THE COTTON & SUSTAINABILITY GUIDE

Cotton Incorporated

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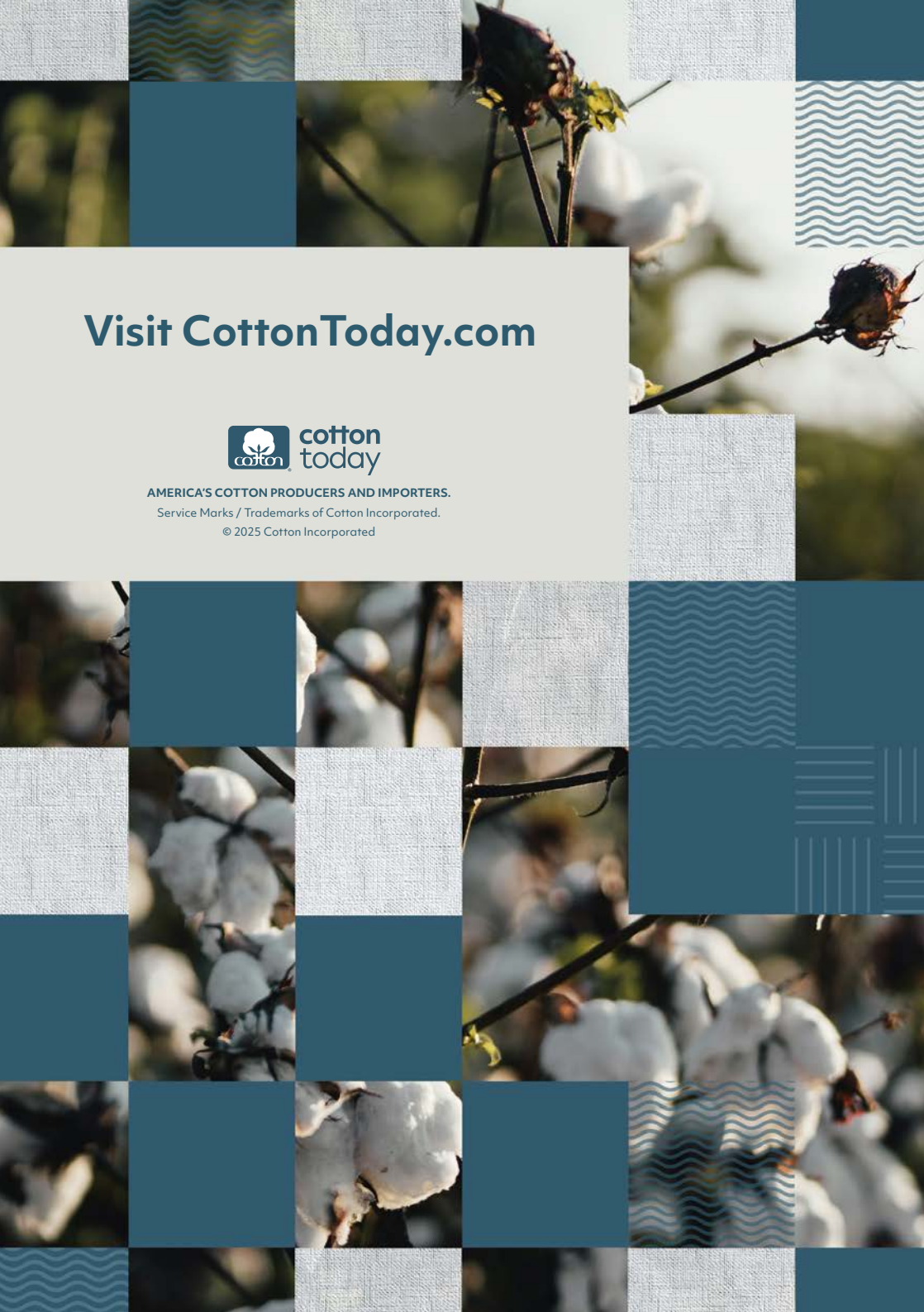

THE COTTON & SUSTAINABILITY GUIDE

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Foreword


▲ Jesse Daystar

I am pleased to team with Ecotextile News to bring you The Cotton & Sustainability Guide. This guide is designed to help brands navigate the intricate and evolving intersection of cotton production and sustainability – a complex area that presents exciting opportunities for innovation and progress.

The mission of Cotton Incorporated is to improve the demand for and profitability of cotton through research and promotion. Our research has driven advancements in cotton production efficiency and sustainability for decades. We are dedicated to continual improvement, ensuring that cotton remains a responsible choice and a transformative one. The breadth of programs highlighted in this guide – from those enhancing farm practices to initiatives restoring ecosystems – underscores the industry's commitment to supporting a more sustainable future for cotton globally.

These diverse programs tackle challenges in unique ways specific to their regions and areas of expertise, providing brands with a range of sourcing options to meet their sustainability and business needs effectively.

In a field as complex as sustainability, where differing and sometimes biased opinions abound, The Cotton & Sustainability Guide offers a balanced perspective. It cuts through the noise to provide reliable insights and a clear representation of various cotton programs. The guide delves into agricultural practices such as agroecology and regenerative agriculture, while also addressing supply chain challenges like traceability and data reporting. Organising these critical topics equips brands – the primary audience – with the tools and information needed to meet their cotton sourcing and sustainability goals.

Cotton Incorporated is committed to advancing cotton's sustainability through data transparency, research, and collaboration. This guide reflects our dedication to empowering stakeholders and driving progress across the whole value chain.

I invite you to explore this guide and use it as a tool to drive meaningful progress in sustainability with cotton. Together, we can shape a future where cotton thrives – economically, socially, and environmentally.

Sincerely,

Jesse Daystar, Ph.D.
Chief Sustainability Officer
at Cotton Incorporated

How to use this guide

This guide is not an analysis or opinion on the cotton standards covered here.

It sets out to present their main features, theoretical background and goals, in a way that allows each one to be compared to others, to help readers in their understanding of cotton programmes schemes, and if desired, identify ones for further research.

It covers standards, production programmes and schemes, and other promoter led actions based on sourcing or specific geographies.

Each listing shows the documents consulted and where to find more information.

The introduction sections also lay out the main theories behind sustainable cotton, the agricultural theories, and also explains the different understanding of terms like "regenerative", which can have different definitions, but also builds on earlier concepts like agroecology.

It then outlines cotton transparency, assurance and metrics, as well as certain legal obligations, and then delves into programmes and ends up with a list of useful tools and resources for the reader.

Readers are encouraged to follow the links we provide to learn more about standards of interest to them.
Enjoy the read!

Introduction


▲ Simon Ferrigno, author

All cotton standards and programmes use the same toolboxes to develop their unique criteria, and all make trade-offs and compromises as they do, depending on their end goals, and final targets.

The common goal is a desire to reduce cotton's negative impacts and improve some elements.

It's hard to find the right standard or scheme, because it can be hard to find summaries and details that don't come with a sales pitch. This guide tries to do just that.

The International Trade Centre has a standards map[1] that lists many of the standards available for farming and processing of many products, including cotton and fibres. It maps them according to what they do, and how they are organised, certified, verified and traced. It covers new concept areas like due diligence. We recommend looking at this resource as well (not all schemes are covered, however).

We also recommend that you look at the Textiles Standards & Legislation guide from MCL News & Media for independent standard snapshots and links.[2]

A search on the ITC map for agriculture and due diligence shows 46 standards covering both areas, with cotton and natural fibres added. A search for standards covering cotton and agriculture returned 83 standards, out of 351 standards listed on the map (almost a quarter). It is likely many of these will not actually certify any cotton, and the non-expert would find searching these results a difficult task.

Some of them are not used in or relevant to cotton. Some are useful add-ons, like the OECD guidelines, Ethical Trading Initiative (ETI) human rights guidelines, or carbon standards. The table overleaf shows the returned standards, and which ones we chose to cover. Those coded dark Green (we cover in depth), light Green (we cover in short or to be reviewed), and Yellow (not covered).

In this guidebook we have only covered the main cotton and sustainability standards in use, and a few of the less popular ones that are still interesting standards and schemes for readers to consider.

First, before we look into the more prominent cotton standards and schemes, we will revisit some of the theories and buzzwords that underpin them, from agroecology and Integrated Pest Management (IPM) to "regenerative agriculture".

We're sure that this will prove to be a very useful tool for our industry.

Please read on …!

[1] https://www.standardsmap.org/en/home
[2] https://www.textilestandards.com

The standards and schemes we reviewed were assessed for information on a range of areas.
The matrix below shows each one, and the information that we found. Dark green is for information available, or not relevant (e.g., legal basis for a voluntary standard), light green for information partly available, or where relevant information was found, and yellow for information unavailable. Absence of an area (such as theory of change) is not a reflection on the standard, merely that the information was not available online, or that we did not find it, or that the topic is not relevant in that particular case. Not all the programmes we looked at are standards, and this is also a factor.
We recommend contacting operators directly for complete details of any cotton scheme of interest.

Standard	Theory of change	Agricultural theories and approaches	Laws and regulation	Status	
EU Regulation (EU) 2018/848					
US National Organic Program (NOP)					
East Africa Organic					
National Programme for Organic Production (India)					
US Cotton Trust Protocol					
Abrapa ABR					
myBMP					
BCI					
Control Union/Regenagri					
BioRe sustainable cotton					
Fairtrade cotton					
Global Organic Textile Standard (GOTS)					
Cotton made in Africa (CmiA)					
CmiA organic					
Regenerative Cotton Standards (RCS)					
IFOAM norms and family of standards					
REEL cotton and REEL regenerative					
Textile Exchange Organic Content Standard (OCS)					
Textile Exchange Unified (now Materials Matter)					
Regenerative Organic Certified					
Haiti smallholders					
Organic cotton accelerator					
Oeko-Tex organic cotton					
The Sourcery					
Biodynamic/Demeter					
Climate beneficial Cotton					

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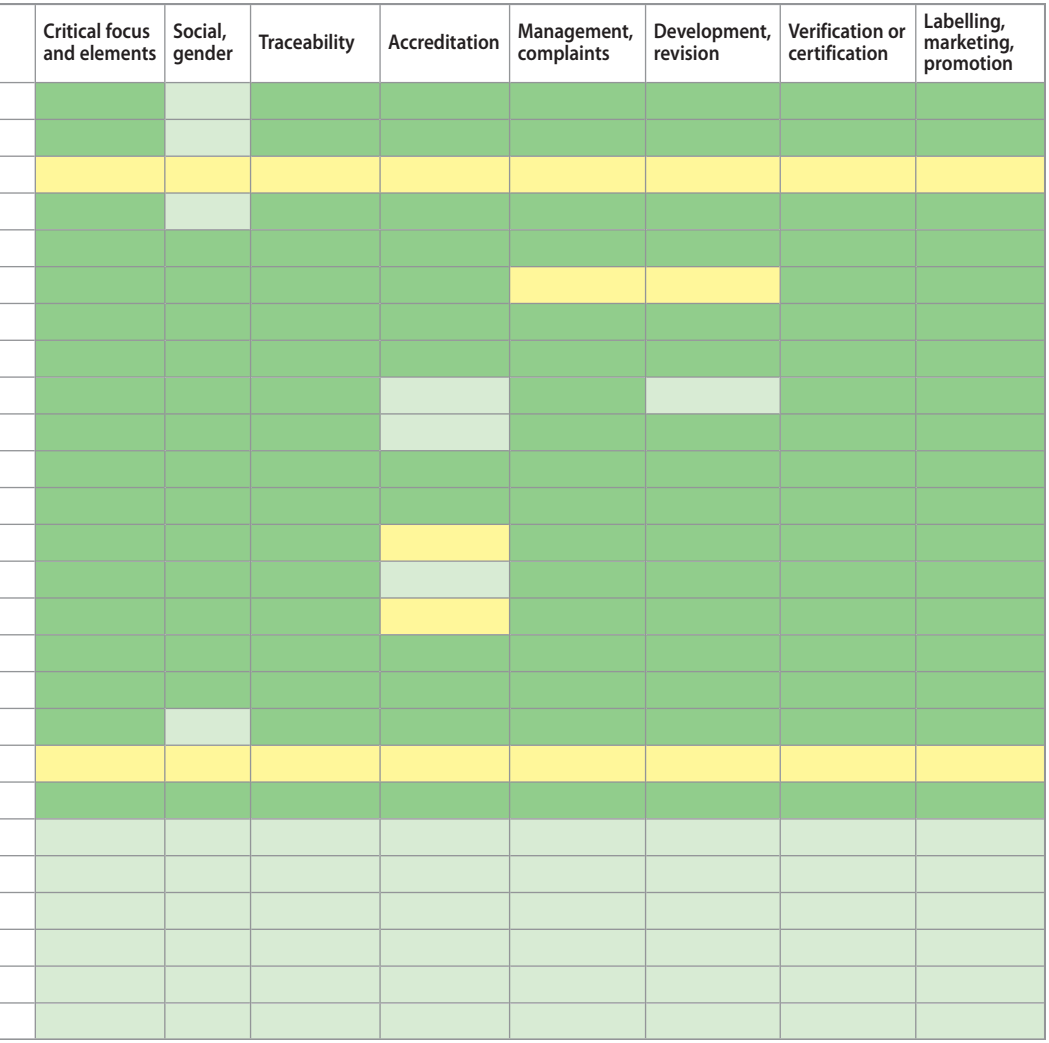
Key: No information/relevance Partial information/relevance All relevant information available



The basis of sustainable cotton schemes

What is 'sustainable'? We all think we know it, instinctively, because it is part of our modern lexicon. But do we? It can be even more confusing when mentioning the term 'regenerative'.

How do we then dig down to defining sustainable agriculture? Sustainable cotton? Does sustainable cotton exist in a vacuum as a single crop? Or does it need to be sustainable in a wider farming, processing and rights system that covers labour, women's, and human rights?

All standards do have some common foundations – and all interpret them, which explains why there are many standards, and why there can be major differences in focus and adoption of elements between them, defined by practicalities, as well as geography.

The principles come from theories, including agroecology, which will sometimes cover non-production related items as well as farming. But **Integrated Pest Management (IPM)** focuses specifically on the agricultural and ecosystem elements. Regenerative, coming in many shapes and forms, can vary as a system.

Sustainable implies something that can be continued over time. It implies, perhaps, no damage, although there is a grey-zone: damage may predate sustainable production, such as deforestation.

Landscapes untouched by human activity are rare, and continuously

Sustainable cotton – as we know it – began by a growing understanding of problems with modern cotton farming, and of the principles of agroecology and IPM.
Image: © | CRSPHOTOS | Depositphotos

> **It is hubris to think these concepts are new, or that traditional societies did not understand them**

threatened. This is because the human farming footprint extends far beyond the edge of fields.

Existing cotton schemes come across this a lot, as seen with a report from Earthsight earlier in 2024 that linked the Better Cotton Initiative (BCI) to deforestation. And all living things contain chemicals linked to human activities, such as DDT, PFAS, or microplastics.

So, as well as production that can be sustained over time, sustainability is increasingly talked about as both needing to do no more damage, and where possible, to repair it – the much hyped and multiply-defined '**regenerative**' is a case in point.

It is a useful concept if you focus on restoring soil functions and soil quality, ecosystem functions that can work with other tools (scientific, human and robotic) to better manage pests and diseases without causing as much damage as in the past.

Indian tradition, and later, the Romans, had concepts linked to 'regenerative' sustainability. The British manor garden system was said to be highly productive, as were many terraced farming systems in Asia. It is hubris to think these concepts are new, or that traditional societies did not understand them. They may have done more than we did, because they could not fall back on a chemical sector fed by an oil industry by-product that results in cheap energy. Nonetheless, internal and external changes did cause many of them to collapse.

Sustaining and regenerating also means that we have to address consumption, demand, and so on. There may be levels of consumption where neither sustaining, repairing, or restoring systems and soils are possible.

But for now, at least, we are looking broadly at production systems that can be sustained as a minimum. That means what is produced today can be produced tomorrow, while supporting a decent living for those producing it (there is no sustainable farming without a farmer who can sustain an income, along with their workers).

It's always good to go back to broadly accepted definitions too.

The UN Food and Agriculture Organisations (UNFAO) definition of sustainable agriculture, and the definition of the **Brundtland Commission** for sustainable development, which kick-started the modern sustainability industry, are worth remembering.

The UNFAO definition places agriculture in a context of food production. And while modern, large-scale cotton production in some regions is not commonly linked to food production, most farms in most cotton-growing countries do rotate cotton and food crops. Millions of smallholders may even produce cotton fibres as minority crops, purely for the cash. The definition could usefully mention fibres.

Brundtland Commission: sustainable development	**UN FAO:** sustainable agriculture
"Development that meets the needs of the present without compromising the ability of future generations to meet their own needs"[1]	"To be sustainable, agriculture must meet the needs of present and future generations, while ensuring profitability, environmental health, and social and economic equity. Sustainable food and agriculture (SFA) contributes to all four pillars of food security – availability, access, utilisation and stability – and the dimensions of sustainability (environmental, social and economic). FAO promotes SFA to help countries worldwide achieve Zero Hunger and the Sustainable Development Goals (SDGs)."[2]

More recent initiatives may try and address different types of farmer and production system, with different requirements according to size, such as BCI.

Various approaches and definitions have been trialled over the years, often based on agroecosystem theories, as well as applications including **Integrated Pest Management (IPM)** or **Good Agricultural Practices (GAP)** and to recent terminology such as Regenerative Farming.

There is a common toolkit behind them, which seeks to balance and protect natural processes and biodiversity with scientific management of plants and plant breeding, soil productivity, pests and diseases.

Their development comes from a reaction to the impacts of the green revolution, particularly in the use of pesticides, and their impact is seen in the reduction of pesticide use.

[1] United Nations accessed 15/7/2024 https://www.un.org/esa/sustdev/csd/csd15/media/backgrounder_brundtland.pdf

[2] Food and Agriculture Organization of the United Nations (UN FAO) accessed 15/7/2024 https://www.fao.org/sustainability/en/

Chinese workers stack cotton at a yard in Chongqing.

Image: © Chinaimages | Depositphotos

Agricultural definitions for cotton schemes and standards

Sustainable cotton – as we understand it – began with a growing understanding of problems with modern cotton farming, and of the principles of agroecology and IPM. These began to be applied in different programmes, both those looking to reduce the problems caused by agrochemicals through training programmes, and those seeking to eliminate them [organic farming, or Non-Pesticide Management (NPM)].

What influences sustainable agriculture?

Sustainable agriculture does not focus on the crop, but the ecosystem and the interplay between crops, soil, weather, pests, and predator complexes, diseases, and the use of tools, both natural and technological, to intervene to grow a healthy crop with economic returns. It understands an ecosystem seeks balance and that disturbing it too much will create more problems.

"Ecosystem approaches to pest management include agroecology, organics and ecosystem-based IPM. Whilst these approaches differ in some respects, they share a number of features including prevention of pest damage and diseases through maintenance of a healthy agroecosystem, prioritisation of soil health as the key ingredient in a healthy agroecosystem, and use of pesticides of any sort only as a last resort."[3]

It depends on science, local knowledge, adaptation to local conditions, and technology. It often aims to be as little reliant as possible on external, disruptive, inputs.

Agroecology

Miguel Altieri and Clara Nicholls, two of the pioneers of the concept of agroecology identified the starting point as "a devastation of resources, soil pollution, land erosion and loss of biodiversity"[4]. They argued that modern agriculture ignored earth's ecological potential. Standards for sustainable agriculture look to address this, and increasingly to restore land. Approaches are diverse, ranging from the extreme, such as permaculture approaches, to the ❱

[3] Watts and Williamson Replacing chemicals with biology/

[4] Miguel Altieri and Clara Nicholls, from University of California – UN university textbook: Agroecology and the search for a truly sustainable agriculture, 1st edition, PNUMA, Basic Textbooks for Environmental Training (2005)

tinkering, where the goal is maximum scaling out of small step changes eventually leading to large-scale change (BCI, for example).

But agroecology is also about culture, place and traditional knowledge, where other concepts are more industrial. It aims to "open a dialogue between scientific knowledge and traditional wisdoms; to empower farmers, peasants and indigenous peoples as social actors to renew their community based productive practices, to enable them to inhabit their cultural territories.", argue Altieri and Nicholls[5].

They also noted that yields can be increased "using technological approaches based on agroecological principles", which also include conserving biodiversity to protect ecosystem balance, protecting soils, conserving water, using biological pest control…and "regenerative technologies"[6]. That includes things like crop rotation, refuges, trap crops, mulching, and soil conservation.

Agroecology extends to ensuring crop diversification and a move away from monoculture, and can include agroforestry. The goal in farming is to avoid providing a feast for major pests and diseases, which otherwise lie unprotected by natural defences. A more diverse ecosystem will include natural predators, and indeed, these can be encouraged.

The seven core principles of agroecology, as described by Watts and Stephenson, "aim to develop and maintain an agroecosystem that works with nature, not against it – creating a balance that keeps pests in check". See table opposite[8]:

These principles and approaches are applied in different ways, and with varying importance given to elements such as cultural or social aspects.

"The goal is to design an agroecosystem that mimics the structure and function of local natural ecosystems; that is, a system with high species diversity and a biologically active soil, one that promotes natural pest control, nutrient recycling and high

What is agroecology?

"On the other hand, the science of agroecology, which is defined as the application of ecological concepts and principles to the design and management of sustainable agroecosystems, provides a framework to assess the complexity of agroecosystems (Altieri, 1995). The idea of agroecology is to go beyond the use of alternative practices and to develop agroecosystems with the minimal dependence on high agrochemical and energy inputs, emphasising complex agricultural systems in which ecological interactions and synergisms between biological components provide the mechanisms for the systems to sponsor their own soil fertility, productivity and crop protection (Altieri and Rosset, 1995)."[7] The five main principles they identify are:

1. Enhance recycling of biomass and optimising nutrient availability and balancing nutrient flow.
2. Securing favourable soil conditions for plant growth, particularly by managing organic matter and enhancing soil biotic activity.
3. Minimising losses due to flows of solar radiation, air and water by way of microclimate management, water harvesting and soil management through increased soil cover.
4. Species and genetic diversification of the agroecosystem in time and space.
5. Enhance beneficial biological interactions and synergisms among agrobiodiversity components thus resulting in the promotion of key ecological processes and services.

Agroecology principles			
Adapting to local environments	Providing the most favourable soil conditions for plant growth	Promoting biodiversity	Enhancing beneficial biological interactions
Minimising losses of energy and water	Minimising the use of non-renewable external resources	Maximising the use of farmers' knowledge and skills[9]	

soil cover to prevent resource losses."[10]

Agroecology also leads us towards regenerative agriculture, but also brings in other concepts, including, according to some, the notion of "sustainable intensification", increasing productivity on existing land while improving its productivity via improved conservation of soil and ❱

[5] Altieri and Nicholls, 2005

[6] Altieri and Nicholls, 2005, P30

[7] Source: Altieri and Nicholls, 2005, P30

[8 9] Watts and Williamson Replacing chemicals with biology. Box 4.1: Meriel Watts with Stephanie Williamson Replacing Chemicals with Biology: Phasing Out Highly Hazardous Pesticides with Agroecology Executive Summary https://pan-international.org/wp-content/uploads/Phasing-Out-HHPs-with-Agroecology-ExecutiveSummary-en.pdf

[10] https://biosafety-info.net/articles/sustainable-systems/ecological-agriculture-food-security/agroecology-principles-and-strategies-for-designing-sustainable-farming-systems/

Image © Jim Black | Pixabay

Watts and Williamson, Watts and Stephenson Replacing chemicals with biology

Check list of the key agroecological characteristics
promote key ecological processes – diversify – conserve resources – minimise inputs

1. ***Adapting to local environments***
   - √ harmonize farm with the environment
   - √ choose suitable plants and animals
   - √ use locally adapted seeds
2. ***Providing favourable soil conditions***
   - √ maximize organic matter
   - √ maximize biological nitrogen fixation
   - √ keep soil covered
   - √ minimize tillage
   - √ maximize biological nitrogen fixation
3. ***Diversifying species and genetic resources***
   - √ intercrop, poly-crop, agroforestry
   - √ crop rotations, cover crops
   - √ multiple species, varieties and landraces of plants and livestock
4. ***Enhancing beneficial biological interactions***
   - √ prevent pests, weeds, diseases
   - √ enhance biological controls
   - √ optimize timing of planting and weeding
5. ***Minimizing use and loss of water and energy***
   - √ mulches
   - √ efficient water harvesting and irrigation
   - √ renewable energy
   - √ local resources
6. ***Minimizing use of non renewable external resources***
   - √ substitute biological process for inputs
   - √ eliminate environmental pollution
   - √ use chemical as a last resort only
7. ***Maximizing the use of farmers' knowledge and skills***
   - √ local knowledge
   - √ traditional systems
   - √ work cooperatively

resources, according to a 2021 paper in the journal Outlook on Agriculture. "Regenerative Agriculture, while using new language, is no different than sustainable agriculture, sustainable intensification, climate-smart agriculture, organic farming, agroecology and so on."[11]

They also point out that interventions to reduce input use may be beneficial where their use is high, but detrimental where it is too low or sub-optimal. Part of sustainable agriculture is fine-tuning what is done to deliver the best result, and targets need to be set accordingly.

Agroecology is just the start.

Next comes **Integrated Pest Management** (IPM), which itself leads to **Integrated Pest and Production Management** (IPPM) and Non-Pesticide Management. There are many terms.

A study by the International Panel of Experts on Sustainable Food Systems (IPES-Food): 'Smoke and Mirrors' says the multiple terms, including "agroecology, climate-smart agriculture, sustainable intensification, conservation agriculture, zero-carbon agriculture, permaculture, biodynamic farming, organic agriculture, holistic resource management, and so on, all focus on sustainable agriculture[12].

Integrated Pest Management (IPM)

IPM – Integrated Pest Management – is the next big term. It was an attempt to reconcile productivity with implementation of both "conventional" pest control, and agroecological principles at scale; it is often combined with the Farmer Field School (FFS).

