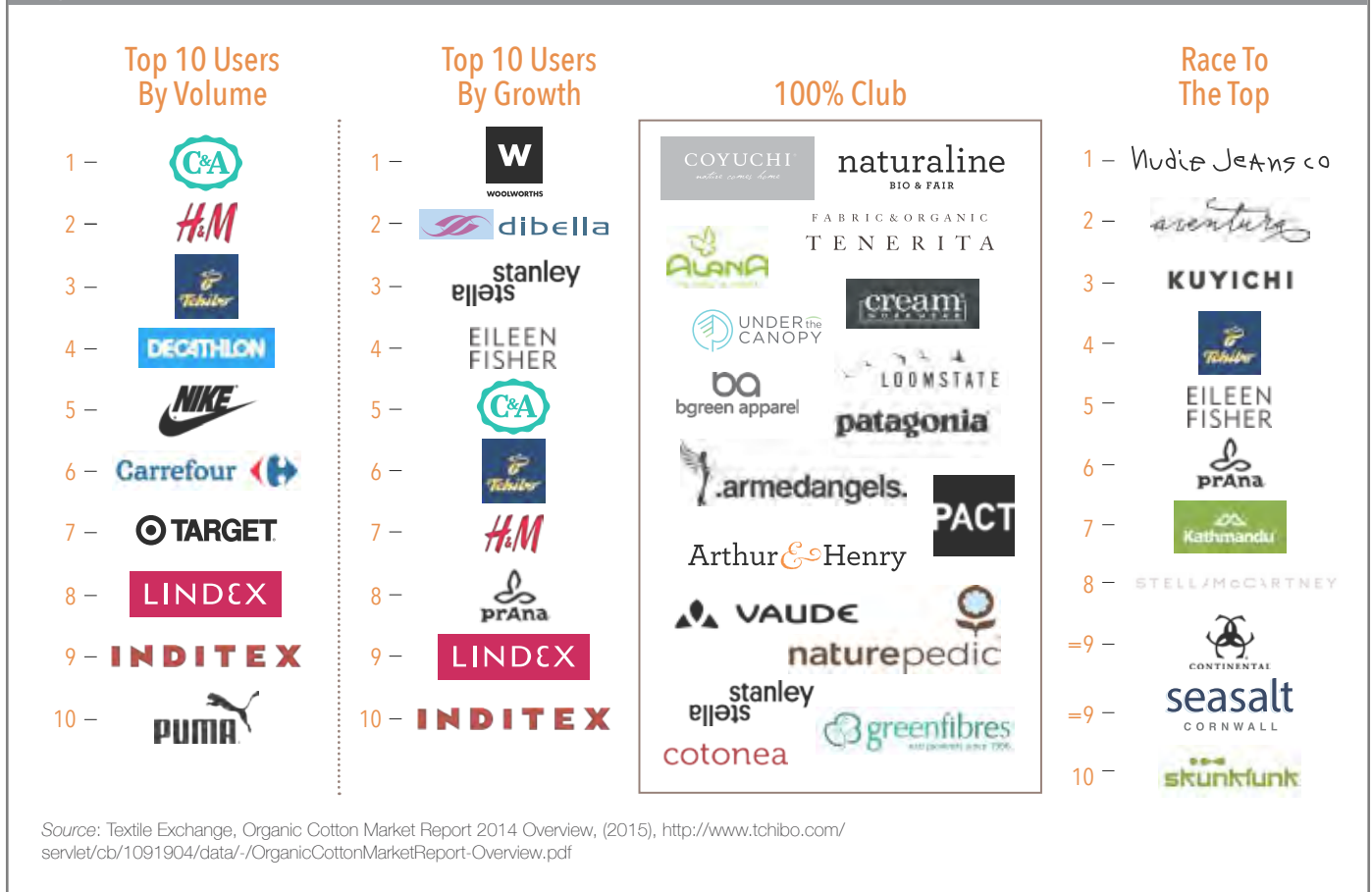
⁵³ Pesticides Action Network UK, Solidaridad, and WWF, Sustainable Cotton Ranking, Assessing Company Performance (June 2016), <http://www.wwf.se/source.php/1646743/Cotton%20Ranking%20Report%20-%20June%202016.pdf>

⁵⁴ Ibid.

⁵⁵ Ibid.

⁵⁶ Ibid.

Figure 12: Top Companies Dedicated to Buying Organic Cotton



Market for organic cotton: Organic cotton is of specific interest for this study, given the integral nature of its production strategies (which go particularly well with the existing initiatives and programs developed by the Smallholder Farmers Alliance in Haiti, see Annex 4). As mentioned above, 2014 marked the beginning of a turnaround for the organic cotton market: overall organic production grew by 10% to 116,974 metric tons of fiber, corresponding to a total market value of around 15.7bn USD. Most of this growth in the organic cotton market could be attributed to increased market demand and improved connections between organic cotton farmers and the textile supply chain.⁵⁷ Based on in-conversion data and farmer forecasts, the Organic Cotton Market Report 2015 outlined an additional 15-20% growth estimate for 2015.⁵⁸ Most organic cotton originates from India, which accounts for nearly three-quarters (74.25%) of total supply, followed by China (10.46%) and Turkey (6.80%). The remaining production is in the Americas, Africa and Central Asia (8.49%).⁵⁹

Prices paid for organic cotton can fluctuate tremendously depending on the type of cotton sold, the quality, and other factors. In the years 2013/14 prices for organic cotton fluctuated from 1.38 USD per pound for organic upland cotton prices as high as 2.20 USD/lb for organic pima cotton.⁶⁰

According to the Organic Cotton Market Report 2014, the top 10 companies that source Organic Cotton by volume are: 1. C&A, 2. H&M, 3. Tchibo, 4. Decathlon, 5. Nike, 6. Carrefour, 7. Target, 8. Lindex, 9. Inditex, 10. Puma. In 2014 the total amount of organic cotton used by these top 10 brands grew by 25%.⁶¹ Five brands in the list above are also in the top 10 companies by growth in terms of organic cotton consumption (Figure 12). Finally, the report outlines an “100% Club” (listing 10 companies using only organic cotton in their products) and the category “Race to the Top” (ranking 10 companies by the rate they are converting conventional to organic cotton).

⁵⁷ Textile Exchange, Organic Cotton Market Report Press Release (June 3rd, 2015), <http://about.lindex.com/no/wp-content/uploads/sites/4/2015/06/Organic-Cotton-Report-Press-Release-3-July-2015.pdf>

⁵⁸ Ibid.

⁵⁹ Ibid.

⁶⁰ Organic Trade Association, 2013 and Preliminary 2014 U.S. Organic Cotton Production & Marketing Trends (January 2015), https://ota.com/sites/default/files/indexed_files/2013%20and%202014%20Organic%20Cotton%20Report.pdf

⁶¹ Ibid.

Challenges marketing sustainable cotton: While both the 2016 Sustainable Cotton Ranking and the 2014 Organic Cotton Report show promising data with regards to the market for sustainable cotton, there are still several challenges that need to be overcome in order for the sustainable cotton market to really grow to its potential. One of the most pressing issues is that the gap between uptake and supply is widening as production grows faster than demand. The result is that the bulk of more sustainable cotton ends up on the conventional market: in 2015, 517,000 metric tons of Better Cotton (equivalent to 13% of the 2014/15 harvest) were taken up by spinners and retailers or brands as conventional cotton.

Organic cotton has the largest share of uptake as a percentage of production with 70% to 80% reported sold as certified (87,731 metric tons) in 2013. However, as with Better Cotton, a substantial amount of organic cotton is still sold to conventional markets.⁶² The leading barrier to

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62 Pesticides Action Network UK, Solidaridad, and WWF, Sustainable Cotton Ranking, Assessing Company Performance (June 2016), <http://www.wwf.se/source.php/1646743/Cotton%20Ranking%20Report%20-%20June%202016.pdf>

future growth of the organic cotton market is the shortage of non-GMO seed supply. Another issue is that 96.7% of the total global organic fiber is produced in the top five organic cotton-producing countries, indicating a need to spread out production and supply chains to more countries to extend the reach of organic cotton.

Another big problem is that a large part of more sustainably produced cotton is not properly traced throughout the value chain: only 17% of all sustainably farmed cotton is actually traded and recognized as sustainable cotton at the consumer end of the value chain. The remaining 83%, as a result of poor traceability, gets mixed and "lost" with regular cotton.⁶³

Overall, it is clear that the sector would benefit from more transparency and coordination across the supply chain, including information about indications of market demand and understanding where the bottlenecks are in the supply chain.

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63 Pesticides Action Network UK, Solidaridad, and WWF, Mind the Gap: Towards a More Sustainable Cotton Market (April 2016), <http://www.solidaridadnetwork.org/sites/solidaridadnetwork.org/files/publications/Mind%20the%20Gap%20-%20Towards%20a%20more%20Sustainable%20Cotton%20Market.pdf>



CHAPTER 2: Access to International Markets — Regulations and Standards

Haiti has both advantages and disadvantages in terms of access to the international markets for cotton. Following the WTO's Tenth Ministerial Conference, held in Nairobi, Kenya from 15 to 19 December, 2015, Haiti, as a 'least developed country' (LDC) enjoys duty-free and quota-free access to the markets of developed countries. At the same time, Haiti is not ideally located in terms of proximity to the main cotton importing (and processing) markets: the main importers of cotton from LDC's are China, India, Vietnam and Bangladesh, and they can get their cotton more cost effective from sources that are closer. While the cotton sector in the United States is well developed, the US does not import cotton, making Haiti's geographical proximity to that country redundant in this context.

With regards to regulation, Haiti does currently not have any regulation in place regarding the production in, or sale of, cotton from the country. That said, GMO seeds are banned, however this is not something that will affect the (organic/sustainable) cotton production models proposed by this study. The only regulation, then, that affects the production and export of cotton from Haiti is regulation related to the terms of buying and selling, something which is done through a variety of private regulation systems, any of which can be used to regulate cotton trading. As such, importers and exporters wishing to trade must opt for one of these before drawing up a contract. The system most commonly used (in more than 60% of the world's transactions) is the Liverpool system, supported by the International Cotton

Association. Others do exist, though, and are in widespread use. An example of this are the European Cotton Rules, promoted by the Belgian Cotton Association and by a few other European organizations, mainly Spanish and French.

Taken together, these private regulation systems greatly facilitate the task of professionals, providing them with a widely known common base. This helps reduce the content of contracts to essential information (place and date of delivery etc.), sometimes taking up just a few pages, even when the quantities sold are huge.

Finally, following international consumer trends, many global retailers increasingly demand, or greatly value, compliance with internationally recognized voluntary standards, such as the Better Cotton Initiative, Fairtrade or organic. These voluntary standards may be of particular relevance for new exporters to the international market, as they can function as proof of reliability for potential buyers. The following sections will outline some of the common standards and supplier qualifications that apply to growing and selling cotton.

Common Standards and Supplier Qualifications Applying to Growing and Selling Cotton

The purpose of standards is to create a universal system for measuring cotton fiber and product quality. The cotton value chain is a long and complex one, and different standards apply to different parts of the value chain. It is beyond the scope of this study to

go into all the possible standards and qualifications applying to cotton production and processing. However, the selection below represents the principal standards that apply to the stages of cotton production, ginning and packaging of lint cotton for export.¹

Cotton classification: The term 'cotton classification' refers to the application of official standards and standardized procedures developed for measuring those physical attributes of raw cotton that affect the quality of the finished product and/or manufacturing efficiency. Classing methodology is based on both grade and instrument standards used in tandem with state-of-the-art methods and equipment to provide the cotton industry with the best possible quality information for marketing and processing. Cotton classification includes the cotton quality determinations of color grade, leaf grade, preparation, fiber length, length uniformity index, fiber strength, micronaire (fineness), color Rd, color +b, trash content and extraneous matter identification. As classing systems around the world progress, reliance on human senses is diminishing and instrument classing is expanding. Countries including Australia, Brazil, China, Uzbekistan and the United States have either fully implemented or are very close to fully implementing instrument classification on 100% of their cotton crops

Manual grading: The traditional method of cotton classification is through manual grading. Manual grading is based on appearance and feel, and is accomplished mainly through the senses of sight and touch. Manual grading includes determinations for such factors as color grade, leaf grade, staple length, preparation and the identification of foreign or extraneous matter. These determinations are made by trained cotton classers based upon visual comparisons with physical and descriptive standards.

Grade standards: Grade standards are used for manual classification. They represent the various grade levels for such factors as color, leaf and preparation. The most recognized and widely used grade standards are the Universal Upland Grade Standards. They are considered universal because of wide international acceptance. Twenty-three of the world's major cotton associations, representing 21 countries, are delegates to the Universal Cotton Standards Agreement. These standards are maintained and distributed throughout the world by the United States Department of Agriculture (USDA). In addition to the Universal Grade Standards, USDA maintains the American Pima Grade Standards (Pima cotton is markedly different from Upland cotton). In recent times many cotton producing countries have developed their own grade standards in order to more closely represent their own cotton.

USDA has twenty-five official color grades for American Upland cotton and five categories of below-grade color, as shown in the table below. USDA maintains fifteen physical grade standards for American Upland cotton. Seven of the white color grade standards also serve as official leaf grade standards for American Upland cotton. The remaining grades are descriptive.

For the classification of American Pima cotton, USDA has six official grades for color and leaf, all of which are represented by physical standards. There is also a descriptive standard for cotton that is below grade for color or leaf.

Both Universal Upland and American Pima Grade Standards are valid for only one year, because of gradual changes in color as cotton ages. Grade standards for both American Upland and American Pima cotton are reviewed periodically to ensure that they are still representative of the U.S. crop. If at some point all segments of the U.S. cotton industry agree that the standards are no longer representative of the crop, special measures must be taken to review and amend the standards. In addition to the Universal Upland and American Pima Grade Standards, many cotton producing countries have developed their own grade standards in order to more closely represent their own cotton.

Instrument standards: Instrument standards are cottons used for instrument calibration and verification. These standards include Universal HVI Calibration cotton, Extra-Long Staple (ELS) Calibration cotton, Universal HVI Micronaire Calibration cotton, and Universal HVI Cotton Color and Cotton Trash Standards. These standards serve the USDA and most cotton organizations worldwide as the basis for instrument cotton classification.

Cotton selected for use in instrument calibration must pass rigorous screening procedures. As a first step, USDA conducts an extensive search in the National Database for uniform lots of cotton from the current crop that have fiber properties appropriate for their intended use. Candidate bales are purchased from producers and retested through a rigorous value establishment process to determine whether they meet the strict certification requirements set for calibration cotton.

Contracts: In the global cotton market, it is important to establish a concise contract, placing particular emphasis on both parties holding a clear understanding of their joint obligations under the agreed terms and conditions. These terms and conditions should be clearly expressed and understood during the negotiations of 'offer and acceptance', and many of them are specific to the international trade in raw cotton.

Trade in cotton is generally conducted under a standardized set of terms and conditions. There are several recognized

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 1 This selection was made from the International Trade Center's (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf> The same document provides a wealth of more detailed information on the standards mentioned below as well as a host of other common practices used in the cotton trade.

Figure 13: Official Grades of American Upland Cotton

	White	Light spotted	Spotted	Tinged	Yellow stained
Good middling	11-1**	12	13	—	—
Strict middling	21-2**	22	23*	24	25
Middling	31-3**	32	33*	34*	35
Strict low middling	41-4**	42	43*	44*	—
Low middling	51-5**	52	53*	54*	—
Strict good ordinary	61-6**	62	63*	—	—
Good ordinary	71-7**	—	—	—	—
Below grade	81	82	83	84	85

* Physical standards for colour grade only.

** Physical standards for colour grade and leaf grade.

All others are descriptive.

Source: International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

cotton trade associations assisting trade in cotton, of which the International Cotton Association Ltd (ICA), formerly the Liverpool Cotton Association Ltd, is most prominent. It is estimated that their rules are involved in approximately 60%–70% of global cotton contracts. This Association provides a draft international contract form for this purpose and a majority of cotton traded internationally is concluded under ICA Bylaws and Rules which can apply to contracts provided there is mutual consent.

In summary, the Cotton Exporters Guide outlines the following standard contractual terms:

- **Quality – terms of valuation:** Cotton fiber is produced at many different origins from a variety of seed varieties distributed under varying local controls and planted in different districts farmed and managed under different criteria and controls. The result is the production of a wide range of lint fiber properties influenced not only by these factors but also by climatic conditions throughout the planting, growing and picking cycles. Cotton lint is marketed in different ways, and buyers rely on the supplier to meet the precise contractual quality specifications. Summarized these are:²

- *On description (based on 'Universal Standards')*: is a system of manual classification of grade and color with reference to the Universal Cotton Grade Standards.

- *Basis 'on type'*: is the process of selling cotton fiber on the basis of a private 'type'(sample) which represents the specific named characteristics defined by the seller and is supplied to the potential buyer for approval.
- *HVI (high volume instrument testing) or SITC (Standard Instrument Testing)*: is a fully implemented system that provides results not possible by manual or physical evaluation. The seller will specify in the contract the range of specifications they are content to offer.
- *Sale on government class*: means a sale made based on government classification (e.g. USDA) based on grade, color, staple length, micronaire and other standard measurements made by HVI.
- *Sale on certification*: means that at the time of contract the parties will agree the basis of quality and insert a clause in the contract stating that an independent certification of quality will be conducted by a named independent international cotton controller.
- *Pre-shipment inspection and approval of actual stock lots*: means that at the time of contract the parties agree to the quality basis of the contract. A clause is added that permits the buyer to access the allocated lots of cotton and to inspect and sample prior to shipment.

² For more detail we refer to the International Trade Center's Cotton Exporters Guide (2007)

Figure 14: Dimension and Density of the ISO-Compliant Bales

Length (mm)	Width (mm)	Height (mm)	Density (kg/m ³)
1060	530	780–950	360–450
1400	530	700–900	

Source: International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

- Growth and quality:** The growth and origin of the cotton, or the agreed optional growths of the cotton, should be expressed in the contract. 'Quality' of cotton fiber can include the following identification of fiber valuations:
 - crop production year.
 - seed variety of the cotton.
 - obtained by either manual/physical classification or by mechanical testing:
 - grade (leaf and color)
 - length (staple)
 - obtained by mechanical testing/SITC testing:
 - color grade
 - leaf/trash content
 - length (staple)
 - micronaire (fineness)
 - strength
 - maturity
 - uniformity
 - moisture
 - elongation
 - short fiber index
 - count strength product
- Quantity:** Cotton is usually sold in lots, which vary in size from origin to origin. Contracts can be expressed in bales, by the number of 'standard' or 'high cube' containers FCL (20 or 40 foot), or by weight. All contracts are recognized contracts for weight and are based on the net weight of the shipment, so if for example '500 bales' are contracted and an average bale weight is stated as '200 kilos', the contract would be for 100 tons, allowing for any agreed weight tolerance. Weight tolerance gives the shipper much-needed flexibility within individual shipments. Normally the standard practice is to apply a tolerance of 3%–5% to cotton contracts.
- Price and terms:** Pricing can be 'fixed' or based 'on call', both expressed in a nominated currency depending on the parties' agreement and market tradition. Generally, cotton

prices are expressed in United States cents per pound or United States dollars per ton and sold in units of weight expressed in 'imperial' pounds, metric kilos or metric tons.

- *Fixed priced contracts:* are contracts where the price has been agreed at the time of contract and will not vary without the express agreement of the parties.
- *'On call' contracts:* are commonly known as a 'basis contracts'. The basis is agreed between the parties at the time of contract with reference to a nominated New York Cotton Futures trading month. The basis could for example be expressed as '200 United States cent points/pounds off October New York'.

The mechanism for price fixing in an 'on call' contract is stipulated in the contract and expressed as either 'buyer's call' or 'seller's call'. In the case of 'buyer's call' the seller will fix the final price of the contract, or portion thereof, on the New York cotton futures month when he or she receives the buyer's instructions to fix. This must be prior to the first notice day of the future contract month and before the invoice is issued. If the buyer does not issue a fixation order and the parties have not agreed to any extension to the fixation period, the seller can fix the price.

Cotton bale packaging & labelling: Cotton is packaged, stored and transported in units called bales. Packaging and labelling requirements of cotton bales have changed over the past century. There are numerous weights, sizes, dimensions and densities of cotton bales produced around the world. Bale weights may be as great as 330 kg as in some Egyptian bales and as low as 100 kg as in old-type bales observed in China. However, recent advances in standardization are rapidly reducing the variation among cotton bales. Today most bales are compliant with the International Standard ISO-1986 (E).³ The nominal dimensions and density of the ISO-compliant bales are shown in the following table. The recommended density for

³ This International Standard lays down the nominal overall dimensions and the bale density of banded cotton bales. It applies to the shaping and forming, the transport and the opening of the bales. It does not apply to wrapping, to banding, or to the marking of bales.





PROFILE Traceability in Practice: The Case of Chetna Organic

Chetna is a smallholder driven group of farmer cooperatives that grow, among other things, organic cotton in India. In order to comply with buyer's demands, Chetna has developed a traceability system that allows them to trace their organic cotton from production site up to the ginning site.

- Traceability starts the moment the cotton gets picked. The cotton is collected in bags with individual labels mentioning details of the farmer. Farmer groups are issued bags based on the expected yield, which is used to pack the produce, post-harvest. Emphasis is on cotton cloth bags to avoid foreign fiber contamination. Each bag is labeled and contains detailed information about the supplies farmer such as 'Name', 'Village', 'SHG Name', 'Unique Farmer Code', 'Organic Status', 'Staple Length', 'Seed Variety', 'Moisture Content' etc. Furthermore, cotton at different stages of organic compliance is labeled in different colors. For instance, Green colored labels are attached to the bags containing organic cotton, while IC2 and IC1 cotton is labeled with blue and red colored labels respectively. Such a system not only helps trace cotton to the supplier farmer but also helps assess the cotton as well as maintain segregation during the ginning process. This process is far from the practice of bringing cotton in open trucks, as followed in the case of conventional cotton.
- Detailed farmer diaries are maintained and cotton arrivals with farmer details captured earlier are tallied upon arrival. Farm diaries are like the biography of a farmer's cotton in a year. It contains details of every practice followed by the farmer, its date, expected results and actual results. Information such as cultivation area, seed variety used, expected yield, number of pickings etc., help set expectation levels for each farmer's produce and tallying them at the village procurement point helps check contamination and maintain traceability.
- Once at the gin, cotton of specific staple lengths is organized in separate heaps based on location. Cotton from one location does not get mixed with cotton from another location, though both may get ginned at the same facility. The cotton is also taken up for ginning and pressing in separate and sequential batches which helps ensure traceability for each bale as per its location as well as variety used. Each bale is numbered with a unique number (Bale Press Running Number) and is traceable to its location given the past data collected for it.
- Chetna Organic uses Tracenet to help keep track of traceability. The group also works closely with 'Made-By', an umbrella label based in the UK and Netherlands that works with brands to help them move towards improving sustainability in their procurement. Made-By brands subscribe to a traceability system called 'Track & Trace' – a unique tracing program which captures lot numbers and consignment numbers at each stage to trace origins of a cotton product.