Its approach "to minimise chemical use and maximise the efficiency when used" (often working with more resistant varieties to pests and diseases), and goes

[11] https://journals.sagepub.com/doi/full/10.1177/0030727021998063

[12] https://ipes-food.org/_img/upload/files/SmokeAndMirrors_BackgroundStudy.pdf

[13] Watts and Williamson

Farmer Field School

A Farmer Field School essentially brings farmers together with experts and trainers to learn and study aspects of production, biology, entomology and so on in real-life and based on their own skills and knowledge – it means observing what is happening, and how for example to use natural pests, or observe soil fertility, or the effects of different interventions.
It can be combined with a demonstration plot or plots, which illustrates practices in action.
"The broad philosophy is to assist farmers to act on their own initiative and analysis, and to identify and resolve problems themselves in a manner that promotes a sustainable agricultural system. Farmers learn in their own and each others' fields, and a top-down approach of blanket recommendations is specifically avoided."[13]

The role of IPM in sustainable agriculture:

- **Applies sustainable pest control.** IPM builds on ecosystem services such as pest predation while protecting others, such as pollination. It also contributes to increased farm productivity and food availability by reducing pre- and post-harvest crop losses.
- **Reduces pesticide residues**. IPM contributes to food and water safety, as reducing the amount of pesticides used in turn reduces residues in food, feed and fiber, and environment.
- **Enhances ecosystem services**. IPM seeks to maintain the national crop ecosystem balance. It conserves the underlying natural resource base (i.e. soil, water and biodiversity) and enhances ecosystem services (i.e. pollination, healthy soils, diversity of species).
- **Increases income levels**. IPM reduces production costs through reduced levels of pesticide use. Higher quality crops (with less residues) can command better prices in markets and contribute to increased farmer profitability.
- **Strengthens farmer knowledge**. IPM promotes farmer stewardship, increases farmer knowledge of ecosystem functioning adapted to their local context.

Source: https://www.fao.org/pest-and-pesticide-management/ipm/integrated-pest-management/en/

Image: © Balefire9 | Depositphotos

hand in hand with techniques that can be labour intensive, such as scouting crops for pests to "trigger responsive spraying when a particular threshold of the pest and disease is observed, rather than preventative spraying at particular times in the cropping calendar".

Agroecological tools such as crop rotation, intercrops, and cover crops are recommended, while FFS might be used for farmers to identify pests and predators, alongside traditional management tools[14].

Often bundled in with disease, and even weed management, it has variants, such as Integrated Weed Management, Integrated Pest and Production Management, and so on. The focus, drawing on agroecology, is to use non-chemical tools to manage pests and redress imbalances caused by intensive chemical use.

The European Union (EU) has an expanded definition which mentions elements such as "use of balanced fertilisation, liming and irrigation/drainage

Integrated Pest Management (IPM)

According to FAO "IPM is the careful consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations. It combines biological, chemical, physical and crop specific (cultural) management strategies and practices to grow healthy crops and minimise the use of pesticides, reducing or minimising risks posed by pesticides to human health and the environment for sustainable pest management."[15]

practices" as well as using hygiene to prevent the spread of "harmful organisms", such as cleaning tools and equipment. It also specifies the targeting of pesticides as "specific as possible for the target" with as few side-effects for humans and other organisms as possible. It also talks about "reduced doses, reduced application frequency or partial applications, considering that the level of risk in vegetation is acceptable and they do not increase the risk for development of resistance in populations of harmful organisms", specifying that pest resistance should be minimised[16].

Sustainable crop intensification

Sustainable crop intensification, as mentioned above, never really got traction in cotton, but focuses on increasing output from cultivated areas sustainably, to avoid land clearance and conversion. It means producing more from the same area, with reduced environmental impacts and an improved ecosystem[17].

It is both "knowledge-intensive" and "location-specific", using "ecologically-based Integrated Pest Management (IPM) systems", making use of "natural processes" to maximise any inputs used, including natural predators and soil biota to improve plant feeding."[18]

FAO Climate smart agriculture and Precision agriculture

These two concepts have emerged quite recently, and also draw on some of the same concepts. They also focus on technology and data. FAO has defined climate smart agriculture as working to increase productivity as well as incomes, and food security, building resilience, and cutting greenhouse gas emissions, including the use of carbon sinks.[19]

This is how the World Economic Forum define regenerative farming:

- "Regenerative agriculture focuses on improving the health of soil, which has been degraded by the use of heavy machinery, fertilizers and pesticides in intensive farming.
- There may not be enough soil left to grow food to feed the world within 50 years.
- Regenerative agriculture and other farming methods that don't harm the climate can improve farmers' incomes, as well as cutting emissions and boosting soil health."[20]

Regenerative farming

There are definitions from the mainstream to the extreme for this concept, which is popular with apparel brands presently. Definitions come from a range of organisations as well.

Regeneration International says "Regenerative Agriculture" describes farming and grazing practices that,

[14] https://journals.sagepub.com/doi/full/10.1177/0030727021998063

[15] https://www.fao.org/pest-and-pesticide-management/ipm/integrated-pest-management/en/ accessed July 29 2024

[16] https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/integrated-pest-management-ipm_en

[17] FAO. 2014. The State of Food and Agriculture. Based on Pretty J, 2009. Agricultural sustainability: concepts, principles and evidence. Phil Trans Royal Soc B: Biol Sci 363(1491):447-65.

[18] Watts and Williamson

[19] Quoted in Watts and Williamson

[20] https://www.weforum.org/agenda/2022/10/what-is-regenerative-agriculture/ There is also an image there

among other benefits, reverse climate change by rebuilding soil organic matter and restoring degraded soil biodiversity – resulting in both carbon drawdown and improving the water cycle."[21] They also fully acknowledge the role of agroecology in regenerative agriculture[22].

The belief is that restoring soil health fixes everything else. However, this may be questionable, as it does not address other ecosystem imbalances from monoculture, or loss of insect biodiversity. But it is a start.

The group cites farmers in Brazil growing other crops alongside cotton, and replacing chemical fertilisers with organic alternatives, with tripled cotton yields – and it turns out they are practising agroecology, showing how related the concepts are.[23]

Originally, the regenerative concept related to grazing and land use. Grasslands, well-managed, can hold a lot of CO_2. Intensively used, they not only release GHGs, they reduce soil productivity, and over time, how much can be raised on them.

The Savory Institute claims "Holistic Management is a decision-making framework for balancing the ecological, financial, and social needs of any complex system and creating truly regenerative outcomes for all involved." It seeks 'symbiotic' relationships between herbivores and grasslands and says that regenerating 'lands and livelihoods' is about managing 'the ecological, financial, and social dynamics'. They call it "a framework for making decisions amidst the ever-changing conditions of the living world."[24].

The Rodale Institute meanwhile claims to have pioneered "regenerative organic". They say it "prioritises soil health while simultaneously encompassing high standards for animal welfare and worker fairness. The idea is to create farm systems that work in harmony with nature to improve quality of life for every creature involved."[25]

Many definitions can be confusing for the uninitiated. The British Ecological Society reviewed the definitions, and concluded "there is no regulatory definition or definition from a well-respected international body. Two recent literature reviews have shown that a common definition does not emerge from either scientific literature or use by practitioners"[26].

On the links between regenerative agriculture and sustainable intensification, Giller et al.(2021) asked what agronomic problem regenerative was seeking to solve, and what the solutions were[27]. It traced the evolution of the concept, not just in agroecology but also to "organic and 'low external input agriculture'", with a stress on "the importance of biological structuring, progressive biological sequencing and integrative farm structuring" as well as "nitrogen fixation, nutrient cycling, integrated nutrient management, crop rotation, integrated pest management (IPM) and 'weed cycling'."[28]

Rodale meanwhile had started talking about regenerative in 1983.[29] They mentioned principles including minimising tillage, maintaining soil cover, building soil carbon (biochar, compost, green manures,

Image © Bishnu Sarangi | Pixabay

animal manures), sequestering carbon (agroforestry, silvopasture, tree crops), relying more on biological nutrient cycles, fostering plant diversity, integrating livestock, avoiding pesticides, and encouraging water percolation.

It also stresses the importance of soils: "The greatest opportunities to increase soil carbon are found in low yielding regions, where increasing crop yields increase the available biomass stock and inputs of organic matter to the soil", but also points out such increases are temporary and a new "equilibrium" will be reached where increases stop, often below what soil carbon would be under "natural vegetation cover".

It means we can regenerate soils on converted land, but they will never hold as much carbon as soils that have never been changed. In other words, regenerating could be taken to mean stopping land use. No more converting forest and grassland, and more agroforestry, which "has the greatest potential to contribute to climate change mitigation through carbon capture both above and below-ground."[30]

[21] https://regenerationinternational.org/2023/12/22/the-definition-of-regenerative-agriculture/

[22] https://regenerationinternational.org/why-regenerative-agriculture/

[23] https://news.mongabay.com/2022/01/farmers-in-brazils-cerrado-cotton-on-to-the-benefits-of-agroecology/

[24] https://savory.global/holistic-management/

[25] https://rodaleinstitute.org/why-organic/organic-basics/regenerative-organic-agriculture/

[26] https://www.britishecologicalsociety.org/wp-content/uploads/2022/10/BES-Report-on-Regenerative-Agriculture_final.pdf

[27] https://journals.sagepub.com/doi/full/10.1177/0030727021998063

[28] https://journals.sagepub.com/doi/full/10.1177/0030727021998063

[29] https://eric.ed.gov/?id=EJ275343

[30] https://journals.sagepub.com/doi/full/10.1177/0030727021998063

How to trace, trust the verification model, and measure results in cotton supply chains

Credit: © Kilomeaters | Depositphotos

Traceability

Traceability can seem like a vague term, but there is an actual global traceability standard (GS1, updated in 2017). Based on ISO Standard 9001:2015, it defines traceability as being able to follow the history, use and location of something from the origin of inputs/ingredients to the final product, with a processing history to the point of sale/delivery, including a barcode.[1]

The International Organisation for Standardisation (ISO 9000-2015)[2] itself says traceability is the ability to trace the "history, application or location of an object", including " the origin of materials and parts; the processing history; the distribution and location of the product or service after delivery.".

It's slightly different to transparency, which means "a situation in which business and financial activities are done in an open way without secrets, so that people can trust that they are fair and honest".[3] Traceability is about product and process, transparency is philosophical: openness and honesty and willingness to admit weakness in public. The two go together.

In sustainability, transparency is also defined under the United Nations Framework Convention on Climate Change (UNFCCC). Here it means both data and information, and its "reporting, review and consideration", including "GHG emissions, policies and measures, progress towards targets, climate change impacts and adaptation, levels of support and capacity-building needs."[4] It may refer primarily to countries, but business actions contribute to what countries report.

GS1 also mentions transparency, describing it as helping to make supply chains visible. This is also a due diligence requirement: the OECD Guidelines on Garments and Footwear require relevant information to be made available to all stakeholders in the value chain.
It argues that effective transparency allows companies to act to manage risks more effectively.[5]

Traceability provides the nuts and bolts for transparency, as well as ways to gather and monitor metrics (which we will come to later). As the GS1 traceability standard also says, "Traceability enables access to relevant data so that data can be analysed and decisions can be made … about every important event throughout supply and production."[6]

But it's not easy. Those "events" include "textile fibre origins and production methods, textile processing, chemicals employed, sewing threads, buttons, accessories, environmental footprint, social conditions and distribution information." All of which also have to be communicated.

[1] https://www.gs1.org/standards/gs1-global-traceability-standard/current-standard#1-Introduction+1-1-Objective

[2] ISO, "ISO 9000:2015. Quality management systems – Fundamentals and vocabulary", https://www.iso.org/obp/ui/#iso:std:iso:9000:ed-4:v1:en:term:3.6.13

[3] https://dictionary.cambridge.org/dictionary/english/transparency

[4] https://unfccc.int/process-and-meetings/transparency-and-reporting/about-transparency/what-is-transparency

[5] https://mneguidelines.oecd.org/responsible-supply-chains-textile-garment-sector.htm

[6] https://www.gs1.org/standards/gs1-global-traceability-standard/current-standard#2-Traceability-and-the-importance-of-standards+2-1-Business-drivers

[7] https://www.isealalliance.org/get-involved/resources/iseal-guidance-chain-custody-models-and-definitions

ISEAL also offers a working definition of traceability:

"The system that records and follows the trail as products, parts, and materials come from suppliers and are processed and ultimately distributed as end products. Often when someone says 'traceability system' they mean an online traceability/tracking system, but this does not have to be the case. Systems used to ensure traceability vary widely and are designed to be fit for purpose (e.g. could be paper based or only go to a limited level of detail)"[7]

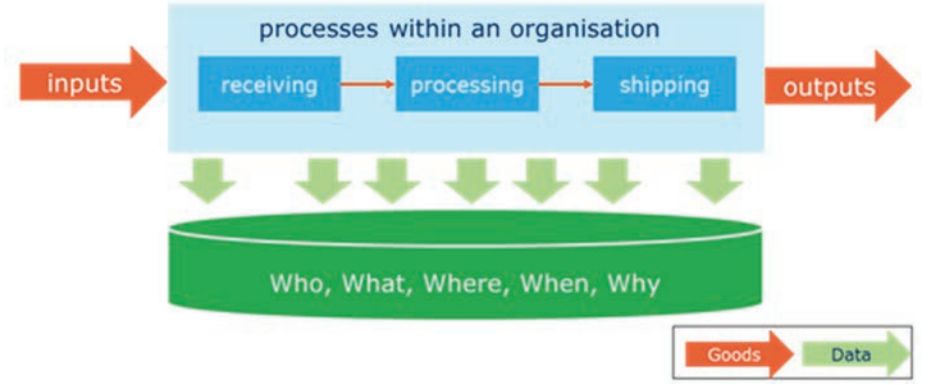
Traceability is also a component of Chain of Custody (CoC). CoC is the system that guarantees the product that enters is the same as the product that leaves, plus all added ingredients and processes and minus any wastage or losses, or rejections (such as for non-conformity). Given its importance to traceability for sustainability initiatives, ISEAL also offers "Guidance on Chain of Custody Models".[8] It argues:

"The objective of the CoC System is to validate claims made about the product, process, business or service covered by the sustainability standard. This is achieved by defining a set of requirements and measures that provide the necessary controls on the movement of material or products, and associated sustainability data, from approved or certified businesses through each stage of the supply chain. Many standard systems set a CoC standard for this purpose, in addition to their production or management standard."[9]

It is the basis for claims on verified or certified products, supported by the assurance system which includes " auditing, oversight, reporting, claims approval, etc" (see next section), or as ISEAL puts it "traceability is the ability to demonstrate the CoC." CoC validates who is in charge at any given point, and traceability is the documentation and recording that verifies movement and continued integrity.

The UN Global Compact takes it further ›

Generation of traceability data - single company view - from GS1



Summary of the properties of each model

	2.1 Identity preservation	2.2 Segregation	2.3 Mass balance overview			2.4 Certificate trading
			2.3.1 *Batch level mass balance*	2.3.2 *Site level mass balance*	2.3.3 *Group level mass balance*	
Ensure that volumes of certified material sold matches (or does not exceed) volumes of certified material bought[1]	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**[2]
Traceability linked to volume reconciliation over a set time period	No	No	No	**Yes**	**Yes**	**Yes**
Allows mixing of certified and non-certified content	No	No	**Yes**	**Yes**	**Yes**	**Yes**
Physical traceability	**Yes**	**Yes**	**Yes**	**Yes**, to point of blending	Depends	No[3]
Identify origin of a final product or product component in actual product	**Yes**	**Yes**, but 'origin' may not be as specific as IP depending on the supply chain (e.g. to country or region may be possible)	Depends (lost with physical blending)	Depends (lost with physical blending)	Depends (lost with physical blending)	No

[1] *Accounting for conversion rates*
[2] *Refers to numbers of credits as they represent volumes, rather than the volumes themselves*
[3] *No physical traceability, but can sometimes be linked to location or region, i.e. volume of production per country*

Source: ISEAL CoC guidance page 8

[8] https://www.isealalliance.org/get-involved/resources/iseal-guidance-chain-custody-models-and-definitions
[9] file:///home/simon/Downloads/ISEAL%20Guidance_%20Chain%20of%20custody%20models%20and%20definitions.pdf
[10] https://d306pr3pise04h.cloudfront.net/docs/issues_doc%2Fsupply_chain%2FTraceability%2FGuide_to_Traceability.pdf
[11] https://www.iisd.org/projects/state-sustainability-initiatives
[12] Ferrigno, Simon. Due diligence in cotton sourcing, West Yorkshire: MCL News & Medial, 2016.

for sustainability by bringing in specific discussion of "human rights, labour (including health and safety), the environment and anti-corruption",[10] while the International Institute for Sustainable Development says "Traceability systems help ensure the integrity of claims by providing accountability between standard-compliant products produced and sold."[11]

Traceability is essential to due diligence – knowing where a product came from is a prerequisite to understanding and mitigating its impact.[12]

Types of traceability

We have moved on from just documents and online databases recording documents and movements. But it's worth remembering the core types of chain of custody models before we look at systems that are often complementary, including the use of Blockchain systems, DNA markers and so on.

IISD identified four methods of traceability with different levels of responsibility.

1. Book and claim, with production volumes certified but with no traceability or product ownership.
2. Mass Balance, where product is tracked for some of the process but may not be used in products.
3. Segregation, where the product is followed and used at all stages.
4. Identity preservation, where the product is individually identified at all stages and in all products.

Much of the industry is moving away from mass balance types of systems, in part perhaps because of Due Diligence requirements and other regulatory changes that make final users responsible for their supply chains, and so require them to know exactly where inputs and materials came from.

But there is no perfect system for tracing that gives 100% assurance against fraud. Most systems assure it "on balance". This is why efforts to improve systems continue, and why new entrants are always on the lookout for improvements: "the wholly guaranteed grail", if you will.

Systems in use range from older, even paper-based, systems to "new kids on the block" including blockchain systems (supposedly impossible to correct or fake. Entries are permanent), and DNA or colour marker-based systems. These were much hyped not long ago. We also find forensic-style tracing of cotton varieties to point of origin, down to soil type, while RFID systems have also been suggested. Others make much of using risk assessments to ensure inspections and testing are ramped up where problems are more likely.

Newer, software-based tools as well as markets and testing can all form part of assurance and chain of custody procedures. The ISEAL Chain of Custody document does not go into detail; needless to say, this can be a tricky area to explore, especially given the sheer pace and variety of offers and new developments, as well as the lack of long-term road-testing for some developments. Many initiatives will package a traceability offer with the standard and verification

system, but may not link or supply impact data as yet.

So one thing to look at is what each system plans in terms of improvements, compatibility with other systems, data carrying, risk assessment, and so on.

Blockchain

Blockchain was initially developed to disrupt supply chains and redistribute profits and power (Blockchain architecture was behind Bitcoin). However, investment and growth means it is increasingly a corporate affair.

Blockchain was designed as a record of transactions. A record that cannot be modified (which means errors are frozen, a downside), and which "everyone" holds, and no one "owns" (even as the chain is secured using cryptography).

So, in principle, everyone can see what everyone else does. This means production, and production methods, but also costs, prices, investments and even trainings. This in itself results in large amounts of data and server use can mount up, which has its own environmental cost (though this is now dwarfed by AI). Several trials and applications exist which have been used in cotton.

"Marker" traceability

There are two types of marker: ones that are based on DNA (detectable by a test) and ones using options including colours, such as fluorescent viscose fibre or pigments, or even "smart tags" and other digital tools, as well isotope maps, QR codes and RFID.[13]

These systems will commonly be used with another, like blockchain and chain of custody.[14] The aim is a product where non-verified product cannot be introduced, and all raw material origins identified.

Prehistoric traceability: databases and (gasp) paper

Older traceability systems remain common, such as ones based on electronic documents and databases, and even many that still use paper in whole or part (in places without connectivity, this might be essential). However, these have also changed, and moved from an initial focus on automating document flows and monitoring product flows to a focus on relationships, and reconciliation of information to databases such as those of certification bodies; in this way, buyers anywhere in the supply chain can check that materials and products are what they say.

As well as transparency and credibility, traceability systems can also improve supply chain efficiency and dialogue, reduce documentation and hopefully bring cost savings. But traceability is only as good as the data that is input.

Assurance

Certification and verification – everything lumped under the "integrity" header requires trust and credibility. The assurance that business is done properly and backed ›

[13] See for example https://textilegenesis.com/

[14] See for example https://fashionforgood.com/wp-content/uploads/2019/12/Fashion-for-Good-Organic-Cotton-Traceability-Pilot-Report.pdf or https://thetextilethinktank.org/cotton-traceability-technologies/s

by sound management and credible information. Good management, proper verification of processes, with verifiable, measurable and believable data. It covers not just the product, but also other areas such as finance, training, and management, (even though our focus here is integrity of the sustainable product itself, you might still want assurances it was not made with dirty funding).

It's a form of guarantee, and 'guarantee system' is another term often used for the provision of integrity assurance in sustainability.

It means not just being verified or certified but operating within expectations in the wider supply chain: meeting legislative and regulatory standards, being transparent, and being responsible. Quality control will also come into it. So will labour standards, and health or animal welfare where relevant.

It means, ultimately, the systems that ensure you, as final user, are getting what you expect are being delivered.

Metrics and measurement

How do you measure sustainability impacts and assess sustainability problems?

Metrics and measurement are needed for two reasons. The first, and most important, is to know if the intervention is making things better (so it needs to measure, and compare, against a previous state of that same cotton production area, community and landscape). The second is to ensure users of the cotton can report against regulatory requirements, some of which we mention elsewhere, liked CSRDD, PEF, and others (see sections on the legal basis for sustainable agriculture).

An ancillary use might be in comparing different types of sustainable cotton, to choose the best fit for corporate goals. But that goal is restricted by the limitations in availability of supply, its location, as well as its economics. This might also not be the best approach for for Due Diligence reporting either, as it does not assess impacts or need on the ground first. Sustainability is often a series of trade-offs, and cotton metrics are no different.

Brands need to carefully assess the options on offer, their strengths and limitations (a topic Ecotextile News visits frequently). Brands should also consider the competition between promoters of different metrics, and beware the sirens of comparability and "better-than-ness".

It is true it can be important to understand if the cotton you buy is better than the cotton you could have previously bought, or, if the same origin, if it has improved against desired goals or needs. It can seem important to know if it is better than the alternatives. But that is not the be all. The cotton has to work in the supply chain and meet regulations. Importantly, it also has to be affordable and useful. More trade-offs are needed here.

Some systems like Life-Cycle Assessments can be expensive, and may just be snapshots of a state at a given time on a given day. They will be limited by geography, and by the data boundaries chosen, and the availability of data, and cost. Most LCAs studies are not meant to be compared to each other as they have differing system boundaries and methods.

Only comparative LCAs designed to compare two product systems in a single study should be used for comparison.

Impact assessments are useful, but local. LCAs, impacts assessments and social surveys to look at labour, equity, equality, and the meeting of both legislative and international convention requirements can be combined (and should, if possible). The more real data you have, the better the picture you will have of the impact of your brand's real impacts, and where interventions are needed.

Another siren song in this area is the use of averages, and aggregation. Average data on production. Aggregated data on a particular region, or even a particular standard. However, within that average will be such disparate regions, fields, and producers that the data will have significant limitations.

An average is fine when identifying hot spots. Or if brands source US Cotton but don't have full visibility as to which farmers grow the cotton. A US average is probably the best but there are still challenges.

To get good metrics, baselines and knowing where your starting points are is essential, (having targets can be useful, but is much less important). But it is also important to know that it is not all about big gains. Sometimes, only small steps will be possible, so understanding the context is essential (and being able to explain it to stakeholders, internal and external). Sometimes, a 1% improvement might be worth more than a 10% one.

The only way to measure progress is to know what the situation was when you started. How much soil carbon was there? How many species of insects? In what numbers? How many trees? What intercrops were planted? What daily rate were workers paid? How many rest breaks did they get? How many drinking water points did they have access to? What shelter in a heat-wave? Cotton production conditions are variable, as are the levels of mechanisation, sizes of farmers, and so on.

But for many, right now, data is a pass or fail in a programme or standard verification process. This data is is often aggregated. Insight to the actual field is limited or non-existent. A bale level metric might be available.

So what efforts are underway to improve data collection and reporting?

The aforementioned regulations will be one place. There may be an outcry presently about weightings, but the outcry is only possible because we have gone from nothing to something. Regulations and data collection can be improved, once they are part of accepted practice (always being aware of special pleading and lobbying affecting data quality and regulation requirements).

Each programme will have some data and metrics. There have been efforts to develop comparative systems. These have included the Delta project framework,[15] which included not just cotton but coffee stakeholders, the most recent of which involves the use of LCA data, but also includes programme level data, rather than more granular types.

[15] https://www.deltaframework.org/

The legal bases of sustainable agriculture

Sustainable agriculture and textile fibres such as cotton are impacted by both regional and international laws and other directives and impending regulation. Farming laws, of course, are important for cotton – but chemical laws, water regulations, and so on need to be carefully considered (if produced in a country, or grouping such as the EU). There are also relevant international, legally based conventions, on chemicals, labour, etc that impact on the cotton supply chain.

Organic cotton is also affected by laws and regulations in its entirety.

European Union

In the European Union, users and importers of sustainable cotton might be affected by national as well as EU level legislation, although there are no policies relating to cotton production itself, or regulating how it can be grown.

The Dutch Centre for the Promotion of Imports from developing countries (CBI) for the Netherlands Ministry of Foreign Affairs, lists some of the requirements for selling sustainable cotton into the EU market, including those that are mandatory and voluntary[1]. These include chemical regulations such as REACH, safety requirements, or labelling.

Europe is also a very dynamic regulatory market, with new and upcoming legislation on due diligence for corporations, as well as environmental or carbon foot-printing and product design that includes apparel containing cotton. These will all have a big influence on sustainable cotton programmes, standards and schemes related to its farming, production and use.

The EU also has its own organic regulations.

Increasingly, people will have to meet other non-organic requirements for product footprints, **Green Claims Directive, or CSDDD** (due diligence), the **EU Strategy for Circular Textiles**[2], and not just REACH, or its local equivalents.

REACH

Some cotton textile products will have to contend with the REACH[3] regulations, which will likely be tightened further in future, but this will vary and may be more applicable to finished products. REACH applies to all chemicals produced or imported into the European market, and these chemicals (identified by unique CAS numbers), must be registered and approved. Companies bear the "burden of proof" and it aims to replace the most harmful products[4].

Many national laws will apply to cotton in production countries, be it on the use of

chemicals, water allocations, workers' rights, and even sourcing origins, such as restrictions in the USA on Xinjiang cotton covered by the **UFLPA** regulation.

These requirements will also be outlined in this guidebook – where relevant – under each specific standard.

Accreditation

While not necessarily official, both the standards, and those who certify it will often have to be accredited. It ensures that the certifier conforms to certain strict requirements, or in the case of a standard, that it has been elaborated in a way that conforms to best practice and in concert with stakeholders.

The International Standards Organisation (**ISO**) defines it as "Accreditation – the formal recognition by an independent body, generally known as an accreditation body, that a certification body operates according to international standards."[5]

IFOAM (The International federation of Organic Agriculture Movements) accredits many certifiers and standards as part of its "family of standards", while many standards use the **ISEAL** code to develop their own labels, schemes and initiatives. There are also ISO standards covering this area[6].

IFOAM accreditation

The so-called family of organic standards includes a variety of global and regional regulations. These include the Japanese Organic Regulations, US Organic Rules, and the East African Organic Standard, as well as EU rules and APEDA in India.

IFOAM has rules known as the International Requirements for Organic Certification Bodies (**IROCB**). It conducts equivalence assessments for all these standards against IROCB. IFOAM claims it is similar and equivalent to ISO 17065."[7]

ISO standards

Through its Committee on Conformity Assessment (**CASCO**), ISO has a set of standards relating to the performance of conformity assessments[8].

ISEAL accredition

ISEAL produces the "Code of Good Practice for Sustainability Systems" (aka the "ISEAL code") which includes how to set and assure standards in development, and how to credibly measure impacts.

Many cotton programmes use it to develop their standards and their claims systems, and will be ISEAL "code compliant" if they comply with all ISEAL Codes of Good Practice.

The ISEAL code[9] focuses on:

- How to develop, structure and improve a standard
- Requirements for assessing compliance (the assurance system)

[1] https://www.cbi.eu/market-information/apparel/sustainable-cotton/market-entry

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0141

[3] Registration, Evaluation, Authorization, Restriction of Chemicals

[4] https://echa.europa.eu/regulations/reach/understanding-reach

[5] https://www.iso.org/certification.html

[6] https://www.iso.org/certification.html

[7] List of Conformity Assessment Systems recognized by IFOAM-Organics International as equivalent to the IROCB

[8] https://www.iso.org/committee/54998/x/catalogue/p/1/u/0/w/0/d/0

[9] https://www.isealalliance.org/defining-credible-practice/iseal-code-good-practice

- The monitoring, evaluation and learning system
- How claims are determined and made.

It also covers topics from data to gender, via due diligence and offers guides on claims and other areas, not just standards development.

Chemical conventions

As a fibre derived from agriculture, another area that greatly impacts on cotton standards and schemes, and may also have legal implications, are international conventions. These cover chemicals including herbicides and insecticides, and these conventions will list those chemicals which are either banned or whose use is heavily controlled.

They include the **PIC** and POPs or **Rotterdam and Stockholm Conventions**, as well as the Globally Harmonised System of Classification and Labelling of Chemicals (**GHS**)[10].

The UN Conventions on Prior Informed Consent (PIC) and Persistent Organic Pollutants (POPs)[11], also known as the Stockholm (POPs) and Rotterdam (PIC) conventions are used by many standards as a tool to determine bans or restrictions on certain hazardous chemicals, alongside legislation like REACH.

▲ The Stockholm (POPs) and Rotterdam (PIC) conventions are used by many standards as a tool to determine bans or restrictions on certain hazardous chemicals.

Non legislative tools like **PAN International**'s lists of Highly Hazardous Pesticides also features[12].

Persistent Organic Pollutants (POPs) are defined as carbon-based organic chemical substances. They also have properties including a long life (years) once released into the environment, spread widely in soil, water and air, and "accumulate in the living organisms including humans, and are found at higher concentrations at higher levels in the food chain", and are toxic to humans and wildlife[13].

The **Prior Informed Consent** (PIC) convention concerns trade in hazardous chemicals and is also covered by an EU regulation on trade in "hazardous chemicals that are banned or severely restricted in the EU". It is the implementing tool within the EU and covers "Banned or severely restricted chemicals listed in Annex I to the PIC Regulation", most notably pesticides and biocides[14].

The GHS looks at a classification of chemicals and a harmonised way to communicate them, and to ensure that information is available when they are used, stored and shipped, with hazard labels that are commonly understandable. Its tenth edition will be reviewed in 2025[15].

Others

Many other laws may affect cotton – although we will not cover in detail within this guidebook. It's not in our remit as we are instead focused on cotton programmes,

but these 'other' categorised regulations include the following as examples.

Due Diligence, now part of the EUs **Corporate Sustainability Due Diligence Directive** (CSDDD)[16] is thxe main one that will impact on cotton textiles, but it may be joined by others in future. Many also use the **OECD Guidelines** as well, even though they are voluntary. This makes brands responsible for assessing environmental and human rights issues in the supply chain, and means they must take responsibility for anything within their supply chains if the OECD Guidelines are to be fully observed.

New York State has been looking at similar legislation – known colloquially as the **New York Fashion Act**, which, while it has failed to make the statute book for now, may still become law at some point.

Other EU legislation is coming on stream or in development, including the Ecodesign (now in force)[17], Product Environmental Footprint (PEF)[18], and the Green Claims Directive[19].

The USA has restrictions on cotton from Xinjiang in the form of the **Uyghur Forced Labor Prevention Act** (UFLPA)[20]. A recent court ruling in the UK on forced labour also has implications for Xinjiang and other imports where there are due diligence risks[21].

The **Green Claims Directive** proposals go with its attempts to control greenwashing, and includes "a verification system for companies that want to make environmental-related claims", which must be backed by evidence and be pre-approved. The recently elected UK parliament is due to continue working on this. It will also have minimum standards for "Ecodesign" and on 'right to repair'[22].

For a comprehensive look at a range of rules, directives and active regulation, take a look at the recently published (September 2024), **Textile Standards & Legislation** 128-page guidebook from MCL News & Media which details over 30 pieces of environmental laws, directives, frameworks and both impending and existing regulation.

See: www.textilestandards.com

[10] https://unece.org/about-ghs

[11] https://pops.int/TheConvention/ThePOPs/tabid/673/Default.aspx

[12] https://pan-international.org/wp-content/uploads/PAN_HHP_List.pdf

[13] https://echa.europa.eu/regulations/prior-informed-consent/understanding-pic

[14] https://pic.int/default.aspx

[15] https://unece.org/transport/dangerous-goods/ghs-rev10-2023

[16] https://commission.europa.eu/news/new-rules-fostering-sustainable-and-responsible-corporate-behaviour-enter-force-2024-07-25_en - https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401760 - https://www.lse.ac.uk/granthaminstitute/news/how-the-eu-corporate-sustainability-due-diligence-directive-csddd-can-be-harnessed-to-promote-a-just-transition/

[17] https://commission.europa.eu/news/new-law-make-products-eu-market-more-sustainable-2024-07-19_en

[18] https://green-business.ec.europa.eu/environmental-footprint-methods/pef-method_en - https://eplca.jrc.ec.europa.eu/EnvironmentalFootprint.html

[19] https://www.consilium.europa.eu/en/press/press-releases/2024/06/17/green-claims-directive-council-ready-to-start-talks-with-the-european-parliament/ - https://environment.ec.europa.eu/topics/circular-economy/green-claims_en https://environment.ec.europa.eu/publications/proposal-directive-green-claims_en

[20] https://www.cbp.gov/trade/forced-labor/UFLPA - https://www.cbp.gov/trade/programs-administration/forced-labor/xinjiang-uyghur-autonomous-region-wro-frequently-asked-questions - https://www.business-humanrights.org/my/latest-news/investors-human-rights-groups-call-on-us-to-enact-a-regional-ban-on-cotton-imports-from-xinjiang-based-on-evidence-of-forced-labour/

[21] https://guidepostsolutions.com/insights/blog/how-the-uk-high-court-decision-on-forced-labor-impacts-your-supply-chain-due-diligence/

[22] https://www.europarl.europa.eu/topics/en/article/20240111STO16722/stopping-greenwashing-how-the-eu-regulates-green-claims

Image: © Mariya | Pixabay

Cotton programmes

The following pages look more in-depth at cotton standards, as well as programmes and schemes that may not be standards based, or verified/certified, but are seeking to promote sustainability in the cotton supply chain.

Where available, we start each standard, scheme or programme section by looking at its theory of change (ToC), and the agricultural theories, approaches and regulations behind it.

We then look at whether it is part of a regulated, private, voluntary, NGO or multi-stakeholder initiative, its critical focus, social and gender aspects, how it is traced, its accreditation, its critical focus in terms of its priorities, how it is managed, including how complaints are handled, its revision and development processes, whether it is verified or certified, and any labelling, marketing or promotion.

Each entry has a 'grid' located near the front to indicate its coverage of these areas.

We also divide cotton programmes between legally defined and voluntary standards. We also start each section with a short 'in their own words' box, for how each scheme describes itself.

Legally based cotton standards

Much organic cotton is legally regulated, and the list is restricted to the most important ones, either for influence or production volumes.

Organic cottons

Organic farming is regulated, and thus organic cotton farming is covered by these regulations, which tend to stop at the gin. The major markets for and producers of organic cotton have legislation, including the EU, US and India, which we cover here (equivalent standards like Japan and East Africa are not covered, and neither is China).

Theory of Change	Agricultural theories and approaches	Laws and regulations on which it is based	Status: voluntary, MSI, private	Critical focus	Social, Gender
Traceability	Accreditation	Management, complaints	Development, revision	Verification type or certification	Labelling, Marketing, promotion

Key: No information/relevance Partial information/relevance All relevant information available

EU Regulation (EU) 2018/848

The EUs organic farming regulations were most recently updated on January 1, 2022, and now cover areas like group certification. They are broadly equivalent to the US NOP, and are considered part of the IFOAM family of standards.

Regulation EU 2018/848, like other organic standards, bans synthetic chemicals and Genetically Modified Organisms (GMOs). It includes rules on how products can be labelled, and how products produced outside the EU have to be handled[23].

Regulation (EU) 2018/848[25], covers both ›

In its own words[24]

"Organic production is an overall system of farm management and food production that combines best environmental and climate action practices, a high level of biodiversity, the preservation of natural resources and the application of high animal welfare standards and high production standards in line with the demand of a growing number of consumers for products produced using natural substances and processes. Organic production thus plays a dual societal role, where, on the one hand, it provides for a specific market responding to consumer demand for organic products and, on the other hand, it delivers publicly available goods that contribute to the protection of the environment and animal welfare, as well as to rural development."

Theory of Change: No requirement	**Agricultural theories and approaches:** IPM, agroecology	**Laws and regulations on which it is based:** EU laws	**Status:** Legal	**Critical focus:** Agriculture	**Social, Gender** No requirement
Traceability: Required	**Accreditation:** Regulated	**Management, complaints:** Regulated	**Development, revision:** Regulated	**Verification type or certification:** Required	**Labelling, marketing, promotion:** Promoted by voluntary bodies and via voluntary standards using product

Key: No information/relevance Partial information/relevance All relevant information available

[23] The latest EU organic info is here: https://agriculture.ec.europa.eu/farming/organic-farming/future-organics_en

[24] https://agriculture.ec.europa.eu/farming/organic-farming/future-organics_en; the legislation can be downloaded here https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018R0848

[25] https://eur-lex.europa.eu/legal-content/ES/TXT/PDF/?uri=CELEX:32018R0848&from=ES

[26] https://agriculture.ec.europa.eu/farming/organic-farming_en and https://www.standardsmap.org/en/factsheet/777777/ overview?products=Cotton%20%26%20fibers

the principles of producing organically, and certification, labelling and advertising.

The International Trade Centre's summary[26] describes the EUs organic standard as setting down "the rules concerning organic production, related certification and the use of indications referring to organic production in labelling and advertising".

Theory of Change

The EUs organic policy has no theory of change for farming. It does set out goals, including clear labelling for consumers, "using natural substances and processes" to reduce environmental impact, by encouraging "responsible" use of energy and resources, preserving biodiversity and "regional ecological balances" as well as looking after soils and water quality. It also encourages high animal welfare standards[27].

Agricultural theories and principles

As legislation founded on existing organic voluntary standards, the agricultural criteria are largely based on agroecology and IPM. Both the voluntary and regulatory rules predate the widespread adoption of regenerative terminology.

Practices recommended include the use of crop rotation, the use of nitrogen fixing plants, green manures, banning mineral nitrogen fertilisers, use of weed and pest resistant varieties, and natural pest control.

Laws and regulations on which it is based

The EU organic standard is based on regulation 2018/848. There is also an implementing regulation for imports into the EU, the "Commission Delegated Regulation (EU) 2021/2306 of 21 October 2021, supplementing Regulation (EU) 2018/848 of the European Parliament and of the Council", which regulates how organic and in-conversion consignments are controlled when imported into the EU.[28] It covers compliance and equivalence with EU organic regulations.

Status: Regulatory, voluntary, MSI, private

It is a legal standard. Certified bodies and farms must also comply with applicable national legislation.

Critical focus and elements

Like other legal organic regulations, the EUs organic standard has no social criteria.

Core rules include not using Genetically Modified Organisms (GMOs), or "ionising radiation", that is, radiation used to induce what is normally known as "mutagenisis", a way of accelerating plant mutations, which can help identify useful new traits[29], as well as being used for prolonging food shelf life[30] or addressing risks of certain diseases[31].

The use of artificial fertilisers, herbicides and pesticides is limited, as is the use of antibiotics, and the use of hormones is banned. Any products used for pest or disease control must be approved by the EU. Seeds must also generally be raised organically[32].

Water quality plans and environmental monitoring are required. There is also a general requirement to "protect" the climate, and limit non-renewable and external inputs, and to protect biodiversity.

Regarding GMOs, their use is banned including in feeds, processing aids, plant protection products, and so on. GMOs in the regulation are defined according to EU regulations, such as Article 2 of Directive 2001/18/EC. The regulations do allow users to rely on labels, provided they are in compliance with relevant EU law on labelling thresholds, which "represent ceilings, which are exclusively linked to adventitious and technically unavoidable presence of GMOs."

Social, Gender

No requirements.

Traceability

Traceability is a requirement of the standard, as part of Internal Control Systems (ICS). Imported products must also ensure consignments have a certificate of inspection from a control authority or body in the exporting country, with verifications that "always include a documentary check and, according to the risk, a physical check of the consignment."[33]

There should be traceability of all documents, with mass balance checking of flows required from the control body or certifiers. Documents[34] to include are inspection records, production plans, transport documents, records kept by operators or groups of operators, and so on, as required by the control authority.

Groups must have an internal control system, with document records, with a person in charge of ensuring compliance. Data includes who is in the group, how and when inspected, documents and records, who inspects and how they are trained, products, and how yields are cross-checked and produce traced.

There are also criteria for group organisations such as cooperatives.

Accreditation

The EU standard is recognised by IFOAM, but as a law, has no other accreditation.

Management, complaints

Any problems are to be investigated under (EU) 2017/625 if there are any reports of non-conformities[35]. This puts management into the hands of operators and promoters first, who have to then follow the process as per EU law. The operator is required to act on suspicions of risks or problems.

Development and revision

There are no specific mechanisms or timings. Change and development is part of the EU law making process.

[26] https://agriculture.ec.europa.eu/farming/organic-farming_en and https://www.standardsmap.org/en/factsheet/777777/overview?products=Cotton%20%26%20fibers

[27] https://agriculture.ec.europa.eu/farming/organic-farming/organics-glance_en

[28] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R2306

[29] https://link.springer.com/chapter/10.1007/978-981-16-9720-3_23

[30] https://www.fda.gov/food/buy-store-serve-safe-food/food-irradiation-what-you-need-know

[31] https://www.food.gov.uk/safety-hygiene/irradiated-food

[32] https://agriculture.ec.europa.eu/farming/organic-farming/organic-production-and-products_en

[33] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R2306

[34] According to Article 45(1), point (b)(i), of Regulation (EU) 2018/848

[35] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R0625

Verification, certification type

Certification is by third party. That is, an external, accredited body inspects operations to ensure they comply with the law. The regulation sets out the criteria for controls and traceability, including on checking documents, operators, timings, on site inspections, and inspection locations. Separation and segregation are also covered.

The regulation says member states, those importing cotton, can also take "other appropriate measures on their territory to avoid the unintended presence of non-authorised products and substances in organic agriculture", as long as they inform the Commission.

Checks will look at tracing the cotton in supply, and to retail.

Certification only covers cotton, not the final product (which can be certified or traced according to one of the voluntary standards, like GOTS), and can use the EU logo, as long as the product is 95% agricultural and that the control body code number is displayed with the logo.

Most cotton will be grown under an equivalent agreement, unless it is grown in an EU country such as Spain, Greece or Italy, which have no organic at present, then processed or traced under a system such as GOTS or the Organic Content Standard (OCS) from Textile Exchange.

Finished products using organic cotton may have to also conform to other labelling requirements on fibre composition. According to IFOAM, "The EU Strategy for Sustainable Textiles foresees to reopen this regulation."[36]

Labelling, marketing and promotion

The EU rules on labelling and advertising are included in Regulation (EU) 2017/625. This also covers control systems, and trade. Certificates must be issued in the country for origin for products imported into EU. Labelling should not "confuse or mislead consumers". There are also requirements for labelling organic and in-conversion products, and on protecting "fair competition", and helping consumers make informed choice. Labelling requirements cover raw materials only, and their journey through processing, but not the processing itself, which to be certified organic needs to pass one of the voluntary standards.

[36] https://www.organicseurope.bio/what-we-do/organic-textiles/

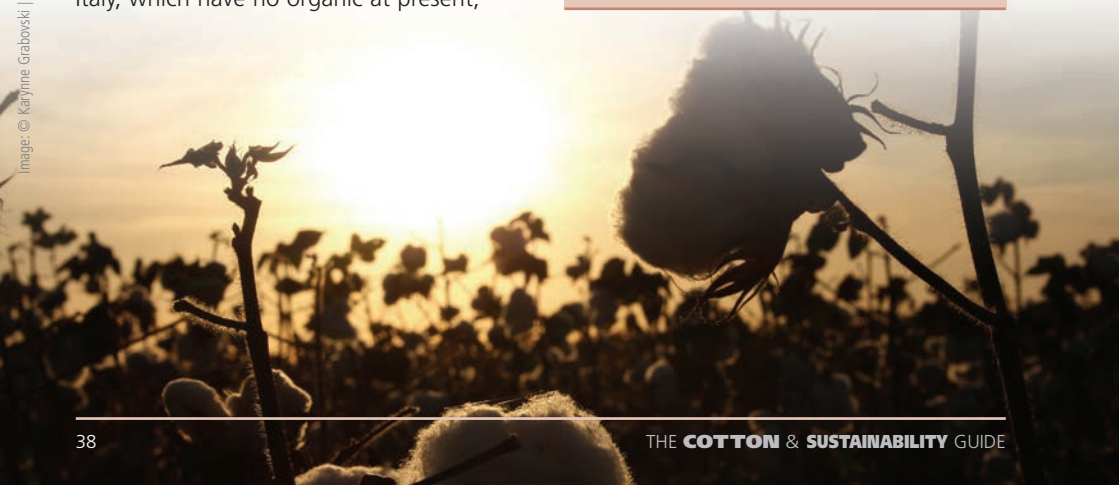


Image: © Karyinne Grabovski | Pixabay

US National Organic Program (NOP)

The USDA National Organic Program (NOP) is a management programme for public and voluntary organic standards. It regulates and enforces standards for organic production, handling and trade and is governed by a board, which sets and governs the rules, the National Organic Standards Board[37].

It is another environmental standard, covering agriculture, and the handling, labelling, market information, certification, accreditation, allowed inputs, and compliance of production.

In its own words

"The National Organic Program (NOP) develops the rules & regulations for the production, handling, labelling, and enforcement of all USDA organic products. This process, referred to as rulemaking, involves input from the National Organic Standards Board (a Federal Advisory Committee made up of fifteen members of the public) and the public. The NOP also maintains a Handbook that includes guidance, instructions, policy memos, and other documents that communicate the organic standards"[38]

Theory of Change

None as such.

Agricultural theories and approaches

NOP has no declared theory, but its prescribed practices are largely from the agroecological and IPM toolboxes, including using reduced tillage, organic nutrient management, natural manures and composts, and crop rotation.

[37] See https://www.ams.usda.gov/rules-regulations/organic and https://www.standardsmap.org/en/factsheet/169/overview?products= Cotton%20%26%20fibers for more information

[38] https://www.ams.usda.gov/rules-regulations/organic

Theory of Change: No requirement	**Agricultural theories and approaches:** IPM, agroecology	**Legal:** US	**Status:** legal	**Critical focus:** Environment	**Social, Gender:** No requirement
Traceability: Yes	**Accreditation:** IFOAM family	**Management, complaints:** Regulated	**Development, revision:** Regulated	**Verification type or certification:** Certified	**Labelling, Marketing, promotion:** Labelled; promoted by voluntary bodies e.g., US Organic Trade Association

Key: No information/relevance Partial information/relevance All relevant information available

Laws and regulations on which it is based

It is a legally defined government standard, with governing documents being the USDA organic regulations[39], its list of allowed and banned substances[40], a handbook which includes guidance documents for operators[41], the act establishing the NOP[42], and a history of the standard[43].

Status: regulatory, voluntary, MSI, private

NOP is a legal regulation.

Critical focus and elements

The NOP is an environmental standard focused on agricultural production. Products certified as either "100 percent organic" or "organic" or "made with organic" must have been produced without, and handled free of, "synthetic substances"* and other prohibited substances in the regulation; there are also regulations on methods that can be used, Including, as for the EU, "ionising radiation" and GMOs.

The standard also covers areas such as land use and land management, soil fertility, soil improvement and erosion reduction, as well as the use of crop rotations, cover crops and plant and animal wastes.

It prescribes detail in some areas, such as crop rotation, including "but not limited to sod, cover crops, green manure crops, and catch crops that provide the following functions that are applicable to the operation."[44]

The use of organic seeds is also required "where possible". Natural pest control is also required as well, including physical and mechanical control.

Gender/social

No

Traceability

Production and processing must have an "audit trail". That is, documentation that tracks "the source, transfer of ownership, and transportation" of products in accordance with how they will be labelled (e.g., "100% organic").[45]

Accreditation

NOP regulates and accredits certifying agents.

Management, complaints

The standard is managed by the National Organic Program. Complaints start with the certifying body, and continue with a state's organic program[46]. The NOP also handles complaints regarding certifiers, use of the logo, etc[47].

Development and revision

NOP is developed and revised under USDA NOP with input from the National Organic Standards Board (a Federal Advisory Committee made up of fifteen members of the public) and the public.[48]

Verification, certification type

The NOP is third party standard certified by accredited agents. This includes production and well as all transport, operations and handling. Records must be kept, including on locations. This includes plans on the handling of production, management, practices used, and mass balance audits.[49]

Imports to the US are also covered, which must have a valid NOP import certificate. This will be issued by an

* Refer to the standard's website for full lists of prohibited substances.

accredited agent. It will be checked with the Organic Integrity Database, and have been part of an organic control system.[50]

Labelling, marketing and promotion

USDA offers labelling guidance[51], which regulates how the term organic may be used and use of the USDA organic label (which as with the EU only applies to the raw material).[52] It has three options: 100% and 95% organic materials are organic, while products with less than 70% are labelled "Made with organic (specified ingredients)".

The Organic Trade Association has some recommended practices for labelling, which include products outside NOPs scope in the case of textiles. This means first that the raw material is NOP certified, to a "USDA accredited, and NOP recognised standard when NOP standards do not exist (i.e. Global Organic Textile Standard)", and restricted to content claims.[53]

East Africa organic

The East African organic standard (EAS 456:2007) is worth a short mention as it is the second regional organic standard after the EUs. It was developed by organic movements and national standards bodies working cooperatively in a Regional Standard Technical Working Group including members from Kenya, United Republic of Tanzania, Uganda, Burundi and Rwanda, and the East African Business Council[54]. It is accredited to the IFOAM family of standards.

[39] http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr&sid=3f34f4c22f9aa8e6d9864cc2683cea02&tpl=/ecfrbrowse/Title07/7cfr205_main_02.tpl

[40] https://www.ams.usda.gov/rules-regulations/organic/national-list

[41] https://www.ams.usda.gov/rules-regulations/organic/handbook

[42] https://uscode.house.gov/view.xhtml?req=granuleid%3AUSC-prelim-title7-chapter94&saved=%7CZ3JhbnVsZWlkOlVTQy1wcmVsaW0tdGl0bGU3LWNoYXB0ZXI5NC1mcm9udA%3D%3D%7C%7C%7C0%7Cfalse%7Cprelim&edition=prelim

[43] https://www.ams.usda.gov/rules-regulations/resource-center-preamble

[44] 7 CFR Part 205 (up to date as of 8/07/2024) National Organic Program

[45] 7 CFR Part 205 (up to date as of 8/07/2024) National Organic Program

[46] https://www.ams.usda.gov/services/enforcement/organic/file-complaint and https://www.ecfr.gov/current/title-7/subtitle-B/chapter-I/subchapter-M/part-205

[47] https://www.ams.usda.gov/rules-regulations/organic/handbook/sectionsd-f

[48] https://www.standardsmap.org/en/factsheet/169/

[49] 7 CFR Part 205 (up to date as of 8/07/2024) National Organic Program

[50] 7 CFR Part 205 (up to date as of 8/07/2024) National Organic Program

[51] https://www.ams.usda.gov/sites/default/files/media/OrganicTextilePolicyMemo.pdf

[52] 7 CFR Part 205 (up to date as of 8/07/2024) National Organic Program

[53] ORGANIC TRADE ASSOCIATION BEST LABELING PRACTICES FOR TEXTILES https://ota.com/sites/default/files/indexed_files/BestLabelingPractices_Textiles_05152019_Links.pdf

[54] https://www.standardsmap.org/en/factsheet/144/overview

National Programme for Organic Production (NPOP)

In India, organic cotton is regulated by the National Programme for Organic Production (NPOP)[55], which defines it as growth "without the use of chemical fertilisers and pesticides with an environmentally and socially responsible approach."[56] Its implementing agency is India government agricultural export promoting body, APEDA, and it has some international accreditation. They manage the National Standard for Organic Production (NSOP), which comes under NPOP.[57]

Theory of Change

NPOP has no specific theory of change separate from its standard, which does lay out goals, such as benefiting the ecosystem.