Figure 15: Cotton Sustainability Initiatives Compared

	 Better Cotton	 Cotton made in Africa	 Organic Cotton	 Fairtrade Cotton
Year Established	2005	2005	1990s	2004
Geographical Scope	Currently operating in Brazil, India, Mali, Pakistan, China, Turkey and Mozambique. Global scope intended.	Sub-Saharan Africa: Burkina Faso (SCS), Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Malawi, Mozambique, United Republic of Tanzania (including CmiA-Organic), Uganda, Zambia, Zimbabwe	20 countries, of which the five largest producing countries: India, Turkey, China, United Republic of Tanzania and the United States.	Global (small-scale farming only)
Farmers Participating	300,000 (excluding equivalent standard CmiA farmers)	438,605 (2012/13) 448,406 (2013/14, preliminary data) plus 401,351 farmers starting with harvest 2014/15 (preliminary data)	214,905 (2011/12), 218,966 (2010/11)	58,468 (2010/11)
Total Production	750,000 tons of lint (2012/13) (excluding CmiA)	144,909 tons lint (2012/13) 193,956 tons lint (2013/14, preliminary data) plus 162,200 tons lint starting with harvest 2014/15 (estimate)	138,813 tons lint (2011/12), 151,079 tons lint (2010/11)	23,948 tons of lint (2011/12), 19,639 tons of lint (2010/11)
Area Covered	755,000 ha (2012/13)	585,748 ha (2012/13) 610,659 ha (2013/14, preliminary data) plus 397,031 ha starting with harvest 2014/15 (preliminary data)	316,907 ha (2011/12), 324,577 ha (2010/11), 460 973 ha (2009/10)	n.a.
Average Yield	1 ton/ha of lint	0.25 tons/ha lint (2012/13), 0.32 tons/ha lint	Ranging from 0.274 – 2.835 tons/ha lint (see section on organic cotton below)	n.a.

continued...

	Better Cotton	Cotton made in Africa	Organic Cotton	Fairtrade Cotton
Certification/ Verification	Guided self-assessment by farmers on an annual basis, second party credibility checks (by BCI or partners) and independent third party verification on a sampling basis.	Annual self-assessment of participating cotton companies and biannual external verification of managing entities on field and gin level by independent verification companies (at present EcoCert and AfriCert) serves to verify the adherence to the specified production standards.	Organic production practices are verified by third party certifying agencies.	Third party certification and annually executed audits through on-site visits of participating farmers cooperatives and selected participating farmers.

Source: Unless indicated otherwise data comes from: Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

a cotton bale is 450 kg/m³. Bales meeting ISO standards are of optimum size for use in ISO containers having the nominal length of 12 meters. Additional information on bale strapping and bale cover materials can be found in the International Trade Center's Cotton Exporters Guide.⁴

Labelling: International Standard ISO 8115-3:1995(E) specifies that for identification purposes each bale of cotton shall have a mark that identifies the shipping lot. The mark should be identical to those on the bill of lading, the delivery order and other shipping documents. The standard also stipulates that the marking color or ink shall not penetrate through the protective wrapping, and that all bales shall be marked at the same position. The ISO standard further requires each bale to have a label giving the bale number in figures and barcode, along with gin number and/or name.

Traceability: The enormous complexity of the cotton value chain makes it almost impossible to follow and trace cotton through the supply chain. As a result, traditionally there has not been a large emphasis on traceability of cotton. However, with increasing consumer awareness about the issues associated with conventional cotton, and even more so its processing into garments by the garment industry, more and more initiatives try to improve

transparency in the value chain. In January 2016 the Better Cotton Initiative started implementing the final step to establish end-to-end traceability for products, from field to store. The Better Cotton Initiative will be addressed in the section following.

Cotton-Specific Voluntary Sustainability Initiatives and Frameworks

With an increasing interest in cotton that is sustainably produced, several standard initiatives have sprung up over the past decades. Each standard brings something different to the table, both in terms of the standards themselves and the systems supporting them. While Organic Cotton focuses on the environmental implications, Fairtrade addresses the social aspects of cotton farming. CmiA and Better Cotton cover both environmental and social dimensions, but CmiA is limited in scope to Sub-Saharan Africa. The table in Figure 15 gives a comparative overview of the four main sustainability initiatives that apply to cotton. In the sections that follow, each initiative will be discussed more extensively.

Better Cotton Initiative

The Better Cotton Initiative (BCI) is a multi-stakeholder initiative comprising retailers and brands, suppliers and manufacturers, as well as donor, civil society and producer organizations. It was founded in 2005 and currently operates in eight countries (excluding those in Africa covered by its recognized equivalent standard CmiA).

⁴ International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

In 2013, 755,000 ha were cultivated by 300,000 participating farmers under BCI. Targets for 2015 are 1 million Better Cotton farmers and 2 million ha under Better Cotton cultivation.

The initiative requires participating cotton growers to adopt and adhere to specific production and management practices – farmers have to comply with the initiative's minimum production and management criteria and achieve continuing progress on the wider sustainability indicators. Compliance is verified by annual self-assessments that farmers need to report. Self-assessment is then complemented by second party credibility checks (carried out by BCI or partners) and independent third party verification on a sample of farms. Ginners are obliged to track (physically segregate) "Better Cotton" and produce bales of lint using only Better Cotton (instead of a product mix). No physical segregation is required after the ginner. In such a way, BCI's overall objective is to transition mainstream cotton production towards production systems of enhanced environmental sustainability that respect and promote decent working conditions and realize financial profitability.

BCI does not set or encourage a premium price for producers. The objective is that the producers earn more money through enhanced yields and lower input costs. The avoidance of any larger price differential provides the basis for absorbing a very high share of the global cotton sector into BCI. BCI furthermore does not carry a consumer facing label and is entirely conceived as a business-to-business standard.

BCI aims to transform cotton production worldwide by developing Better Cotton as a sustainable mainstream commodity. BCI's specific aims are to:

- reduce the environmental impact of cotton production;
- improve livelihoods and economic development in cotton-producing areas;
- improve commitment and flow of Better Cotton throughout the supply chain; and
- ensure the credibility and sustainability of the Better Cotton Initiative.

Indicator framework: In order to qualify as producing Better Cotton, BCI farmers have to comply with the initiative's minimum criteria as well as achieving continuing progress on a suite of wider sustainability indicators until full adherence with them is reached. For aspects that are not measurable on the activity level and for evaluating the broader achievements of the initiative, BCI uses instead a selected number of results indicators. A complete overview of these indicators can be found in BCI's document "Better Cotton Production Principles and Criteria (2013)."

Better Cotton's new country start-up policy: While in principle any country can become a candidate for the Better Cotton program, BCI has developed a new country start-up policy that aims to maximize the way it can leverage its resources to achieve maximum scale and impact. In practice this means that the majority of its resources are focused on countries where cotton is already grown and where institutions are already in place to help restructure the existing cotton industry. For the period 2016-2020 China, India and Pakistan are among the principal countries to receive support through the Better Cotton program.

One of the key differentiators between BCI and the more traditional certification systems discussed below, is the requirement to engage national stakeholders and secure broad-based support for a new program prior to starting to grow Better Cotton in any given country. This requirement is there for a number of reasons – it facilitates long-term national embedding, it involves all stakeholders and ensures everyone understands the role they have to play in creating positive change at farm-level and it forms a base for the credibility of the BCI Assurance Programme.⁵ For all new countries the program seeks out partners who are able to take on significant oversight, management and funding responsibilities.

BCI will make a decision on whether or not it will approve operations in a new country based on a set of strategic criteria. These criteria include, but are not necessarily limited to:

- *Multi-stakeholder ownership:* A pre-requisite for starting up is the ability to demonstrate strong domestic support for initiating a Better Cotton Program from a broad range of stakeholders (this should include as a minimum, but is not limited to, Producer Organizations, Suppliers & Manufacturers, Retailers & Brands, Local / National Government, Civil Society), and identified opportunities (or at least potential) to coordinate with existing national or regional-level activities;
- *Demonstrable need:* There is a demonstrable need for improvement in the environmental, social and economic conditions where the cotton is being produced;
- *Demonstrable demand:* There is demonstrable demand for Better Cotton to be sourced from the country, and identifiable linkages to BCI Members within the supply chain;
- *Medium & long-term potential:* There is clearly identified potential to scale-up Better Cotton production within a well-defined timeframe;
- *Financial support:* BCI expects any proposal to start-up in a new country (this includes all components of the Better Cotton New Country Start-Up Process) to be accompanied

⁵ BCI, BCI New Country Start-Up Policy 2016 [Working Draft] (2016)

FACT SHEET Better Cotton Initiative

Year Established: 2005	Farmers Participating: 300,000 (excluding equivalent standard CmiA farmers)
Geographical Scope: Currently operating in Brazil, India, Mali, Pakistan, China, Turkey and Mozambique. Global scope intended.	Total Production: 750,000 tons of lint (2012/13) (excluding CmiA)
Area Covered: 755,000 ha (2012/13)	Average yield: 1 ton/ha of lint
Global market share: 2.8% of global production (2012/13)	Implementing or coordinating organization: Better Cotton Initiative (BCI)
Main objective: To promote environmentally friendly cotton production systems as well as decent working conditions and realize their financial profitability as a contribution to an overall vibrant cotton sector.	Stakeholder involvement: Multi-stakeholder initiative comprising retailers and brands, suppliers and manufacturers, civil society, producer organizations and associate members.
Financing model: Combination of membership fees (currently at about 30%), donations and grants, training fees and a currently foreseen volume-based fee on Better Cotton use from retailers and brands.	Major donors: IDH, ICCO, SECO, SIDA, Swedish Postcode Lottery, Rabobank, WWF
Total funding: Annual funding EUR 3.8 million (2013) to cover the Secretariat, plus approximately EUR 8 million from brands and retailers, and donors to cover farmer training programs.	Verification process: Guided self-assessment by farmers on an annual basis, second party credibility checks (by BCI or partners) and independent third party verification on a sampling basis.
Technical assistance to farmers: Selected farmer trainings on agricultural practices, knowledge-sharing, skill development, organizational capacity and financial services through implementing partners.	

by a robust, and clearly defined, financial support proposal. This may take the form of an existing structure which is already fully funded, and/or sources of funding which have been identified and which will be accessible once a new program is (or is being) established;

- Production volume & number of farmers:** BCI's 2020 targets include reaching 5 million farmers and covering 30% of global production. Subsequently, it will give priority to countries where there is a significant national volume of cotton production and/or a large number of cotton farmers (typically in countries where smallholders are in the majority) who would benefit from adopting the Better Cotton Standard System (BCSS);
- Early-stage opportunity:** There are clearly identified opportunities to start working with a significant percentage of the total cotton farmers, and/or area of land which is being planted to cotton, during the first years of establishing a new program;
- Strategic partner(s):** BCI will ordinarily prioritize engagement in a country where a suitable Strategic Partnership(s) can be formed with national-level programs or similar initiatives that promote the social, environmental and economic sustainability of cotton production;
- Established national / industry cotton standard:** Where possible, BCI is keen to engage with other credible domestic cotton sustainability programs which are already established in a country. BCI's usual preference is to work with the existing program in order to understand if, and how, cotton produced in this way can be recognized as being equivalent to Better Cotton. This process is distinct from the Standard-Format Version of the Better Cotton New Country Start-Up Process, and is based on an independent (third-party) led systematic gap analysis leading to a formal recognition of the existing standard and a Strategic Partnership Agreement to govern the oversight of the recognition status; and

- *Other considerations:* BCI will also give consideration to practical issues, such as perceived country risk for implementation by BCI staff and/or Partners, access to independent verifiers, and whether or not local language requirements would present an impediment to being able to provide the required level of training and disseminate information.

BCI will consider these criteria, plus other factors, before reaching a conclusion about whether or not to initiate a program or project in a new country.⁶

Cotton made in Africa

Cotton made in Africa (CmiA) works according to the principles of a social business. It was initiated in 2005 and is currently implemented by the non-profit Aid by Trade Foundation in 11 sub-Saharan African countries: Burkina Faso (SCS), Cameroon, Cote d'Ivoire, Ethiopia, Ghana, Malawi, Mozambique, United Republic of Tanzania (including CmiA-Organic), Uganda, Zambia and Zimbabwe.

CmiA aims at improving the livelihoods of sub-Saharan African smallholder cotton producers by enabling farmers to adopt good agricultural practices and by requiring production standards that are environmentally and socially sustainable, thereby contributing to protect the environment in cotton-producing countries and increasing the demand for African cotton on international retail markets. By linking participating farmers to the regular and growing demand of specific retail partners for sustainable cotton, CmiA activates market forces instead of aid.

International retail partners do not pay any premium prices for cotton verified as CmiA. Instead they pay a license fee that is levied at the end of the textile value chain and which is at present approx. 0.025 – 0.10 EUR per piece of garment (depending on total transacted volumes). The CmiA logo can be used as an additional or ingredient brand on the product as well as at the corporate level. Depending on the chosen purchasing model – Mass Balance (MB) or Hard Identity Preserved (HIP) – retailers can indicate the use of CmiA verified cotton in specific products or their support of the initiative and its work. In the framework of the Competitive African Cotton Initiative (COMPACI), the work of Cotton made in Africa is indirectly also funded by the public sector, for example the German Ministry for Economic Cooperation and Development (BMZ).

Revenues paid to the Aid by Trade Foundation are reinvested to benefit smallholder farmers in the project countries. Partly with additional capacity support under COMPACI, CmiA engages in agricultural as well as business training measures for farmers and capacity support to cotton companies, the provision of

loans and inputs on credit and support to additional community projects under private–public partnership funding – e.g. improving school infrastructure or promoting women's cooperatives in rural cotton-growing regions.

The verification of adherence to the initiative's standard criteria extends to smallholder farmers and ginner workers. The verification lies to a significant extent in the responsibility of the actor identified as the so-called "managing entity", which is often the participating ginning or aggregator company. They provide annual self-assessments of practices and also have the responsibility to provide specified training and capacity support measures to farmers. These control processes are complemented by bi-annual independent verifications from external companies (at present EcoCert and AfriCert), which serve to verify the adherence to the specified production standards. This is complemented by sample-based surveys and selected impact evaluation studies on the social, environmental and economic outcomes of CmiA activities.

Indicator framework: The CmiA sustainability indicators are subdivided into the categories' exclusion criteria and sustainability criteria at farm, ginner and management level. Since the FAO/ICAC report on Sustainability in Cotton Farming Systems focuses exclusively on the farm level, ginner and management aspects are largely omitted below. The criteria catalogue firstly sets out exclusion criteria to decide whether smallholder farmers and cotton companies are eligible to participate in the Cotton made in Africa initiative. These minimum requirements include, for example, bans on slavery, human trafficking, exploitative forms of child labor according to the ILO, as well as deforestation of primary forests. There is also a ban on the use of hazardous pesticides and of genetically modified seeds. The exclusion criteria presented below are motivated by a specific vision of environmental sustainability, basic social rights of the decent work agenda, and by major consumer preferences for sustainability.

The wider sustainability indicators (farm level criteria) rank CmiA participating farmers concerning their crop rotation practices, application of pest management, access to training on agricultural practices, and the minimization of pesticide use and hazards from their application, handling, storage and disposal. A second set of indicators specifies whether the cotton company/ginning enterprise engages in fair pricing methods for provided inputs, controls the quality of the produced cotton, pays farmers without major time delays and respects a broad range of minimum working conditions and rights. The performance of farmers and cotton companies is evaluated on a traffic light rating scale, to promote an orientation and mechanism for continued improvements. To support smallholder farmers and

6 BCI, BCI New Country Start-Up Policy 2016 [Working Draft] (2016)

FACT SHEET Cotton made in Africa

Year Established: 2005	Farmers Participating: 438,605 (2012/13) 448,406 (2013/14, preliminary data) plus 401,351 farmers starting with harvest 2014/15 (preliminary data)
Geographical Scope: Sub-Saharan Africa: Burkina Faso (SCS), Cameroon, Côte d'Ivoire, Ethiopia, Ghana, Malawi, Mozambique, United Republic of Tanzania (including CmiA-Organic), Uganda, Zambia, Zimbabwe	Total Production: 144,909 tons lint (2012/13) 193,956 tons lint (2013/14, preliminary data) plus 162,200 tons lint starting with harvest 2014/15 (estimate)
Area Covered: 585,748 ha (2012/13) 610,659 ha (2013/14, preliminary data) plus 397 031 ha starting with harvest 2014/15 (preliminary data)	Average yield: 0.25 tons/ha lint (2012/13), 0.32 tons/ha lint
Global market share: 0.6% (2012/13)	Implementing or coordinating organization: Aid by Trade Foundation (AbTF), Competitive African Cotton Initiative (COMPACI)
Main objective: CmiA aims at improving the livelihoods of sub-Saharan African smallholder cotton producers by increasing the adoption of good agricultural practices, linking farmers to a secure and growing demand of retail partners for sustainable cotton and thus achieving environmental, social and economic sustainable production systems.	Stakeholder involvement: Farmers, cotton companies, retailers and other supply chain actors
Financing model: Combination of license fees by participating retailers and brands, cotton companies and donor contributions.	Major donors: Aid by Trade Foundation, Bill & Melinda Gates Foundation (BMGF), German Federal Ministry for Economic Cooperation and Development (BMZ), Gatsby Foundation, Walmart.
Verification process: Annual self-assessment of participating cotton companies and biannual external verification of Managing Entities on field and gin level by independent verification companies (at present EcoCert and AfriCert) serves to verify the adherence to the specified production standards.	Technical assistance to farmers: Farmer trainings on production practices, such as crop rotation, pesticide use, eradication of child labor and other related issues, are an important component of the initiative.

cotton companies in their efforts, CmiA conducts technical trainings, through their partners, for smallholder farmers in efficient and environmentally sound farming methods for cotton.

The initiative's emphasis on sustainability criteria that actively demand service provision from intermediate or downstream value chain actors to farmers is thus, besides the direct provision of a market linkage, a further important differentiation to other initiatives.

Organic Cotton

Organic cotton defines a holistic approach that addresses the entire production system. Organic production thereby entails following a specific vision of environmental sustainability, a set of social rights, and fair compensation/rewards for

ecological "value added". It may in addition provide economic benefits through the associated consumer-facing label and product differentiation.

Certified organic cotton gained its first momentum in the 1990s. It refers to any type of production that is certified by an independent organic certification body that either follows its own defined standard or applies an established national or international standard (e.g. the EU regulations for organic farming or the USDA National Organic Program [for cotton production]). The Organic Content Standard (OCS) is a voluntary standard used to track and verify the organic fiber content in the finished product and the Global Organic Textile Standard (GOTS) builds textile processing criteria for the entire supply chain on the basis of farm-level requirements.

FACT SHEET Organic Cotton

Year Established: 1990s	Farmers Participating: 214,905 (2011/12), 218,966 (2010/11)
Geographical Scope: 20 countries, of which the five largest producing countries: India, Turkey, China, United Republic of Tanzania and the United States.	Total Production: 138,813 tons lint (2011/12), 151,079 tons lint (2010/11)
Area Covered: 316,907 ha (2011/12), 324 577 ha (2010/11), 460,973 ha (2009/10)	Average yield: – Africa ¹ : 0.274 (0.170–0.365) tons/ha – China: 2.097 (1.001–2.835) tons/ha – India ² : 0.407 (0.155–1.289) tons/ha – Turkey: 1.432 (1.415–1.600) tons/ha – United States: 0.6 tons/ha – Latin America: 0.708 (0.272–0.991) tons/ha – Egypt (biodynamic): 1.432 tons/ha – Central Asia ³ : 1.030 (0.9–1.16) tons/ha
Global market share: 0.6% of global production (0.7% average over past 3 years)	Implementing or coordinating organization: Decentralized implementation and coordination by autonomous organizations.
Main objective: Organic Agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic Agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.	Stakeholder involvement: Farmers, producer associations, ginners, traders, NGOs, spinners/manufacturers, certifying agencies, textile brands and retailers, some with direct links to farmers.
Financing model: Farmers utilize existing financing systems and certification fees are usually covered by the farmers' group or a coordinating organization acting on behalf of the farmers.	Verification process: Organic production practices are verified by third party certifying agencies.
Technical assistance to farmers: Organic certified systems have no standard mechanism of technical assistance in place and largely depend on the existence of farmers' membership in producers' organizations, extension services through contractor or supply chain partner (e.g. ginner, spinner), funded programs, or targeted state extension programs.	

1. Africa includes Benin, Burkina Faso, Mali, Senegal, United Republic of Tanzania.

2. Latin America includes Brazil, Nicaragua, Paraguay, Peru.

3. Central Asia includes Kyrgyzstan and Tajikistan.

While considerable freedom exists for private certification bodies to define their specific standard independently, the International Federation of Organic Agriculture Movements (IFOAM)'s Organic Guarantee System serves to harmonize organic agricultural standards on a global scale as well as to make them more comparable. It is built around the IFOAM Norms that contain the Common Objectives and Requirements

of Organic Standards (COROS) which were agreed upon by the IFOAM members and endorsed by FAO and UNCTAD.

Certified organic cotton farmers pay annual fees for certification to the respective certification agency and usually realize higher market prices than for conventional cotton (note: for small-scale farmers this is often taken care of by the association

administrative department or contracting partner). While organic production is in general a stronger autonomous and decentralized activity, certified organic cotton producers often establish a link to ginning or spinning facilities that are equally certified for processing organic cotton.