Theory of Change:	**Agricultural theories and approaches:** Agroecology, IPM	**Laws and regulations on which it is based:** Indian national laws	**Status:** Legal	**Critical focus:** Agriculture	**Social, Gender**
Traceability: regulated, by promoter	**Accreditation:** regulated	**Management, complaints:** Regulated	**Development, revision:** Regulated	**Verification type or certification:** Certified	**Labelling, Marketing, promotion:** by promoter

Key: No information/relevance Partial information/relevance All relevant information available

In its own words

"Organic products are grown under a system of agriculture without the use of chemical fertilisers and pesticides with an environmentally and socially responsible approach. This is a method of farming that works at grass root level preserving the reproductive and regenerative capacity of the soil, good plant nutrition, and sound soil management, produces nutritious food rich in vitality which has resistance to diseases."
India is bestowed with lot of potential to produce all varieties of organic products due to its various agro climatic conditions. In several parts of the country, the inherited tradition of organic farming is an added advantage. This holds promise for the organic producers to tap the market which is growing steadily in the domestic and export sector. As per the available statistics, India's rank second in terms of World's Organic Agricultural land and first in terms of total number of producers. (Source: FIBL & IFOAM Year Book, 2024).
The APEDA, Ministry of Commerce & Industries, Government of India implements the National Programme for Organic Production (NPOP). It involves the accreditation of Certification Bodies, standards for organic production, promotion of organic farming and marketing etc. The NPOP standards for production and accreditation system have been recognised by European Commission and Switzerland for unprocessed plant products as equivalent to their country standards. With these recognitions, Indian organic products duly certified by the accredited certification bodies of India are accepted by the importing countries. APEDA is also in the process of negotiation with Australia, South Korea, Taiwan, Canada, Japan etc.[59]

Agricultural theories and approaches

The standard does not specify the exact theories, but mentioned techniques imply agroecology and IPM as the basis for the standards. It says organic farming should benefit the ecosystem, with certification programmes ensuring a minimum percentage of the farm is set to "facilitate biodiversity and nature conservation." It also says that there should be mixed crops, which can include perennial crops as well as crop rotation, cover crops and green manure, intercrops, and so on.

Laws and regulations on which it is based

NPOP is a legal standard implemented by APEDA, the government's export promotions agency.[60]

Status: regulatory, voluntary, MSI, private

NPOP is a regulated standard based on national laws. APEDA, the promoter, is a government agency.

Critical focus and elements

The standard's focus is agricultural production and environmental protection. It mentions the importance of working to protect "the reproductive and regenerative capacity of the soil" and of plant nutrition, soil management, to produce crops with disease resistance.[61]

[55] https://cdd.fssai.gov.in/files/docs/National%20Programme%20for%20Organic%20Production.pdf
[56] https://apeda.gov.in/apedawebsite/organic/ORGANIC_CONTENTS/National_Programme_for_Organic_Production.htm
[57] https://apeda.gov.in/apedawebsite/organic/organic_contents/national_programme_for_organic_production.htm
[58] https://apeda.gov.in/apedawebsite/TracenetOrganic/TraceNet.htm
[59] https://apeda.gov.in/apedawebsite/organic/Organic_Products.htm
[60] NPOP PDF
[61] https://apeda.gov.in/apedawebsite/organic/Organic_Products.htm

Alongside the practices such as plant diversity and crop protection, organic producers and groups are required to have a crop production plan, including a planting plan, the type of crop, and how it is segregated. They must also maintain records.

The standard also requires the use of farming systems that minimise crop losses to "pests, diseases and weeds", and recommends using adapted crop varieties, "balanced" fertilisation, use of productive soils, and the use of "preventive cultural techniques" to manage problems. Pest management is recommended to use natural processes, for example to disrupt pest cycles, by using natural enemies and managing habitat for them.

No GMOs are allowed, or synthetic chemicals, while the standard has lists of allowed and restricted practices.

Social, Gender

None

Traceability

Traceability is via APEDAs Tracenet system.

Accreditation

APEDA is required to meet ISO standard 17011 to accredit certification bodies, and to have policies for accreditation as well as "surveillance of the Certification Bodies." Accredited certifiers must be Indian based or have an office in India. APEDA is required to facilitate certification to the National Standards for Organic Production, as well as to certify in accordance with other countries' standards if required, and to encourage promotion of organic farming and processing.[62]

Management, complaints

APEDA manages the programme and any complaints under the NPOP.

Development and revision

No specified process, but the standard is in its seventh edition.

Verification, certification type

Organic producers are third party certified under the NPOP. The standards prescribe inspector qualifications, and how they must be rotated to avoid them certifying the same operations regularly. The standard also has guidelines for equivalency recognition with other countries' organic programmes. The standard also clarifies the information operators must make available to certifiers, including "a description of activities/processes, maps/plans, product specifications, inputs used, earlier irregularities, infringements, conditions and disciplinary measures." It also requires risk assessments on contamination (and several tests for GMOs) and other risks and details on how non-conformities are managed.

Inspections are annual, with a minimum requirement for 10% unannounced inspections. There are rules for chain of custody, and Internal Control Systems (ICS).

Labelling, Marketing and promotion

Use of India Organic mark is granted on compliance and certification. Promotion is by APEDA.

[62] NPOP PDF

US Cotton Trust Protocol

The voluntary US Cotton Trust Protocol for the US cotton industry also complies with some legal requirements. It allows communication of best management practices and impact by producers and a framework for continuous improvement, which is a core philosophy. It covers environmental protection, workers' rights, and profitability.[1]

Theory of change

The recently updated mission of the Protocol is to create a sustainable standard for U.S. Cotton that is data-powered, traceable by design, and generates positive impact through the global cotton value system – from farms, right through to finished product.[3]

In its own words

"The U.S. Cotton Trust Protocol is the voluntary sustainability program for U.S. cotton growers, and traceability platform for all U.S. Cotton.
The Trust Protocol is the only system that provides quantifiable, verifiable goals and measurement and drives continuous improvement in six key sustainability metrics - land use, soil carbon, water management, soil loss, greenhouse gas emissions, and energy efficiency.
The program is the world's first sustainable cotton fibre program to offer article-level supply chain transparency to all members".[2]

Agricultural theories and approaches

It includes IPM approaches, especially for crop protection, which have been used in the US cotton sector for years, but it also brings in elements of regenerative approaches, particularly for soil.

Laws and regulations on which it is based

While a voluntary programme, producers must follow all relevant US law, such as ❱

[1] https://trustuscotton.org/ and https://www.standardsmap.org/en/factsheet/803/overview?products=Cotton%20%26%20fibers

[2] USCTP overview document

[3] https://trustuscotton.org/vision/vision-mission-values

Theory of Change	**Agricultural approach:** IPM	**Laws upon which it's based:** Some US	**Status:** Voluntary	**Critical focus:** Agriculture, social	**Social, gender: policies:** social and legal e.g., employment
Traceability: Yes	**Accreditation:** ISEAL	**Management, complaints:** Yes	**Development, revision:** Trust Protocol	**Verification type or certification:** verified, including some third-party	**Labelling, Marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

on Conservation Compliance, employment law, and those around pesticide use and handling.

Status: regulatory, voluntary, MSI, private

It is a voluntary programme run by a private body. It includes both organic and conventional parts of the industry, and a board of directors including producers, brands and retailers, experts, and others.

Critical focus and elements

The starting point is agriculture and production, with additional focus on environmental protections and workers' rights.

Its principles and criteria cover soil health, crop protection, fibre quality, data management and traceability, nutrient management, chemical management, farm management, water management, biodiversity, and worker well-being. It wants both to improve the impact of cotton, and ensure producers are profitable and workers protected.

Its soil principles cover erosion reduction, reducing the conversion of wetlands into farmland, building up soil organic matter, and ensuring soils can retain water. It includes various types of conservation tillage, e.g., minimum, strip, mulch, no-till. It also requires the use of approaches such as crop rotations and the use of cover crops.

Soil fertility and nutrient management focuses on the "optimisation" of inputs. That is, ensuring the maximum benefit with minimum side-effects, including minimising run-off. It promotes the use of soil tests to ensure farmers apply what the crop needs, based on a nutrient plan which is based on data including soil types, pH, local conditions, etc.

Crop rotation principles are based on an IPM strategy, which CTP calls a "holistic" system for pest management which combines "biological, cultural, physical, and chemical tools in a way that minimises economic, health, and environmental risks of toxic materials."[4]

It includes use of traps to monitor pests, as well as the use of economic damage thresholds to determine when use of crop protection is appropriate. It requires producers to use legal and registered pesticides and proper application/use protocols.

Producers must destroy crop residues, and enhance biodiversity habitats, as well as take unproductive land out of production, which should be converted to uses including "rainwater storage, wetlands, pollinator habitat, wildlife corridors suitable for promoting biodiversity."[5] This should include assessing trends in wildlife population assessments.

Principles on worker well-being include meeting legal requirements, and ensuring workers have access to water, with provisions are made for temporary labour, including for accommodation.

Social, gender

Producers must meet legal requirements, with some additional provisions (see above).

Traceability

The US CTP ensures traceability (identity preservation) by using national **Permanent**

Bale Identification systems, which provide information on quality measurements as well for supply chain actors.

It is also designed to ensure the integrity of the data, validating it, and using it to report against environmental goals, and deliver metrics with independent verification.

It uses proprietary technology in its "Protocol Consumption Management Solution (PCMS)" to verify the movement of cotton through the supply chain, into the finished product, allowing brands and retailers to make data backed claims on their PCCUs (Protocol Consumption Units. These are not however tracked to an individual farm, but to bales).

Accreditation

The programme is accredited to ISEAL as a "community member".[6] It is also recognised by Textile Exchange and Forum for the Future, and part of Cascale. It has also been published in the International Trade Centre Standards Map, recognised as a standard for sustainable cotton by the Partnership for Sustainable Textiles, and approved as a standard for sustainable cotton by the German Federal Government.

Management, complaints

The programme is managed by the Trust Protocol, but enquires or complaints on non-sustainability issues should be referred to the National Cotton Council.

Development and revision

The grower questionnaire is revised every three years but not the full program. It published a 5-year strategic plan recently.[7]

Verification, certification type

The program is verified with some third-party verification. Field environmental impacts are quantified each year using the "**Field to Market FieldPrint Platform**" which gathers and analyses data on land use, greenhouse gases, energy use, biodiversity, water use efficiency and a water quality index, as well as a soil carbon index. It is aligned with the Science Based Target Initiatives as well as the UNs Sustainable Development Goals.[8]

Producers complete a "grower questionnaire" with 54 required questions and 65 regional ones (where producers are grouped).[9] This is the basis for second-party verification. Third-party verification, also based on a proportion of producers, involves half day visits to selected farms, with workers interviews.

The resulting confirmation is valid for a year.

Labelling, marketing and promotion

It has a claims framework, with different levels, all of which need pre-approval before they can be used.

On product claims regarding consumption of the Protocol Cotton or US cotton are more stringent, according to the ❱

[4] From USCTP P&C document

[5] From USCTP P&C document

[6] https://trustuscotton.org/usctp-iseal-community-member/?_gl=1*14gbxk6*_ga*MTM1Njc0MjYzOC4xNzI1Nzc4OTQ4*_up*MQ..*_ga_Y8N7MTCSM7*MTcyNTc3ODk0Ny4xLjAuMTcyNTc3ODk0Ny4wLjAuMA.

[7] https://trustuscotton.org/wp-content/uploads/2024/10/USCottonTrustProtocol_Strategic-Plan-2024.pdf#new_tab

[8] USCTP P&C document

[9] Cotton Trust standard guidelines document

claims framework. Use of the programme logo is also required to meet criteria, and is governed by the framework.

Claims can also be made by supply chain actors and farmers.

The Protocol is working to align with other requirements, including EU Product Environmental Footprint rules, and is also "approved as a standard for sustainable cotton by Siegelklarheit, an initiative of the German Federal Government."

Abrapa

Abrapa, the Associação Brasileira dos Produtores de Algodão or Brazilian cotton producers association[10], runs the Brazilian cotton industry's sustainability standard, ABR, which is also accredited to BCI, and describes itself as "the largest BCI producer in the world"[11]. Together with APEX, Brazil's export agency, it also runs the Cotton Brazil brand.

ABR allows certification of farms to agricultural, environmental, social and economic criteria, which are unified to BCIs.

ABR
ALGODÃO BRASILEIRO RESPONSÁVEL
RESPONSIBLE BRAZILIAN COTTON

Theory of Change
None available.

Agricultural theories and approaches
Good agricultural practices/IPM.

Laws and regulations on which it is based
The programme starts with Brazilian laws, and builds on them.

Status: regulatory, voluntary, MSI, private
Voluntary with a basis in national laws as well as ILO labour requirements. Farms can choose to be ABR only, or also Better Cotton licensed.

Theory of Change	**Agricultural theories and approaches:** IPM	**Laws and regulations on which it is based:** BCI and own	**Status:** Voluntary	**Critical focus:** Agricultural environment, Social, economic	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** BCI	**Management, complaints:** Unclear	**Development, revision:** Unclear	**Verification type or certification:** Verified, some third party	**Labelling, Marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

Critical focus and elements

It is an agricultural standard, which covers environment, social and economic criteria, and also requires avoidance of deforestation under the Brazilian Forest Code.

There are minimum production criteria as well as mandatory elements including "prohibition of child labour, slave-like, indecent or degrading work on rural properties".[12] It is also based on the same principles as BCI of continuous improvement.

Farmers are required to practice crop rotation, to test and use water "rationally" and conserve water, and use IPM to manage pests and diseases, as well as protect biodiversity. They are also required to keep between 20 and 80% of native vegetation on each farm, as well as forest borders along rivers and streams.

"Smart" practices using technology are also used to promote reduced input use, and biopesticides are also recommended as an option, alongside soil conservation practices, including no- and reduced tillage, to reduced greenhouse gas emissions.

The standard also claims to seek a ❱

In its own words

"The Responsible Brazilian Cotton (ABR) program and the Better Cotton Initiative (BCI) are specifically designed for cotton production. Together, they promote sustainable management through the progressive advance of good social, environmental and economic practices based on the health, safety and well-being of workers and also include the protection of river sources and biomes, water and soil preservation.

The certification protocol is divided into eight criteria which meet the requirements of Brazilian and international legislation in addition to good production practices:

1. Employment contract;
2. Prohibition of child labor;
3. Prohibition of work analogous to slavery or in degrading or undignified conditions;
4. Freedom to unionize;
5. Prohibition of discrimination against people;
6. Safety, occupational health and the work environment;
7. Environmental performance;
8. Good agricultural practices."

[10] https://abrapa.com.br/quem-somos/

[11] https://cottonbrazil.com/sustainability/

[12] Cotton Brazil: Brazilian Cotton Sustainability Guide

"gradual reduction in the use of crop protection products"[13], which includes workers being trained on PPE.

Social, Gender
ABR includes requirements on social issues relating to working conditions, as well as safe handling and use of pesticides. They are based on national laws and ILO requirements.

Traceability
Bales of Brazilian cotton are marked with codes that allow each to carry information on farm, crop year, gin, classing and HVI results, as well as the certification received (ABR and/or BCI license).

Accreditation
Cotton Brazil licenses companies allowed to do the auditing of producers to the ABR standard.

Management, complaints
The program is managed by Abrapa, together with Cotton Brazil and the Brazilian export agency APEX. No specific complaints avenue was found.

Development and revision
Not specified.

Verification, certification type
Verified and certified by independent auditors. There are 192 items to be verified (second-party by state officials), and 177 (third-party and including gin assessment) to be certified under the programme. If clear, a seasonal certificate is awarded.

Farms also opting for BCI have to keep the appropriate records required by BCI.

Labelling, Marketing and promotion
Cotton Brazil promotes Brazilian Cotton, and the other managing agencies also seem to play a role.

MyBMP

The myBMP (BMP stands for Best Management Practices) programme is an Australian voluntary cotton farm and environment standard which allows farmers to self-assess against a set of modules. It is led by the Cotton Research and Development Corporation and Cotton Australia, with participation by CottonInfo (which is an extension service)[14].

COTTON AUSTRALIA

Theory of Change
None as such, but the goal is to improve the impact of Australia's cotton.

Theory of Change: Not as such	**Agricultural theories and approaches**: BMP/IPM	**Laws and regulations on which it is based:** Australian laws plus voluntary approaches	**Status:** Voluntary	**Critical focus:** Improved management, labour/social	**Social, Gender:** Yes
Traceability: Working towards	**Accreditation:** BCI	**Management, complaints:** Private and public institutions	**Development, revision:** Yes	**Verification type or certification:** Verification	**Labelling, Marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

In its own words

" 'myBMP' is a voluntary farm and environmental management system which provides self-assessment mechanisms, practical tools and auditing processes to ensure that Australian cotton is produced according to best practice. The original BMP program began in 1997 and was reviewed and redeveloped in 2006-07 with the new online 'myBMP' system re-launched in 2010.

myBMP is the industry's assurance mechanism, a best management practice system for growers to improve on-farm production. It attends to the industry's requirement for risk management and supports industry's social licence. Through myBMP, all Australian cotton growers have a resource bank to access the industry's best practice standards, which are fully supported by scientific research and development, resources and technical support.

By using myBMP's tools, growers can improve on-farm production performance, by:

- Better managing business and production risk
- Maximising potential market advantages
- Demonstrating responsible and sustainable natural resource management to the community.

myBMP is the result of industry wide consultation with growers, researchers and industry bodies, taking into consideration the requirements of the cotton industry now and into the future. The initiative is supported by the Cotton Research Development Corporation and Cotton Australia.

Information is categorised into 10 key modules for growers:

- Biosecurity - for prevention, management and control of pests and diseases
- Energy and Input Efficiency - for more efficient energy inputs such as electricity, fuel and fertilisers
- Fibre Quality - for growing the best quality cotton possible
- Human Resources and Work Health and Safety - helps growers manage employees and contractors whilst providing a safe and compliant workplace
- Integrated Pest Management (IPM) - for management of pests, weeds and diseases
- Sustainable Natural Landscape - for managing the vegetative and riparian assets on your farm
- Pesticide Management - for all aspects of pesticide management, storage and use on farm
- Petrochemical Storage and Handling - for managing fuels and lubricants on farm
- Soil Health - for maintaining and/or improving soil quality and fertility
- Water Management - covering water quality, efficiency of storage and distribution for both dryland and irrigated farming practices

Ginning and Classing modules are also available for the Australian cotton ginning and classing facilities."[15]

[13] Ibid
[14] https://www.mybmp.com.au/What_is_different.aspx and https://www.standardsmap.org/en/factsheet/712/overview?products=&name=myBMP%20-%20Best%20Management%20Practices
[15] https://www.mybmp.com.au/What_is_different.aspx

Agricultural theories and approaches

MyBMP is based on integrated disease, pest and weed management plus Australian legal requirements applicable to farming.

Laws and regulations on which it is based

Relevant Australian laws.

Status: regulatory, voluntary, MSI, private

MyBMP is a voluntary standard governed by both Cotton Australia and the Cotton Research Development Corporation, which is a collaboration between the Australian government and cotton growers.

Critical focus and elements

Farmers self-assess against 10 modules, which cover pest control (under Biosecurity), to prevent and control pests and diseases. This module is also matched to another on IPM, which requires growers to have an "integrated disease management strategy". This includes "optimising" crop nutrition, and items on irrigation, crop residues, disease management, the use of crop rotations, and control of "insect vectors", including monitoring of pests, pollinator counts, and promotion of beneficial insects.[16]

Farmers are also required to improve 'Energy and Input Efficiency', not just on fuels but also fertiliser use, while ensuring they grow good quality cotton (Fibre Quality). Another area is on worker health and safety (Human Resources and Work Health and Safety) to ensure a safe workplace – in compliance with laws. Farmers must also follow all pesticide regulations, for application, handling and storage (Pesticide Management).

The criteria also include options for farmers' weed management to consider alternatives to glyphosate, and for pest resistance management in **Bt cotton**.

Under soil management criteria (including Soil Health), farmers are expected to monitor soil carbon, use cover crops and minimum tillage, and monitor erosion. Farmers are also expected to manage vegetation and riparian assets (Sustainable Natural Landscape), including by mapping natural resources on the farm and managing biodiversity and habitat, while improving carbon sequestration. Water Management criteria cover quality, storage, distribution and irrigation.

Farmers are also required to manage storage of fuels and lubricants safely

Source: MyBMP Module areas - https://mybmp.com.au/

(Petrochemical Storage and Handling). The final module covers ginning and classing of cotton.[17]

Social, Gender

MyBMP requires farmers to meet legal requirements under Australian law, and to reach the identified best practices.

Traceability

Farmers register online for myBMP, where they self-assess. Data is recorded. The myBMP website does not make much mention of traceability, but all data is recorded by farmers. Cotton sold into the Better Cotton programme will be traceable under the BCI system. Cotton Australia can assist with the partial traceability of Australian cotton at this stage.[18]

Accreditation

MyBMP is "aligned" with other programmes including Better Cotton, the Partnership for Sustainable Textiles, Textile Exchange, according to its website.[19] it was also part of Cotton Leads with the US cotton sector.

Management, complaints

It is managed by Cotton Research and Development Corporation, and Cotton Australia, with CottonInfo. Complaints are handled by the myBMP office, and it also has a "Resolution of Complaints Procedure", which outlines required processes.

Development and revision

All levels are updated yearly in line with Australian legislative requirements and new research coming down the pipeline.

Verification, certification type

Certification to myBMP requires meeting some 300 "best practice" criteria across the 10 modules. Currently some 45% of Australian cotton crop is myBMP certified. To achieve full certification, farms must meet all level 1 and level 2 standards of the myBMP program.

They enter data online, which audited when Levels 1 and 2 are complete.

Each checklist item in the modules has three levels. Level 1 requires meeting legal requirements; Level 2 agreed best practice standards; and finally Level 3 covers "Innovative practices", which is identified as adopting new technology and "cutting-edge practices".[20]

Audits are by "accredited independent auditors". When given, certificates are valid for five years. There are also random audits. Random audits will always include five of the core modules: Pesticide management, Water management, Natural assets, Soil health, and Petrochemical storage and handling". [21]

Labelling, Marketing and promotion

Cotton Australia promotes Australian cotton.[22]

[16] BMP Modules IPM

[17] https://www.mybmp.com.au/What_is_different.aspx

[18] https://australiancotton.com.au/traceability

[19] https://cottonaustralia.com.au/mybmp-program

[20] https://australiancotton.com.au/assets/downloads/Australian_Cotton_Fact_Sheet_-_myBMP_Best_Management_Practices.pdf

[21] https://australiancotton.com.au/assets/downloads/Australian_Cotton_Fact_Sheet_-_myBMP_Best_Management_Practices.pdf

[22] https://australiancotton.com.au/assets/downloads/Australian_Cotton_Fact_Sheet_-_myBMP_Best_Management_Practices.pdf

Better Cotton Initiative

Better Cotton is an assurance system by the Better Cotton Initiative (BCI). It works to support farmers to implement more sustainable practices with a goal to increase scale rapidly. It focuses on productivity as well as sustainability, and working conditions."[23]

Theory of Change

Better Cotton has a Theory of Change. This is used to measure their results and progress. It links to a set of Principles & Criteria (P&Cs) which set out requirements for producers and their implementing partners (organisations support and training farmers on Better Cotton). The P&Cs are supported by capacity building, and data is gathered in the field on practices and results.

Its Theory of Change document outlines the use of farm and market impact pathways as well as continuous improvement, fed by "evidence-based learning". Critical to this, is channelling of funding from the market for farm activities. Market funding comes from volume-based fees paid by brands, as well as a "growth and innovation fund". That funding is supposed to generate more farm level improvements, which drives more market activity, which generates more funding for farm activity.[25]

In its own words

"The Better Cotton Standard System is a holistic approach to sustainable cotton production which covers all three pillars of sustainability: environmental, social and economic. Each of the elements – from the Principles and Criteria to the monitoring mechanisms which show results and impact – work together to support the Better Cotton Standard System, and the credibility of Better Cotton. The system is designed to ensure the exchange of good practices, and to encourage the scaling up of collective action to establish Better Cotton as a sustainable mainstream commodity. "[24]

Theory of Change: Yes	**Agricultural theories and approaches:** IPM, and increasingly regenerative	**Laws and regulations on which it is based:** voluntary, with requirement to follow national legislation	**Status:** Voluntary, MSI	**Critical focus:** Agriculture, environment, social, labour	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** ISEAL	**Management, complaints:** Yes	**Development, revision:** Updated every 5 years	**Verification type or certification:** Verified, moving to certified	**Labelling, Marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

Better Cotton Principles & Criteria and cross cutting themes

Source: https://bettercotton.org/what-we-do/defining-better-our-standard/

Agricultural theories and approaches

Better Cotton started as an IPM based programme, but is increasingly adopting regenerative terminology and practices.

Laws and regulations on which it is based

Better Cotton is a voluntary standard, but which requires respect for all relevant national laws.

Status: regulatory, voluntary, MSI, private

BCI is a voluntary standard, and a multi-stakeholder initiative, involving brands, suppliers, prioducers, as well as NGOs.

Critical focus and elements

Better Cotton is based on the three pillars of sustainability concept, which covers environmental, social and economic areas.

The Principles and Criteria are based on the three elements, and form the basis of the assurance (soon to be certification) system.[26]

The six principles of Better Cotton cover Management, Natural Resources, Crop protection, Fibre Quality, Decent Work, and Sustainable Livelihood. The system also has cross-cutting areas on gender and climate change.

Each of the principles and criteria has ❱

[23] https://bettercotton.org/who-we-are/frequently-asked-questions/

[24] https://www.standardsmap.org/en/factsheet/2/overview?products=&name=myBMP%20-%20Best%20Management%20Practices,Better%20Cotton

[25] https://bettercotton.org/wp-content/uploads/2024/06/Better-Cotton-Theory-of-Change-Narrative-2024-1.pdf

[26] https://bettercotton.org/what-we-do/

desired outcomes, which producers need to meet to become licensed. The system is divided into three farm types, according to size.

As well as trying to reduce the impact of pesticides, Better Cotton's Natural Resources criteria bring in regenerative approaches to soil health, as well as protection of biodiversity and water. It includes a principle that natural ecosystems should not be converted, including in areas of high conservation value.[27]

It defines regenerative agriculture as ensuring "farming can give back to, rather than take from, nature and society", and includes traditional knowledge.[28] Regenerative here includes building soil health, increasing biodiversity, as well as cutting pesticide use, and sequestering carbon. Soil health requirements including using crop rotation, intercrops, and cover crops, but with a focus on selecting interventions based on "soil type, topography, climate, available crops, labour force, cultural and social dynamics and yields.", with agroforestry also mentioned.[29]

Producers are also required to "optimise" both fertiliser and water use, and to seek alternatives to synthetic fertilisers. As well as protecting water, they are also tasked with restoring degraded croplands, and not to grow cotton on "land converted from natural ecosystems after 31 December 2020".

Crop protection criteria include rules on active ingredients, based on the Globally Harmonised System, with some being required to be phased out, and it also uses the HHP list and PAN International's list of Highly Hazardous Pesticides (HHPs), to determine allowed, restricted and banned products under Better Cotton. These take into account human health as well as impacts on pollinators and aquatic systems.

Producers are required to adopt IPM as part of the Crop Protection principle, and use it to determine which pesticides can be used, as well as their handling, to mitigate health and environment risks. It proposes using biological, cultural, mechanical and physical, and chemical control methods, as well as eliminating HHPs.

Under Decent Work, the focus is on working conditions, but also areas such as child, forced and compulsory labour, as well as discrimination, and so on.

The Better Cotton Standard System

Source: https://bettercotton.org/what-we-do/

Producers are required to implement a "Decent Work monitoring system" to track both risks and incidents. It also requires respect for areas such as freedom of assembly, and like other areas requires producers to also meet national laws.

All this leads to Better Cotton's sixth principle, which focuses on ensuring producers can make a living and lead " a happy life".

Finally, the cross cutting theme on climate change aims to mitigate the impacts of global warming, and help farmers adapt.

Social, Gender

Better Cotton, as well as its decent work components, has a specific gender equality cross-cutting theme. This includes requirements to have gender focused leads or committees in management, and to address barriers to women's participation. There are specific indicators to assess progress.[30]

Traceability

Better Cotton's traceability is ensured through its own chain of custody standard, the Better Cotton Chain of Custody Standard, which came into use in 2023. It offers four options for traceability, which include "Mass Balance, Controlled Blending, Segregation (Multi-Country), and Segregation (Single Country)."[31]

The mass balance system uses Better Cotton Claim Units (BCCUs) to track flows. The system operates to the country of origin level, using the Better Cotton Platform, and has been moving towards more fully traceable cotton. It follows through the supply chain, and can be used to direct "impact investment" to cotton communities.[32]

Physical chain of custody is now also part of the system. [33]

Accreditation

Better Cotton is ISEAL Code Compliant.

Management, complaints

Better Cotton is managed by BCI, which is led by an elected council. Complaints are managed under its Chain of Custody rules.

Development and revision

The governance structure of BCI includes feedback mechanisms. There is a pubic review every five years. This is open to external parties.

Verification, certification type

Better Cotton is a verified licensing standard, which is transitioning to third-party certification. This will include new labelling.[34]

All indicators must be met from the Principles and Criteria for licensing.

[27] For more on High Conservation Values see https://www.hcvnetwork.org/hcv-approach

[28] https://bettercotton.org/what-we-do/defining-better-our-standard/

[29] Ibid.

[30] https://bettercotton.org/what-we-do/defining-better-our-standard/

[31] https://bettercotton.org/what-we-do/connecting-supply-demand-chain-of-custody/

[32] https://bettercotton.org/traceability/

[33] https://bettercotton.org/chain-of-custody-standard/

[34] https://bettercotton.org/certification-2024/

Regenagri

The regenagri standards[1] are owned and managed by Regenagri C.i.C, a community interest company registered in the UK and owned by Solidaridad.[2] It provides standards and a data platform used to assess and certify organisations and now also has a textile standard, which covers processing from raw material to finished product.[3]

In its own words

"regenagri is a regenerative agriculture initiative aimed at securing the health of the land and the wealth of those who live on it. It supports farms and organisations to transition to holistic farming techniques that increase soil organic matter, encourage biodiversity, sequester CO_2 and improve water and energy management."[4]

"regenagri is designed for continuous improvement, enabling the transition from conventional to regenerative techniques to be monitored and refined over time. It can also provide routes to additional funds for farms through carbon credit markets and environment related subsidies.

A key element of this initiative is the certification against the regenagri's criteria, which covers items across all aspects of regenerative agriculture, from soil health to biodiversity and GHG emissions. Certification provides you with recognition for and proof of your efforts to regenerate the land."[5]

Theory of Change

Regenagri Community Interest Company's Theory of Change focuses on identifying solutions and tackling causes of problems such as soil health degradation and climate change, with stakeholder consultation and "robust analysis". It includes regular review and risk analysis[6]. Review is partly done through the monitoring, evaluation and learning system.[7]

Agricultural theories and approaches

It focuses on soil and climate, working to "increase soil organic matter, encourage biodiversity, reduce GHG emissions and sequester CO_2". Animal welfare and improving livelihoods is also covered. It has a requirement for continuous improvement and promises to "provide routes to additional funds for farms through carbon credit markets and environment related subsidies."[8]

There is a contextualised approach and it requires the limitation of soil disturbance,

Theory of Change: Yes	**Agricultural approach:** Regenerative	**Laws upon which it's based:** None, it is voluntary, private	**Status:** Voluntary, private	**Critical focus:** Regenerative agriculture	**Social, Gender policies:** Yes
Traceability: Yes	**Accreditation:** Of certifiers	**Management, complaints:** Via regenagri	**Development, revision:** Via stakeholder consultations	**Verification type:** Certification; GHG verification	**Labelling, marketing, promotion:** Labelling

Key: No information/relevance Partial information/relevance All relevant information available

using soil cover, implementing crop rotations, enhancing biodiversity, conser vation and integrating livestock.

Laws and regulations on which it is based

None, but certified organisations are required to comply with applicable laws where required.

Status: regulatory, voluntary, MSI, private

Private

Critical focus and elements

The strong focus of the standard is farming and soils, with biodiversity, water and greenhouse gases also a feature. But it also includes social aspects.[10] A prime requirement is for organisations affiliated to Regenagri CIC to "safeguard" areas with high biodiversity and high carbon stocks values, and not to be involved in the conversion of such land after 2015.[11]

It seeks to link carbon sequestration and emissions to "gain access to environmental subsides and the carbon credit market"[12]

Soil testing is critical, and minimum requirements are for sampling of "SOM and SOC levels, pH of the soil, CEC, NPK levels, magnesium levels, infiltration rates, and bulk density."[13] Soil organic carbon and other relevant data is used in calculating emissions scores for farms.

Farming requirements include common approaches such as cover cropping, conservation tillage, crop rotations, inter- and multi-cropping, as well as less common ones such as the use of perennial crops and vegetation. It requires, when they are used, the switch from synthetic to natural fertilisers, and similar for pest and disease control.

Landscapes are required to be managed for biodiversity and water protection around farmed land, with conservation of natural habitat. Locally-appropriate afforestation is also a recommended practice, and part of the certification process, with points awarded for net gains in tree numbers. Environmental impact scores are also awarded, including for plastic pollution prevention, rainwater harvesting or renewable energy use.

Emissions are verified.[14]

Social, Gender

The standard uses a risk assessment system for areas such as child labour, based on the World Bank's Worldwide Governance Indicators (WGI). It requires ›

1 https://regenagri.org/about-us/

2 https://regenagri.org/why-regenagri/ and https://www.controlunion.com/case/control-union-partnership-regenargri-solidaridad/

3 https://regenagri.org/updates/regenagri-launches-new-and-updated-standards/

4 https://regenagri.org/why-regenagri/

5 https://www.controlunion.com/certification-program/regenagri/

6 The Full ToC can be found here https://regenagri.org/wp-content/uploads/2023/07/regenagri-Theory-of-Change.pdf

7 https://regenagri.org/theory-of-change/

8 https://www.controlunion.com/certification-program/regenagri/

9 See standards documents here https://regenagri.org/standards-documents/

10 https://services.controlunion.com/organic/product/regenagri/ and https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

11 https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

12 https://www.controlunion.com/certification-program/regenagri/

13 https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

14 https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

farms to cover requirements for children and young workers, as under it, farms must meet requirements for children and young workers, workplace violence and harassment, freedom of association, pay, working hours, all the way to health & safety.[15]

The standard also includes a requirement to ensure communities benefit from regenerative farming.

Traceability

Traceability is linked to segregation in the standard, throughout "production, processing, and manufacturing". Regenagri has a Content Standard and in some cases a crop-specific regenagri Chain of Custody Standard."[16]

Accreditation

Control Union is the sole certifier for this standard, and as the certifier records and verifies data during the annual auditing process. Control Union provides certified companies with access to a chain of custody traceability system to approve Transaction Certificates.[17] [18]

Management, complaints

Regenagri is a separate and independent organisation. There is no involvement of CU in Regenagri. CU is just a certification body.[19] Complaints should be made to Regenagri. "It also offers "data analytics and benchmarking and advisory services", according to the standard documents.[20]

Development and revision

Regenagri's secretariat is responsible for "developing and continuously improving the regenagri standard, criteria, and guidelines."[21]

Verification, certification type

Regenagri is a certified system with content and crop specific standards, as well as a chain of custody system. Group certification is possible using an Internal Control System.[22]

There are three certification scopes: "Farm Level Certification", "Chain of Custody", and "Brands License".

Certificates are awarded if farms pass the minimum requirements.[23] A minimum score of 65% against the standard criteria is required to hold and to maintain the certification an improvement of score is required. The assessment is annual, and continuous requirement is necessary.[24]

Labelling, marketing and promotion

Regenagri has a "certified trust mark" for public claims.[25] A license agreement with Regenagri is required."[26]

[15] https://www.worldbank.org/en/publication/worldwide-governance-indicators

[16] https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

[17] https://connected.controlunion.com/en

[18] https://www.controlunion.com/certification-service/reporting-tracking-tracing/

[19] https://regenagri.org/about-us/

[20] https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

[21] https://regenagri.org/about-us/

[22] https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

[23] https://www.controlunion.com/certification-program/regenagri/

[24] https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

[25] https://www.controlunion.com/certification-program/regenagri/

[26] https://regenagri.org/wp-content/uploads/2024/08/regenagri-standard-criteria-v3.3.pdf

BioRe sustainable cotton

BioRe is a private sustainable cotton standard that includes organic cotton, and has additional sourcing principles, working with small farmers in India[27] and Tanzania.[28] The standard is owned by the BioRe Foundation, and was founded with Remei, a Swiss company. Remei markets organic cotton products, with subsidiaries in each country, Remei India Ltd and Remei Tanzania Ltd.

Theory of change

The standard does not specify a theory of change, but the bioRe Foundation's mission is to support farming communities in India and Tanzania, with a focus on improving their livelihoods through organic farming."[30]

Agricultural theories and approaches

BioRe sustainable cotton is based on the EUs organic farming standard.

Laws and regulations on which it is based

Certified organic cotton[31] with the addition ›

In its own words

The bioRe® Sustainable Cotton Standard is the quintessence of bioRe's sustainability performance and commitment towards small contract producers in India and Tanzania. Unlike any other social system which endeavours reconciliation between economic interests and social enhancement, the project's unique features along with its pioneering spirit promoted the benchmarking of bioRe's social system into a recognised standard system.
The endeavour was also to anchor the bioRe® sustainability system on methodological grounds. By setting it into a recognised standard system, the sustainability system has become socially accountable, hence auditable and verifiable. The objective assessment and verification by an independent body was indispensable for the standard's acceptance and recognition.
The development of the bioRe® Sustainable Cotton Standard was commissioned to FLO-Cert, the most renowned and only internationally accredited social certification body, for its expertise in social standard settings."[29]

[27] https://www.bioreassociation.org/

[28] https://www.standardsmap.org/en/factsheet/234568/overview?products=&name=bioRe

[29] https://www.biore.ch/wp-content/uploads/X_bioRe_Sustainable_Cotton_Standard_2017_version_3.0.pdf

[30] https://biore-stiftung.ch/en/what-we-do/

[31] The website still mentions an older version of the EU organic standard

Theory of Change: Not as such	**Agricultural theories and approaches:** Organic	**Laws and regulations on which it is based:** EU organic + voluntary	**Status:** Voluntary, private	**Critical focus:** Agriculture, environment, social, economic	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** No, except via EU certification	**Management, complaints:** Via BopRe	**Development, revision:** BioRe	**Verification type or certification:** Certification	**Labelling, marketing, promotion:** Labelling, and marketing via Remei

Key: No information/relevance Partial information/relevance All relevant information available

of bioRe's own social criteria, which was developed with FLO-Cert.

Status: regulatory, voluntary, MSI, private

It is a social and environmental private standard, but built over regulated organic cotton certification.

Critical focus and elements

The focus of the standard is on improving livelihoods and opportunities for small farmers in India and Tanzania, and ensuring its marketing. The focus for environmental interventions is meeting the EUs organic standard, with added interventions.

This includes training, and a focus on preserving soil fertility, using "on-farm" resources. There is a requirement for the use of non-GMO seed, and bioRe invests in seed research in India.

Criteria are set up to cotton ginning.[32]

Social, gender

The social part of the standard focuses among other areas on livelihoods, but also human rights, to ensure "effective and right-based participation of beneficiaries and the fulfilment of human rights."[33]

Farmers receive a premium over one kilo of seed cotton, of "a minimum of 15% of the average price over the past five years", with purchase guarantee of 5 years of 80% of production (total or estimated).

Producers have to meet local labour and other relevant laws as well, and follow non-discrimination rules. The foundation also promotes community development projects, and the foundation also has policies on CO_2 compensation and offsetting policies.

Traceability

All cotton produced to the sustainable cotton is traceable, with the BioRe sustainable textiles standard tracing cotton in finished garments back to farms. The sustainable textiles standard describes itself as supporting: "Organic cotton grown without GMO, fair production, ecological and skin-friendly, CO_2-neutral and traceable back to farming."[34]

There is an online traceability tool[35], with Remei, the company, as licensee of cotton for marketing.

Accreditation

Only as EU certified cotton is accredited.

Management, complaints

BioRe

Development and revision

BioRe

Verification, certification type

BioRe sustainable cotton is a certified standard, licensed to Remei. The Social standard element was designed by FLO-Cert.

Labelling, marketing and promotion

Remei AG is licensed to use the sustainable cotton and sustainable textiles standard. Remei agrees communication of the label with its customers."[36]

[32] https://biore-stiftung.ch/en/what-we-do/

[33] https://www.biore.ch/wp-content/uploads/X_bioRe_Sustainable_Cotton_Standard_2017_version_3.0.pdf

[34] https://www.biore.ch/wp-content/uploads/bioRe-Sustainable-Textiles-Standard-2019_version-0.0_public-1.pdf

[35] https://www.my-trace.ch/

[36] https://www.biore.ch/wp-content/uploads/X_bioRe_Sustainable_Cotton_Standard_2017_version_3.0.pdf

Fairtrade cotton

Fairtrade cotton is produced under the Fairtrade standard for small-scale producer organisations[37] and the Fairtrade standard for fibre crops.[38] Fairtrade cotton is produced under the SPO standard or the Contract Production standard, in conjunction with the product-specific standard for fibre crops.

Theory of change

Fairtrade's goals are social and environmental: improving farmer incomes and resilience to market volatility, through trade and a more equitable and transparent supply chains, and sustainable production. It also aims to influence trade beyond its own standard system."[40]

Agricultural theories and approaches

The starting point of Fairtrade for agriculture is IPM, but it also includes elements of agroecology. Much Fairtrade cotton is also jointly certified to an organic cotton standard.

[37] https://www.fairtrade.net/standard/spo
[38] https://www.fairtrade.net/standard/cp-fibre-crops
[39] https://info.fairtrade.net/product/cotton
[40] https://files.fairtrade.net/publications/2016_FairtradeTheoryOfChange.pdf

In its own words

"Fairtrade works with farmers who've formed small producer organisations, as well as contract production organisations in the process of forming independent cooperatives. Many Fairtrade cotton organizations are in West Africa – namely Mali, Senegal, Cameroon and Burkina Faso. But it's India that grows the most Fairtrade certified cotton.
Cotton production is linked to several environmental issues: Extensive usage of agrochemicals and excessive use of water put fresh water supplies for local populations at risk. Unpredictable weather conditions also endanger the livelihoods of small-scale farmers. Fairtrade works with farmers to stop or reduce the usage of agrochemicals and supports them to adapt to changing climate patterns. Fairtrade cotton fields in western Africa and India are rain-fed, reducing the region's water footprint, when compared with production in other countries.
Requirements in the Fairtrade Standards also protect farmers' health and safety, and ban genetically modified cotton seeds. A large percentage of Fairtrade cotton is also organic certified, and Fairtrade encourages and empowers cotton farmers to protect the natural environment as an integral part of their farm management.
There are other important advantages for Fairtrade cotton farmers, too.
The Fairtrade Minimum Price is the minimum that producers are paid when selling their products through Fairtrade. It aims to cover the average costs of sustainably producing their goods and acts as a safety net when market prices drop. Producers can get the market price when this is higher and can always negotiate for more.
The Fairtrade Premium is an extra sum of money paid on top of the selling price that farmers or workers invest in projects of their choice. They decide together how to spend the Fairtrade Premium to reach their goals, such as improving their farming, businesses, or health and education in their community.
The Fairtrade Standards are the requirements that producers and the businesses who buy their goods have to meet for a product to be Fairtrade certified. The Standards ensure fairer terms of trade between farmers and buyers, protect workers' rights, and provide the framework for producers to build thriving farms and organisations."[39]

Theory of Change: Yes	**Agricultural theories and approaches:** IPM, agro-ecology	**Laws and regulations on which it is based:** Relevant national laws, including organic if double certified	**Status:** Voluntary, MSI, private: private	**Critical focus:** Agriculture, social, economic	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** FLOCERT accredited by DAkkS	**Management, complaints:** Via Fairtrade	**Development, revision:** Regularly	**Verification type or certification:** Certification	**Labelling, marketing, promotion:** Labelling

Key: No information/relevance Partial information/relevance All relevant information available

Laws and regulations on which it is based

Fairtrade is a private standard, but requires application of relevant national laws, and also references the ILO standard.

Status: regulatory, voluntary, MSI, private

Private, voluntary

Critical focus and elements

Fairtrade is limited in where it is applied, as "Excluded from Fairtrade International's geographical scope are members of the European Union and G8-countries." The number of small producers in an organisation is not limited (unlike EU organic regulation), and in that participants must use family labour. Where hired labour might apply, there is a standard, but it only applies to specific crops, not including cotton (at least at present).[41] Contract production requirements cover small producers not involved in formal or informal structures, working in partnership with intermediaries. This body becomes a "promoting body" and is meant to support producers to become independent producer organisations able to become Fairtrade certified.[42]

Fairtrade focuses on reducing "risks to health and the environment" and protecting biodiversity (including protecting forests and riparian boundaries), with IPM approaches to reduce the use of pesticides, and ensure they are properly stored and handled, with no use of "forbidden pesticides".

Soil fertility approaches focus on reducing erosion risks and improving soil fertility. Water management sustainability is also part of the requirements.

There should be no intentional use of GMOs and contamination should be avoided. Producers are required to implement climate adaptation measures (including carbon sequestration), and use energy efficiently.

Fairtrade cotton can be certified under the Fairtrade Textile Standard for finished products. This can include responsibly produced fibres under other standards, including Better Cotton.[43]

Social, gender

The fibre crop standard requires good payment terms for Fairtrade producers, and the textile standard requires payment of a living wage. National legislation and ILO standards are also minimum requirements, alongside no use of forced

Fairtrade theory of change

Source: https://files.fairtrade.net/publications/2016_FairtradeTheoryOfChange.pdf

or child labour, freedom of association, attention to occupational health and safety and discrimination.

Fairtrade also has strong criteria on women's empowerement and gender, and promotes women's participation in Fairtrade. It also offers a guide on human rights and environmental due diligence (HREDD) for producers.[44]

Traceability

Purchases and sales of cotton are recorded under Fairtrade, and are segregated during storage, transport, processing and so on, until the point of sale.

Accreditation

Fairtrade is ISEAL Code Compliant.

Management, complaints

Fairtrade has a complaints procedure.[45] The system is managed by Fairtrade, but organisations are required to have management systems, to monitor their compliance with Fairtrade requirements, and to have democratic decision making.

Development and revision

Fairtrade has a standards committee that meets regularly and reviews standards, minimum prices, and looks at new areas.[46]

Verification, certification type

Fairtrade is a certified system verified by FLOCERT.

Labelling, marketing and promotion

The Fairtrade mark goes on certified products. Use of the mark is under contract with Fairtrade International or national Fairtrade organisations.[47]

[42] https://files.fairtrade.net/standards/FibreCrops_SPO_EN.pdf

[43] https://www.fairtrade.net/standard/ and https://www.fairtrade.net/standard/textile

[44] https://www.fairtrade.net/news/fairtrade-releases-first-ever-hredd-guide-for-farmers

[45] https://files.fairtrade.net/standards/2016-02-04_short_SOP_Complaints_against_Fairtrade_Standards_setting.pdf

[46] https://www.fairtrade.net/standard/how-we-set-standards

[47] https://www.fairtrade.net/standard/spo

Global Organic Textile Standard (GOTS)

The Global Organic Textile Standard – imanaged by non profit Global Standard – is a programme for processing organic cotton and other organic fibres. It sets environmental and social standards for the processing chain and checks the credibility of organic raw materials.[1]

In its own words

"The aim of the standard is to define world-wide recognised requirements that ensure the certified organic status of textiles, from the harvesting of the raw fibre, through environmentally and socially responsible manufacturing up to labelling in order to provide credible assurance to the end consumer. Textile processors and manufacturers are thus enabled to export their organic fabrics and garments with one certification accepted in all major markets."
"In developing GOTS, we set strict – and binding – requirements regarding ecological and social parameters. In doing so, we take into consideration the need for a standard that is practicable for industrial production and appropriate for a wide range of products. Taking both aspects into account, we define organic textiles as containing a minimum content of organic fibres, being processed with the least possible environmental impact, under strict controls on natural and synthetic chemical inputs and with respect for labour conditions."[2]

Theory of Change

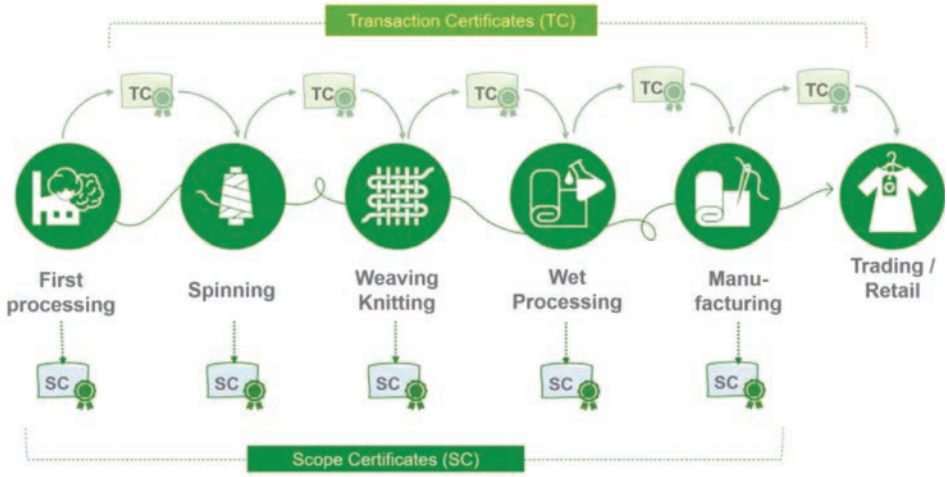
GOTS does not have a theory of change but describes a philosophy and vision[3] it seeks to develop and promote GOTS-certified products, with the best possible – that is, as sustainable as possible – impact: "the standard stipulates requirements throughout the supply chain for both ecological and labour conditions in textile and apparel manufacturing using organically produced raw materials". As with farming standards, GMOs are banned.[4]

Agricultural theories and approaches

There are no set theories here as GOTS is a processing standard, but inputs to the system are required to be organic.

Theory of Change: Not as such	**Agricultural theories and approaches:** Not applicable, but fibres are organic	**Laws and regulations on which it is based:** Applicable national standards	**Status: Voluntary, MSI, private:** Voluntary	**Critical focus:** Supply chain, processing, tracing	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** IFOAM family of standards	**Management, complaints:** Global Standard	**Development, revision:** Yes	**Verification type or certification:** Certification	**Labelling, Marketing, promotion:** Labelling

Key: No information/relevance Partial information/relevance All relevant information available



Source: https://global-standard.org/the-standard/gots-key-features/traceability

Laws and regulations based

GOTS is a voluntary private standard, but certified fibres will meet the relevant national laws, such as EU or NOP.

Status: regulatory, voluntary, private

Voluntary, private

Critical focus and elements

The GOTS system is a vehicle for processing organic fibres. Organic fibres have to be certified to a standard that is recognised by the IFOAM family of standards, such as EU, US and Indian cotton and fibre standards.
It adds to this a set of environmental and social criteria for processing, and traces fibre materials through the supply chain. It also now includes due diligence guidance.[5]
Environmental criteria focus on GMOs, highly hazardous chemicals, and the search for other low impact options.

Social, gender

Social criteria are also important in the standard, particularly for labour. There are requirements for gender equality, including "equal, fair, and transparent recruitment, promotion, and reward procedures and practices."[6] There are prohibitions on forced and child labour, as well as gender-based violence, harassment, discrimination, and requirements for freedom of association and

1 https://global-standard.org/the-standard/gots-key-features https://www.standardsmap.org/en/factsheet/30/overview?name=Global%20Organic%20Textile%20Standard%20-%20GOTS

2 https://global-standard.org/the-standard/philosophy

3 https://global-standard.org/the-standard/philosophy

4 https://global-standard.org/the-standard/philosophy

5 https://global-standard.org/the-standard/gots-key-features/organic-fibres and https://global-standard.org/the-standard/gots-key-features/due-diligence

6 https://global-standard.org/images/resource-library/documents/standard-and-manual/GOTS_7.0_ENG_signed.pdf

7 https://global-standard.org/the-standard/gots-key-features/human

other rights, and fair wages.[7] The standard also references the UN Guiding Principles for Business and Human Rights and the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector.[8]

Traceability

GOTS tracks both scope (the products a company makes, and the production units, partners included) and transaction (the movement of the products) certificates. Both can be reconciled and mass balance checked (volume reconciliation). There are also on-site third-party audits.[9]

Farmers, including farmers in ICS groups, have to register in the "GOTS Farm-Gin registry" before their fibres can enter the GOTS system.[10]

Accreditation

GOTS requires all cotton and fibre entering its system to be certified under an IFOAM family of standards scheme (for cotton and organic inputs). GOTS is an ISEAL community member (committed to following the ISEAL code of conduct, and reporting on progress). It also has its own accreditation system to approve GOTS certifiers, and for monitoring. It requires certifiers to be accredited at a minimum to ISO/IEC Guides 17011 and 17065, which cover how certifiers perform their work.[11] [12]

Management, complaints

GOTS is a private standard, and leads investigating, and if needed, sanctioning complaints for misuse of the label or certification issues."[13]

Development and revision

GOTS also keeps the standard under review as part of its continuous improvement and development.[14]

Verification, certification type

GOTS is third-party verified, with inputs such as organic cotton certified under the relevant, IFOAM accredited, national or regional organic standards."[15] Products certified to GOTS have to contain at least 70% organic, natural, fibres. There are annual and random inspections.[16]

Labelling, marketing and promotion

Certified products can be labelled and sold as long as they meet the requirements to have 70% certified organic fibres. The standard reserves labels for textiles certfied under the standard. Labels will read, for example, "made with (x%) organic materials" or "made with (x%) Organic in-conversion materials".[17]

It also has regional representatives who promote the GOTS standard.