Despite the above-outlined diversity of certification standards, the associated farming principles of organic cotton production are still comparably well-defined and centered around the following:

- no application of any synthetic fertilizers such as NPK or urea and the importance of nutrient recycling as well as locally closed nutrient cycles.
- no application of toxic and persistent synthetic pesticides (including herbicides, insecticides, fungicides), growth promoters or defoliants to facilitate mechanized harvest.
- no use of genetically modified organisms (GMO) such as Bt-cotton varieties.
- adoption of crop rotation (no cotton after cotton in the same field in two subsequent years) and of intercropping.
- prevention of spray drift from neighboring conventional fields, e.g. by growing border crops.
- maintenance of records and documents for inspection and certification.

Indicator framework: The organic production standards promote a specific vision of sustainability. While having many indicators similar to those of the other voluntary initiatives presented, organic production also gives importance to aspects of integrated farming systems that do not use synthetic fertilizers or pesticides and includes practices of crop rotation as well as on-farm crop diversity. Integration of livestock (food products, soil fertility, farm work) is also often part of the integrated organic production system. A product cannot be certified organic if human rights or labor standards (ILO) have been breached. It is common for small-scale producers in developing countries to combine Fairtrade standards and certification with their organic criteria.

The following list displays the main sustainability issues that are covered by the above identified Common Objectives and Requirements of Organic Standards, relevant to crop production. Cotton relevant sustainability issues covered by the Common Objectives and Requirements of Organic Standards (COROS):

- organic ecosystems:
 - ecosystem management, including water use efficiency (blue water) and avoidance of water pollution (grey water)
 - resource management

- genetically modified organisms and nanotechnology.
- general requirements for plant production:
 - maintenance of organic management
 - avoiding contamination
- crop production:
 - seed, propagation material and seedlings
 - soil conservation and crop rotation
 - management of soil fertility
 - pest, disease, weed and growth management
- processing and handling:
 - ingredients and processing aids
 - processing methods
 - packaging and containers
 - cleaning, disinfecting and sanitizing processing facilities
 - pest and disease control
- social justice
- labelling
- economic: fair prices for organic (sometimes called value added premiums), as well as farmer-centric contractual terms and conditions (e.g. pre-financing and forward contracting) are sometimes part of the organic cotton business model. The potential for lower input costs and secondary incomes from rotation/intercrops in mature systems, can also result in higher and/or more reliable incomes for farmers.

Fairtrade Cotton

The Fairtrade standard defines a set of environmental, social and economic requirements in production, trade and transformation of agricultural commodities and their end products. Cotton was first listed as a Fairtrade certified product in 2004 in four West African countries linked to Max Havelaar France and subsequently in India linked to Max Havelaar.⁷ The Fairtrade standard originated from the natural growth of a series of independent national initiatives, while since 1994 the Fairtrade Labeling Organizations International (FLO), renamed Fairtrade International in 2012, has been the international standard setting umbrella organization.

This harmonized Fairtrade standard entails the provision of a set of social and work rights for producers, environmental production standards, and economic benefits for producers as well as their communities. Most notably the Fairtrade standard regulates the adherence to a comprehensive set of ILO

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 7 ICAC, Report on some specialty cottons: Organic, Fair Trade, and Cotton Made in Africa. (Washington DC, 2010), www.icac.org/delegates/sc_notices/sc_meeting_504/504_at3.pdf

FACT SHEET Fairtrade Cotton

Start of Wider Diffusion: 2004	Farmers Participating: 58,468 (2010/11)
Geographical Scope: Global (small-scale farming only)	Total Production: 23,948 tons of lint (2011/12), 19,639 tons of lint (2010/11)
Global market share: 0.1%	Implementing or coordinating organization: Fairtrade International (FLO)
Main objective: Fairtrade is a strategy that aims at providing fair remuneration and further economic benefits to producers and their organizations, guaranteeing the respect of basic decent work standards and increasing the environmental sustainability of production systems.	Stakeholder involvement: Fairtrade International, including its standards and the Fairtrade Mark (product labelling) is owned and governed 50% by Fairtrade farmers and 50% by 24 national Fairtrade organizations in main marketing countries bringing together NGOs, consumer associations, trade unions and other stakeholders.
Financing model: Fairtrade minimum price and Fairtrade Premium are paid to producers and their organizations. The Fairtrade system including producer support activities is financed by licensing fees. Certification is paid independently to the certification body by all certified operators.	Verification process: Third party certification and annually executed audits through on-site visits of participating farmers cooperatives and selected participating farmers.
Technical assistance to farmers: Fairtrade encourages farmers to establish their own environmental development plans to ensure that waste is managed correctly, materials are recycled, and steps are taken to avoid soil erosion and water pollution.	

conventions on rights at work, offers producers an expectable minimum price for their goods that usually leads to sales above the market price, entails a Fairtrade Premium paid to producer organizations for health, education, social or business investment projects, and offers the possibility of upfront credit which may reach a maximum of 60% of the estimated purchase price.⁸ The Fairtrade minimum price for cotton is set depending on the production region and updated at intervals. It intends to reflect and remunerate the costs of sustainable cotton production systems and is replaced by the market price, whenever it exceeds the minimum price level. Besides, the so-called Fairtrade Premium accounts for around 5 EUR per kg of seed cotton and is paid to the producer organizations.⁹ Fairtrade does not include any guaranteed market.

The Fairtrade rationale is also based on the condition that cotton producers need to be predominantly small family

8 Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC), *Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework* (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

9 ICAC, *Report on some specialty cottons: Organic, Fair Trade, and Cotton Made in Africa*. (Washington DC, 2010), www.icac.org/delegates/sc_notices/sc_meeting_504/504_at3.pdf

farms and producers need to be organized in democratically structured and farmer-owned organizations and cooperatives. With regard to the latter, India and Pakistan are somewhat an exception to the rule, since in both countries the business model involves individual cotton farmers selling to a promoting body as a transitional phase towards building producer organizations.¹⁰

Besides the higher purchase price, financing for core operations is provided by licensing fees which are charged to all retail marketers of Fairtrade labelled products. In this regard, producer organizations that want to become Fairtrade certified must meet the criteria for the general Standard for Small Producer Organizations¹¹, as well as the specific fiber crop standard.¹²

10 Ibid.

11 Fairtrade International, *Fairtrade Standard for Small Producer Organizations* (2011), http://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2012-07-11_SPO_EN.pdf

12 Fairtrade International, *Fairtrade Standard for Fibre Crops for Small Producer Organizations*, (2011), http://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2011-10-15_EN_SPO_Fibrecrops_Standard.pdf

The initial Fairtrade certification, as well as subsequent inspections and audits, are carried out by the separate company FLO-CERT, under ISO-65 accreditation, making use of local auditors who are annually trained. The initial audit covers a varying number of farmers as well as the cooperative or farmers' organization itself. Also subsequent annual inspections involve on-site visits, though organizations with high compliance levels over several years may be inspected as part of a three-year inspection cycle only.

Currently there are 33 Fairtrade cotton producer groups in operation, and Fairtrade cotton is mainly produced in India, Burkina Faso, Cameroon, Mali, Senegal, Brazil, Egypt, Peru and Kyrgyzstan, with West Africa and India the biggest producing regions. By the end of 2008, over 27.6 million items made of Fairtrade certified cotton were sold, which almost doubled the sales of the previous year, while 2.3 million items were at the same time certified as organic.¹³

Fairtrade sustainability standards are mainly defined in the Fairtrade Standard for Small Producer Organizations, the Fairtrade Standard for Crop Fibres and the Fairtrade Standard for Contract Production.

When considering only farm level and production-linked indicators, and thus omitting many additional issues covered by the above-named standards, the remaining 90 or more indicators are often further divided into several sub-requirements.

The main sustainability issues covered by the Fairtrade standard are:

- general requirements:
 - members are small producers
- production:
 - pest management
 - soil and water
 - waste
 - genetically modified organisms (GMO)
 - biodiversity
 - energy and greenhouse gas (GHG) emissions
- labor conditions:
 - freedom from discrimination
 - freedom of labor
 - child labor and child protection
 - freedom of association and collective bargaining conditions of employment
 - occupational health and safety

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 13 Food and Agriculture Organization of the United Nations (FAO) and the International Cotton Advisory Committee (ICAC),

Measuring Sustainability in Cotton Farming Systems, Towards a Guidance Framework (Rome: FAO and ICAC, 2015), 5. <http://www.fao.org/3/a-i4170e.pdf>

- business and development:
 - development potential
 - democracy, participation and transparency
 - non-discrimination

Global Organic Textile Standard (GOTS)

The Global Organic Textile Standard (GOTS) is a voluntary standard for the sustainable processing of organic cotton. Within the context of this study it is relevant as it applies to the processing (including ginning) of organic cotton.

The GOTS was launched in 2006 by four organizations, including the International Association of Natural Textile Industry (IVN), the Japan Organic Cotton Association (JOCA), the Soil Association and the Organic Trade Association (OTA), in an attempt to address the proliferation of private voluntary labels. These days it is recognized as the world's leading processing standard for textiles made from organic fibers. It includes ecological and social criteria, and is backed up by independent certification of the entire textile supply chain.

The aim of the standard is to "define world-wide recognized requirements that ensure organic status of textiles, from harvesting of the raw materials, through environmentally and socially responsible manufacturing up to labelling in order to provide a credible assurance to the end consumer. Textile processors and manufacturers are enabled to export their organic fabrics and garments with one certification accepted in all major markets."¹⁴

The standard covers the processing, manufacturing, packaging, labelling, trading and distribution of all textiles made from at least 70% certified organic natural fibers. The final products may include, but are not limited to fiber products, yarns, fabrics, clothes and home textiles.

The key criteria for fiber production can be identified as:¹⁵

- organic certification of fibers on the basis of recognized international or national standards (IFOAM family of standards, EEC 834/2007, USDA NOP);
- certification of fibers from conversion period is possible if the applicable farming standard permits such certification; and
- a textile product carrying the GOTS label grade 'organic' must contain a minimum of 95% certified organic fibers whereas a product with the label grade 'made with organic' must contain a minimum of 70% certified organic fibers.

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 14 Website GOTS (consulted on July 20th, 2016), <http://www.global-standard.org/the-standard/general-description.html>

15 Global Organic Textile Standard International Working Group (IWG), Global Organic Textile Standard (GOTS) Version 4.0, (March 2014), http://www.global-standard.org/images/GOTS_Version4-01March2014.pdf

Generally, a company participating in the GOTS certification scheme must work in compliance with the above mentioned fiber production criteria, as well as all the other criteria of the standard.¹⁶ GOTS relies on a dual system to check compliance with the relevant criteria consisting of on-site auditing and residue testing.

Certification of the entire textile supply chain:¹⁷

- fiber producers (farmers) must be certified according to a recognized international or national organic farming standard that is accepted in the country where the final product will be sold.
- certifiers of fiber producers must be internationally recognized through ISO 65/17065, NOP and/or IFOAM accreditation. They also must be accredited to certify according to the applicable fiber standard.
- operators from post-harvest handling up to garment making and traders have to undergo an onsite annual inspection cycle and must hold a valid GOTS scope certificate applicable for the production and trade of the textiles to be certified.

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 16 For the other criteria, which include processing criteria see: Global Organic Textile Standard International Working Group (IWG), Global Organic Textile Standard (GOTS) Version 4.0, (March 2014), http://www.global-standard.org/images/GOTS_Version4-01March2014.pdf

17 Global Organic Textile Standard International Working Group (IWG), Global Organic Textile Standard (GOTS) Version 4.0, (March 2014), http://www.global-standard.org/images/GOTS_Version4-01March2014.pdf

- certifiers of processors, manufacturers and traders must be internationally accredited according to ISO 65/17065 and must hold a 'GOTS accreditation' in accordance with the rules as defined in the 'Approval Procedure and Requirements for Certification Bodies'.

SA8000 (Social Accountability)

SA8000 (Social Accountability 8000) is a voluntary standard for workplaces, based on ILO and UN conventions – which is currently used by businesses and governments around the world and is recognized as one of the strongest workplace standards. It was launched in 2007 by Social Accountability International (SAI), a non-governmental, international, multi-stakeholder organization dedicated to improving workplaces and communities by developing and implementing socially responsible standards.

It takes a management systems approach by setting out the structures and procedures that organizations must adopt in order to ensure that compliance with the standard is continuously reviewed. Those seeking to comply with SA8000 have adopted policies and procedures that protect the basic human rights of workers.

SAI is the official USA representative for Cotton made in Africa and is helping to introduce CMA's cotton to American companies, making a case for these companies to start using the initiative's socially responsible cotton.



CHAPTER 3: Smallholder-Grown Cotton — Challenges, Opportunities and Best Practices

At present, approximately 60-70% of all cotton in the world is grown by smallholder farmers. The majority of the cotton grown by these farmers is produced using conventional methods, including heavy use of pesticides and GMO varieties.

This chapter will provide an overview of current best practices in smallholder grown cotton. The focus will be on the production and initial processing of *organic* cotton. The reason for this is twofold: firstly, when discussing best practices in cotton production, organic cotton essentially provides us with the highest standard currently available, making it an excellent benchmark. It takes into account and addresses all of the issues that make conventional cotton so problematic (including environmental, social and ethical issues). Secondly, this study is conducted within the framework of larger programs that are being developed by the Smallholder Farmers Alliance in Haiti with the support of its international affiliate, Impact Farming. These programs are based on the development of integrated, environmentally sound farming systems that are sustainable in the long term. Given its inherently integrated and systems-based approach, organic cotton production is the best reference point when discussing best practices in smallholder-led cotton production.

Why organic? The concept of organic agriculture builds on the idea of the efficient use of locally available resources as well as the incorporation of adapted technologies such as soil fertility management, closing of nutrient cycles as far as possible,

control of pests and diseases through management and natural antagonists. It is a whole system approach based upon a set of processes that ultimately result in a sustainable ecosystem, safe food, good nutrition, animal welfare and social justice. Some specific reasons for considering organic cotton production are:

- *It's better for the environment:* conventional cotton production uses large quantities of chemical pesticides and fertilizers that are harmful to the environment. Frequent use of chemical fertilizers and narrow crop rotation can cause declining soil fertility. Pesticides also kill beneficial insects while pests can develop resistance and thus cause additional damage. In organic farming, the absence of chemical sprays and increased biodiversity results in a better eco-balance between pests and beneficial insects. It improves soil fertility and ultimately the long-term sustainability of a farm system.
- *It is better for human health:* chemical pesticides can cause poisoning as well as long-term effects on human health. In the cotton producing state of Andhra Pradesh (India) the ground water in some areas has become so polluted with chemicals that people need to buy their drinking water from outside. In a hospital in the same state up to a thousand farmers per month are treated because of pesticide intoxication.¹

1 FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

- *The costs and risks are lower:* in organic cotton, yields might be lower, but so are the input costs and thus the financial risk. Since no pesticides or other chemicals are used, the dependence on these inputs is reduced or eliminated. The importance of this should not be underestimated since it was this dependence on inputs (and the associated financial risks) that were partly responsible for a wave of suicides among Indian farmers who were faced with poor crop returns and no way of paying back loans required to get these inputs in the first place. Since organic cotton is grown as part of a larger system that includes other crops, farmers have greater yield stability and reduced effects of potential crop failures: when one crop fails another crop may still provide them with cash or food for subsistence.

Current Best Practices in Smallholder-Grown Organic Cotton

This chapter will provide an overview of various current best practices in smallholder grown organic cotton. Before continuing it is important to note that while a variety of best practices can be discerned, there is no one best ‘package of practices’ for organic cotton farming: conditions differ from farm to farm with specific soils, climatic conditions, production facilities, availability of labor, and the individual objectives and skills of the farmer

all being variables that affect the set of best practices that may ultimately work best.² As such, the sections that follow aim to improve the understanding of an organic farming system and to point out available management options. In any case, the suitability of the suggested methods in a specific setting needs to be explored on the respective farms and the methods potentially need to be adapted and further developed.³

One of the main references for the following section is the Research Institute of Organic Agriculture (FiBL) *Organic Cotton Crop Guide – A Manual for Practitioners in the Tropics* (2005), which is specifically designed to provide information and guidance to organic cotton farmers and extension workers involved in organic cotton production on smallholder farms in the tropics. More detailed information on each of the sections below can be found in the guide.

Organic cotton as part of a larger ‘farm system’: Before going into more detail on specific best practices, it is important to emphasize the fact that in order to grow cotton organically, a holistic approach is required and management of the production

2 FiBL, *Organic Cotton Crop Guide – A Manual for Practitioners in the Tropics*, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>
 3 Ibid.

Figure 16: Advantages of Cultivating Cotton Organically

	Conventional Cotton	Organic Cotton
Environmental	<ul style="list-style-type: none"> – pesticides kill beneficial insects – pollution of soil and water – resistance of pests 	<ul style="list-style-type: none"> – increased bio-diversity – eco-balance between pests and beneficial insects – no pollution
Health	<ul style="list-style-type: none"> – accidents with pesticides – chronic diseases (cancer, infertility, weakness) 	<ul style="list-style-type: none"> – no health risks from pesticides – healthy organic food crops
Soil Fertility	<ul style="list-style-type: none"> – risk of declining soil fertility due to use of chemical fertilizers and poor crop rotation 	<ul style="list-style-type: none"> – soil fertility is maintained or improved by organic manures and crop rotation
Market	<ul style="list-style-type: none"> – open market with no loyalty of the buyer to the farmer – dependency on general market rates – usually individual farmers 	<ul style="list-style-type: none"> – closer relationship with the market partner – farmers usually organized in groups
Economy	<ul style="list-style-type: none"> – high production costs – high financial risk – high yields only in good years 	<ul style="list-style-type: none"> – lower costs for inputs – lower financial risk – satisfying yields once soil fertility has improved

Source: FiBL, *Organic Cotton Training Manual*, (2005)

COMPARISON Organic vs Conventional Cotton — The Results Compared

Comparing the yields and the profitability in organic and conventional cotton production is a difficult task because there are many factors that affect the productivity of either system: even if the conditions of two farms were to be the same (climate, soil, irrigation sources etc.), the skills and practices of the farmers will have a great impact on the result. Further, the results of a comparison depend on the production intensity of conventional and organic farms. Similar to conventional farming, organic cotton production can also be more or less intensive regarding input use and productivity. While conversion to organic farming usually means a reduction in intensity (i.e. fewer external inputs, smaller yields), in some cases it can also lead to higher intensity – with intensive organic nutrient and pest management. In practice then, the yields and profits of organic cotton production vary to a great degree among different farms and different regions, and it is not easy to make a general statement on how organic cotton production compares with conventional production in economic terms.

The following observations can be made, however, when comparing conventional to fully converted organic farms: most organic cotton projects in the tropics report that after going through a conversion period of 2–3 years, the cotton yields on organic farms reach roughly the same level as on conventional farms (20 % lower to 10 % higher yields). Costs for inputs (plant nutrition and pest management) are usually 20 - 80 % lower, depending on whether organic manures and pest management items are purchased from outside (e.g. oil cakes, Bt preparations) or are produced on the farm itself (e.g. compost, liquid manures, botanical pesticides). While organic cotton production usually involves more work in plant nutrient management (preparation of compost, application of organic manures), labor required for spraying and weeding is usually less. Thus, labor costs usually are about the same in organic and conventional cotton farming.

Altogether, with similar yields, lower production costs (inputs) and a premium price (usually 10–20% over market prices), organic cotton farming can be far more remunerative compared to conventional cotton farming. It should be kept in mind, however, that for a comprehensive comparison of the performance of organically and conventionally managed cotton farms, the yields and production costs of the intercrops and crops grown in rotation with cotton in an organic system also need to be taken into consideration. Also, it is important to note that additional indirect costs (training, the negative health impacts of chemicals) and benefits (reduced production risk, improved food quality, long-term improvements in soil fertility) are not factored into these kind of comparisons.

should be considered within a larger 'farm system'.⁴ Organic cotton cannot be grown on its own (as a monoculture): it requires a variety of crops performing special roles to support the organic nature of the farm system. This means each crop grown on the farm has a role to play in supporting the viability of the organic farm system to produce cotton—and thus the livelihood of the small scale farmer.

Besides supporting the production of the primary crop (cotton), the farm system also plays a valuable role in meeting nutritional and social needs for smallholders, including household food security, health, and safety. Moreover, from a financial perspective there are also significant advantages to be gained by

working with a range of crops that are grown as part of a diverse farm system: growing multiple crops helps farmers spread risk, a consideration that is particularly important in places confronted with unpredictable weather and climatic—as well as financial—conditions. All of these advantages are fundamental to small-scale farmers and their communities.⁵

Selecting the right varieties: Growing cotton starts with selecting the right varieties. There are a large number of different cotton varieties available on the seed market, but most of them are bred for producing yields under high-input conditions. Organic farmers, however, are more interested in varieties that are resistant to, or tolerant of, pests and produce satisfying

4 Organic Exchange, A Snapshot of Crop Diversification in Organic Cotton Farms, (2010), <http://farmhub.textileexchange.org/upload/library/Farm%20reports/Crop%20diversification.pdf>

5 FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

yields with medium manure supply. Some varieties combine the advantages of so-called 'des' varieties (hardy, drought resistant) with those of the hirsutum varieties (high yield, long fibers) making them particularly interesting for organic farmers with less irrigation.

To select the most suitable varieties, farmers should first consider the site conditions (soil quality, rainfall, availability of irrigation water, etc.) as well as the conditions of the farm (availability of manure, possibility for pest management, etc.). Where irrigation is a constraint and rainfall is erratic, it is preferable to use varieties that require less water (e.g. those with less leaf area). In addition, farmers need to consider the buyers' requirements concerning staple length and other quality aspects. Finally, it is important to be aware whether there are any government regulations on the type of cotton varieties that can be grown.

Soil fertility: Soil and soil fertility management are the foundation of a sustainable and productive organic farming system. When organic farming is introduced in areas with poor soil fertility (i.e. depleted, marginalized soils), big efforts are often required to repair this. Various studies have shown that the lowest yields of organic cotton are recorded in areas where either soil fertility in general is poor or degraded (i.e., West Africa) or in areas where farmers are resource poor and unable to use the best available organic technologies and approaches to manage their soil (for example, Uganda).⁶ On the other hand, when soil is well managed, pest pressure is reduced, water use is optimized and yields will improve for all crops grown in the rotation. Altogether, soil fertility has to be a priority for organic farmers and organic farming projects.⁷

The best strategy for improving and maintaining soil fertility in cotton primarily depends on the soil types present on a farm. Light soils usually have a lower water retention capacity and the nutrients are more easily leached out than in heavy soils, making application of compost particularly important. As these soils are less suitable for intensive production, the variety and crop selection should be adapted accordingly, for example robust, frugal, and drought-resistant cotton varieties and rotation crops. Intercropping of more drought-resistant crops like sorghum, safflower, sesame, or castor can help to reduce the risk of complete crop failure in drought-prone areas. Soil cultivation should be shallow and kept to a minimum in order to avoid soil erosion and enhanced decomposition of organic matter.⁸

6 ICAC, Components of a Sustainable Cotton Production System - Perspectives From the Organic Cotton Experience, (2009), https://www.icac.org/cotton_info/tis/organic_cotton/documents/2009/e_march_2009.pdf

7 Ibid.

8 FiBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

In deep or heavy soils (e.g. 'black cotton soil'), intensive production is possible with sufficient inputs of organic manures, intensive crop rotation, and green manuring. Frequent shallow-soil cultivation helps to improve soil aeration and nutrient supply. It also reduces evaporation and suppresses weeds. When the cotton crop is well established (usually after 6-9 weeks), it is recommended to apply additional organic manure (e.g. vermicompost or oil cakes) and to earth up ridges in order to accelerate decomposition of manures and to bury weeds.⁹

Regardless of the type of soil, organic matter has a very crucial significance for soil fertility improvement and needs to be supplied continuously for stable yields. The most important

source of organic matter are the residues of the crops grown on the field itself (leaves, stalks, roots etc.). Therefore, balanced crop rotation, intercropping, and mulching—complemented by the application of farmyard manure, compost and organic manures—are the most efficient ways to enhance soil fertility.¹⁰

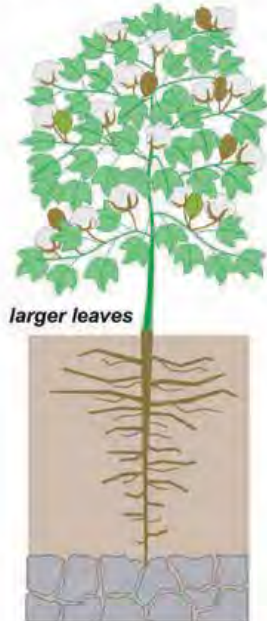
Crop rotation: Crop rotation is a key technique in organic farming. It helps to improve and maintain soil fertility and ensures balanced nutrient contents in the soil. It also helps to prevent the build-up of pest populations, diseases and weeds (pests find it more difficult to move from one host plant to another, and they are controlled by a number of beneficial insects hosted by the rotation crops or intercrops). The crop diversity that results from rotating crops also reduces a farmer's risk, making farmers less vulnerable to crop failure and to fluctuating prices. Finally, it helps prevent a shortage of labor in peak seasons, as labor requirements are more evenly distributed throughout the year.

With regards to cotton: Cotton requires a lot of nutrients to grow well. Generally speaking, it is therefore not recommended to grow organic cotton in fields where the previous year's crop was also cotton (no 'cotton after cotton'). The main reasoning behind this is that if cotton is grown year after year in the same fields, soil nutrients get depleted, pest populations increase and there is a risk for soil-borne diseases. As such, within most rotation patterns organic cotton is grown every alternate or every third year with other crops grown in between the cotton crops. That said, with appropriate management it is also possible to grow cotton in subsequent years. This might, for example, be considered by owners of very small land holdings which may not always have another option. In this case, however, farmers will have to work with green manure crops and intercrops that will maintain soil fertility (see Figure 18).

9 Ibid.

10 Ibid.

Figure 17: Selecting the Right Cotton Varieties

American Upland cotton (*G. hirsutum*)**Advantages:**

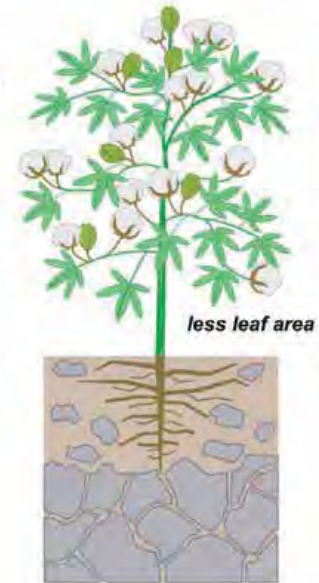
- High yields
- Longer staple (higher price)

Disadvantages:

- Needs more water
- Needs more manure
- More prone to pests

Suitable for:

- Deep soils
- Heavy soils
- Good irrigation

Indian 'desi' varieties (*G. arboreum*, *G. herbaceum*)**Advantages:**

- Better drought resistance
- More pest tolerant

Disadvantages:

- Smaller yields
- Mostly shorter staple (lower price)

Suitable for:

- Shallow soils
- Sandy soils
- Little/no irrigation

Source: FIBL, Organic Cotton Crop Guide – A Manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

Organic cotton can be grown in a large variety of rotation patterns. Which rotation pattern is the most suitable for a particular farm depends on a number of factors, including soil properties, irrigation facilities, crop prices, market access, and the skills and preferences of the farmer. Particularly good yields are achieved when cotton is grown after pulses (soy bean, chick-pea, pigeon pea, groundnut, etc.), horticultural crops like chillies or vegetables, and after sugar-cane and wheat. Organic farmers in particular should take care to include pulses in the rotation, as they increase the nitrogen content in the soil by fixing nitrogen from the air. In some places a crop of wheat, pulses or fodder can be grown after cotton in the winter season. In India, where sufficient irrigation is available, farmers usually uproot the cotton crop before the second flush, in order to grow a wheat or chickpea crop in the 'Rabi' season. Growing wheat instead of continuing to harvest the cotton is usually more remunerative, as the gains from the wheat crop more than compensate for the loss in cotton yields and the additional production costs. However, sufficient availability of irrigation water and of labor are important pre-conditions for this.¹¹ Figure 18 lists some suitable

rotation patterns from organic cotton projects in various parts of India and Africa.¹²

Green manures and intercrops: These are cultivated for a variety of reasons to:

- distract pests from the cotton crop, and host and feed beneficial insects;
- catch nutrients and fix nitrogen from the air (legumes);
- make nutrients available to the crop while decomposing, and to build up organic matter;
- suppress weeds and reduce soil erosion;
- provide mulch which keeps the moisture in the soil and feeds soil organisms; and
- provide additional harvests (intercrop) and fodder.

Green manure crops for cotton are usually sown between the cotton rows after the cotton seedlings have emerged (see

¹¹ FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

¹² FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

Figure 18: Suitable Rotation Patterns From Organic Cotton Projects in India and Africa

Rotation Type	1st year	2nd year	3rd year
Pulses + cereals	Cotton (winter crop: wheat or pulses)	Pulses (soya, moong beans, cow pea, black gram, pigeon pea), maize or sorghum	Cotton (winter crop: wheat or pulses)
Vegetable	Cotton (winter crop: wheat or pulses)	Chilli, onion or other intensive vegetable crop	Cotton (winter crop: wheat or pulses)
Sugar cane	Cotton	Sugar cane	Sugar cane
Diverse rotation (from Tanzania)	Cotton	Sesame, safflower, sorghum or maize	Pulses (moong, chick pea, cow pea, pigeon pea, groundnut)
Rotation with herbal plants (from Egypt)	Cotton (winter crop: wheat or pulses)	Herbs (anise, basil, fennel etc.)	Maize with clover intercrop

Source: FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

than merely applying fertilizers.¹³ Similarly, organic farming emphasizes preserving the nutrients that are already available in the soil and on the farm.

The basis of nutrient management in organic cotton farming is crop rotation and intercropping with legumes, together with the recycling of crop residues and the application of farm-produced organic manure (FYM and compost).¹⁴ In this aspect it is important that organic farmers do not try to copy conventional fertilizer application schemes by simply substituting NPK-fertilizers with organic manures. Unlike chemical fertilizers, organic manures release nutrients only when they decompose, which in moist soils usually starts 1-2 weeks after application. This means that the timing of application needs to be different from application of fertilizers in conventional farming. Furthermore, crop nutrition needs to be adapted to local conditions, including growing pattern, soil condition, the previous crop, and type of manures.¹⁵

Figure 19). They are cut before or at the time of flowering, and are either used as mulch or incorporated into the soil. Typical green manures for cotton include pulses like sun hemp or cow pea, or mixtures containing pulses and cereals. Intercrops like corn, pigeon pea, or chick pea can be grown in rows every few meters, replacing a row of cotton. Sunflower (an effective trap crop) can also be used as an intercrop, with 10-15 meters of distance between rows in order to reduce competition through shade. Smaller pulses like mung bean, black gram, and cow pea, or small millet varieties can also be grown in between the cotton rows, or between the individual cotton plants. Intercrops are usually allowed to mature and are cut and used as organic mulch after the seeds are harvested.

Since green manures and intercrops do compete with the cotton crop, appropriate spacing and timing are crucial for overall benefit. Furthermore, the planting of intercrops, trap crops, and border crops should be properly timed because they should flower at the same time with cotton.

Crop nutrition (nutrient management): In organically managed soils crops mainly depend on the nutrients supplied by minerals and organic matter in the soil. Organic matter takes up, stores and releases nutrients through exchange, weathering and decomposition. Soil organisms play a vital role in this process and should be supported through careful soil cultivation and regular application of organic matter. Measures to improve overall soil fertility are more likely to result in increased yields

Pest and disease management: In conventional farming, cotton is considered a crop that is highly sensitive to pest attack. A large number of pests feed on it, including caterpillars (e.g. bollworms), beetles, bugs, aphids, whitefly, and many more. Conventional cotton farms typically rely on large quantities of synthetic pesticides which are sprayed to keep these under control. And as the natural enemies of many pests are decimated, the pest problem usually ends up increasing.

Organic cotton farming takes a very different approach, the aim first and foremost being to prevent pests from becoming a problem in the first place. This is done by establishing a diverse and balanced farm ecosystem and by monitoring pest populations carefully. Diverse cropping systems and natural habitats enhance control of pest populations by means of natural enemies (e.g. birds, ladybirds, beetles, spiders, parasitic wasps, bugs and ants). Trap crops like sunflower, okra or corn distract pests from the cotton plants.

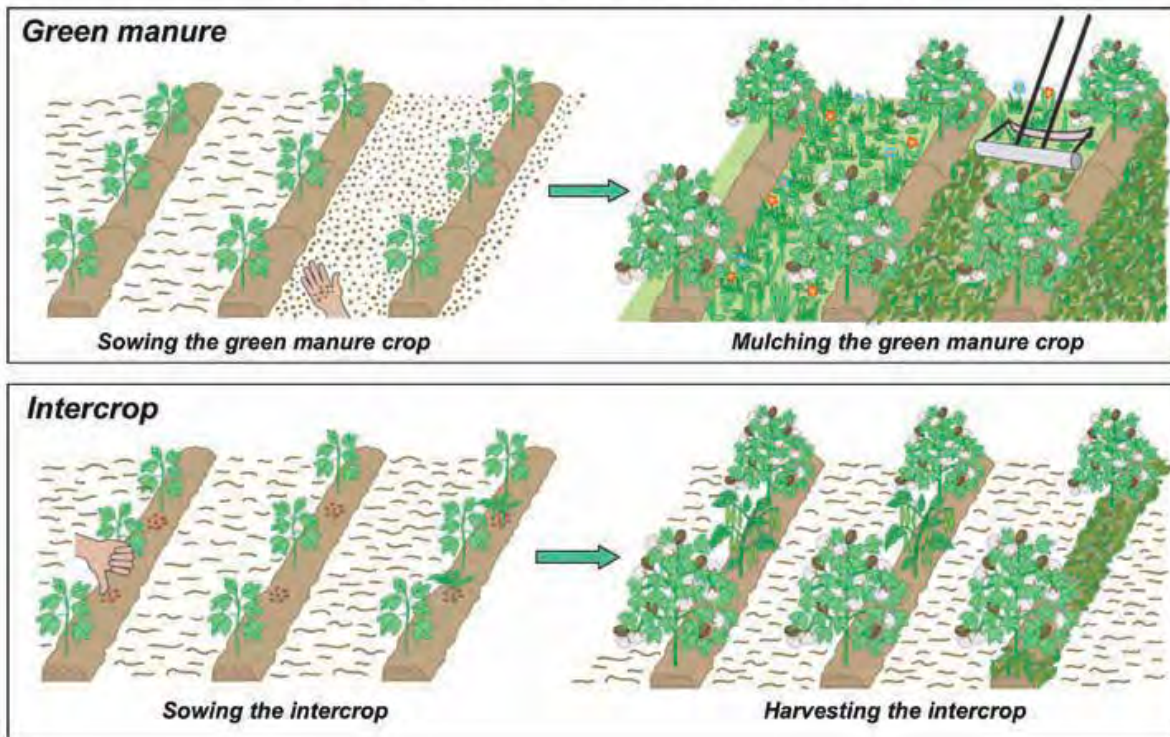
All of the soil-building techniques mentioned above (intercropping, rotational cropping, adequate nutrition management, etc.) also help prevent a crop from being affected by pests. Many pests attack plants that are 'stressed', meaning healthy plants

¹³ FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

¹⁴ Ibid.

¹⁵ The Organic Cotton Crop Guide – A manual for Practitioners in the Tropics provides an excellent overview of various types of compost, manure and bio fertilizers used in organic cotton farming, as well as ways to prepare them.

Figure 19: Green Manure and Intercrops



Source: FiBL, Organic Cotton Crop Guide – A Manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

are less likely to be affected than plants that, for example, lack balanced nutrition. Similarly, pests tend to multiply faster if the same crop is grown on the same field year after year, which is another reason to rotate crops.

All in all, with the right preventive measures in place, the pest problem in organic cotton is surprisingly minor.¹⁶ A certain level of pest attack does not significantly have to reduce cotton yield as long as pest infestations remain below threshold levels (i.e. levels where the costs of controlling a pest are lower than the damage it causes). It is therefore recommended that before applying pest control strategies, farmers should wait and see whether natural enemies are able to control the pest.^{17 18}

Irrigation in cotton cultivation: In many areas, cotton is grown with the help of irrigation from groundwater or surface water such as rivers, lakes and reservoirs. Irrigation can increase cotton yields

¹⁶ FiBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

¹⁷ Ibid.

¹⁸ For more in depth information the Organic Cotton Crop Guide – A manual for Practitioners in the Tropics lists the main pests affecting cotton, as well as prevention strategies and direct control techniques to combat each one.

considerably, but can also lead to the depletion of freshwater resources and to problems owing to soil salinization or waterlogging. Organic soil management usually leads to better soil structure and thus to better infiltration of water. Increasing soil organic matter also improves water retention in the soil and thus allows the crop to better sustain dry periods. Therefore, conversion to organic agriculture can help increase the water-use efficiency in cotton cultivation. In irrigated cotton, the application system, intensity and timing of irrigation are crucial for good yields and healthy plants. During the first 6–7 weeks after sowing, irrigation should be moderate in order to avoid very heavy vegetative growth, and to encourage cotton roots to penetrate deeply into the soil. Since the cotton crop is very sensitive to waterlogging, which causes increased boll shedding and negatively affects yields, measures done to improve soil structure are considered more relevant than the application of fertilizers.¹⁹

Water harvesting and saving: In rain-fed cotton and in regions with limited availability of irrigation water (i.e. in most semi-arid cotton-growing areas), a major emphasis should be on allowing rainwater to infiltrate into the soil as well as

¹⁹ FiBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

Figure 20: Support Crops in Organic Agricultural Systems

Crop:	Overview of Crop Role:	Examples:
Crop Rotation	Replenishment of nitrogen is achieved through the use of green manure in sequence with cereals and other crops, improving soil structure by alternating deep and shallow-rooted plants.	soy, wheat, sesame, rice, mungbean
Intercropping	The agricultural practice of cultivating two or more crops in the same space at the same time (Andrews & Kassam 1976). Intercropping may benefit crop yield or control of some kind of pest, or may have other agronomic benefits.	corn, sorghum, beans, peanut
Trap Crop	A trap crop is a plant that attracts parasitic insects away from attacking nearby crops. Trap crops can be planted around the circumference of the field (border crops) to be protected, or interspersed among them, for example being planted every ninth row.	corn, tobacco, sunflower, cowpea, marigold, sorghum
Border Crops	These are crops planted around the circumference of the field to be protected and often used as trap crops to attract pests from the cultivated crop.	castor, okra, marigold, corn, sorghum
Periphery and Plantation	Crops that may or may not have a direct benefit to the production of cotton. They can serve a purpose such as provide shade and cover to the soil, or keep the microbial activity in the soil constant or simply be crops grown on the farm for other reasons.	

Source: FiBL, Organic Cotton Crop Guide – A Manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

preserving soil moisture. Application of compost and organic manures, mulching, and shallow soil cultivation (hoeing) all play an important role in this. In addition, active rainwater harvesting through pits or trenches leading to wells can help to recharge groundwater levels, thereby improving the availability of irrigation water. Where little irrigation water is available, alternate-furrow irrigation can still help irrigate the crop. If rains fail after the seedlings have germinated, a last resort to save seedlings might be plant by plant bucket irrigation.

Drip irrigation: Over the past decade, drip irrigation systems have become increasingly popular for cotton. They enable farmers to start cotton cultivation before the onset of the rainy season, thus allowing them to bridge dry periods and protect at least part of their fields from drought. Drip systems make it possible to grow 'more crop per drop' as the water directly reaches the root zones of the plants and less water is lost to infiltration and evaporation.

Drip irrigation also discourages weeds from growing between the cotton rows. While fiber quality is found to be higher in drip-irrigated cotton, higher investments and labor requirements should be considered as well. Another possible disadvantage of drip systems is that the decomposition of

organic manures is slower, thereby limiting the continuous nutrient supply to the plant (something of particular importance with cotton).

Harvest and post-harvest operations: Once the cotton is ready to be harvested, various factors can influence the quality of the cotton lint that is eventually sold. Since better quality cotton will get farmers a better price, measures taken to improve the quality of the harvest can directly pay off for the farmers:

- allow the cotton bolls to fully ripen and open.
- pick the cotton after the morning dews have dried up, so that the cotton is dry and less prone to fungus when being stored.
- pick the cotton into clean cotton cloth material, never into nylon or other synthetics (foreign fibers).
- remove leaves, capsules and damaged bolls from the cotton harvest.
- keep cotton of lesser quality separate with the help of a second, smaller picking bag.

PROFILE The Importance of Women in Global Cotton Production

In many countries the running and managing of a smallholder farm is considered the domain of men. The role of women is frequently overlooked, despite the fact that women often play an equal or more significant role than men in determining the quantity, quality, and sustainability of the products grown.

The recently released Cotton Connect report *Planting The Seed: A Journey To Gender Equality In The Cotton Industry* outlines how in India—the world's second largest producer of cotton—women account for 70% of cotton planting and 90% of the handpicking; they effectively undertake the majority of roles in the country's cotton production.

While women there have a disproportionate responsibility in driving cotton output and quality, they have far fewer opportunities to improve their livelihoods. For example the average income for women in rural India is 78% of men's income, despite their role and contribution. Meanwhile interventions focused on capacity building and training are often orientated towards men, leaving women without the additional knowledge and skills that would help them ensure that they and their families remain healthy and resilient.

To address this issue, Cotton Connect launched the “Women in Cotton” program in India which aims to empower women through equal opportunity and training. Women were coached in appropriate farming techniques for their land that included seed selection, sowing, soil, water, pesticide and pest management through to picking, fibre quality, grading and storage of the harvested cotton. The training also covered health and safety issues and working conditions.

The results, obtained over a three-year pilot, far exceeded expectations and show that the potential of women's influence in cotton farming communities is huge. In this case yields improved by 16%, water and pesticide use went down by respectively 16% and 43%, and profits went up by 43%. Not only did average household income grow, but there was a measurable improvement in family welfare and investment in households. One particular case study from a major retailer, Primark, showed that significant accomplishments were made through early engagement in this process.

This specific example from India reinforces other data that clearly shows that improving the status of women smallholder farmers through the development of gender-related programs will ultimately result in better cotton supply chains, helping brands and retailers to ensure a more resilient, transparent and sustainable cotton market of the future.

Source: Cotton Connect, *Planting The Seed: A Journey To Gender Equality In The Cotton Industry Improving The Lives Of Women In The Cotton Growing Communities Of India* (2016), http://cottonconnect.org/media/28667/cc_planting_the_seed_final.pdf

- picking delays can cause reduction of fiber quality, as the opened bolls are exposed to dew, dust and honeydew from insects longer.
- it is important that no unripe cotton is picked, as it will not absorb the dye well enough and thus is priced lower. A major cost factor in cotton production is the labor required for cotton picking.
- use a long sack so that the weight rests on the ground.
- keep the sack permanently open with a ring of flexible wood.
- pick two rows at a time.
- keep a separate, smaller bag for second-grade cotton.