[8] https://global-standard.org/the-standard/gots-key-features/human

[9] https://global-standard.org/the-standard/gots-key-features/traceability

[10] https://global-standard.org/images/resource-library/documents/GOTS_Due_Diligence_Handbook_for_Certified_Entities_10.pdf

[11] https://www.iso.org/standard/67198.html and https://www.iso.org/obp/ui/#iso:std:iso-iec:17065:ed-1:v1:en

[12] https://global-standard.org/images/resource-library/documents/GOTS_Due_Diligence_Handbook_for_Certified_Entities_10.pdf

[13] https://global-standard.org/the-standard/philosophy

[14] https://global-standard.org/the-standard/philosophy

[15] https://global-standard.org/the-standard/philosophy

[16] https://global-standard.org/images/resource-library/documents/standard-and-manual/GOTS_7.0_ENG_signed.pdf

[17] https://global-standard.org/the-standard/gots-key-features

Cotton made in Africa (CmiA)

Cotton made in Africa[18] (CmiA) was the first standard developed by Aid by Trade Foundation[19] (AbTF), and is now joined by CmiA organic and the Regenerative Cotton Standard for cotton, as well as a cashmere standard. It is targeted at smallholder farmers in Africa, whose cotton is rain-fed and not genetically modified (GM).

Theory of Change

CmiA's Theory of Change (ToC) covers all three standards in the CmiA family.[21] It focuses on inputting support into production (trainings, verification, community investment, market development) to improve sustainability, profitability and efficiency, leading to better livelihoods.

In its own words

"Cotton made in Africa, an initiative of the Aid by Trade Foundation, is one of the world's leading standards for sustainably produced cotton. Our goal is to help people help themselves, via trade rather than donations, in order to improve the living and working conditions of smallholder farmers in Africa and to protect our environment. We work with a wide-ranging network in cotton-growing countries, including numerous partners throughout the textile value chain as well as both governmental and non-governmental organisations.
Our work is built on the four pillars:

1. People: CmiA supports smallholder farmers, working to promote gender equality, dignified labour conditions, and respect for the rights of children.
2. Planet: CmiA is committed to protecting soil,water, biodiversity, the climate, and the environment, including by banning the use of genetically modified organisms and reducing the negative effects of crop protection.
3. Prosperity: CmiA facilitates access to high-quality equipment and is actively helping improve productivity, fibre quality, and overall living conditions.
4. Management: CmiA sets out the requirements related to responsible business conduct, verification and commitment to CmiA values "[20]

[18] https://cottonmadeinafrica.org/en/
[19] https://www.aidbytrade.org/en/home/
[20] https://cottonmadeinafrica.org/en/about-us/

Theory of Change: Yes	**Agricultural theories and approaches:** IPPM, conservation agriculture	**Laws and regulations on which it is based:** It is a voluntary standard	**Status:** Voluntary, private, MSI	**Critical focus:** Agriculture, social, ecology, climate, economic	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** No	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** Certified/verified	**Labelling, marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

Training is a critical component, with an emphasis on "experts' knowledge on sustainable and profitable cotton production (as inputs)". The increased capacity is expected to help farmers deliver impacts including improved working conditions, diversified crops, lower input costs, higher yields, and less pesticide use, as well as better soil fertility.[22]

Agricultural theories and approaches

CmiA requires farmers to protect biodiversity and natural habitat, and to reduce land conversion. It aims to do this by helping farmers be more productive and profitable. It uses IPPM and conservation agriculture, with techniques like crop rotation, intercropping, biochar with a focus on soil health.

Laws and regulations on which it is based

CmiA is a voluntary standard, which also requires participants to follow national and global laws as applicable, as well as ILO conventions.

Status: regulatory, voluntary, MSI, private

It is a private voluntary standard owned by Aid by Trade Foundation.

Critical focus and elements

The standard system is implemented via a managing entity (ME) which manages farmers, through input- and training-provision. It is aimed at small farmers in Africa who grow under rain-fed conditions. The foundations for production are environmental and climate-friendly farming, soil and water conservation, biodiversity protection, and reduced impacts from crop protection.[23] There are targets to improve livelihoods, and community health.

The majority (90%) of farmers have to farm less than 20ha of land, with most work done by the farmer, their family and the community, and with no year-round paid workers.[24] A further goal is to build up producer organisations.

The agricultural approach requires assessing and protecting areas of high conservation value (HCV), as well as reforestation. Alongside IPPM, farmers are also required to follow practices that promote carbon sequestration, including "minimising" the use of synthetic fertilisers, and "recycling" crop residues, while operators and stakeholders should seek to reduce the use of fuel, and gins to switch to renewable energy.[25]

Fertiliser is meant to be "optimised" to local conditions, with a focus on restoring soil fertility, through the use of crop rotation, and building soil organic matter content. Food security is also meant to improve with these practices.[26]

Pesticide use reduction is important, including banning highly hazardous pesticides, with pesticides allowed needing to be registered, labelled in national languages, and used under IPPM principles, that is, replacing their use with other pest management techniques where possible. There is a list of prohibited pesticides, including those under the Stockholm, Rotterdam, and Montreal conventions, and some under WHO or GHS lists. Farmers and workers are also protected by "Occupational health and safety criteria" to ensure safe application, and handling.

MEs should also seek improved

profitability, and offer farmers training on business skills, as well as literacy and numeracy. The system seeks continuous improvement, and has both core as well as improvement criteria. [27]

Social, gender

Social criteria focus on areas such as human rights, and business conduct, with requirements for due diligence to be performed in areas of high risk such as child labour, non-discrimination, freedom of association and fair labour, a safe and healthy working environment.

CmiA has a position paper on gender equality that promotes participation as well as "access to resources and opportunities for women on equal terms with men, offering women the chance of personal development." The standard has several gender related criteria and indicators, that focus on women's empowerment, and non-discrimination. Partners are required to make commitments. Specific rights touched upon include equal pay, and maternity rights, as well as equal opportunities. They must have a written gender policy.[28]

Traceability

CmiA collects data from all certified production based on its "monitoring, evaluation and learning (MEL) system", with MEs providing data during the self-assessment process. CmiA also collects data from MEs and also monitors traded volumes of CmiA certified cotton.[29]

CmiA has a chain of custody model, and also options for mass balance and "Hard Identity Preserved" (HIP: Bales of ginned lint are also traceable back to their point of purchase, that is the village or "buying station") traceability. CmiA cotton, seed as well as lint, has to be segregated. Sales are recorded.[30] Buyers of CmiA can then track the cotton they use through the supply chain, either as mass balance or HIP, following the Chain of Custody guidelines.[31] All levels of the supply chain (handling and/or sourcing) have to have a relationship with CmiA.

Accreditation

No current accreditation found.

Management, complaints

AbTF manages the CmiA standard and other standards in the system, with its marketing company Atakora managing the supply chain and marketing.

AbTF has a "Concerns and Complaints Mechanism", which cover anything from ›

[21] https://cottonmadeinafrica.org/wp-content/uploads/CMIA_Standard_ToC_Textdokument_final_EN.pdf

[22] https://cottonmadeinafrica.org/en/principles-and-criteria/

[23] https://cottonmadeinafrica.org/en/principles-and-criteria/#panel3

[24] https://cottonmadeinafrica.org/wp-content/uploads/CMIA_Standard_ENG.pdf

[25] https://cottonmadeinafrica.org/en/principles-and-criteria/#panel1

[26] https://cottonmadeinafrica.org/wp-content/uploads/CMIA_Standard_ENG.pdf

[27] https://cottonmadeinafrica.org/wp-content/uploads/CMIA_Standard_ENG.pdf

[28] https://cottonmadeinafrica.org/wp-content/uploads/CmiA_Gender_Equality_A4_Final_EN.pdf

[29] MEL system report

[30] https://cottonmadeinafrica.org/wp-content/uploads/CMIA_Standard_ENG.pdf

[31] https://cottonmadeinafrica.org/wp-content/uploads/CmiA_Chain_Of_Custody_2023.pdf

its policies to third party verifiers, or concerns about fraud. MEs are also expected to have management systems and grievance procedures covering their implementation of CmiA.[32]

Development and revision

CmiA has procedures for developing and revising the standard, including with working groups appointed by and reporting to AbTF management.[33]

Verification, certification type

CmiA is a verified system which begins with self-assessment by managing entities. Companies submit this annually, and compare their data to the programme's criteria. AbTF then uses this to commission external verification by independent third parties, and to monitor impact. This is also done annually. A certificate, delivered by AbTF, is valid for two years, and the process alternately looks at farming and ginning. Compliance with core indicators is a requirement. Improvement indicators are also monitored, but would not prevent certification if an organisation is not in compliance. Organisations are however required to have a continuous improvement plan.[34]

Labelling, marketing and promotion

Marketing is managed by Atakora, a company related to AbTF. Retailers and brands pay a licencing fee to use the CmiA label, with that revenue used to finance CmiA activities and development, including agriculture.[35]

[32] https://cottonmadeinafrica.org/wp-content/uploads/CmiA-Assurance-Manual-V1.1.pdf

[33] https://cottonmadeinafrica.org/wp-content/uploads/Standard_Setting_and_Revision_Procedure_2024.pdf

[34] https://cottonmadeinafrica.org/en/assurance/

[35] https://cottonmadeinafrica.org/wp-content/uploads/CMIA_Standard_ENG.pdf

CmiA Organic

Cotton made in Africa Organic is essentially CmiA cotton, but grown under organic farming standards, meaning it has to be certified organic. It then adds in social, economic and environmental requirements from CmiA, including improving the livelihoods of cotton farmers, ginnery workers and their communities, along with traceability and other aspects.

Theory of Change

CmiA organic is part of the same family as CmiA, and has the same ToC.

Agricultural theories and approaches

The CmiA Organic standard starts with CmiA. But on top of IPPM also comes a requirement for managing entities to get their operations certified organic, to an IFOAM accredited standard.

In its own words

"Cotton made in Africa Organic is a cotton standard that expands on existing certifications in two respects. Firstly, it takes elements from an organic standard within the internationally recognised IFOAM family of standards and blends them with Cotton made in Africa's own established standards for improving the living and working conditions of small-scale cotton farmers. Secondly, it takes the criteria for organic certification and supplements them with social criteria and indicators found in Cotton made in Africa (CmiA) standards.[36]

Laws and regulations on which it is based

Where CmiA is a voluntary, private standard, CmiA organic will have an added legal standard for the organic part, from the IFOAM family of standards, with EU organic and NOP being mentioned.

Status: regulatory, voluntary, MSI, private

CmiA organic, like CmiA, is a private, voluntary standard.

[36] https://cottonmadeinafrica.org/en/organic/

Theory of Change: Yes	**Agricultural theories and approaches:** IPPM + organic	**Laws and regulations on which it is based:** Organic standards	**Status: Voluntary, MSI, private:** Voluntary, and legal	**Critical focus:** Agriculture, environmental, social, economic	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** IFOAM Family of Standards for organic	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** Verified, certified	**Labelling, marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

Critical focus and elements

The requirement for most producers to be African smallholders, growing under rain-fed conditions, also applies to CmiA Organic. But unlike other organic standards, it adds social and economic criteria, and also requires segregation and handling criteria. Specific topics covered include child labour, fair working conditions, freedom of assembly, and so on. As with CmiA, there are also community projects.[37]

Added criteria in the IPPM module are for pest control methods to avoid pest resistance, while management of any organic inputs has added criteria on handling, cleaning and storage.[38]

Social, gender

The requirements are the same as CmiA's.

Traceability

Traceability will be the same as for CmiA, but with any added requirements from the relevant organic certification.

Accreditation

Certified organic cotton will have followed IFOAM accreditation, that includes in the family of standards EU organic and the US NOP among others.

Management, complaints

As per CmiA.

Development and revision

As per CmiA.

Verification, certification type

CmiA organic is certified organic, and then verified CmiA, and only uses the Hard Identity Preserved (HIP) traceability system. Managing Entities have to register their organic certificates annually with AbTF with their self-assessment.

Verifiers will check that there is an appropriate organic certificate for the operation.[39]

Labelling, marketing and promotion

Labelling and marketing is the same as CmiA.

[37] https://cottonmadeinafrica.org/en/organic/

[38] https://cottonmadeinafrica.org/wp-content/uploads/CmiA-Organic_Compl-Requirements-CmiA-Vol4_V1_EN.pdf

[39] https://cottonmadeinafrica.org/wp-content/uploads/CmiA-Organic_Compl-Requirements-CmiA-Vol4_V1_EN.pdf

Regenerative Cotton Standard

AbTFs Regenerative Cotton Standard (RCS) is the latest standard joining CmiA and CmiA organic. It differentiates by no longer focusing exclusively on African smallholders, and not being exclusively rain-fed, as its pilot roll-out is taking place in both India and Africa. The majority of farmers (95%) must still be smallholders.

Theory of Change

RCS does not have a standalone Theory of Change as CmiA does, but its stated aims are to increase farmers' resilience against climate change, diversify crops and incomes, protecting agricultural landscapes, and natural resources. It also uses a similar structure to CmiA,

Theory of Change: Not standalone	**Agricultural theories and approaches:** Regenerative	**Laws and regulations on which it is based:** It is a voluntary standard, but applicable national laws	**Status: Voluntary, MSI, private:** Voluntary, private	**Critical focus:** Agriculture, environment, social	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** No	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** Verification by independent bodies	**Labelling, marketing, promotion:** Yes, via Atakora

Key: No information/relevance Partial information/relevance All relevant information available

In its own words

"Developed by the Aid by Trade Foundation (AbTF), the Regenerative Cotton Standard (RCS) is a voluntary standard for cotton grown by small-scale farmers using regenerative farming methods. RCS aims to improve the overall resilience and productivity of small-scale farming while adding value to farmland, rural communities, the biosphere, and the quality of life of farm animals.To achieve these aims, RCS targets the entire production system rather than only the cotton itself. RCS focusses on farm-level outcome indicators. It includes all arable land on which cotton could be grown as part of a crop rotation as well as any livestock on the farms. The managing entity carries a high level of responsibility to involve, organise and train RCS-associated farmers and to create the preconditions for enabling a transformation towards regenerative farming. This includes established management and social criteria which have already made Cotton made in Africa (CmiA) a successful and credible standard. Respecting and amplifying traditional knowledge, combining this traditional knowledge with today's state-of-the-art scientific knowledge, and involving the farming communities' views during prioritisation and implementation are core factors within most operative criteria."[40]

[40] https://regenerative-cotton.org/en/home/

using managing entities to "organise" RCS farmers.[41]

Agricultural theories and approaches

The RCS standard has adopted its own definition of Regenerative Agriculture, which focuses on "creating co-benefits" to improve agricultural systems, bringing in traditional knowledge as well as science.[42]

Regenerative Agriculture: the AbTF definition

"The idea of regenerative agriculture is not new and has been subject to different definitions. The Aid by Trade Foundation's RCS defines it as follows: Actively creating co-benefits in interaction between nature, people, society, and the economy, bringing agricultural systems into a better state than they are currently in.
Responsible management forms the basis to enable transformation towards community-supported regeneration. To achieve and verify this, it is key to combine suitable and available traditional knowledge and farming approaches with scientific insights and state-of-the-art digital technology".[43]

Laws and regulations on which it is based

RCS is not a legal standard, but does reference some external laws, including the EU Deforestation Directive (farm areas must be deforestation free from December 31, 2020) and the ILO conventions 138 and 182.[44]

Status: regulatory, voluntary, MSI, private

It is a private, voluntary standard.

Critical focus and elements

Climate change is one of the drivers of the standard, as well as resource degradation in farming systems. The RCS has ten principles and a range of indicators. Core are the notions of responsible management, community engagement, and traditional knowledge and science. It also covers the farm system, and not just cotton. Animal welfare and management are included in the standard. Managing entities are required to ensure sufficient trained extension agents. Ginneries or cotton companies involved must also meet RCS ginnery requirements as set per the CmiA standard criteria and indicators. Biodiversity requirements include protecting areas of High Conservation Value (HCV). Important for the RCS is that impact is viewed as most important, and farmers can set priorities according to local realities: "Solutions may be specific to a particular location or context."[45]

Because of this, rather than just criteria, managing entities should do a "risk and opportunity assessment" to prioritise criteria, and where needed make "continuous regeneration plans". RCS areas and field margins need to be mapped, and soil assessments made with "GPS-tagged soil assessments and laboratory analysis results (wherever possible)".[46]

Soil health starts with the crop rotation and the farm system, "with the goal of making the whole farming system more resilient in both ecological and economic terms."[47] Approaches are expected to include farmers in planning, using their knowledge, and to "regenerate and return degraded land to production".

Continuous improvement, as well as adaptation to local conditions, are important in regenerative. The improvements should include training and learning needs. RCS also brings in culture

and society alongside growing areas and conditions.[48] For soil, this means monitoring soil health, and a plan to restore fertility and reduce erosion.

The standard also looks at "reducing or replacing synthetic inputs", and also "discourages" the use of GM seeds, on the grounds that these generally require high use of "synthetic" inputs, which contradicts the goals of regenerative farming.[49] Where GMOs have been used before starting RCS, a strategy needs to be developed to replace them with low-input adapted seeds.

Restrictions on synthetic inputs include those under the Stockholm, Rotterdam Conventions and Montreal Protocol, and certain World Health Organisation and GHS classifications. Organic inputs must meet the requirements of the applicable standard. Requirements also cover handling, storage and maintenance of protective and use equipment, as well as farmer training. Managing entities support access to inputs for producers, and managing and organising training on their use.

Another principle of the RCS is for farmers in a group to be close to each other, enabling "peer exchange" but also for organic and carbon containing waste to be easily recycled within the group. It is not mandatory for farms to work exclusively under rain-fed conditions. Those not irrigated before joining RCS must remain rain-fed, while for farms who were irrigated, "efficient" water management is required.[50] Water bodies must be protected from pollution.

Alongside crop diversity and rotation over 3 or 4 years, the RCS requires MEs to look at reforestation and agroforestry, and use where possible locally adapted low-input seeds. These should use native trees and shrubs, with MEs helping farmers to get saplings or supporting nurseries. Seeds must be "suited" for low input farming.[51]

Social, gender

The RCS also includes both social and gender-specific requirements, with the ME required to promote gender equality, and social requirements in areas including non-discrimination and no use of forced or child labour. Freedom of association and rights to unionise are covered, while managing entities promote gender policies. This includes on pay, employing female facilitators, and paying women farmers directly. They should also have grievance and arbitration procedures. The RCS also covers disadvantaged and minority groups.[52]

[41] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[42] https://regenerative-cotton.org/en/home/

[43] https://regenerative-cotton.org/en/home/

[44] https://www.ilo.org/international-programme-elimination-child-labour-ipec/what-child-labour/ilo-conventions-child-labour

[45] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[46] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[47] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[48] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[49] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[50] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[51] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[52] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

Traceability

RCS cotton has to be traced and verified to be sold as RCS, with seed cotton traceable from the marketplace, and "stored and processed separately from any other cotton in the ginnery", with documentation on all stages.[53] RCS products are exclusively Hard Identity Preserved, that is, fully traceable.

Accreditation

None identified.

Management, complaints

Managing entities are expected to have grievance and arbitration procedures. They should also have done due diligence to identify "hot spots", and an analysis should be done at least every three years. Atakora, as the marketing body, has a code of conduct for all business partners in the RCS.[54]

Development and revision

The RCS standard documents do not specify a timetable for revision but does state they are "subject to regular evaluation and revision".[55] Processes may also be similar to CmiA.

As a new standard, this may simply yet to be established.

Verification, certification type

Managing Entities are expected to provide information for a baseline (checked every five years) and develop a strategic approach documented in the annual "Continuous Regeneration Plan".

For verification purposes, the ME annually submits a self-assessment against the RCS core and improvement indicators. Independent third-party verification bodies then check the MEs and farmers compliance against RCS requirements (annually for the first two years, then possibly every second year).The ME receives a certificate when verification results confirm RCS compliance. [56] Entities that are already certified with CmiA may get RCS as an add-on certification.

Labelling, marketing and promotion

As with CmiA, Atakora, an AbTF subsidiary, is responsible for marketing and promotion of the standard. The idea, as with CmiA, is a positive feedback loop with sales of RCS cotton generating revenues to be reinvested in the system, and supporting farmers and their communities. Rotation crops can also be traded.[57]

[53] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[54] https://regenerative-cotton.org/wp-content/uploads/Code-of-Conduct-2023.pdf

[55] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[56] https://regenerative-cotton.org/en/home/ and https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

[57] https://regenerative-cotton.org/wp-content/uploads/Regenerative_Cotton_Standard_0.0-2.pdf

IFOAM Norms and IFOAM Family of standards

IFOAM – The International Federation of Organic Agriculture Movements – has its own production norms, and standard. Organic farming as a concept predates laws regulating what it is, and the IFOAM norms reflect this, including with some social aims. The norms also have rules for accrediting certifiers. They exist to ensure market conformity of organic products, and to allow equivalence and recognition of different, but similar, standards and certifications.[58]

Theory of Change

IFOAM norms do not have a Theory of Change as such. However, its standard sets out a goal for it to be a certifiable standard and a model "for organic standard setters to discuss standards and create synergies

In its own words

"The IFOAM Norms form the basis of the Organic Guarantee System of IFOAM - Organics International. They are composed of three parts.

- Firstly, the Common Objectives and Requirements of Organic Standards (COROS) - IFOAM Standards Requirements.
- Secondly, the IFOAM Standard for Organic Production and Processing.
- Thirdly, the IFOAM Accreditation Requirements for Bodies Certifying Organic Production and Processing." [59]

"IFOAM-Organics International defines organic agriculture as "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"." [60]

Theory of Change: Not as such	**Agricultural theories and approaches:** Organic, agroecology	**Laws and regulations on which it is based:** None, but it accredits several under the family of standards	**Status: Voluntary, MSI, private:** Voluntary	**Critical focus and elements:** Agriculture, environment	**Social, Gender:** Some
Traceability: Yes	**Accreditation:** Yes, for certifiers and recognition of other organic standards	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** Third party certification	**Labelling, marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

[58] https://www.ifoam.bio/our-work/how/standards-certification/organic-guarantee-system and https://www.standardsmap.org/en/factsheet/165/overview?products=&name=IFOAM%20Standard

[59] https://www.ifoam.bio/our-work/how/standards-certification/organic-guarantee-system/ifoam-norms

[60] Ifoam norms

for standard development and harmonisation at the global level".[61] It is also worth visiting IFOAM's Organic 3.0 concept paper, which seeks to lay out a pathway for the development of organic.[62]

Its principles include ecological, economic, social, cultural and accountability goals.

Agricultural theories and approaches

IFOAM is an organic system, that shares common roots with agroecology, with early theory often inspired by traditional farming systems, such as India's. It includes social justice goals. Its core principles are health, ecology, fairness, and care.[63]

Laws and regulations on which it is based

The IFOAM standard is not based on a particular law, but accredits and seeks to influence laws. The EU, US and Indian standards are all recognised as part of the IFOAM family.

Status: regulatory, voluntary, MSI, private

IFOAM is a private, international, membership association.

Critical focus and elements

The IFOAM standard is based on farming without using synthetic inputs, and working with nature, with requirements also on landscape protection, including preserving areas of High Conservation Value (HCV), biodiversity protection, and habitat creation.

Soil health is important, with requirements to "conserve and improve the soil, maintain water quality and use water efficiently and responsibly."[64] Healthy soils are central, but so is local adaptation for "ecology, culture and scale". Like some regenerative approaches, it requires the reduction of input use and recycling of waste and organic matter, and "efficient management of materials and energy in order to maintain and improve environmental quality and conserve resources."[65] There must be crop rotation and the use of local soil fertility options where available.

Crop rotation

No synthetic inputs are allowed, and no GMOs. The standard requires that "species and varieties" are adapted to local conditions, and are tolerant to local pests and diseases. Seeds must be organic. There is also a three-year conversion period.