Additionally, measures that might help to increase the efficiency of cotton picking and ensure a high quality harvest are:

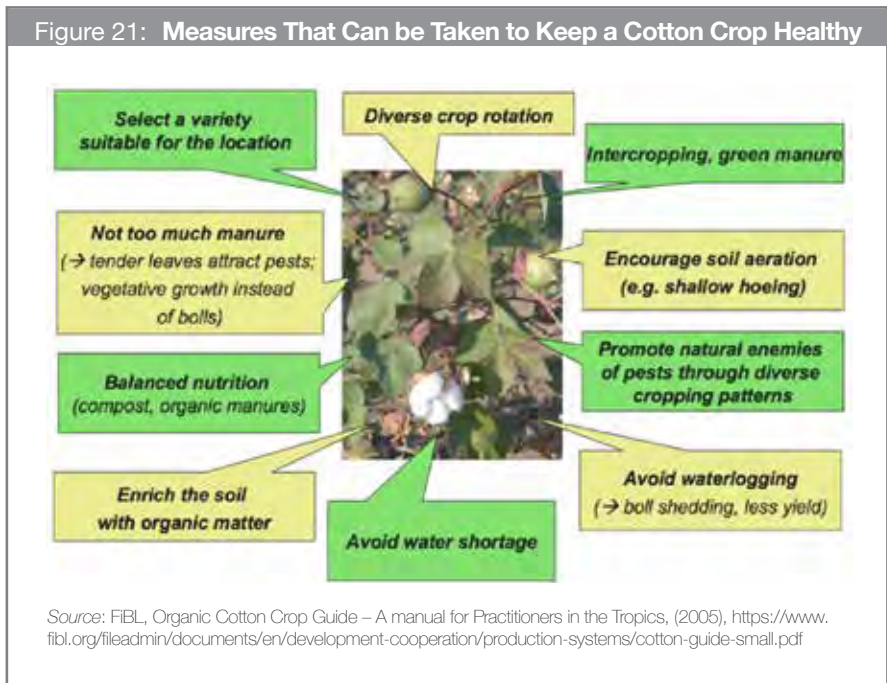
Storage: There are many factors that affect the seed and fiber quality during seed cotton storage. Among them are: moisture content, length of storage, amount of high-moisture foreign matter, variation in moisture content throughout the stored mass, initial temperature of the seed cotton, temperature of the seed cotton during storage, weather factors during storage (tempera-

20 FIBL, *Organic Cotton Crop Guide – A manual for Practitioners in the Tropics*, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

ture, relative humidity, rainfall), and protection of the seed cotton from rain and wet ground. As such, the storage place needs to be clean and dry and farmers should take care to prevent contamination with dust, foreign fiber material (from clothes, human hair etc.) or chemicals, especially fertilizers, pesticides, and petroleum. Storage pest control (e.g. DDT) should under no circumstances be used on the harvested cotton. When organic harvest is stored in the same facilities with conventional cotton (e.g. in ginneries), care must be taken to clearly separate the organic, in-conversion and non-organic produce, and to avoid any mixing. For long storage periods moisture should be below 12%, and 10% if the seeds will be saved for planting.²¹

Processing and trade: While many organic cotton growing projects do not necessarily include a processing component, there are examples of projects that include a first cleaning, the ginning and the baling of the cotton lint. However, it is fairly uncommon for smallholders to be in charge of this part of the value chain, and in many cases ginning and baling will be outsourced to a third-party operated gin. In the latter case in particular it is important to ensure that the organic cotton is separated from conventional cotton throughout the process: many spinning mills and processing entities process organic and conventional cotton on the same machinery, making it crucial to clearly separate the cottons and clean the equipment before processing an organic lot. The organic seed cotton, lint and bales need to be clearly labelled in the storage and identified in the books. In any case, the ginnery will be inspected by the external certifier. Unless the project is organized by a spinning mill or textile brand, the next processing steps – spinning, fabric formation, dyeing, stitching and finishing – are usually looked after by the respective buyer of the cotton lint.

While it goes beyond the scope of this study to provide a complete cost/benefit analysis of a cotton gin that processes organic, smallholder grown cotton, the checklist on page 48 provides an example of the some of the typical infrastructure and elements that should be considered when establishing a cotton gin that can serve a smallholder cotton operation. Additionally, Annex 2 provides a more in-depth overview of the various machinery involved—and its appropriate handling—when processing the cotton. Finally, additional best practices that apply to later stages in the cotton processing



process can be found in the International Trade Center’s Cotton Exporters Guide.²²

Challenges and Key Success Factors in Organic Cotton Production

Organic cotton production requires the involvement of many different actors, and often partnerships between public and private actors, NGOs and business stakeholders as well as farmers. This makes it a very complex sector, more so because of the diversity of ecological, environmental, cultural, social, economic and political contexts in which farming takes place. Given the sector’s inherent complexities, anyone seeking to establish a cotton production program should take into account a set of challenges and key success factors that might affect the degree to which the outcome of a program will be successful.

Challenges:²³

- Commercial availability of high quality, uncontaminated organic seed: this continues to be a major hurdle for organic cotton producers. Genetically modified (GM) seeds have become dominant in the marketplace as major seed companies have purchased smaller labels and discontinued their organic, non-GM and non-treated cottonseed offerings.

²¹ FIBL, Organic Cotton Crop Guide – A manual for Practitioners in the Tropics, (2005), <https://www.fibl.org/fileadmin/documents/en/development-cooperation/production-systems/cotton-guide-small.pdf>

²² International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

²³ Some of these general challenges may be less applicable to Haiti, where agriculture is largely de facto organic.

CHECKLIST Things to Consider When Setting Up a Cotton Gin

While the focus of this study is on best practices in smallholder cotton production, we also wanted to have a general idea about best practices in terms of the first steps involved in processing cotton (i.e. ginning and baling). Typically cotton is ginned in the same country where it is harvested and, provided it is feasible to grow cotton in Haiti, it therefore would make sense to study the requirements of establishing a cotton ginning operation there as well. The points below are the result of consultations with various groups that operate, or are involved with, cotton ginning operations that are supplied by smallholder farmers (including Chetna in India and GADC in Uganda).

- ***Importance of sufficient supply:*** in order to be cost efficient, a gin needs to be supplied with sufficient volumes of cotton. For example: one double roller gin can process about 50kg seed cotton per hour. With a minimum set up of 16-24 double roller gins, this amounts to an average processing capacity of around one metric ton per hour (i.e. several metric tons per day). In order for the gin to be cost-efficient, it should be considered if there will be enough volume to keep the gin running. This is particularly relevant in organic cotton where volumes tend to be lower than conventional cotton.
- ***Financing:*** a typical, smallholder-supplied ginning operation might require an investment of about 1 million USD (minimum costs are estimated at about 700-800k USD, not including the building and installation costs).
- ***Typical infrastructure required:*** includes (among other things):
 - module feeder
 - machinery to clean the cotton
 - double roller ginning machines (minimum amount: 16, recommended amount: 24). Double roller machines are preferred because they produce a long staple length fiber that spinners prefer.
 - vertical flow drier
 - machines for pressing, tying and bagging bales (e.g. vertical double baling press)
 - centralized vacuum system
 - conveyor belts for both seeds and lint
 - lathe machine, drill, power saw, welding machines
- ***Infrastructure acquisition:*** most ginning machines used in Africa come from India, where cotton gins are produced and tend to be most cost efficient.
- ***Energy costs:*** cotton processing requires a lot of energy. Energy and electricity costs should be taken into consideration in a cost/benefit analysis for a cotton ginning operation.
- ***Management:*** based on experience elsewhere, it may be recommended to outsource ginning to a third party as smallholder farmers generally do not tend to have the capacities to operate and run a cotton ginnyery.
- ***Certification:*** for cotton to be sold as organic the ginning operation would have to be certified GOTC.

- ***Conversion from conventional to organic cotton production is challenging and provides farmers with significant financial risks:***²⁴ this is probably one of the most important hurdles for organic cotton production as it takes time for a

proper organic system to be implemented: yields usually drop by 10-50% (depending on the level of previous yields and the methods used)²⁵ and usually take 2–3 years to recover as the soil builds up organic matter and populations of soil organisms increase. Pest problems are also usually higher in

24 International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

25 Ibid.

the initial years, as the eco-system that got disturbed through the continuous application of chemical pesticides first needs to get into balance and populations of beneficial insects need to build up. Moreover, farmers are usually required to put in additional effort and time during conversion and they are usually not rewarded with a price premium for their in-conversion produce during this time. Finally, in order to prevent contamination an additional direct cost for organic farmers might be the need to separate their fields from those where cotton or other crops are grown conventionally.²⁶

- *The organic cotton sector is fragmented and under-supported:* partly as a result of the ever-growing interest in Bt-cotton and other GM varieties, research and sectoral support for organic production is too limited (getting increasingly less attention). Organic crop management techniques are an amalgamation of methods, many of which are little understood by both science and farmers. Research is urgently needed to understand, support and strengthen the organic cotton sector.²⁷ This includes support for organic seed improvement and the development of other strategies that farmers may need in order to successfully convert to organic production.
- *Organic farming is a knowledge-intensive type of production:* farming requires new skills, and, therefore, training and experimenting. Competent extension services thus play an important role in organic farming, especially during the establishment/conversion period when it is crucial that farmers get competent and timely advice.

Keys to success: Various measures can be taken in order to address the abovementioned (and other) challenges when developing an organic farming program. A good overview of the key components that should be considered when developing such a program is provided by Simon Ferrigno's "Components of a Sustainable Cotton Production System: Perspectives From the Organic Cotton Experience", commissioned by Organic Exchange in 2009.²⁸

- *Social components:* The social aspects of organic cotton production were very important in most early organic cotton projects and continue to be promoted in many new ones. Most successful projects involve some form of formal or semi-formal farmer structure and/or a strong element of social/community/family cohesion among farmers. In Peru and Uganda, the APAEM and LOFP groups are farmer

owned/managed structures who are closely involved in the extension, certification, research and sometimes trading activities, while in countries such as Turkey, production is often based around farmers bonded by strong social and family ties. Strong groups can have a better influence on the supply chain when it comes to negotiating prices and contracts. Finally, strong farmer organizations and participation can benefit production by helping motivate farmers and drawing on their experience and knowledge.²⁹

Key components of social sustainability are transparency, negotiation and trust, all of which can be built up through institutions, investments by producer partners and project organizers, and fair and transparent pricing mechanisms and a balance of benefits given to producers as part of the system. These elements may be particularly relevant for initiatives that are driven externally, since the farmers contracted are vulnerable and may constantly wonder whether they are getting fair returns while at the same time comparing themselves to other groups and organic returns against other production methods.³⁰

In most successful organic production projects investments were made in the way farmers were organized among themselves for production as well as marketing of their crops, and how they relate to those aspects of the value chain and the wider cotton sector nearest to them.³¹

- *Ecosystem & environmental components:* Understanding and working with the ecosystem and natural environment is critical for organic farming that is sustainable over time. As pointed out in the earlier chapter on best practices, soil and soil fertility management are the foundation of sustainable and productive organic farming. When soil is well managed, pest pressure is reduced, and water use is optimized, then yields will improve for all crops grown in the rotation. As such, to be sustainable and to enable organic cotton production to grow to meet demand, soil fertility has to be a priority for farmers and farming projects.³² Similarly, understanding the importance of an integrated systems approach, which takes into account things like biodiversity, crop rotation, and crop and water risk management strategies over time are essential.

Having a good understanding of crop rotation strategies are particularly important because diverse crop rotation reduces the farmer's dependency on fluctuating cotton prices, helps spread out labor requirements over a longer season and contributes to better food security for the farm family and

26 International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf>

27 Ibid.

28 Ferrigno, Components of a Sustainable Cotton Production System: Perspectives From the Organic Cotton Experience, (2009), https://www.icac.org/cotton_info/tis/organic_cotton/documents/2009/e_march_2009.pdf

29 Ibid.

30 Ibid.

31 Ibid.

32 Ibid.

the region. It is recommended that suitable crop management methods for the main rotation crops are included in the extension system of the organic cotton project, all the more because if only the cotton cultivation succeeds while the performance of the rotation crops is poor, the overall conversion to organic farming might not be viable.³³

Finally, seed selection is also important, and farmers need to have access to varieties that are resistant or less susceptible to common pests and diseases. Being able to choose an adapted variety for organic cotton can substantially improve productivity. Knowing beforehand where to get seeds and taking the time to test a variety of them before getting started can make a tremendous difference in the project's early and longer term success.

- *Economic components:* Several factors play a role when looking at the economic sustainability of organic cotton production. Some of these factors are internal to the farms (e.g. socio-economic status of the farmers and their access to resources and finance), while others are external (e.g. access to finance, the availability of local, national or international financial and technical support, and the willingness of buyers to support the transition process and paying premiums).³⁴

Since external variables such as changes in interest rates, oil prices and currency exchange rates can be important factors affecting sustainable organic cotton production it is impor-

tant that there is an ability to absorb short term impacts and manage risk over time. Ensuring long term purchase agreements can help manage some of the risks. Price is another critical point: extension, training, capacity building, certification and other normal costs of cotton trade should essentially be covered by the price.³⁵ Generally speaking this might lead to prices for organic cotton being 20-50% higher than conventional cotton.

Apart from the price for the organic cotton, it is important to check beforehand the marketing options for other organic crops grown in rotation with cotton: organic cotton farmers can benefit even more if they also can manage to find a market with a better price for the rotation crops. Also, planning this beforehand allows for the the cropping system to be adjusted accordingly from the beginning.

From an external standpoint a further necessity in organic cotton is the availability of services such as finance (crop and other business finance), and insurance. Innovative examples of financing in organic cotton exist already with the activities of the U.S. based ethical group Root Capital, who support crop financing for many organic cotton projects and in a new pilot program between the Dutch Cooperative Bank Rabobank, and the NGOs Solidaridad and Organic Exchange.³⁶

- *Technology and policy components:* Ensuring sustainability over time with sufficient returns means that organic farming needs to invest in improving productivity of the cotton crop and of the whole farm. An ideal scenario would see organic farming totally independent of the need for premiums or even a specific organic market. To attain this ideal requires that organic yields and returns factored against production and management costs are sufficient to make a compelling economic case for farmers to adopt this system.

Improving the technological package available in organic cotton by, for example, managing costs and improving knowledge on agronomic approaches while offering adapted seeds will make the system more attractive. The development of such technologies requires a system that supports research and extension services to develop new approaches to managing organic cotton production, to develop seed varieties and seed banks, and to improve the overall sectoral sustainability. Policy support at the state level can make a tremendous difference in the long term viability of an organic cotton sector, even more so when this sector needs to be built from the ground up as is the case in Haiti.

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33 Ferrigno, Components of a Sustainable Cotton Production System: Perspectives From the Organic Cotton Experience, (2009), https://www.icac.org/cotton_info/tis/organic_cotton/documents/2009/e_march_2009.pdf

34 Ibid.

35 Ibid.

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36 Ibid.

PROFILE Chetna Organic: A Success Story in Smallholder Organic Cotton Production

Chetna Organic aims to improve the livelihood options of small farming households in rain-fed regions of India by making their farming systems more sustainable and more profitable. Chetna has developed an innovative strategy combining the strengths of collective action and creating a supply chain owned by the farmer. Chetna has grown from reaching 234 farmers in 2004 to a membership base of over 35,000 farmers in 2014.

The Chetna Organic Farmers Association (COFA) was registered in 2007 as a not for profit organization focusing on sustainable agriculture & livelihoods for the benefit of Chetna farmers and the rural communities in general. These are achieved through engaging in various forms of: extension services, capacity building and socio-technical interventions, establishing & strengthening the internal control systems, field research & studies, enterprise development for income enhancement, education, food security & family nutrition, policy advocacy and campaigning.

In addition to promoting organic farming, Chetna has developed a complete farmer owned supply chain. In this respect, Chetna Organic Agriculture Producer Company Ltd (COAPCL) was incorporated in 2009 as a 100% farmer owned trading company which works towards bringing ethical and more remunerative market opportunities for its member farmers through a combination of collective procurement and sales as well as moving up the value chain to engage in activities beyond sale of raw produce. Towards this goal, COAPCL is also involved in helping co-operatives establish local level processing units and manage them at market level efficiency. COAPCL works towards collective marketing of cotton and rotational crops such as lentils, rice, wheat, soya bean in addition to non timber Forest Produce such as Wild Forest Honey, Turmeric etc. that are produced by its member farmers. The company also facilitates all necessary certifications such as organic, fair trade, shop for change fair trade and Non-Pesticide Management Initiative (NPMi).

Both COFA & COAPCL work are under the umbrella of Chetna Organic performing different functions for the benefit of small holder farmers. Under these two national level organizations are 571 farmer Self Help Groups federated into 9 Farmer Cooperatives from 290 villages in 3 states.

The results of Chetna's integrated approach are impressive: in general, the development of viable financing models has allowed local farmers to avert the external risks typically associated with traditional models of intensive agriculture practices elsewhere in the region. Sales of cotton and other food crop have multiplied; in 2014 Chetna's farmers produce around 6,300 tons of organic and Fairtrade seed cotton with no use of child labour, synthetic pesticides and fertilizers, and GMOs.

More importantly, average Chetna prices for cotton have been 10-15% above the market price, while farmers enjoyed savings as a results of a reduction in inputs costs, health outlays, and certification & transportation costs. Profits have gone up, farmers health has improved, and a variety of community benefit projects has been realized as a result of the allocation of Fair Trade premiums received over the sales of Fairtrade cotton.

Chetna's success factors: The OneWorld Foundation India team undertook a review of the Chetna program focusing on initiative's activities in Odisha, India. The review identified the following as important lessons from Chetna's experience which can aid in replication of the program:

- Building trust through visible results: for the start of the project, Chetna's staff worked with a limited number of farmers, once the quantity of organic production was at a similar level to conventional (chemical dependent production), farmers were able to see the long term benefits and participation figures increased.
- *Systemizing the supply chain:* by eliminating middlemen in marketing and lobbying for a separate marketplace and by establishing a producer company that allows farms to establish direct relationships with brands, distributors and retailers, Chetna has managed to simplify and make the supply chain more effective and beneficial to farmers.

continued...

- *Developing a competitive advantage*: Chetna's business model is based on transparency, traceability of the product and long term relationships with brands and retailers. All of this alongside organic farming techniques and fair trade practices contributes to give cotton grown by Chetna farmers a competitive advantage over conventionally grown cotton.
- *Long term relationship with buyers*: by working directly with buyers, Chetna aims to guarantee markets for the producers. Chetna also offers the option for the buyer to trace the product giving precise details about the variety of cotton and place of production. To date, some of the retailers and brands that COAPCL has developed relationships with include: Jackpot (Denmark), Felissimo (Japan), Marks & Spencer, bioRe (Switzerland), Fair & Co, Imps & Elves (both Netherlands). COAPCL has ventured into the domestic market segment for organic and Fairtrade cotton by collaborating with top Indian fashion designer Anita Dongre and Indian Fairtrade label – Shop for Change.

Source: Textile Exchange, The Chetna Story: The Positive Power Of Collective Action, <http://farmhub.textileexchange.org/upload/library/Case%20studies/The%20Chetna%20Story.pdf>

CHAPTER 4: History of Cotton Growing in Haiti



Cotton was once the fourth largest agricultural export from Haiti before it all but disappeared by the late 1980s. Any consideration of reintroducing cotton must be grounded in an understanding of the reasons for its demise and guided by the lessons learned from that experience. This chapter sets out to tell the story of cotton from its introduction during the country's colonial period through to the present.

Rise and Fall of Cotton: 1737–1980s

The history of cotton dates to the colonial period when it was introduced to Haiti, then known as the colony of Saint-Domingue, by French settlers in 1737. A combination of factors resulted in the rapid development of the cotton sector: 1) slaves made for cheap manpower, 2) sugarcane plantations had been ravaged by the sugar ant and an alternative crop was needed, and 3) soon after cultivation began, Haitian cotton fiber gained a reputation as being the finest in the world.

Introduction of cotton in Haiti (1737-1789): Initially cotton production in Saint-Domingue was concentrated in the greater area of Gonaives and sections of the adjacent Artibonite Plain that were too dry to cultivate sugarcane. As production significantly expanded in these areas, what had been outposts of production in other parts of the colony grew rapidly. In the south of Saint-Domingue, for example, production expanded from 22,900 cotton plants in the late

1730s to 530,000 plants in 1751¹. Between 1783 and 1789, areas planted with cotton increased by a third², reaching 6,311 hectares, most of it in the colony's south and west. By 1789 the south of the colony alone counted 182 cotton installations, which were primarily gins.

With the colonial powers recognizing the quality and value of Haitian cotton, it did not take long for the crop to become a key export product. In 1775, over 5 million pounds of cotton was exported to France. By 1788 this number grew to 6.3 million pounds, and reached 7 million pounds in 1789.³ Most of the cotton was exported from the port city of Saint Marc, located in the middle of the west coast of current day Haiti and conveniently close to some of the prime cotton growing areas near Gonaives and the Artibonite Plain. Adjusting total volume of output to include exports to other countries (including England) as well as local consumption, it is estimated that total cotton production in Haiti peaked at around 10 million pounds of fiber a year (4,536 tons) in 1789.

Collapse of cotton (1790-1821): Cotton production started to drop in Saint-Domingue after the famous slave revolt of 1791, which resulted in a large-scale abandonment of the cotton fields.

1 Moreau de Saint-Mery, *Description de la Partie française de l'île de Saint-Domingue*, (Volume 1 – p 1165)

2 Christian Rudel, *Haiti, les chaînes d'Aristide* (p 21)

3 St-Victor Jn-Baptiste, *Histoire de la Guerre de l'Indépendance* (General Nemours) & *Deux Concepts D'indépendance* (p 100)

Figure 22: Value of Exports from Haiti, 1922

Exports :	
Coffee	\$16,407,233
Cotton (including seed)	1,933,576
Cocoa	648,395
Logwood	578,698
Sugar	506,959
Goatskins	369,959
Hides	149,992
Honey	260,565
Castor beans	231,453
Lignum-vitæ	70,825
Mahogany	4,436
Total	21,460,044

Source: Inquiry Into Occupation and Administration of Haiti and Santo Domingo, U.S. Congress, 1922.

Figure 23: Agricultural Exports from Haiti, 1980-84

Haitian Agricultural Export Commodities (in '000 of m tons)					
	1980	1981	1982	1983	1984
Coffee	43	33	32	36	37
Sugar-cane	5,641	5,443	5,440	5,674	5,700
Cotton	5.9	5.7	5.4	6.6	6.6
Cocoa	3.4	2.2	4.5	4.6	4.7

Source: Haitian Ministry of Agriculture, Natural Resources and Rural Development (MARDNR)

Renewal of cotton cultivation (1821–1950):

There is a lack of documentation describing the renewal of cotton production in Haiti in the years between 1821 and the 1950s. What is known is that relations with France were resumed under the presidency of Jean-Pierre Boyer (1818–1843) and following Haiti's agreement in 1825 to begin paying France 'debt payments' for their loss of men and its slave colony. After that, France once again became Haiti's primary commercial partner and started importing and exporting a wide array of goods and services to and from the country. Trade was also re-established with other countries, in particular England, which was the main importer of cotton at this time.

While little data is available regarding total cotton production volumes or exports during this period, one reference shows up in a report to the U.S. Congress in 1922, which was during the American occupation of Haiti (1915 to 1934). A chart from that report shows cotton exports valued at \$1,933,576 (see Figure 22).

New Haitian cotton era (mid-1950s–1980s):

The General Census of 1950

reports that 52,000 hectares of cotton were being cultivated in the Central Plateau. A substantial part of this was grown on small plots, most of them measuring no more than a few hectares. The majority of this cotton was cultivated using rain fed methods, with only 5-7% being irrigated. While traditionally Haiti had always relied on growing perennial varieties, this changed in 1954 when the first upland cotton varieties were introduced in the Gonaïves area. On farms there that had irrigation, many recorded successful results with a rotation of 3 crops per year.