Pest and disease management requirements stipulate the use of "biological and cultural" techniques, and other techniques, including "companion planting, green manures, functional biodiversity, habitat management, beneficial organisms."[66]

The standard also covers processing and handling requirements such as segregation, and managing risks of non-organic contamination, pest control during handling and transport, or the use of GMOs in processing (e.g., enzymes). [67]

Social, gender

The IFOAM standard is also required to be fair: to people and to shared resources: "equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings."[68] It also covers fairness in relationships in the supply chain, that "fairness at all levels and to all parties involved." Collective organisation for farmers and staff, access to

education, the rights of indigenous peoples, community investment, and land rights are all covered, along with labour rights, and child and forced labour specifically.[69]

Traceability

Organic products under IFOAM have to be traceable, and ensure organic products are segregated during handling and processing. They should be identifiable and handled so as to avoid mixing or substitution with "conventional" products.[70]

Accreditation

IFOAM accredits certifiers and also accredits other organic standards against its own norms, in its "family of standards". Its "International Requirements for Organic Certification Bodies (IROCB) assesses equivalence of Certification Bodies, using a method considered "equivalent to ISO 17065", according to IFOAM[71]

Management, complaints

The IFOAM norms are managed by IFOAM. Complaints on organic certification should be made to certifiers first.[72]

Development and revision

IFOAM has a policy for development and revision of the standard.[73]

Verification, certification type

The IFOAM organic guarantee system is a third-party certified system. It also covers equivalence between organic systems, with the aim of promoting trade. For equivalence, IFOAM has the "Common Objectives and Requirements of Organic Standards (COROS) – IFOAM Standards Requirements", which allow equivalence to be checked.[74] There is also a Participatory Guarantee System (PGS) which covers more local, and small farmer systems[75] and another for certification of Internal Control Systems (ICS) for Group Certification.[76]

Labelling, marketing and promotion

Organic labels must be clear and accurate, according to the standard,[77] and can be labelled as Organic (95 to 100% organic), Made with organic (70 to 95%), or if less, only the ingredient can be marked organic in the label.[78]

[61] https://www.ifoam.bio/our-work/how/standards-certification/organic-guarantee-system/ifoam-standard
[62] https://www.ifoam.bio/sites/default/files/2020-05/Organic 3.0_v.2_web.pdf
[63] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[64] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[65] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[66] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[67] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[68] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[69] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[70] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[71] See list of Conformity Assessment Systems recognized by IFOAM-Organics International as equivalent to the IROCB at https://www.ifoam.bio/our-work/how/standards-certification/organic-guarantee-0
[72] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[73] https://archive.ifoam.bio/en/ogs-policies-library
[74] https://www.ifoam.bio/our-work/how/standards-certification/organic-guarantee-system/coros
[75] https://www.ifoam.bio/our-work/how/standards-certification/participatory-guarantee-systems/pgs-faqs
[76] https://www.ifoam.bio/our-work/how/standards-certification/internal-control
[77] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf
[78] https://ifoam.bio/sites/default/files/2020-04/ifoam_norms_version_july_2014.pdf

REEL Cotton and REEL Regenerative

REEL (Responsible Environment Enhanced Livelihood) Code is a private training programme run by CottonConnect working with brands and retailers to source sustainable cotton directly. It is also an implementing partner for BCI. It offers both the REEL Cotton Code (version 3.1) and REEL Regenerative Code (v 1.1) which builds on the REEL cotton code).

Theory of Change

Each of REEL cotton and REEL regenerative has a theory of change (ToC). The Cotton Code ToC[82] focuses on farm performance, environment and cotton quality, as well as traceability and "social fairness". The Regenerative ToC focuses on farmer resilience, climate adaptation and "enhancing biodiversity."[83] It includes land management and social aspects.

In its own words

"The REEL Cotton Code covers both environmental and social criteria, with a big focus on enabling and supporting sustainable agricultural practices, such as sustainable pest management, improved soil health, and reduced fertiliser and water use."[79]

"REEL Cotton Code is a flagship three-year agricultural training programme by CottonConnect for sustainable cotton production. CottonConnect has been working to improve the sustainability of cotton production for over ten years with global brands and cotton farming communities to deliver positive results with huge environmental and social benefits."

"We have three REEL Codes of Conduct: REEL Cotton, REEL Regenerative Cotton and REEL Linen. These define specific criteria for sustainable raw material production, and form the basis of our 3-year REEL agricultural training programmes for farmers."[80]

"Our REEL Cotton Code is based on our Theory of Change to improve farm performance, reduce environmental impacts and improve cotton quality in the supply chain.

Our REEL Regenerative Code is based on our Theory of Change to boost farmer resilience, while adapting to climate changes and enhancing biodiversity."[81]

Theory of Change: Yes	**Agricultural theories and approaches:** IPM, regenerative	**Laws and regulations on which it is based:** n/a	**Status: Voluntary, MSI, private:** Private	**Critical focus and elements:** Agriculture, environment, social	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** n/a	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** Verification	**Labelling, Marketing, promotion:** Working with clients

Key: No information/relevance Partial information/relevance All relevant information available

Agricultural theories and approaches

REEL adopts a position close to that of sustainable intensification: "Sustainable cotton is grown and produced in a way in which high levels of production can be maintained while ensuring minimal environmental impact."[84] The (add on) regenerative element specifically looks to increase conservation approaches.

Laws and regulations on which it is based

None.

Status: regulatory, voluntary, MSI, private

REEL is a private initiative.

Critical focus and elements

REEL cotton focuses on increasing production while reducing the use of inputs such as water, chemical pesticides and fertilisers. It seeks to implicate brands and partners in farmer training, and to also improve quality and ensure traceable cotton. Conservation also underpins the regenerative add-on, with protecting biodiversity another part of this, including agricultural biodiversity.[85]

CottonConnect defines regenerative agriculture as "... a holistic, outcome-based farming approach. It focuses on practices that help to improve soil health, encourage biodiversity, promote water efficiency and reduce greenhouse gas emissions whilst also supporting farmers to diversify their incomes and become more resilient to climate change".[86] The Code also focuses on livelihoods, and ensuring that practices work for the long term in the face of "ecological constraints and socioeconomic pressures".[87] Trainings focus on practices to improve sustainability, including practices to reduce pesticide use, making compost, using crop rotation, adopting natural pest control, and so on. As well as more sustainable farming and protection of natural resources, this is also meant to increase yields and incomes, to improve livelihoods.[88] Soil health is major part of this, along with IPM, and the use of buffer zones, and protecting water sources.

Management skills are also part of the training, including with a focus on contracts, producer groups and employment.

Social, gender

REEL has a strong record around "fairness" in its codes, but also has additional interventions on gender. Measures in the code cover freedom of association, unions, discrimination, forced labour, equal pay, ›

[79] https://www.cottonconnect.org/sustainable-practices

[80] https://www.cottonconnect.org/sustainable-practices

[81] https://www.cottonconnect.org/sustainable-practices

[82] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/64a26f2552f9ba44ae3ff27d/1688366886517/CC_REELcotton_ToC2023.pdf 071749/t/64a26f2552f9ba44ae3ff27d/1688366886517/CC_REELcotton_ToC2023.pdf

[83] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/64a26f2bb299003f9fba41fa/1688366892891/CC_REELregen_ToC2023.pdf

[84] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/618a22670300f04b4abb435a/1636442736880/CC+REEL+Cotton.pdf

[85] https://www.cottonconnect.org/sustainable-practices

[86] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/662222719be07114e0e7b5aa/1713513079104/CC_REELregen2024_v03.pdf

[87] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/618a22670300f04b4abb435a/1636442736880/CC+REEL+Cotton.pdf

[88] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/618a22670300f04b4abb435a/1636442736880/CC+REEL+Cotton.pdf

harassment, and child labour. It references ILO, including ILO 100.[89]

For women, REEL cotton has programmes including Women in Cotton, Farmer Business School and a code of conduct for cotton gins. The first includes both social and agronomic training, focused on improving income from agriculture, as well as literacy, numeracy, rights and health.[90]

Traceability

CottonConnect uses its own TraceBale[91] software for tracing REEL cotton, which allows real time tacking and chain of custody for the supply chain, to the final product. Field level information traced includes farm, farmer, cropping patterns, as well as data on other stages.[92] It also allows segregation of REEL cotton, and "real-time" information on available cotton.

Accreditation

CottonConnect is an ISEAL Community Member.[93]

Management, complaints

The Codes are managed by CottonConnect, which also has a range of policies including a grievance policy available to all their stakeholders, farmers included. [94]

Development and revision

REEL codes of conducts will become certified standards, beginning 1 April 2025.

Verification, certification type

Verification of the REEL cotton programme

Image: © Russell_Yan | pixabay.com

is done via the REEL Code of Conduct, which was developed by FLOCERT. [95] Internally, there is a Monitoring, Evaluation and Learning (MEL) team, with external verification by FLOCERT. The Code checks both farming, decent work and traceability. Peterson and Control Union do external audits as well, for specific clients of CottonConnect. Where a REEL programme is also organic, relevant certification will also apply.

Labelling, marketing and promotion

There is no specific label, but CottonConnect provides market and support to clients and farmers.

[89] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/618a22670300f04b4abb435a/1636442736880/CC+REEL+Cotton.pdf

[90] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/618a22670300f04b4abb435a/1636442736880/CC+REEL+Cotton.pdf

[91] https://tracebale.com/

[92] https://www.cottonconnect.org/traceability https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/618a22670300f04b4abb435a/1636442736880/CC+REEL+Cotton.pdf

[93] https://www.isealalliance.org/community-members/cottonconnect

[94] https://www.cottonconnect.org/general-5 and https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/66de96a8a21a1e276c815c95/1725863594709/Grievance+%26+Complaints+Policy.pdf

[95] https://static1.squarespace.com/static/5ff5d85f409193661a071749/t/63d75146b7f1253e9f42a58f/1675055444133/CC_Eligibility_requirement_REEL_v02.pdf

Textile Exchange

Textile Exchange offers a variety of standards relating to its "preferred" materials, many of which are currently merging into its Unified/Materials Matter Standard. Cotton is however not yet part of these, although this may change. Presently, the organic content standard remains the main cotton relevant standard from TE.

Organic Content Standard

The organic content standard (OCS) is, as its name implies, not a production, but a traceability standard, which provides a chain of custody check of organically certified cotton through a supply chain and into the final end product.[96]

Theory of Change

The OCS has no Theory of Change

Agricultural theories and approaches

The OCS is a content claim, chain of custody standard, which certifies organic cotton flows and organic content (non-food or feed). Cotton has to come from a standard acknowledged within the IFOAM family of standards. [98]

Laws and regulations on which it is based

The relevant organic laws will apply according to which standard is used.

In its own words

"The Organic Content Standard (OCS) is an international, voluntary standard that provides chain of custody verification for materials originating on a farm certified to recognized national organic standards. The standard is used to verify organically grown raw materials from the farm to the final product. Individual sites are certified by independent, third-party certification bodies using annual audits. Material is tracked from the farm to the final product following the requirements of Textile Exchange's Content Claim Standard (CCS). For more information or to apply for certification, please visit: TextileExchange.org/Integrity. The goal of the Organic Content Standard (OCS) is to increase organic agriculture production. The OCS aims to deliver this goal through three key objectives:

- Provide the industry with a tool to verify the organically grown content of the products they purchase.
- Provide companies with a trusted tool to communicate organically grown content claims to the industry.
- Provide organic farmers with broad access to the global organic market for their products." [97]

[96] https://textileexchange.org/organic-content-standard/ https://www.standardsmap.org/en/factsheet/442/overview?products=&name=IFOAM%20Standard, Textile%20Exchange%20Organic%20Content%20Standard

[97] Organic Content Standard

[98] https://textileexchange.org/organic-content-standard/

Status: regulatory, voluntary, MSI, private

Voluntary, private.

Critical focus and elements

The standard focuses on providing chain of custody for organically grown material through the supply chain, including ›

Theory of Change: No	**Agricultural theories and approaches:** Organic	**Laws and regulations on which it is based:** Relevant organic standards	**Status: Voluntary, MSI, private:** Private, voluntary	**Critical focus and elements:** Chain of custody	**Social, Gender:** No
Traceability: Yes	**Accreditation:** As per relevant standards for raw material and ISEAL code compliant	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** 3rd party certification	**Labelling, marketing, promotion:** Yes

Key: No information/relevance Partial information/relevance All relevant information available

processing sites as well as packaging, labeling, storage and handling. OCS products must contain at least 5% certified organically grown material.[99]

It relates to Textile Exchange's Content Claim Standard.

Social, gender

No criteria.

Traceability

The OCS includes third-party issuance of transaction certificates as the certified material flow through the supply chain, requiring documentation and tracing for each stage and operation, and also that organically grown and non-organic materials are segregated.

Accreditation

Textile Exchange is ISEAL Code Compliant,[100] and uses a third-party system with independent accreditation of certifying bodies wwho conduct audits.

Management, complaints

Organisations certifying to the standard are expected to have the correct management practices to manage integrity of the chain of custody and certification. Textile Exchange manages the standard.[101] Complaints are to be first submitted to the certifier, then Textile Exchange. [102]

Development and revision

OCS is reviewed at least every five years. Feedback can be submitted at any time.

Verification, certification type

The OCS requires third-party certification (which shall be done by an accredited certification body), for cotton in compliance with a programme such as US NOP, EU 2018/848, or from the IFOAM Family of Standards. All certificates have to follow the supply chain.[103] There should be GMO testing on organic cotton at ginning or spinning stages, to the ISO IWA 32:2019 standard.[104] Volume reconciliation is also required.

Labelling, marketing and promotion

Claims are allowed under the OCS, and can be product-specific or general (non-product specific).[105] Products that meet the required criteria can carry a label, including OCS 100 (minimum 95% organic cotton, 5% non-cotton maximum) or OCS blended (5 to 4% organic cotton), as long as the certification body has authorised it. Individual ingredients in a product may be identified as certified to OCS in some cases.

Materials Matter standard

Textile Exchange is transitioning its various tier 4 fibre production standards into a unified standards system called Materials Matter covering many of its existing standards. However cotton is not yet included. It is currently wrapping up its 2024 pilot phase[106] and is planned to beome effective in 2026.

The Textile Exchange website says cotton is among the materials being looked at for inclusion in this standard, "through recognition partnerships with organisations that own sustainability systems at the raw material level". It aims to establish "best practice" for materials "from farms to recycling facilities."[108] So far, its pilot testing covers only recycled fibres and animal fibres.[109] Other materials will require "recognition partnerships with organisations that own sustainability systems in an effort to focus on collaboration first and avoid duplication of standards systems."[110] The focus for now is on promoting existing standards. It also includes criteria for cotton entering the Materials Matter system, however, starting at the gin.[111]

Traceability

Materials certified to Materials Matter will be part of the same traceability requirements as the Content Claim Standard (CCS). It will use the Textile Exchange dTrackit and eTrackit traceability systems.

In its own words

"The Materials Matter Standard aims to meaningfully embed these goals into the production of all raw materials included in the scope of our certification, as well as to facilitate simplified communication at the consumer level through more integrated and aligned claims and labeling." (Summary doc) [107]

"The Materials Matter Standard is a voluntary sustainability standard for the production and initial processing of raw materials used in the fashion, textile, and apparel industry.

The standard sets out to incentivize a system in which the materials in our clothing and textiles support the climate, respect human rights and animal welfare, and drive beneficial outcomes for soil health, water, and biodiversity. It aligns the industry on a shared trajectory towards this vision by establishing what best practice looks like for different materials in various settings, from farms to recycling facilities.

By focusing specifically on the start of the supply chain, the Materials Matter Standard provides a global certification model that is connected to the unique contexts of producers and processors, as well as their local communities and landscapes. A blend of practice-based criteria and outcome-based indicators helps participating organizations get acknowledged for meeting core requirements and builds their capacity to measure results. At the same time, it gives brands and retailers that choose certified materials a way to speak confidently to customers about them."

99 https://textileexchange.org/knowledge-center/documents/organic-content-standard-ocs/
100 https://www.isealalliance.org/community-members/textile-exchange
101 https://textileexchange.org/app/uploads/2021/02/OCS-201-V3.1-OCS-User-Manual.pdf
102 https://textileexchange.org/complaint-form/
103 https://textileexchange.org/knowledge-center/documents/organic-content-standard-ocs/
104 https://textileexchange.org/app/uploads/2021/02/OCS-201-V3.1-OCS-User-Manual.pdf
105 https://textileexchange.org/app/uploads/2021/02/OCS-101-V3.0-Organic-Content-Standard.pdf
106 107 108 109 https://textileexchange.org/materials-matter-standard-pilot/
110 https://textileexchange.org/app/uploads/2024/06/TE-MM-GUI-106-V1.0-PILOT.pdf
111 https://textileexchange.org/app/uploads/2024/06/TE-MM-GUI-106-V1.0-PILOT.pdf

Regenerative Organic Certified

Regenerative Organic Certified (ROC)[112] is a standard that starts with the USDA Organic standard as a baseline, to which it adds three "regenerative organic agriculture" principles, namely on soil health, animal welfare and "social fairness".[113]

Theory of Change

ROC does not have a theory of change as such, but has elements that can serve as a proxy, and which describe its goal of rehabilitating soil and supporting improved farmer livelihoods.[115]

Agricultural theories and approaches

The focus of the standard is regenerative and organic, but many practices are also similar to agroecology and IPM.

Laws and regulations on which it is based

USDA NOP and any relevant national or state laws and international conventions, e.g., for labour practices.[116]

In its own words

"The goal of Regenerative Organic Certified® is to promote holistic agriculture practices in an all encompassing certification that:

- Increases soil organic matter over time and sequesters carbon below and above ground, which could be a tool to mitigate climate change;
- Improves animal welfare; and
- Provides economic stability and fairness for farmers, ranchers, and workers.

Regenerative Organic Certified® consists of three pillars: Soil Health & Land Management, Animal Welfare, and Farmer & Worker Fairness. Regenerative Organic Certified® has three levels: Bronze, Silver, and Gold. Each requires a different number and scope of regenerative organic practices used."[114]

Status: regulatory, voluntary, MSI, private

ROC is a voluntary, private initiative.

Critical focus and elements

The three main pillars of the standard cover soil health, animal welfare, and social fairness. The soil health pillar

Theory of Change: Not as such	**Agricultural theories and approaches:** Regenerative	**Laws and regulations on which it is based:** NOP	**Status: Voluntary, MSI, private:** Private, voluntary	**Critical focus and elements:** Soils, as well as social elements	**Social, Gender:** Yes
Traceability: Yes	**Accreditation:** For NOP	**Management, complaints:** Yes	**Development, revision:** Yes	**Verification type or certification:** Certified	**Labelling, Marketing, promotion:** Working with clients

Key: No information/relevance Partial information/relevance All relevant information available

focuses on building up soil organic matter, as well as using conservation tillage, cover crops and crop rotation. Soil tests are required under the standard, with guidelines,[117] requiring lab tests and field tests every three years, registration of GPS coordinates, and use of an accredited lab.

Other elements include no use of GMOs, or gene editing, and no use of synthetic inputs, among others, along with promotion of biodiversity.

An additional soil and land management section[118] also recommends looking at "intercropping, interseeding, and/or fallow agricultural land practices" as part of crop rotation, to improve soil fertility, and "disrupt pests and weed cycles". This should avoid planting crops from the same "plant family" too close in time. It also includes "perennials, development of pollinator and wildlife habitats, incorporation of agroforestry systems, vegetative barriers, and other regenerative practices that are shown to contribute to the development of soil organic matter."[119]

Producers must have a "Regenerative Organic System Plan (ROSP)", and also look after water and wetlands, and related habitats. They must not clear forest or convert wetlands for production. They must practice agroforestry and other regenerative additional practices, and not use bee toxic pesticides, including organic ones.[120]

Social, gender

The third pillar of the standard, on fairness, requires projects to support capacity building, developing democratic organisation, supporting decent working conditions, promoting living wages, and making long term commitments, as well as being transparent and accountable.[121] They must comply with local , state and national laws as well as ILO conventions. This includes on Freedom of Association.[122] The supply chain in an ROC certified operation must also have an "approved" social certification". There should be no child labour or forced labour, discrimination, or harassment. Producers should have the right to form grower groups. Buyers need to offer fair contracts, fair pricing, and prompt payments. [123]

Traceability

There are textiles specific supply chain, traceability and chain of custody guidelines.[124] These include items on the supply chain, quality management, product flows, and volume reconciliation, as well as documentation of all stages. [125]

[112] https://regenorganic.org/
[113] https://regenorganic.org/becoming-regenerative-organic-certified/
[114] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf
[115] https://regenorganic.org/why-regenerative-organic/
[116] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf
[117] https://regenorganic.org/wp-content/uploads/2020/10/ROC_Soil_Sampling_Guidelines.pdf and https://regenorganic.org/wp-content/uploads/2021/07/070821_SoilTestingFieldGuide_Final.pdf
[118] https://regenorganic.org/wp-content/uploads/2023/03/Framework-Guidance-SoilHealth-LandMgmt.pdf
[119] https://regenorganic.org/why-regenerative-organic/
[120] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf
[121] https://regenorganic.org/our-story/
[122] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf
[123] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf
[124] https://regenorganic.org/wp-content/uploads/2023/03/ROC_Textile_Guidelines.pdf

Accreditation

The NOP standard is part of the IFOAM family, and is the baseline standard on which ROC is built.[126] Other certifications can be used to show compliance with aspects of the ROC, including Demeter Biodynamic, or Fairtrade, which are listed in the "Required Baseline Certifications and Equivalency Assessment".[127]

Management, complaints

The ROC standard is managed by Regenerative Organic Alliance (ROA). It has a complaints process,[128] which includes for requests to change the standard.

Development and revision

Development is managed by the ROA board, which "oversees the development, implementation, and maintenance of the Regenerative Organic Certified program."

Verification, certification type

ROC is a certified standard, with organic and any other certifications being topped with additional certification.[129] It has three levels allowing time for operators to improve, Bronze, Silver, and Gold. Certification is annual.[130]

Labelling, marketing and promotion

ROC has labelling guidelines, "Regenerative Organic Certified Labeling Guidelines & Terms of Use and the Supply Chain Guidelines.", which allow two claims with use of a seal, Regenerative Organic Certified (100%) and Regenerative Organic Certified (95%) and also allow content simply listing of ROC ingredients.[131]

[125] https://regenorganic.org/wp-content/uploads/2023/03/ROC_Textile_Guidelines.pdf

[126] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf

[127] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf https://regenorganic.org/wp-content/uploads/2021/03/ROC_QMS_REF_AEA_v2.pdf

[128] https://regenorganic.org/complaint-form/

[129] https://regenorganic.org/wp-content/uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf

[130] https://regenorganic.org/wp-content/ uploads/2023/03/Regenerative-Organic-Certified-Framework.pdf

[131] https://regenorganic.org/wp-content/uploads/2023/03/Labeling-Guidelines-Terms-of-Use.pdf

Image: © Photo by Kelly | pexels.com

Haiti regenerative cotton

There are a range of cotton schemes that are not standards, but are interventions making sustainability investments or claims. They range from geographical to market focused and corporate led.

One notable programme is Haiti, the Smallholder Farmers' Alliance (SFA)[1] that seeks (since 2019) to revive cotton growing in the country through agroforestry, and offers farmers credit for growing and transplanting trees, which is used to provide "crop seed, tools, training and microcredit loans". It is an organic operation, with what it calls a "pioneering" regenerative methodology. This is focused on climate impact. Production is small, but mapped to each field and each farmer has a "digital ID". [2]

The regenerative programme is implemented with Terra Genesis,[3] who provide inputs and also verify outcomes. It's 'Ethos' system "monitors and reports on the holistic impacts of regenerative agriculture, from soil health to farmer and community wellbeing."[4] The focus is on ecology, soil health, water quality, biodiversity and ecosystem health, along with some social requirements, notably on physical well-being, economy, community organisation, and self-governance, as well as carbon sequestration.[5] Crop diversification is an important part of the programme.

One apparel brand involved is Timberland, part of VF Corporation.

smallholder farmers alliance

Haiti impact highlights in 2023

(latest available data)

- 7,200 lbs or regenerative cotton was grown over two seasons that culminated with the harvest that was completed in January, 2024.
- regenerative cotton being grown by the SFA makes it one of the few sources in the world.
- extensive field data was gathered and linked to geospacial maps of each field and further linked to a unique digital ID for each farmer.

[1] https://www.smallholderfarmersalliance.org/

[2] https://www.smallholderfarmersalliance.org/programs

[3] https://terra-genesis.com/

[4] https://www.ethosrov.com/?_gl=1*1u94lhf*_ga*MTI2MTgyMDYzOC4xNzIzMDQwNTUy*_ga_KEFPSWCWVV*MTcyMzA0MDU1Mi4xLjEuMTcyMzA0MTAwOS4wLjAuMA

[5] https://www.ethosrov.com/rov/haitian-cotton

Organic Cotton Accelerator (OCA)

The organic cotton accelerator (OCA) was set up to increase trade in and development of organic cotton by encouraging investment directly with organic and regenerative producers through implementing partners, and support for these groups to grow.

Organic cotton is traceable to farmers, as investors link to projects. This is to give the stability that has sometimes lacked in the organic sector. OCA also works with brands and donors to get support for organic production.[6] As with other systems, the theory is that more trade will generate more income for investment in the farm.

OCA also tracks impacts. Its farm programme[7] is "a direct-to-farm sourcing model" which aims to create secure markets for farmers. It also offers seed (non GMO seed supply)[8] and innovation (research, traceability…) programmes.[9]

One of the selling points to brands is a "secure" supply of organic cotton. OCA claims to offer "clarity" on price, and third-party verified data on the impact of that cotton. This is similar to what other market-focused programmes are trying to do. Generate sales, and from there, return investment to generate more production, aiming to "mainstream" sustainability. The commitment in advance from buyers is designed to offer security to farmers, who get a firm commitment, and to brands, who can avoid finding themselves without supply. It also aims for equitable sharing of benefits. Its website identifies projects mainly in India, and Pakistan.

OCAs seed programme[10] seeks to remove a critical bottleneck, especially in India: that of sourcing good quality and non-GMO, suitable seed for organic farming. It invests in breeding seed, but also in seeking the best cultivars for the future. It works with FIBLs Seeding the Green Future programme.[11]

OCAs innovation programme[12] describes itself as an "incubator" for solutions to be rolled out into its farm programme, including research and traceability. It was involved in developing the ISO/ IWA 32: 2019 standard for GMO testing with GOTS and Textile Exchange. It also looks at crop diversification, among other investments and research.

[6] https://organiccottonaccelerator.org/

[7] https://organiccottonaccelerator.org/programme/farm-programme/

[8] https://organiccottonaccelerator.org/programme/seed-programme/

[9] https://organiccottonaccelerator.org/programme/innovation-programme/

[10] https://organiccottonaccelerator.org/programme/seed-programme/

[11] https://www.sgf-cotton.org/

[12] https://organiccottonaccelerator.org/programme/innovation-programme/

Oeko-Tex organic cotton

The research and testing association Oeko-Tex[13] also offers a certification scheme for products made of at least 70% organic cotton, which covers " high human-ecological product safety" through the supply chain.

It is a chain of custody standard that starts with cotton certified under any of the IFOAM family of standards, to the final textile, and tests for GMOs and pesticides in the process[14]. It is third party certified. Certifiers must also be properly accredited.

The Sourcery

Where the OCA was set up by non-commercial bodies to take on some of the market challenges they struggle with, the Sourcery has been a commercial body from the word go, which also seeks to deliver on some of the goals that an NGO might have.