One report from the mid-1960s by Robert Lagiere reported exports of one thousand tons of cotton fiber in each of the years 1956-57, 1959-60 and 1963-64. A World Bank report in 1987 included an average export of 5,600 metric tons of cotton between 1980 to 1986 and a total of 12,445 hectares dedicated to the crop. The Haitian Ministry of Agriculture, Natural Resources and Rural Development (MARDNR) reported an average of 6,040 metric tons of cotton exported between 1980 to 1986 (see Figure 23).

At some point between 1986 and 1990, cotton export stopped completely. By the time the comprehensive and well researched

Production had already gone down to 8 million pounds in 1790, but following the slave revolt it was further reduced to 3 million pounds annually by 1794.⁴ In the years that followed, the bloody Independence War and fighting between the colonial powers led to a collapse in the production of cotton and other crops.

While the Independence War eventually resulted in the successful expulsion of the colonial powers and the birth of the first black republic in the world—a truly remarkable and unprecedented feat achieved in 1804—it also came at a huge cost. Many lives had been lost and the country's former productive sectors were largely left in ruins as many former plantation owners fled to other countries to set up plantations there. Moreover, the newly born Republic of Haiti was not recognized by the colonial powers it had defeated, making it very difficult for to establish trade relations with its former principal commercial partners. Finally, internal relations between different groups within Haitian society were highly complex and often strained, further complicating the successful re-establishment of production sectors including agriculture. There are no reports of cotton production or exports between the years 1795–1821.

4 Douyon, Frantz, *Haiti, de l'indépendance à la dépendance*, 2004

*Haiti Agricultural Sector Assessment*⁵ was published in 1991, cotton was not even mentioned. In that document the country's agricultural exports were identified as coffee, cocoa, essential oils, sugar and sisal.

Reasons for the Final Collapse of Cotton in Haiti

Cotton in the post-colonial period, and up to the late 1980s when it disappeared as an export crop, was primarily grown by smallholders with land holdings of less than 2 hectares (5 acres). Just as Haiti is an agrarian nation whose fate is irrevocably linked to that of its one million smallholder farm families, so too the collapse of cotton can only be fully understood from their perspective.

The overarching reason for the collapse of cotton was the lack of a comprehensive support system and related services that smallholder farmers required to cultivate a crop that requires more steps than most in order to get it to market.

Delving into the complex network of domestic and international forces that have shaped the agricultural sector in Haiti is well beyond the scope of this study. Our task is to acknowledge, without attribution of blame or causation, the general lack of support for smallholder farmers from the mid-1950s up to the 1980s and how this affected their cultivation of cotton.

Starting in the 1950s, the Ministry of Agriculture did take steps to assist smallholders through their Cotton Project. And while it assisted farmers in technical training and marketing, the operation never had sufficient financial or human resources to have a lasting impact.

Lack of financial services: The single most important challenge smallholders faced was a lack of access to financial services that would allow them to manage the various phases of cotton production, particularly land preparation, seed supply and pest control. This situation was greatly exacerbated by two related factors. First, the low level of literacy and numeracy among the rural population put farmers at a disadvantage when it came time to oversee the weighing and related financial transactions at the time of sale. Secondly, the farmers were often at the mercy of third party speculators offering advance cash payments with usurious interest rates and lower than market final payments once farmers were locked in to repaying advances.

Smallholders came to resent a system they felt was rigged against them. This led to a lack of care in the quality of what they sold. This often took the form of cotton that was soiled, had

high moisture levels and even small stones or debris that would otherwise not have been the case. This in turn led to lower prices from speculators, and eventually to lower actual market prices because the price of cotton stock arriving at international markets is determined by the quality of its worst sample.

Lack of technical support: In the mid-1950s a rapidly spreading infestation of various cotton pests causes severe damage and was a major factor in the Cotton Project being implemented by the Ministry of Agriculture. Farmers were given help to combat the problem by providing them with insecticides. The pests that had been plaguing Haitian farmers were those common to most cotton farmers elsewhere in the world, in particular the Boll Weevil which earlier in the 1930s had infested all the main cotton production areas in Haiti.

This infestation only served to highlight the lack of a cotton-specific agricultural extension service that could have guided farmers on seed sources and pest control options, provided support for irrigation expansion, offered general market information and access to financial services, and set in place guidelines for purchase agents.

The Cotton Project attempted to address many of these issues, but ultimately lacked the financial and human resources to make a lasting difference. The project's operational costs were very high and loans were often awarded without proper due diligence, resulting in high default rates. There was also a lack of technical capacity to handle a sector that had reached production volumes of 13.3 million pounds (just over 6,000 tons) exported annually.

Unexpected competition: A portion of the cotton crop in the mid-1950s to 1980s period had always been sold to local manufacturers of clothes, pillows and mattresses. A dramatic lowering of import tax on used clothing, as well as new pillows and mattresses, was a major contributing factor to wiping out domestic production of these items for the local market.

Lack of infrastructure: It was not only farmers who suffered from a lack of financial services. Those operating cotton gins and spinning and weaving mills did not have access to working capital and as a result this key aspect of infrastructure was not renewed and kept up to date. As the volumes began to go down, this put even more pressure on owners and eventually all the facilities were closed down.

The cumulative result of all these factors was that by the late 1980s, Haiti's export cotton sector had completely disappeared.

⁵ Inter-American Institute for Cooperation on Agriculture (IICA), *Haiti Agricultural Sector Assessment* (1991), (p. 60).

PHOTOS



Cotton harvest (top photo) at Joannis, near the Esthere Plaine in the Gonaives area in the 1956-57 season. One of the study's authors, Remillot Levielle (left), is inspecting the same field earlier the same year as the field bolls start to open.



CHAPTER 5: Reintroducing Cotton to Haiti as a Smallholder Crop for Export

The primary objective of this study is to establish whether it is feasible to reintroduce cotton to Haiti as a smallholder crop for export. Although substantial amounts of cotton were grown in Haiti in the past, there is currently very little cotton left. What remains are a few fields of mostly perennial varieties that, for the most part, have endured decades of neglect.

While the reintroduction of smallholder cotton in Haiti may come with challenges, it is important to note that an unsuitable climate is not among them. In fact, taking only climate and agricultural conditions into account, Haiti has traditionally been one of the best places in the world to grow cotton. The main reasons for the final collapse of cotton in the late 1980s was a lack of infrastructure, institutional support and other resources (including financing) required to support and maintain a cotton sector. If these factors can be addressed and farmers have access to resources and training, the consensus among those studying this situation is that success is possible.

Moreover, the development of a project that aims to reintroduce cotton would build on the model and work that the Smallholder Farmers Alliance (SFA) has been developing and implementing successfully for many years (see Annex 4). The adoption of an organic approach to cultivating cotton (the one proposed by this study) is in line with the fact that the SFA farmers are already using organic methods and most other smallholder farmers in Haiti already operating on a de-facto organic basis.

This chapter will provide information about potential sites where cotton could be cultivated in Haiti, as well as addressing the potential implications of climate change and to what extent this should be factored in when deciding to implement a cotton project in Haiti. Finally, it provides a projection of the possible scale (including production volumes and total production values) of such a project and a set of recommendations for its implementation.

Potential Sites for Renewed Cotton Cultivation

As part of this study, a number of Haitian agronomists were asked if and where cotton could be grown in Haiti. While not tabulated in a formal manner, the consensus is that indeed there is a very high degree of receptivity among farmers to once again cultivate cotton. And based on previous records of where cotton has grown historically, the table in Figure 30 (p. 62) and the accompanying satellite maps (Figures 24 – 29) indicate areas particularly suitable for cotton production: green dots are specific production sites that are listed as suitable, while the areas shaded in red are the larger adjacent areas that are also suitable.

Climate Change Considerations

When considering the reintroduction of a crop like cotton it is important to take into account the potential challenges posed by climate change: at the end of the day climate change is a reality and it undeniably also affects Haiti.

Haiti is a tropical island with daily temperatures that range, on average, from 19°C to 28°C (67°-83°F) in winter, to 23°C to 33°C (73°-92°F) in summer, in lowland areas. Average annual rainfall varies, from almost none in some areas to more than 127 centimeters (50 inches) in Port-au-Prince. The country's two rainy seasons are from April to June and from August to mid-November, while dry season runs from December to April. The country is subject to periodic droughts and floods, which are made worse by deforestation. Hurricanes also periodically threaten the country.

Like anywhere else in the world, the effects of climate change also affect Haiti: annual average temperatures have risen over the past decades and the rainy season has become less predictable; both trends that forecasts of future climate change predict to continue. In the case of Haiti, the impact of climate is compounded by the fact that the country is largely deforested: close to 98% of the country's original forest cover has disappeared, resulting in erosion, loss of topsoil and increasing population pressure on remaining farmlands.

While climate change is undeniably a reality that affects Haiti and should be factored in when planning the development of long term agricultural interventions, it is hardly something that is unique

to the country: cotton producing countries all over the world are dealing with similar challenges resulting from the increase of the Earth's surface temperature and are developing methods and strategies to address and mitigate the risks posed by climate change. At the end of the day, "cotton production will continue to exist as climate change progresses. It will just have to adapt to the altered environment like every other living organism."¹

The key here is adaptation: a variety of strategies have been effectively used to grow cotton in the changing conditions posed by climate change, many of which can found in the organic farming 'toolkit' proposed in this study. Maximizing plant diversity, maintaining soil cover, minimizing soil tillage, and breeding more resistant cotton varieties are all strategies that have been used successfully in other smallholder driven cotton projects across the globe (including India and various Africa countries).² In addition, using the right cultivation strategies holds the substantial potential to reduce emissions from agricultural production by means of carbon sequestration in the soil.³

1 The Economic Guidebook of the Republic of Haiti (1977 - Haitian Institute of Statistics)

2 International Trade Centre (ITC) Cotton and Climate Change: Impacts and Options to Mitigate and Adapt. Geneva: ITC, 2011. xii, 32 p. (Technical paper), <http://www.intracen.org/cotton-and-climate-change.pdf/>

3 Ibid.

Key for Figures 24 to 29 on following pages

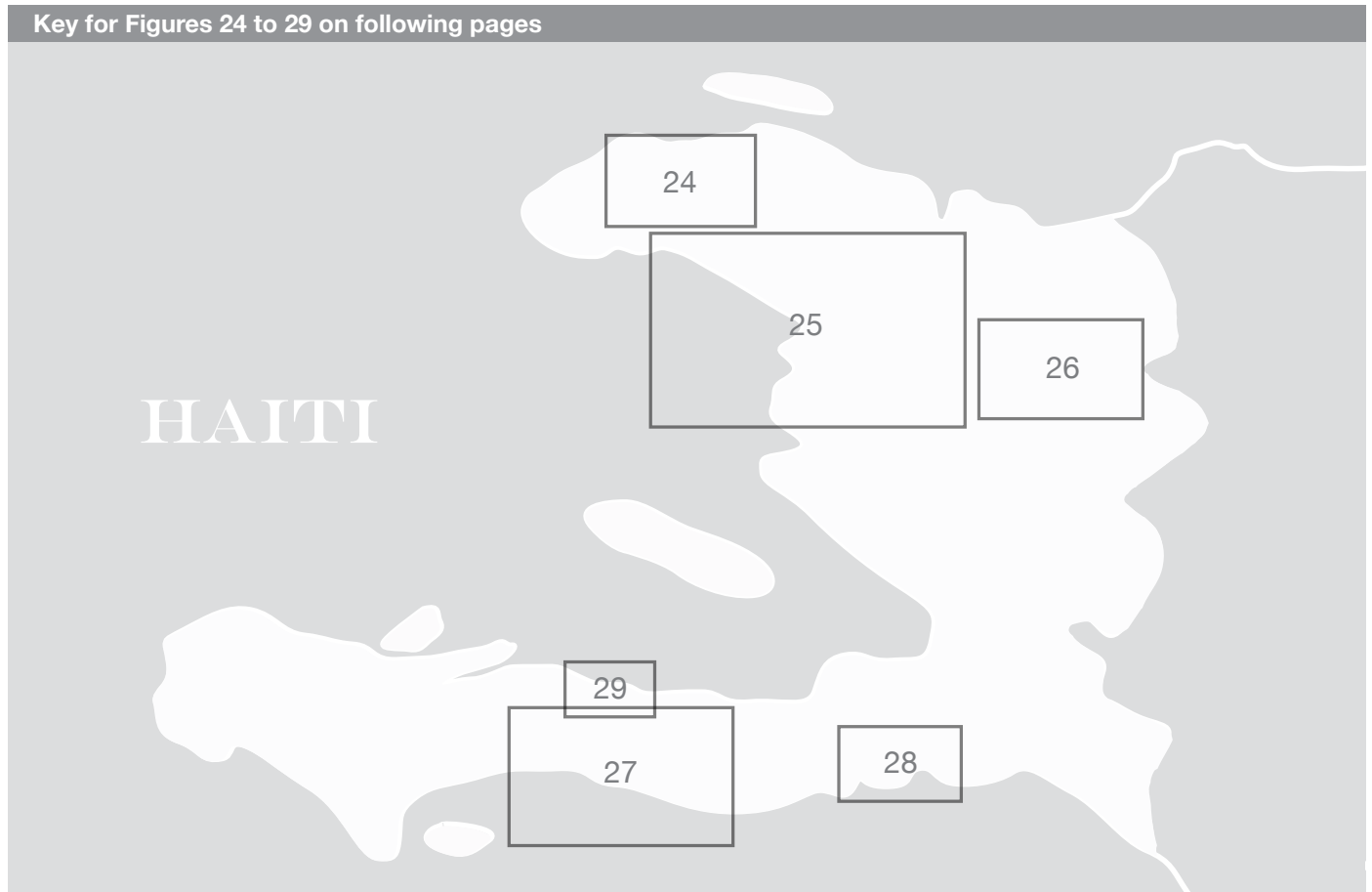


Figure 24: Areas Suitable for Cotton Production / NORTH WEST DEPARTMENT



Figure 25: Areas Suitable for Cotton Production / ARTIBONITE DEPARTMENT

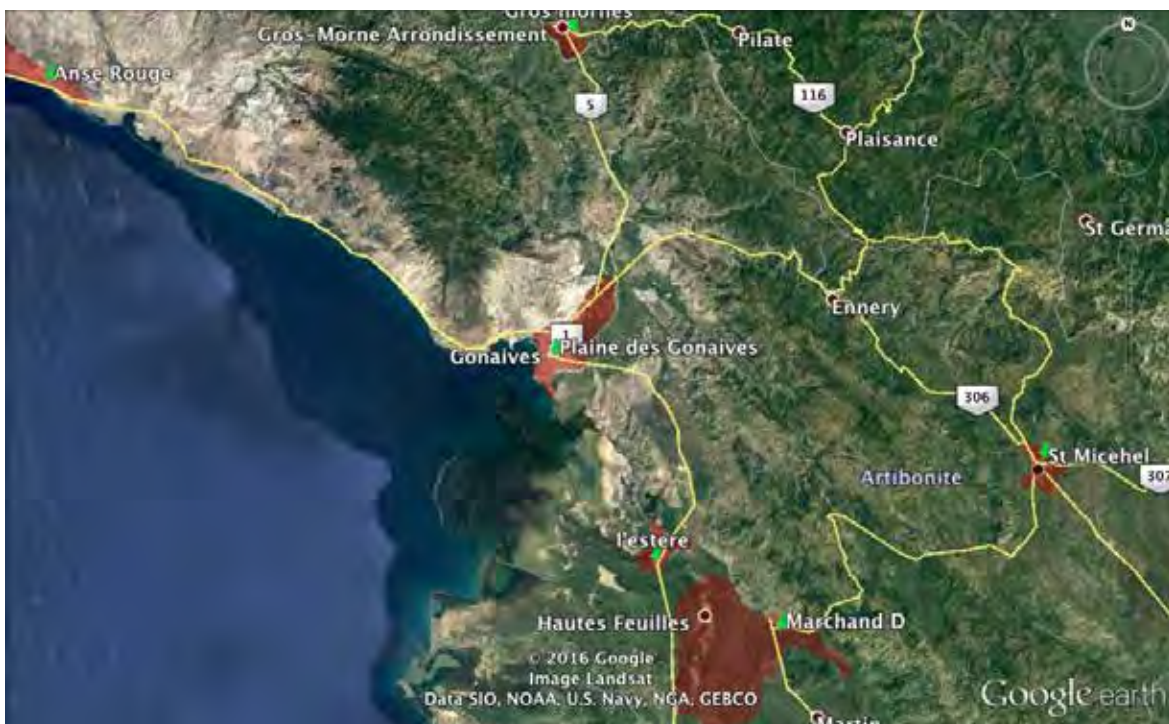


Figure 26: Areas Suitable for Cotton Production / CENTER DEPARTMENT



Figure 27: Areas Suitable for Cotton Production / SOUTH DEPARTMENT



Figure 28: Areas Suitable for Cotton Production / SOUTH EAST DEPARTMENT



Figure 29: Areas Suitable for Cotton Production / NIPPES DEPARTMENT



Figure 30: Areas in Haiti Suitable for Cotton Production

AREAS >	Artibonite Department	North West Department	Center Department	South Department	South East Department	Nippes Department
	Plaine des Gonaives	Bassin Bleu	Mirebalais	Fond des Negres	Jacmel	Baconnois
	Vallee de l'Esthere	Jean Rabel	Croix Fer	Cavaillon	Cayes-Jacmel	
	Marchand Dessalines	Savane Mole	Belladere	Anse a Veau		
	Anse Rouge		Thomonde			
	Doubedou		Hinche			
	Gros Morne		Maissade			
	Saint Michel de l'Attalaye		Los Palis			
			Labelone			
			Cerca Cavajal			
			Thomassique			
			Cerca la Source			
			Saltadere			

Note: see previous maps, Figures 22 - 27

Projecting the Potential Scale of Cotton Production in Haiti

This study has provided an overview of the many factors that should be taken into account when planning the reintroduction of cotton production in Haiti. Using the considerations and recommendations provided in the sections above enables us to make a cautious projection of a future cotton operation. In order to make a 5-year projection, it is good to begin with a set of assumptions that will serve as the basis for a very conservative projection:

- *Assumption 1:* Cotton production in Haiti will be largely, if not exclusively, based on organic production principles:
 - the vision is for all participating farmers to receive organic certification. That said, the certification process may take time, meaning that part of the initial production may have to be sold as conventional cotton.

- *Assumption 2:* 450kg/hectare is a realistic average cotton yield for smallholder grown cotton in Haiti:

- globally, the lowest organic cotton fiber yields of smallholder farmer based cotton production can be found on the African continent (fluctuating between 170–365kgs). Average yields for organic cotton are higher elsewhere in the world: 400kg organic cotton fiber/hectare in India (fluctuating between 155-1290kgs/ha), up to 2000kg/hectare in Egypt.
- part of the cotton production in Haiti would be able to benefit from irrigation, thus potentially substantially increasing the average production yields reached in India (where production is almost fully rain-fed). Irrigated cotton yields have shown to reach up to double the non-irrigated cotton yield.⁶

6 Cotton Inc., Why Irrigate Cotton, <http://www.cottoninc.com/fiber/AgriculturalDisciplines/Engineering/Irrigation-Management/Why-Irrigate-Cotton/>

- if part of the production was to incorporate conventional methods (in particular in the initial phases), average yields will almost certainly be higher than the average yields reported for organic cotton production. Here it is worthwhile noting that historically conventional cotton production yields in Haiti reached up to 2,000kgs/hectare, partly due to the country's beneficial climate.
- **Assumption 3:** Five years from now the price for cotton is projected to be around 70 US cents/lb for conventional cotton and 87.5 US cents/lb for organic cotton:
 - by 2024 world cotton prices are expected to be lower than in 2012-14 in both real and nominal terms: in real terms the world price is expected to be 23% lower in 2024 than in the base period (2012-14).⁷
 - the average price of conventional cotton in the period 2012-2014 was approx. 82 US cents/lb. If cotton prices are 23% lower in 2024 than in the period 2012-2014, the price for conventional cotton would be around 64 US cents/lb in 2024.
 - organic cotton is typically sold at a premium. There is no universally-accepted or formalized mechanism for arriving at a price premium for organic cotton; according to the Textile Exchange the premium percentage for organic cotton can range from 5 to 50 percent depending on a number of factors such as market conditions, price elasticity, arrangements between supply chain players, and product quality.⁸
 - for the purpose of this project we apply a 25% premium to our price for conventional cotton (70 US cents/lb), bringing us to approx. 87.5 US cents/lb 5 years from now.
- **Assumption 4:** The participating smallholder farmers will, on average, be able to cultivate at least one hectare of cotton annually:
 - it is generally not recommended to cultivate cotton on the same plot in subsequent years.
 - for the purpose of creating this projection we worked with a scenario where participating farmers have an average of 2 hectares each and will assign an average of 1 hectare to cotton, rotating to the remaining hectare each subsequent year.
- **Assumption 5:** Five years from now the total number of participating farmers will be 16,500:
 - based on best practices elsewhere, the smallest optimum size for an organized group of cotton farmers in any given area is 500 farms.
 - based on 3 anchor operations of 500 smallholder farmers, with each serving as the catalyst for 5,000 additional farms per area over several years, brings the total to 16,500 participating farmers 5 years from now.

Altogether, with the introduction of 3 anchor operations of 500 smallholder farms each, and with a conservative projected catalytic impact of 5,000 additional farms per operation, the projected output of such a program within 5 years could be 8,185 US tons annually with a total value of between US\$11.5 million and US\$14.3 million depending on market fluctuations and organic vs conventional.

Adding Cotton Processing Capacity

Most of the world's cotton lint is processed in India and China, two countries that happen to be the main importers of cotton in the world. This means that cotton producing countries that are geographically closer tend to have a competitive advantage, in large part due to lower transportation time and costs.

While Haiti's geographical location with regards to India or China is not favorable, it may have alternatives in terms of export destinations for its cotton lint: the United States, Brazil, and more recently Costa Rica, all have cotton spinning infrastructure. That said, if cotton were to be grown and ginned in Haiti some serious thought should be given to the idea of developing spinning infrastructure in the country as well: Haiti currently imports cheap fabrics from India and China and uses them to manufacture inexpensive, finished garments that are exported to the US and other international markets. Manufacturing, among other places, takes place in several Haitian sewing factories and two wash houses owned by SAE-A, the largest apparel manufacturing company in South Korea.⁹ Additional textile and apparel manufacturing capacity on the island can be found in the neighboring Dominican Republic which, like Haiti, produces substantial amounts of garments for the international market.

In short, the main missing link in the apparel production cycle on the island would be the infrastructure required to spin the cotton. Thus, rather than exporting Haitian cotton lint to a country in the region for spinning, only to import it back for final manufacturing, it would most likely be more economically efficient—and environmental friendly—to keep spinning on the island as well.

7 OECD-FAO, Agricultural Outlook 2015-2024, (2015), <http://www.fao.org/3/a-i4738e.pdf>

8 Textile Exchange, (2016), <http://farmhub.textileexchange.org/learning-zone/pricing-organic>

9 Apparel News, Costa Rica Gets First Cotton Spinning Mill (2015), <https://www.apparelnews.net/news/2015/may/07/costa-rica-gets-first-cotton-spinning-mill/>

What makes further exploration of this idea even more interesting is that there may be funding available for the development of precisely such a project: The 10th EDF Haiti-Dominican Republic Programme of Bilateral Economic and Trade Cooperation in the Context of the CARIFORUM-EC Economic Partnership Agreement (EPA),¹⁰ also known as the Haiti-Dominican Republic Bi-national Programme (BNP) was launched in Port-au-Prince, Haiti on September 18, 2012. The Programme seeks to promote the development of Haiti and the Dominican Republic by supporting the regional integration process that takes into consideration the demands of sustainable development and the needs of poverty reduction strategies.

Caribbean Export (The Caribbean Export Development Agency), the institution entrusted by the Governments of the Dominican Republic, Haiti and the European Union with the implementation of the "Trade Component" of this program is seeking "to develop a joint strategy for the promotion and strengthening of Bi-national Value Chains for High-Potential Sectors in Haiti and the Dominican Republic." Given the importance of the apparel sector to both the DR and Haiti it seems a well-designed proposal to bring cotton spinning facilities to the island might very well qualify for the required funding.¹⁰

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 10 Caribbean Export Development Agency (2016), <http://www.carib-export.com/business-advocacy/bi-national-programmes/dr-haiti/>

CONCLUSION & RECOMMENDATIONS

For many years, dating back to the Colonial Period, cotton was successfully grown in Haiti. Its demise was largely the due to external pressures and internal politics, not climate or environmental concerns. Critical areas that led to collapse of the country's cotton sector included: a lack of financing mechanisms, a lack of institutional organization and support, a decline in demand following increased competition from abroad, and a lack of capacity to maintain and further develop the sector.

While climate change is an undeniable reality that needs to be factored in when considering the reintroduction of cotton to Haiti, it is believed that production can be organized in a way to address and mitigate some of its main challenges. Many of the integrated methods and strategies offered by the organic toolkit mentioned in this study have been successfully tested and proven in similarly challenged areas all over the world.

Given the areas available for cotton cultivation—and using a set of assumptions derived from best practices elsewhere in the world—it is believed that 5 years from now a fully developed cotton program in Haiti should be able to produce 8,185 US tons of cotton lint annually with a total value of between US\$11.5 million and US\$14.3 million depending on market fluctuations and organic vs conventional.

It is the conclusion of this study that the reintroduction of cotton to Haiti is a viable agricultural and economic proposition if undertaken by smallholder farmers with the following recommendations:

- **Utilize an integrated social enterprise model:** It is recommended to work with a minimum of 500 smallholder farmers at a time through cooperative or association structures that become the means of purchasing cotton as well as providing training, tools, financial services and seed. The resulting Haiti Cotton Initiative (working title) will function as a social business, with all forms of support provided as part of an overall business operation and not in the form of handouts.
- **Start with purchase orders:** It is highly recommended that any foray into cotton in Haiti be anchored in advance by at least one significant purchase order from a major company. Even if that order may need to be somewhat speculative in nature to begin with as volume and price points are hard to guarantee a year in advance, it is an essential tool in terms of securing the required public and private financing as well gaining the confidence and trust of farmers.
- **Support women farmers:** Based on solid empirical data, providing targeted support and training for women smallholder farmers is recommended in order to maximize yields and profits for cotton production. It has also been shown that support for gender equality in cotton production also results in increased benefits for both families and communities.

continued...

- **Develop a brand:** It is recommended to invest in developing a brand for Haitian cotton that highlights quality, organic certification and the special role of smallholder farmers. The latter is particularly important as smallholders become known to consumers who are willing to pay premium prices for such considerations.
- **Establish exporting and marketing capacity:** It is critical that the Haiti Cotton Initiative develop the capacity to export product directly, without going through third parties, in order to maximize efficiency and profits as well as to develop the capacity to market that product in order to generate more clients. The goal is to incorporate exporting and marketing into a streamlined value chain in which smallholders have a financial stake.
- **Go organic:** The recommendation is to go for organic certification. While the Better Cotton Initiative (BCI) is attractive as a standard, they are not currently operating in Haiti and their policies make an expansion into new territory unlikely. Organic certification has the advantage that it applies to any crop grown on certified farm fields and so would cover other crops on the same land. And Haitian farmers are already largely organic by default in that there is very little use of chemicals throughout the country, with the result that the process of obtaining organic certification is more likely to be measured in months rather than years.
- **Balance export and local crops:** It is recommended that the training, support and research system put in place for cotton is based on the full integration of export and local crops through rotation and/or intercropping.
- **Use centralized ginning:** Since cotton is typically ginned in the same country where it is grown, a central ginning operation should be established in addition to the cotton production operation with smallholder farmers. Learning from best practices in other developing countries, smallholders are not the best suited to managing these ginning operations. They could, however, have an ownership stake in a gin.
- **Explore additional cotton processing capacity:** While the export of cotton needs to be economically viable based on baled raw fiber as the product, it is also recommended to explore the possibility of establishing additional cotton processing capacities—spinning in particular—in Haiti or possibly in the Dominican Republic.
- **Partner with Ministry of Agriculture:** Although there is a challenging political environment in Haiti, no initiative of this kind can be considered without the active participation of the Haitian Ministry of Agriculture. It is recommended that such a partnership take the form of a limited two-year period of ministry staff subsidies to ensure the development of in-house expertise on cotton production as well the preparation of any guidelines and government procedures related to cotton growing and exporting.
- **Enlist best practice advisors:** It is recommended that organizations currently in the forefront of working directly with smallholder farmers in sustainable cotton production be approached to serve in a formal capacity as advisors to the Haiti Cotton Initiative. Their help will be particularly important during the first few years of operation. Two such groups suggested for consideration are Chetna Organic from India and field staff from cotton projects supported by Solidaridad.
- **Build local research capacity:** One of the key lessons from the previous failure of cotton in Haiti was that new seed varieties were widely introduced without having first been tested to determine suitability for local conditions. To this end, it is recommended that the equivalent of a “chair of cotton studies” be established within a Haitian institution such as Université Quisqueya so that there is a permanent resource for field research and study that is connected to other similar centers around the world. This will ensure that new developments in cotton growing—including intercropping—will be accessible, and the possibility will exist for joint research with institutions such as the Swiss Research Institute of Organic Agriculture (FiBL).
- **Incorporate tree planting:** The SFA model in Haiti is built on smallholder farmers growing, transplanting and looking after trees as a way to earn seeds, tools and training for their field crops. By applying this model to cotton production, there is a built in additional net positive impact on the environment.



ANNEX 1:

List of Companies Dedicated to Buying Fairtrade/Organic/Sustainable Cotton

armedangels	https://www.armedangels.de/en/
Arthur & Henry	http://www.arthurandhenry.com
Aventura	www.aventuraclothing.com
C&A	www.c-and-a.com
continental	https://www.continentalclothing.com
cotonea	www.cotonea.co.uk
Coyuchi	https://www.coyuchi.com
Decathlon	https://www.decathlon.es
Dibella	www.dibella.de/en
EILEEN FISHER	www.eileenfisher.com
Electric Tees	http://www.electrictees.co.uk/
ethletic	ethletic.com/en
greenfibres	www.greenfibres.com
H&M	www.hm.com
bgreen apparel	https://www.bgreen.com
Inditex	www.inditex.com
Kathmandu	www.kathmandu.com
KUYICHI	www.kuyichi.com

continued...

naturaline	naturaline.en.ec21.com
naturepedic	www.naturepedic.com
Nike	www.nike.com
Nudie Jeans co	https://www.nudiejeans.com
Seasalt (cornwall)	https://www.seasaltcornwall.co.uk
Skunkfunk	www.skunkfunk.com
Stanley stella	https://www.stanleystella.com
Stella McCartney	www.stellamccartney.com
Target	www.target.com
Tenerita	www.tenerita.com
Timberland	www.timberland.com
PACT	www.wearpact.com
Patagonia	www.patagonia.com
People tree	www.peopletree.co.uk
PrAna	www.prana.com
Puma	www.puma.com
Tchibo	www.tchibo.com
UNDER the CANOPY	https://underthecanopy.com
VAUDE	www.vaude.com



ANNEX 2: Overview of Minimum Ginning Requirements

Ginning cotton is quite a process and may require a variety of machinery. This annex provides an overview of the minimum requirements one should take into consideration when setting up a ginning operation.¹

Cotton ginning machinery: The principal function of the cotton gin is to separate lint from seed and produce the highest total monetary return for the resulting lint, seeds, etc. under the prevailing marketing conditions. These marketing quality standards most often reward cleaner cotton and a certain traditional appearance of the lint. The gin then must also be equipped to remove a large percentage of the foreign matter from the cotton that would significantly reduce the value of the ginned lint, especially if the cotton is machine harvested. A ginner must have two objectives: to produce lint of satisfactory quality for the grower's classing and market system; and to gin the cotton with minimum reduction in fiber spinning quality so that the cotton will meet the demands of its ultimate users, the spinner and the consumer. Thus, quality preservation during ginning requires the proper selection and operation of each machine that is included in a ginning system. The ginner must also consider the weight loss that occurs in the various cleaning machines. Often the weight loss to achieve higher grade results in a lower total monetary return.

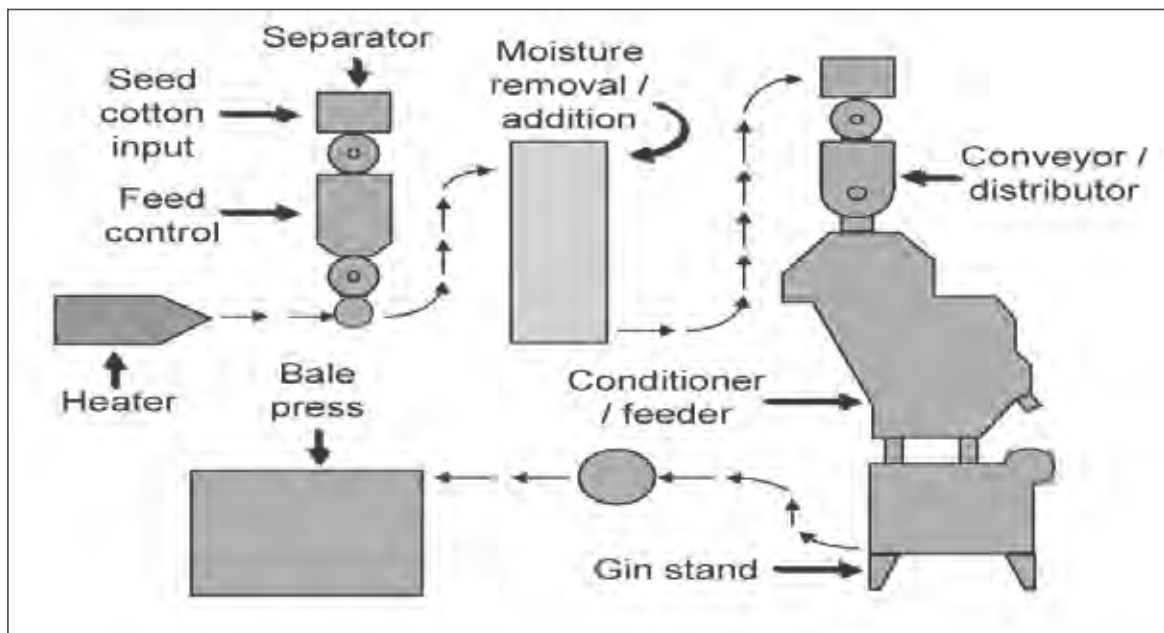
The minimum machinery required to process clean, hand-harvested cotton consists of a dryer and/or moisture restoration device followed by a feeder to uniformly meter seed cotton into a gin stand. The ginner must be able to adjust the moisture of the cotton up or down, individualize the locules of cotton, meter the locules uniformly into the gin stand to separate the fiber from the seed, and then package the fiber and seed for market. The simplified machine sequence in Figure A illustrates the minimum machinery necessary to produce marketable fiber. This simplified sequence, however, does not provide versatility to properly manage cotton that has excessive moisture or trash, or cotton that must meet specialized textile needs. Since saw-type lint cleaning is not included in Figure A, the baled fiber will contain imperfections such as motes and trash, and will not have a smooth appearance. A more extensive machine sequence such as that shown in Figure B provides the flexibility to meet almost any situation for hand or machine-picked cotton.

Foreign matter levels in seed cotton before gin processing usually range from 1% to 5% for hand harvested, from 5% to 10% for spindle-harvested, and from 10% to 30% for strip-per-harvested cottons. The level of foreign matter dictates the amount of cleaning needed.

The quality of ginned lint is directly related to the quality of the cotton before ginning. High grades will result from cotton that comes from clean fields. Lower grades will result from cotton

¹ Taken from: International Trade Center (UNCTAD & WTO), Cotton Exporters Guide (2007), <http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Cotton%20Guide%20August%202013%20small.pdf> (including Figures A - E)

Figure A: Minimum machine sequence used to process clean, hand-picked cotton



that comes from grassy, weedy fields in which poor defoliation or harvesting practices are used.

When gin machinery is used in the recommended sequence, 75%–85% of the foreign matter is usually removed from the cotton. Unfortunately, this machinery also removes small quantities of good quality cotton in the process of removing foreign matter, so the quantity of marketable cotton is reduced during cleaning. Cleaning cotton is a compromise between foreign matter level, and fiber loss and damage. Trash removal efficiency and fiber damage are inversely related to fiber moisture.

Seed cotton unloading: Unloading systems remove seed cotton from the transport vehicle and feed cotton into the gin at a constant and uniform rate. An auxiliary function is to remove rocks, metal, or other hazardous material and to remove wet, green bolls and some sand and dirt. There are two types of seed cotton unloading systems: pneumatic suction through swinging telescopes that remove cotton directly from the trailer or module; and module disperser systems that break up the module mechanically and deposit the seed cotton on to a conveyor that delivers it to a fixed suction pick-up point.

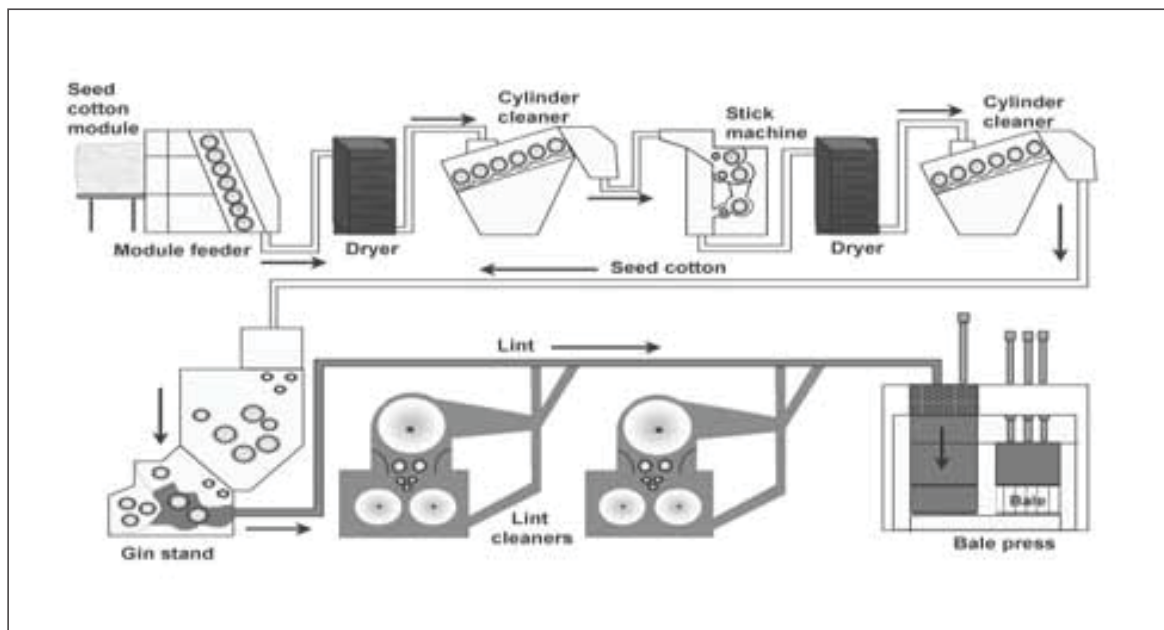
Feed control: Cotton should be steadily and uniformly metered into the gin system. This is normally accomplished by a feed control which consists of a small storage chamber as well as multiple rotating cylinders that may be manually or automatically controlled. The efficiency of the drying, cleaning and conveying systems increases as the uniformity of flow increases.

Drying: The moisture content of seed cotton is very important in the ginning process. Seed cotton with too high a moisture content will not clean or gin properly and will not easily separate into single locks but will form wads that may choke and damage gin machinery or entirely stop the ginning process. Seed cotton with too much moisture will also form tight twists known as 'fish hooks' that remain in the ginned lint and degrade appearance. Excess moisture is removed by exposing the cotton to heated, dry air. Drying systems can seriously over-dry cotton and must be used properly to avoid reducing cotton quality. Drying at low temperatures is much less harmful than drying at high temperatures.

Cotton with too low a moisture content may stick to metal surfaces as a result of static electricity generated on the fibers, and cause machinery to choke and stop. Fiber damage is especially likely at moisture contents below 5%. Dry cotton requires more force and power to compress than does moist cotton. When pressing and baling such low-moisture cotton, it is often difficult to achieve the desired bale weight and density without adding moisture.

Dryers should be adjusted to supply the gin stand with lint having a moisture content of 6%–7% to preserve fiber quality. Cotton at this moisture level is more able to withstand the stresses of ginning without breaking. However, cotton at 5% moisture content will result in better cleaning and a smoother appearance, which is erroneously preferred by many classing and marketing systems. Gin cleaners remove more trash

Figure B: Representative cross-section of typical types of gin machinery arrayed in a sequence used for spindle-picked cotton



at moisture levels below 6%–7% but not without more fiber damage. Fiber moisture higher than 7% preserves fiber length but results in ginning problems and poor cleaning.

Fiber length preservation can best be attained with fiber moisture of 6.5%–8%, but both cleaning efficiency and ginning rate are reduced at higher moistures. As a compromise, moisture contents of 6%–7% are feasible. Ginning below 5% moisture can cause serious damage to the fibers, while ginning above 8% may produce rougher lint, decreased gin capacity, and less effective cleaning. The effects of ginning cotton below 5% moisture are decreased yarn strength and yarn appearance, and increased short fibers in the card sliver.

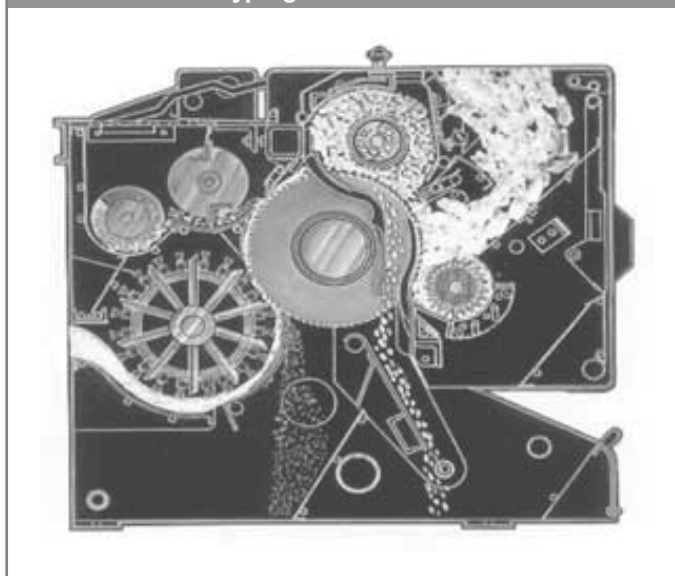
Seed cotton cleaning: The term ‘seed cotton cleaning’ refers to the use of various types of cylinder cleaners designed primarily for removal of dirt and small pieces of leaves, bracts, and other vegetative matter, as well as ‘extractors’ that are used to remove large trash, such as burs and sticks, from the seed cotton. The cleaning and extracting system serves a dual purpose. First, large trash components such as burs, limbs, and branches must be extracted from the seed cotton before they are broken up and embedded in the cotton, and so that the gin stand will operate at peak efficiency and without excessive downtime. Second, seed cotton cleaning is often necessary to obtain optimum grades and market values, especially when ginning high-trash-content cotton. The amount of cleaning and

the extracting machinery required to satisfactorily clean seed cotton varies with the trash content of the seed cotton, which depends in large measure on the method of harvest.

Gin stands: The saw gin was developed by Eli Whitney in 1793. In a gin stand, round saws rotate at a high speed between parallel metal bands called ribs. Saw gin stands typically have 12–18" (30.5–45.7 cm) diameter saws spaced 1/2–1" apart, with as many as 198 saws stacked on a single mandrel. These saws project through the ginning ribs, grasp fiber, and pull the fiber from the seed as the seeds are too large to pass through the opening in the ginning ribs. The capacity of a single gin stand has increased from less than 1 bale per hour to more than 15.

The fiber–seed attachment force varies with cotton variety, field deterioration, moisture content and other factors, but is typically about 55% of the breaking force, suggesting that the fibers can be removed from the seed without breakage. The gin stand, whether saw (see Figure C) or roller, pulls the fiber from the seed. It is the heart of the ginning system. The capacity of the system and the quality and potential spinning performance of the lint depend on the operating condition and adjustment of the gin stand. Gin stands must be properly adjusted, kept in good condition, and operated at or below design capacity. If gin stands are overloaded, the quality of the cotton may be reduced. Short fiber content increases if the ginning rate increases above the

Figure C: Continental Eagle 161 Golden Eagle Saw brush-type gin stand



manufacturer's recommendation. Short fiber also increases as saw speed increases. Increased ginning rate also increases yarn imperfections, and seed damage can result from increasing the ginning rate, especially when the seeds are dry. High ginning rate and low seed moisture cause seed damage ranging from 2% to 8% of the seed in gin stands. Thus, it is paramount to keep the gin stand in good mechanical condition, to gin at recommended moisture levels, and to not exceed the capacity of the gin stand or other components of the system.