Like OCA, it focuses on connecting buyers to farmers – which it calls 'direct to grower' sourcing. Its programmes work with manufacturers, traders and growers, aiming to facilitate "more transparent, fair and efficient trade." This, it claims, means partners can "secure and transact fibre, yarn and fabric with full transparency, traceability and verified commercial, transactional and impact data in real-time and at scale."[15]

Its trade platform is digital (its website says "forthcoming BlueBale traceability platform"), and it says it is "inclusive": it trades fibres, yarns and fabrics including "Better Cotton, organic, regenerative, Regen Agri, US Trust Protocol, as well as conventional ('unaffiliated')."[16]

It has an assurance programme, which it says can offer data on origin, and "authenticity of social and environmental impact."[17] Data reportedly available includes farmer and household details, plots, social and labour, soil and water, quality and traceability of all certification documents. The Sourcery also offers communication and marketing services[18], and a seal to members who qualify, but not product claims.[19]

[13] https://standardsmap.org/en/factsheet/100501/overview and https://www.oeko-tex.com/importedmedia/downloadfiles/OEKO-TEX_ORGANIC_COTTON_Standard_EN_DE.pdf
[14] https://www.oeko-tex.com/en/our-standards/oeko-tex-organic-cotton
[15] https://www.thesourcery.io/directtogrower
[16] https://www.thesourcery.io/directtogrower
[17] https://www.thesourcery.io/impact-assurance-programme
[18] https://www.thesourcery.io/studio
[19] https://www.thesourcery.io/sourcery-faq

Biodynamic: Demeter/ SEKEM

Sekem is probably the best know current cotton project associated with biodynamic as well as organic. Relevant certifications include Demeter.[20]

The main project associated with biodynamic certification is Sekem, an Egyptian organic cotton project that is well established, and supports producers and trade, working with a number of small farmers in Egypt, growing cotton and other crops.[21]

It requires buyers to commit far enough ahead to ensure farmers know how much to plant, and that they know they will get the required sales. The Egyptian Biodynamic Association (EBDA), which certifies Sekem, is a member of Demeter (Biodynamic Federation).[22]

Demeter's biodynamic standards claims to be "higher" than organic, but EBDA also certifies to the EUs organic standard. Both focus on using on-farm resources and building soil fertility.[23]

Climate beneficial cotton

A relatively new, and so far geographically-based standard is Climate Beneficial Cotton[24], an initiative by Fibershed and others in the California Climate Coalition. It is a verified system focusing on healthy soil, and "landscape level stewardship", to sequester carbon. It claims to measure its climate impact by soil testing, and modelling. It also has a market development component. Other important goals are around biodiversity and habitat, and water retention.[25]

It is also a regenerative programme, which Fibershed is driving, including a research partnership with Chico State University.[26] This covers reduced impacts, from seed coatings, to lower tillage, and reduced use of nitrogen inputs. It also has international research partnerships.[27]

[20] https://demeter.net/certification/

[21] https://sekem.com/en/

[22] http://ebda.earth/about-us/ https://demeter.net/

[23] http://ebda.earth/certifications/ http://ebda.earth/knowledges/

[24] https://fibershed.org/programs/climate-beneficial-agriculture/climate-beneficial-fiber/ https://fibershed.org/programs/climate-beneficial-agriculture/climate-beneficial-verification-program/

[25] https://fibershed.org/programs/climate-beneficial-agriculture/climate-beneficial-verification-program/

[26] https://fibershed.org/programs/climate-beneficial-agriculture/regenerating-cotton-systems/ https://www.csuchico.edu/regenerativeagriculture/index.shtml

[27] https://fibershed.org/programs/climate-beneficial-agriculture/regenerating-cotton-systems/

FIBL and FIBL seeding the green future

There are many organisations working in the cotton space on areas of sustainable production, including research and funding. They include government bodies, foundations, NGOs among others.

FIBL (the Research Institutes of Organic Agriculture) is one such organisation. These are European research bodies, with the first being established in Switzerland in 1973, which are also involved in research into seed adapted to organic systems.[28] FIBL undertakes research as well as communication services. Its Seeding the Green Future project is a "participatory" (working with farmers and other stakeholders as well as scientists) project looking to support farmer incomes as well as genetic diversity in the face of climate change.[29]

The project has been supported by OCA (page 92), and is working with Indian partners to develop non-GM cotton varieties and supply. It works with common commercial cottons and also desi, or native, varieties (Gossypium arboreum). Goals include productivity and quality, but also adaptation to climate change.

ITC standards map

The International Trade Centre (ITC) is a UN Trade & Development-WTO collaboration that promotes sustainable business, including in cotton. It offers a standards map[30] that lists many of the main cotton sustainability standards for many products, including textiles and fibres. It is regularly updated and is a valuable resource, as it allows comparison between standards, and lists their core components.

ITC itself offers programmes in responsible sourcing, and research into sustainability areas as well as due diligence. It has a specific programme on textiles, and also on cotton fibres.[31]

[28] https://www.fibl.org/en/

[29] https://www.sgf-cotton.org/about.html

[30] https://www.standardsmap.org/en/identify?products=

[31] https://www.intracen.org/about-us/who-we-are https://www.intracen.org/our-work/topics/goods-and-services/fibres-textiles-and-clothing

Cotton Incorporated

Cotton Incorporated[32] is a not-for-profit organisation in the USA (funded by growers and importers) which supports the cotton and textile industry with research and promotion.

Sustainability and recycling (denim) are two area it works in, and it also collaborates with others, including Better Cotton and the US Cotton Trust Protocol, and the International Cotton Advisory Committee's SEEP (social, environmental and economic performance) panel, as well as Cascale.[33]

Its Cotton Today* section contains information on regenerative farming, soil health and other topics, such as carbon capture.[34] The organisation also supports research and development in sustainable cotton.

* www.cottontoday.cottoninc.com

International Cotton Advisory Committee (ICAC)

The International Cotton Advisory Committee (ICAC) [35] is an inter-governmental body, made up of cotton growing, trading and consuming countries. It was established in 1939 to address problems in the cotton market, and continues to focus on promoting cotton.

It also works on environmental and sustainability issues, including provision of training, and has a SEEP (Social, Economic, Environmental) panel looking at sustainability issues. Its technical section keeps track of scientific progress and offers insight on cotton developments.

It meets annually. It also offers a range of publications and information services both on production, and trade, as well as research developments. Its cotton portal with WTO/ITC claims to offer access to cotton information and statistics.[36]

Many of the researchers working on cotton are also part of the International Cotton Researchers Association, which is linked to the ICAC technical session and involved in World Cotton research conferences. At the time of writing, the website was not working correctly but usually it can be found at:www.icac.org.[37]

Cotton 2040

Cotton 2040 was a Forum for the Future project looking at climate change and cotton.[38] It's work has now ended, but many of its functions have passed to other organisations like Textile Exchange. Its website and reports remain available with information on climate change, cotton and sustainability.

Aid by Trade Foundation

The Aid by Trade Foundation (AbTF) is the foundation set up to develop and promote CmiA and the Regenerative Cotton Standard.[39] It works on sustainable raw materials with the textiles industry, with the goal of reducing poverty and improving livelihoods, particularly for smallholder farmers in Africa, through increased trade, with increased returns to farmers.[40]

Laudes Foundation

The Laudes Foundation is a major donor in the sustainability world, but also a driver of the "landscape" approach,[41] [42] which seeks to place cotton within a broader landscape – what it describes as a "place based approach" rather than a commodity, product based one. This includes regenerative approaches to farming and

[32] https://www.cottoninc.com/
[33] https://cottontoday.cottoninc.com/cotton-incorporated-affiliations/
[34] https://cottontoday.cottoninc.com/
[35] https://www.icac.org/home/index/
[36] https://www.cottonportal.org/cotton
[37] https://staging.icac.org/tech/Production-Research
[38] https://www.forumforthefuture.org/cotton-2040
[39] https://www.aidbytrade.org/en/home/
[40] https://www.aidbytrade.org/en/home/
[41] https://www.laudesfoundation.org/
[42] See for example https://www.iucn.nl/en/our-work/landscape-approach/ or http://forestsolutions.panda.org/approach/sustainable-landscapes

landscape restoration, but also consideration of other influences on production and producers, including markets, economics, governance and so on.

It looks at farming within the system in which it operates. For cotton, that includes soil, weather, inputs, markets, trade, policy and finance, as well as other land uses and crops. It looks at the competing demands and pressures, and also encourages negotiation among stakeholders.

The focus of Laudes Foundation is on "climate change, nature loss and social inequality", and the role business can play in making change. It now presents an "economic systems map" approach which includes the natural environment, as well as government, civil society, communities, finance, business, geography and the built environment. [43]

Fashion is one of its intervention areas. This includes social and environmental areas, with a focus on "mainstreaming landscape approaches, next-generation and circular materials by unlocking finance for scale, and driving uptake by convening and aligning industry."[44]

IDH The Sustainable Trade Initiative also partnered with Laudes on the "Regenerative Production Landscape Collaborative", which seeks to establish a project in Madhya Pradesh, India.[45]

WWF and GIZ have also joined projects in Tanzania and Pakistan. ●

Ethical Trading Initiative

The Ethical Trading Initiative (ETI) is an NGO working on labour issues and decent work in supply chains, and that also now offers support on adopting a Human Rights and Environment due diligence (HRDD). Its base code is the reference document for much decent work intervention. [46]

It most recently looked at "Human Rights in Challenging Contexts".[47] This would include areas affected by climate change and climate risk as well as by conflict and instability.

One of the report's case studies looks at a textiles business withdrawing from Myanmar over human rights concerns. ●

[43] https://maps.laudesfoundation.org/economic-system/#/?resetvid=all&open=ResetView&panx=4600.0&pany=3500.0&zoom=1.0&wpane=380&epane=open&unoInfo=TheBaseMapReset

[44] https://www.laudesfoundation.org/what-we-do/programmes/fashion/

[45] https://www.idhsustainabletrade.com/regenerative-production-landscape-collaborative/

[46] https://www.ethicaltrade.org/

[47] https://www.ethicaltrade.org/insights/resources/human-rights-due-diligence-challenging-contexts-joint-etis-report

OECD (due diligence)

The OECDs work on due diligence in supply chains is the foundation from which the EUs corporate sustainability due diligence directive emerges, and is helping to shape how the fibres and textiles markets are increasingly having to learn about where and what they source.

It is also forcing standards that previously worked on a mass balance model to implement direct traceability.

Two of its standards are of particular relevance to cotton farming, those on agriculture and garments,[48] but the guidelines for multinationals on responsible business conduct are also relevant for businesses and due diligence risk assessment.[49]

GIZ

GIZ is a federally-owned entreprise of the German government that acts to support Germany's international development policy. It is a well-known funder and support of sustainable cotton interventions. [50]

It participates in Germany's influential Partnership for Sustainable Textiles, which promotes responsibility in textiles supply chains.[51]

Cotton Australia[52]

Cotton Australia is a promoting body for Australian Cotton, representing its farmers, and supporting the myBMP programme.

[48] https://www.oecd.org/en/publications/oecd-due-diligence-guidance-for-responsible-supply-chains-in-the-garment-and-footwear-sector_9789264290587-en.html and https://mneguidelines.oecd.org/rbc-agriculture-supply-chains.htm

[49] https://www.oecd.org/en/topics/sub-issues/due-diligence-guidance-for-responsible-business-conduct.html

[50] https://www.giz.de/en/html/index.html

[51] https://www.textilbuendnis.com/en/ (NB: website not working at time of writing)

[52] https://cottonaustralia.com.au/

Pesticide Action Network

Pesticide Action Network is a global network of NGOs working to reduce the hazards of pesticides. Several of its worldwide members have been involved in promoting alternatives to intensively-farmed cotton, such as organic and Better Cotton, notably PAN UK, Germany and Africa.

One of its partners, OBEPAB, founded and runs the organic cotton project in Benin.[53]

Solidaridad

Solidaridad is a Dutch NGO that is heavily involved in cotton and textiles, initiating and funding projects. It covers production as well as processing, and a range of production systems. [54]

It trains and supports farmers to grow cotton using less pesticides, synthetic fertilisers and water, and with respect for decent work. It also partners with others in the sector to create good infrastructure, and work on creating an enabling environment and market-based approaches to make it possible for farmers to produce and sell cotton sustainably.

Syngneta SOA

Syngenta has now moved into this "proprietary" sustainability sector, with regenerative claims. Its Sustainable Outcomes in Agriculture standard is the result. Syngenta is now owned by ChemChina.

"Developed by Syngenta, the SOA (Sustainable Outcomes in Agriculture) Standard provides a framework to help agricultural supply chain companies and crop producers improve outcomes in regenerative agriculture. This Standard applies to all sizes and types of agricultural producers. The Standard document outlines the verifiable criteria within six Sustainable Outcomes (Optimal Production, Water Impact, Soil Health, Biodiversity and Habitat, Human and

Animal Health, and Community Leadership) and its associated Drivers of Change; as well as additional Specific Management Practices (related to Nutrient and Pest; Conservation; Livestock and Irrigation; and Regulation, Farm Records, Community and Storage). Depending on their practices, producers are classified between different Levels: Levels 1 (Essential), 2 (Basic), 3 (Medium), and 4 (High) for each driver of change criteria. "[55]

Naturland

"Naturland standards on production include the following branches of organic production: Plant production Livestock production Market gardening Shoots and germ buds Mushroom cultivation Cultivation of ornamental plants, herbaceous perennials, shrubs, Christmas trees Fruit Cultivation Viniculture Permanent tropical plantations Wild grown products "[56]

Naturland Textile

"The goal when processing organic agricultural produce as understood under the Naturland standards is to manufacture products attaining a high organic and social quality standard, also with respect to their nutritional physiology. For this reason, the processing methods used need to undergo continuous improvements in the light of new scientific findings and amendments to principles of the Naturland standards. Risk technologies, such as the use of genetic engineering or nanotechnology, have to be excluded from processing; new technologies must be scrutinized for possible risks. Consumers are to be protected from deception and fraud by the highest possible degree of transparency. " [57]

[53] https://pan-international.org/

[54] https://www.solidaridadnetwork.org/

[55] https://www.standardsmap.org/en/factsheet/863/overview?products=Cotton%20%26%20fibers&name=

[56] https://www.standardsmap.org/en/factsheet/451/

[57] https://www.standardsmap.org/en/factsheet/314/overview

Delta Framework

The Delta Framework[58] is an initiative that was set up to seek common indicators for measuring the impact of agricultural commodities such as cotton. It included Better Cotton and ICAC among its founders, with funding from the ISEAL Alliance. It also included stakeholders from the coffee sector. The Delta framework is available for download.[59]

BASF e3

BASF e3 was originally called Bayer e3, but is now owned by BASF. It is a commercial standard, e3 Sustainable Cotton, developed by the seed and agrochemicals company to deliver a "traceable, transparent, sustainable cotton supply chain" with its 'FiberMax' and 'Stoneville' seeds. [60]

Worldly (formerly Higg Co)

This technology company hosts the Higg Index, a suite of measurement tools developed and owned by Cascale (formerly the Sustainable Apparel Coalition). Its methodology is currently the most widely used data collection and measurement tool within the apparel and footwear industries. It provides advanced analytics, reporting, and performance tracking tools — as well as complementary data and methodologies from third-parties.

[58] https://www.deltaframework.org/

[59] https://www.deltaframework.org/resources/

[60] https://agriculture.basf.us/crop-protection/e3-cotton.html https://www.basf.com/us/en/media/featured-articles/Technology/next-level-sustainability---farm-to-retail--traceability-

ABRAPA: Associação Brasileira dos Produtores de Algodão or Brazilian cotton producers association

ABR: Brazil's responsible cotton programme

AbTF: Aid BY Trade Foundation

APEDA: Agricultural and Processed Food Products Export Development Authority

BCI: Better Cotton Initiative

BMP: Best Management Practices.

CCS: Content Claim Standard

CoC: Chain of Custody

CmiA: Cotton made in Africa

CSDDD: Corporate Sustainability Due Diligence Directive

ETI: Ethical Trade Initiative

EU: European Union

FAO: Food and Agriculture Organisation

FIBL: the Research Institutes of Organic Agriculture

FFS: Farmer Field School

GAP: Good Agricultural Practices

GHS: Globally Harmonised System of Classification and Labelling of Chemicals

GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit/ German Development Cooperation

GMO: Genetically Modified Organisms

GOTS: Global Organic Textile Standard

HRDD: Human Rights Due Diligence

ICAC: International Cotton Advisory Committee

IFOAM: International Federation of Organic Agriculture Movements

ILO: International labour Organisation

IROCB: International Requirements for Organic Certification Bodies

IPM: Integrated Pest Management

IPPM: Integrated Pest & Production Management

ISO: International Organisation for Standardization

ITC: International Trade Center

IP: Implementing Partner

ME: Managing Entity

NOP: National Organic Program

NPM: Non-Pesticide Management

NPOP: National Program for Organic Production

NSOP: National Standard for Organic Production

OCA: Organic Cotton Accelerator

OCS: Organic Content Standard

OECD: Organisation for Economic Cooperation and Development

PAN: Pesticide Action Network

PEF: product environmental footprints

PIC: Prior Informed Consent

POP: Persistent Organic Pollutants

PPE: Personal Protective Equipment

RCS: Regenerative Cotton Standard

REACH: Registration, Evaluation, Authorisation and Restriction of Chemical

REEL: Responsible Environment Enhanced Livelihoods

ROA: Regenerative Organic Alliance

ROC: Regenerative Organic Certified

SEEP: Social, economic, environmental panel

ToC: Theory of Changeo

USCTP: US Cotton Trust Protocol

USDA: United States Department of Agriculture

Acre
An acre is unit of land area equal to 43,560 square feet – roughly the size of a U.S. football field[1] (0.405 hectare).

Bale
A bale is a basic tradeable unit of cotton lint, or cotton that has been ginned. Bale weights vary from country to country. By convention, a "statistical" bale weighs 480 lbs.[2]

Biocompatibility
A material is generally considered biocompatible if it is compatible with living tissue without being toxic or otherwise injurious.[3] Cotton is generally considered a biocompatible material.

Biodegradation
Biodegradation refers to degradation caused by biological activity, especially by enzymatic action, leading to a significant change in the chemical structure of a material. It is used to define whether a material will naturally disappear in nature. Cotton is biodegradable with or without oxygen, in sewage sludge or in water, and regardless of the finishing applied to the material.[4]

Biodiversity
Maintaining biodiversity is a high priority for cotton growers around the world. Biodiversity is generally defined as a variety of plant and animal life.[5] Variety in the natural environment is considered beneficial to all crops.

Biosequestration
Biosequestration is the absorption and storage of carbon by plants and trees, which take in carbon dioxide as they grow, and then release the oxygen while storing the carbon in plant structures and soil.

Boll
A boll is the "fruiting structure of a cotton plant. It is made up of separate compartments called locks, in which cotton seeds and lint grow".[1]

Bt
Bt, a bacterium formally known as Bacillus thuringiensis, kills a variety of insects that harm the cotton plant. In the 1990s, scientists encoded Bt directly into a plant. After rigorous scientific evaluation, Bt cotton was placed on the market in 1996, allowing growers to protect their plants while applying significantly less insecticide.

Carbon sequestration
Carbon sequestration is also called carbon capture and storage. According to the U.S. Government, "Carbon dioxide is the most commonly produced greenhouse gas. Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide.[6]" Cotton is very efficient at capturing and storing carbon.

Circularity
Circularity principles aim to move away from a linear model where resources are produced, used once and then discarded, to a circular model where resources are intentionally developed to be repurposed to find new life, and waste is eliminated.

As a plant and natural fibre, cotton is inherently circular. It is grown from the earth, can be reused and recycled in a variety of ways, and biodegrades when it is ultimately returned to the earth. And, all parts of the cotton plant, including stems, lint and seeds, can be used.

Compost
Organic soil conditioner obtained by the biodegradation of a mixture principally consisting of various vegetable residues, occasionally with other organic material and having a limited mineral content.[7]

Composting
Organic soil conditioner obtained by the biodegradation of a mixture principally consisting of various vegetable residues, occasionally with other organic material and having a limited mineral content.[8]

Compostability
the property of a material to be biodegradable in a composting process.[9]

Conservation tillage
Tillage is the act of preparing the soil through mechanical agitation, for example through plowing. Conservation tillage is defined by the OECD as "a tillage system that creates a suitable soil environment for growing a crop and that conserves soil, water and energy resources mainly through the reduction in the intensity of tillage, and retention of plant residues."[10]

Cotton
The cotton plant belongs to the Gossypium species and is a member of the hibiscus family.[11] It is grown across the world and is most commonly known for its use in natural, durable textiles – though other parts of the cotton plant can also be used for food and a variety of innovative products.

Fertiliser
In addition to carbon dioxide, water, and sunlight, all plants need mineral nutrients to grow. The primary nutrients needed are nitrogen, phosphorus and potassium. There are various methods to meet the fertility requirements of cotton, including the use of nitrogen-fixing cover crops, manures and soluble fertilisers.

Fibre
Textile fibers are structures that can be spun into yarn for textiles or manufactured into other products in a non-woven state.

Ginning
Ginning is the process of separating cotton fibre from the seed. Ginning takes place in a cotton gin and goes through a process of drying and cleansing before the lint is removed by revolving circular saws. Ginned cotton lint is compressed into bales.[12]

Gossypol
Gossypol is a yellow substance found in the cotton plant. It is toxic to most animals when consumed, but when extracted it can be useful for different types of medicines.[13] This compound is part of the plant's natural defence to pests.

Hectare
A hectare is a metric unit of square measure equivalent to 10,000 square meters, or 2.471 acres.

Life cycle assessment
Life Cycle Assessments (LCA) allow for the holistic examination of the environmental impacts and resource utilisation of a given product, from the raw materials used to create it all the way to that product's end of life, when it is disposed. A fundamental part of an LCA is the Life Cycle Inventory (LCI), which quantifies relevant energy and material input and environmental release data associated with manufacturing and other processes.[14]

Lint
Lint is the cotton fibre that remains from the cotton plant once the cotton seed, leaves and casing have been removed through the ginning process.

Microfibre
As a subsection of microplastics, they are a synthetic fibre finer than one denier per filament that are either engineered specifically to be a microfibre, or produced through degradation.[15]

Microplastics
A simple definition for microplastics is that they are plastic particles smaller than 5 mm. A recent study has defined microplastics more precisely as: "any synthetic solid particle or polymeric matrix, with regular or irregular shape and with size ranging from 1 µm to 5 mm, of either primary or secondary manufacturing origin, which are insoluble in water".[16]

Natural fibre
A fibre is considered natural if it is made from natural materials that can be turned into clothing without first undergoing industrial processes. Cotton is a natural fiber. Other natural fibers include fibers such as wool, linen, hemp and silk.

Pesticide
Pesticide law defines a "pesticide" (with certain minor exceptions) as "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest."[17] These pests can be insects, fungi or weeds that are harmful to the cotton crop.

Polyester
Polyester (polyethylene terephthalate) is a man-made fiber derived from petroleum.

Regenerative agriculture
Regenerative agriculture is a holistic philosophy that aims to positively influence biosequestration, biodiversity, ecotoxicity, climate resilience, water systems, micronutrients, and ecosystem services. Common regenerative agriculture practices include no or low till plowing, cover cropping, multi-use systems, agroforestry, rotational farming, precision agriculture, integrated pest management, and intentional use of inputs that are landscape specific.

Regenerative agriculture is not a one size fits all prescriptive practice, rather it looks at

the combination of practices that support resilience as well as build and nourish our ecosystem. Over time, regenerative practices can increase production and naturally reduce the need for external inputs. When these regenerative practices are implemented successfully, the health of the agriculture ecosystem and farmer economic stability can be improved. This is regenerative agriculture.

Shedding

Shedding in the context of textiles refers to the release of fabric fibres during the laundering process or through natural wear and tear.[18]

Synthetic Fibre

Synthetic fibres are man-made textile fibres, including fully synthetic fibres made from crude oil and other plastics (such as polyester, acrylic and nylon), as well as those made from natural materials (eg. trees) through industrial processes, such as rayon made from cellulose.[19] Cotton is a natural, not a synthetic fibre.

[1] Washington Grown. (n.d.). What does an ACRE look like? http://www.wagrown.com/what-does-an-acre-look-like/.

[2] Cotton Outlook. (n.d.). Glossary of Words. https://www.cotlook.com/information-2/glossary-of-terms/

[3] Merriam-Webster. (n.d.). Biocompatibility. Merriam-Webster. https://www.merriam-webster.com/dictionary/biocompatibility.

[4] The International Organization for Standardization (2002). Plastics — Determination of the degree of disintegration of plastic materials under defined composting conditions in a pilot-scale test. ISO 16929:2002.

[5] Encyclopædia Britannica, inc. (n.d.). Biodiversity. Encyclopædia Britannica. https://www.britannica.com/science/biodiversity.

[6] USGS. (n.d.). What is carbon sequestration? https://www.usgs.gov/faqs/what-carbon-sequestration?qt-news_science_products=0#qt-news_science_products

[7] The International Organization for Standardization (2019). Textiles —Test method for accelerated hydrolysis of textile materials and biodegradation under controlled composting conditions of the resulting hydrolysate. ISO 21701:2019(en).

[8] The International Organization for Standardization (2019). Plastics — Organic recycling — Specifications for compostable plastics. ISO 17088:2021(en).

[9] The International Organization for Standardization (2013). Plastics — Vocabulary. ISO 472:2013(en).

[10] Directorate, O. E. C. D. S. (n.d.). Oecd glossary of statistical terms – conservation tillage definition. https://stats.oecd.org/glossary/detail.asp?ID=413.

[11] Encyclopædia Britannica, inc. (n.d.). Cotton. Encyclopædia Britannica. https://www.britannica.com/topic/cotton-fibre-and-plant.

[12] From field to fabric- ginning. Cotton. (n.d.). https://www.cotton.org/pubs/cottoncounts/fieldtofabric/gin.cfm.

[13] WebMD. (n.d.). GOSSYPOL: Overview, Uses, side Effects, precautions, Interactions, dosing and reviews. WebMD. https://www.webmd.com/vitamins/ai/ingredientmono-106/gossypol.

[14] Cotton Incorporated. (2017). LCA update of cotton fiber and fabric life cycle inventory, (1). https://cottontoday.cottoninc.com/wp-content/uploads/2019/11/2016-LCA-Full-Report-Update.pdf

[15] https://textileexchange.org/materials/glossary/#glossary-m

[16] Frias, J.P.G.L., Nash, R. (2019). Microplastics: finding a consensus on the definition. Mar.Pollut. Bull. 138, 145–147. https://doi.org/10.1016/j.marpolbul.2018.11.022

17 EPA. (