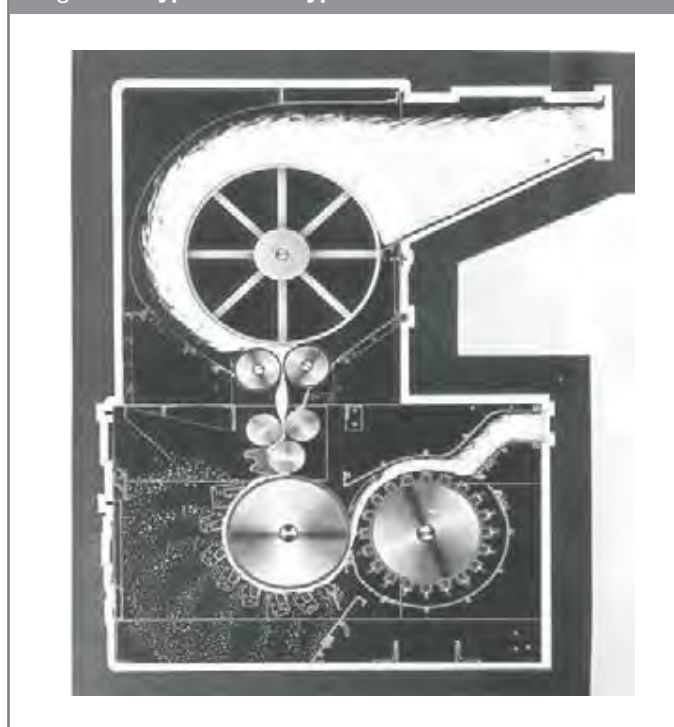
Roller-type gins: Roller-type gins provided the first mechanically aided means of separating lint from seed. Types of roller gins include the Churka, the reciprocating knife and the rotary knife. The ginning rate of the rotary-knife gin is about 20% of the saw-ginning rate per unit of length. Seed cotton conditioning equipment in roller gins is the same type used in saw gins. Lint cleaning in current reciprocating knife roller gins is typically done with cylinder and impact cleaners similar to those used for seed cotton as well as air-jet cleaners. Roller-type gins provided the first mechanically aided means of separating extra-long staple cotton lint from seed. The Churka gin, the origin of which is unknown, consisted of two hard rollers that ran together at the same surface speed, pinching the fiber from the seed and producing about two pounds of lint a day. In 1840, Fones McCarthy invented a more efficient roller gin that consisted of a leather ginning roller, a stationary knife held tightly against the roller and a reciprocating knife that pulled the seed from the lint while the lint was held by the roller and stationary knife. A rotary-knife roller gin was developed in the United States in the late 1950s. The roller ginning process does less damage than saw ginning when separating fiber from cottonseed. However, roller ginning is a much slower process.

Lint cleaners: Lint cleaners (see Figure D) remove leaf particles, motes, grass, and bark that remain in cotton after seed cotton cleaning, extracting and ginning. Most gins that process machine-harvested cotton have one or more stages of lint cleaning.

Lint cleaning generally improves the grade classification (color, leaf, and smoothness) of the lint. However, the extent of grade improvement decreases with each succeeding cleaning. Lint cleaners can also decrease the number of bales that are reduced in grade because of grass and bark content. Lint cleaners reduce bale weights and may decrease staple length, thus affecting bale value. In some cases, the net effect of multiple stages of lint cleaning is a loss in bale sales value as well as an increase in neps and short fiber content which decreases the cotton's spinning value.

Moisture restoration: Adding moisture before fiber–seed separation and lint cleaning will help maintain fiber length and reduce the number of fibers that break in the gin stand and lint cleaners. Adding moisture to lint that has already been ginned and lint cleaned, however, will not increase fiber length. Other benefits resulting from moisture restoration include reducing the static electricity level of the cotton, reducing the volume of the cotton required to achieve a given bale size and reducing the force required to press the bale. The resilient forces exerted on the restraining bale ties are also lower when the moisture cotton is higher.

Figure D: Typical Saw-type Lint Cleaner



The recommended fiber moisture level of 6%–7% is based on production aspects as well as quality aspects. One approach used to restore moisture in cotton fiber is to blow humid air through the cotton to moisten it. The amount of moisture restoration with this system is limited, especially at higher ginning rates. The cotton fibers lose some of their resilience, thus reducing the compressive forces required in baling. Another approach to restoring moisture is to atomize water and spray it directly on the cotton.

Packaging lint cotton: Bale packaging is the final step in processing cotton at the gin. The packaging system consists of a battery condenser, lint slide, lint feeder, trumper, bale press, bale tying and covering systems, and bale conveyance systems. The bale press consists of a frame, one or more hydraulic rams, and a hydraulic power system. Tying subsystems may be entirely manual, semi-automated, or fully automated. Restraining ties are usually steel wire or flat, steel or plastic straps. Six to ten ties are typically spaced along the bale, but a spirally wrapped continu-

Bales should be fully covered (including openings caused by sampling), and all bale covering material should be clean, in sound condition, and of sufficient strength to adequately protect the cotton. Bales are covered in natural fibers such as cotton (preferably), burlap and jute, and synthetics such as polypropylene and polyethylene. The material must not have salt or other corrosive material added, and must not contain sisal or other hard fiber or any other material that will contaminate or adversely affect cotton. For outside storage, bale coverings must include ultraviolet inhibitors commensurate with the anticipated storage period.

Effect of gin machinery on cotton quality: Good gin operations use only the amount of drying, moisture restoration and cleaning required to meet customer demands. New, proven technology must be used to process cotton as well as to monitor and control fiber quality.

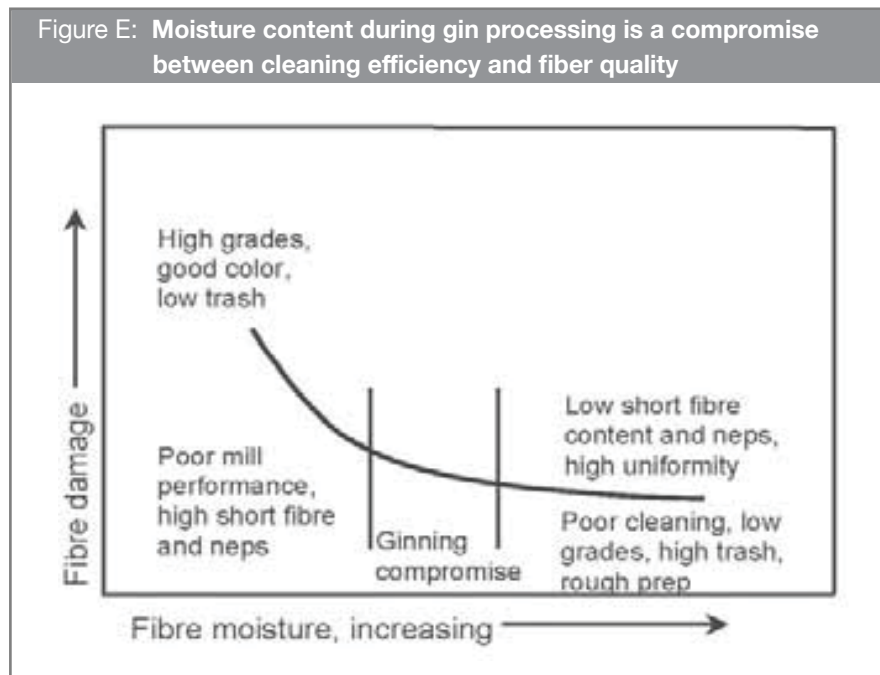
The ginning process can significantly affect fiber length, uniformity, and the content of seed-coat fragments, trash, short fibers and neps. The two ginning practices that have the most effect on quality are the regulation of fiber moisture during ginning and cleaning, and the degree of gin cleaning used. Figure E illustrates the impact of moisture on fiber quality. The addition of seed cotton cleaning machinery affects some fiber quality parameters, and saw-type lint cleaners affect nearly all fiber quality parameters. Large and small trash particles are removed by gin machinery. Particles commonly known as ‘pepper trash’, which are typically about 500 microns, are dramatically reduced by all gin processes except gin stands. Saw-type lint cleaners are especially efficient at removing small trash particles.

Choosing the degree of gin cleaning is a compromise between fiber trash content and fiber quality. Lint cleaners are much more effective in reducing the lint trash content than are seed cotton cleaners, but lint cleaners can also decrease fiber

ous tie is sometimes used. The stress on the ties after the bale is released from the press is a function of the uniformity of the lint distribution, bale weight, bale dimensions, density to which the bale was pressed, moisture content, tie length and other factors. Bale tie strength must be matched carefully to the bale press system to prevent tie breakage and subsequent contamination and handling difficulties. To prevent fiber deterioration in the bale, no portions of the packaged bale should exceed 7.5% moisture content. Fiber degradation increases dramatically as moisture content increases, especially above 9%.

quality and reduce bale weight (turnout) by discarding some good fiber with the waste. Cleaning does little to change the true color of the fiber, but combing the fibers and removing trash and dust changes the perceived color. Lint cleaning can sometimes blend fiber so that fewer bales are classified as spotted or light spotted. Ginning does not affect fineness and maturity although these properties affect the amount of damage to lint during ginning and lint cleaning. Each mechanical or pneumatic device used during cleaning and ginning increases the nep content, but lint cleaners have the most pronounced influence.

Figure E: Moisture content during gin processing is a compromise between cleaning efficiency and fiber quality



The number of seedcoat fragments in ginned lint is affected by the seed condition and ginning action. Yarn strength, yarn appearance and spinning-end breakage are three important spinning quality elements. All are affected by length uniformity and, therefore, by the proportion of short or broken fibers. These three elements are usually best preserved when cotton is ginned with minimum use of drying and cleaning machinery.

Compared to saw ginning, roller ginning has a higher turnout and produces lint that is longer, with fewer short fibers and neps, but contains more foreign matter and cottonseed. The roller gin process results in a lint appearance that is less smooth than that of saw-ginned lint.



ANNEX 3:

Support Networks for Smallholder-Grown Cotton

Company / Institution	Support Provided	Location of Supported Cotton Projects	Examples of Cotton Projects Supported
Better Cotton Initiative	BCI has launched its Growth and Innovation Fund (GIF), which came into force on 1 January 2016. The Fund is BCI's new global investment vehicle for supporting Better Cotton projects in cotton-growing regions around the world. Managed by IDH (Sustainable Trade Initiative – see below)	Currently operating in Brazil, India, Mali, Pakistan, China, Turkey and Mozambique. Global scope intended.	<ul style="list-style-type: none"> • Action for Social Advancement (India) • Dilasa NGO (India) • Mahima Fibres Pvt Ltd (India) • Grupo de Empresa Issufo Nurmamade (GEIN GROUP (Mozambique)) • http://www.mocotex.com/ (Mozambique) • Shandong Huitong Textile Co., Ltd (China)
Bill & Melinda Gates Foundation	Funding	Sub-Saharan Africa / India (not exclusively)	<ul style="list-style-type: none"> • COMPACI (Africa) • Chetna Organic (India)
bioRe (not exclusively)	Capacity building, funding, implementation	India / Tanzania (not exclusively)	<ul style="list-style-type: none"> • bioRe India Limited (inc. Chetna) • bioRe Tanzania Ltd
C&A Foundation	Funding	China, India, Africa (not exclusively)	<ul style="list-style-type: none"> • Bomao Ecological Agriculture Farm in Wuhan (China) • Chetna Organic (India) • Aga Khan Foundation (India) • Action for Social Advancement (India) • Aid by Trade Foundation (Africa) • ASHOKA
Cotton made in Africa	Capacity Building + Brand	West Africa	

Company / Institution	Support Provided	Location of Supported Cotton Projects	Examples of Cotton Projects Supported
FiBL (Research institute of organic agriculture, Switzerland)	Research	India, Africa (not exclusively)	<ul style="list-style-type: none"> • Chetna Organic (India) • SYPROBIO project (Mali, Burkina Faso, Benin)
Ford Foundation			<ul style="list-style-type: none"> • Chetna
German Federal Ministry for Economic Cooperation and Development (GIZ)		Sub-Sahara Africa (inc. Benin, Burkina Faso, Gambia, Malawi, Uganda),	<ul style="list-style-type: none"> • CmiA (Africa) • COMPACI
G-Star Raw Foundation	Funding		<ul style="list-style-type: none"> • Chetna
ICCO	Funding	Globally (inc. India, Kyrgyzstan)	<ul style="list-style-type: none"> • Chetna
IDH (Sustainable Trade Initiative)	With funding from the Dutch, Swiss and Danish Governments, IDH runs public-private, precompetitive market transformation programs in 18 sectors, of which cotton is one of the most promising. Manages BCI's Growth and Innovation Fund	Sub-Sahara Africa, India	<ul style="list-style-type: none"> • Chetna Organic (India) • COMPACI (Africa) • Better Cotton Initiative

Company / Institution	Support Provided	Location of Supported Cotton Projects	Examples of Cotton Projects Supported
Organic Exchange	Organic Exchange brings together brands and retailers with their business partners and key stakeholders to learn more about the social and environmental benefits of organic agriculture	Connected to over 80 organic farming projects in India, China, North America, Turkey and countries in Africa and South America.	
OTTO Group	Funding	Africa (inc. Zambia)	<ul style="list-style-type: none"> • Cotton made in Africa (Zambia)
Rabobank (Dutch Cooperative Bank)	Funding	Globally	<ul style="list-style-type: none"> • Better Cotton Initiative
Root Capital	Support crop financing for many organic cotton projects	Africa (inc. Zambia)	<ul style="list-style-type: none"> • Gulu Agricultural Development Company (GADC – Uganda)
SIDA (Swedish Development Agency)	Funding	Worldwide	<ul style="list-style-type: none"> • Better Cotton Initiative
Solidaridad	Capacity Building	East-Africa, West-Africa, India, China	<ul style="list-style-type: none"> • Better Cotton Initiative
WWF	Funding	Worldwide	<ul style="list-style-type: none"> • Better Cotton Initiative



ANNEX 4: Smallholder Farmers Alliance Model in Haiti



The Smallholder Farmers Alliance (SFA) applies business solutions to help feed and reforest a renewed Haiti by establishing market-based farmer cooperatives, building agricultural export markets, creating rural farm businesses and contributing to community development.

Haiti was once heavily forested and a net exporter of food. It now has less than 2 percent tree cover and imports 58 percent of its food, despite having just over a million farms to feed a growing population of over 10 million.

While other contributing factors loom large in the country's woes, deforestation has reduced agricultural productivity by contributing directly to climate change in the form of a rise in average temperatures along with decreased and more irregular annual rainfall. And when drought conditions are interrupted by periodic tropical storms, there are few trees left to stop the rain from washing away both topsoil and crops.

Most farmers in Haiti are "smallholders" with less than 2 hectares of land (5 acres). They have been largely abandoned for the last half a century, left to their own devices and with no access to improved agricultural techniques, export markets or financing. Their low yields force many to supplement their income by cutting trees to make charcoal for sale in urban areas.

The end result is one of the world's most aggressively self-destructive ecosystems in which agriculture and deforestation are locked in a self-reinforcing downward spiral.

In 2010, Hugh Locke and Timote Georges set out to make a business case for planting trees, which led them to question whether it

might be possible to link reforestation with one of Haiti's other major issues, namely the very low yields of smallholder farmers.

This was accomplished through a new Timberland-supported business model in which smallholder farmers volunteer to grow, transplant and nurture trees in order to earn inputs for their farm crops in the form of seed, tools and training. And the amount of seed received at planting is returned, plus about 10 percent more, to a seed bank at harvest time.

To date close to 6 million trees have been planted by 3,200 members of the Smallholder Farmers Alliance (46% are women) who have increased their crop yields by an average of 40% and their household incomes by an average of 50%. And the trees they planted have further contributed to farm output through fruit and other produce, timber and fodder.

Trees have now become a form of bio-currency and are worth more in the ground than cut for charcoal.

The SFA began by using a market-based approach that leverages increased food production to grow trees. In addition to building and supporting agroforestry farmer cooperatives, the operation has expanded to include a micro-credit loan program for women farmers, a farmer field school, an agricultural supply store, literacy training, livestock, a lime operation and the first export crop in the form of moringa.



Farmer Cooperatives: creating farmer-managed businesses with a triple bottom line: planting trees, increasing food production and improving farm livelihoods.



Lime Operation: reintroducing lime trees in Haiti that will eventually supply a plant being built there to process and export lime oil extract.



Farmer Field School: a certificate program for the SFA farmer-members that trains them to the level of an agricultural extension agent.



Alpha Bon: adult literacy and basic business training for the SFA farmer-members being led by the microfinance institution Fonkoze.



SFA Microfinance: business training and loans to women farmers to assist them with creating and managing secondary business ventures such as the food stall shown here.



Kay Plantè: a business providing agricultural supplies to farmers and wholesale food to micro-entrepreneurs, along with a marketing operation for farmer produce.



Moringa Export: The SFA established a Haitian moringa export market over the past year. To date, tens of thousands of moringa trees have been planted and women farmers are involved in processing the leaves of those trees into powder form. The resulting moringa powder is incorporated into the new Moringa Green Energy shots that are manufactured by Oakland-based Kuli Kuli and currently sold at all 435 Whole Foods Market stores throughout the U.S.



Support for Women Farmers: Simply put, if you don't emphasize overall support to smallholders in favor of women farmers you are not going to get full value for your investment. That is not to suggest that support should be provided to women only, because that causes its own dysfunction. But supporting women to achieve an equal status with male farmers—and with equal access to resources—has been shown to increase farm yields by 20 to 30 percent, according to the Food and Agriculture Organization (FAO).

The SFA model starts by making women and men separate and equal members, including when they farm together as husband and wife, which is something rarely done in Haiti. A woman farmer is a member of the SFA's national board of directors. Women farmers are the exclusive recipients of the SFA micro-finance program, which includes basic business training. And women farmers have the exclusive responsibility for processing moringa as part of the new Haitian moringa value chain.

What began as externally applied rules has begun to change cultural norms regarding the status of women, one community at a time.

About Us



Structure:

The Smallholder Farmers Alliance (SFA) is a Haitian non-profit foundation operating under the laws of Haiti and identified by NIF#: 000-049-555-8. SFA is currently in the process of applying for the final stage of registration with the Government of Haiti.

Board:

- Timote Georges / Co-founder, Executive Director, Smallholder Farmers Alliance
- Raymond Alcide Joseph / journalist; former Haitian Ambassador to the USA
- Hugh Locke / Co-founder, President, Smallholder Farmers Alliance
- Mark Newton / Head of Regulatory and Environmental Affairs, Samsung Electronics America
- Rob Padberg / Director General, Bureau de Nutrition et Developpement (BND)
- Eliette Pierre / farmer and member of Smallholder Farmers Alliance in Gonaïves
- Michèle Pierre-Louis / former Prime Minister of Haiti; President, Fokal
- Jean Ernst Saint Fleur / Officer, UNICEF; formerly with Ministry of Agriculture
- Jean-Frédéric Salès / Principle, Cabinet Salès
- Jane Wynne / Founder, Wynne Farm Ecological Reserve

Advisors:

- | | |
|-------------------|------------------------------|
| • Mark Bamford | • John R. Drexel IV |
| • Pascale Dejean | • Claudine Francois |
| • Lionel Delatour | • Jean-Robert Ronald Painsou |

Address:

Smallholder Farmers Alliance
62, rue Geffrard, Pétiön-Ville, Haiti

www.HaitiFarmers.org

SFA Stats:

3,200

Number of farmer members

46%

Percentage of farmer members who are women

19

Number of tree nurseries

5,784,000

Number of trees planted by the SFA between 2010 and 2016

6,300

Acres under cultivation by farmer members (2,550 hectares)

102

Number of women farmer members receiving micro-credit loans at any given time

40%

Estimated average increase in crop yields by farmer members

50%

Estimated average increase in household income by farmer members

3,400

Estimated number of additional children of farmer-members in school

13,520

Estimated total number of farmers and their family members positively impacted by the SFA's work



CHALLENGE: REBUILDING AGAINST THE ODDS



HAITI IS
98%
DEFORESTED



LACK OF RESOURCES FOR
1 MILLION
SMALLHOLDER FARMS

SOLUTION: A PROFITABLE SOCIAL BUSINESS RUN BY SMALLHOLDER FARMERS

TIMBERLAND TURNED THE PLANTING OF 5 MILLION TREES IN 5 YEARS INTO A NETWORK OF TREE NURSERIES AND A SUSTAINABLE AGROFORESTRY COOPERATIVE CALLED THE SMALLHOLDER FARMERS ALLIANCE (SFA).



IMPACT: AFTER FIVE YEARS - THE BEST OF SOCIAL ENTREPRENEURISM AT WORK



3200 FARMERS
PARTICIPATING IN THE SFA



4.9 MILLION*
TREES PLANTED



40% INCREASE
IN FARM PRODUCTIVITY (AVG.)



50% INCREASE
IN HOUSEHOLD INCOME (AVG.)

* as of 2015

Sponsors, Partners and Collaborators



The following organizations, institutions and companies have been involved in sponsoring, partnering or collaborating with the Smallholder Farmers Alliance.

- A Hundred Years
- Canadian Embassy in Haiti
- Clinton Foundation
- Clinton Global Initiative
- CNN International
- Fairtrasa
- Firmenich Charitable Foundation
- Fondation Seguin
- Fonkoze
- Food and Agriculture Organization – Haiti
- Found Object
- Heifer International
- Inter-American Development Bank
- Kreyòl Essence
- Kuli Kuli
- Lidè
- Ministry of Agriculture – Haiti
- Ministry of Environment – Haiti
- Ministry of Fun
- Nomad Two Worlds
- Partners in Agriculture
- POS Bio-Sciences
- Prodem S.A.
- Sakala
- The B Team
- Trees That Feed Foundation
- Whole Foods Market
- World Bank
- World Central Kitchen
- Wynne Farm Ecological Reserve

Founding corporate sponsor:



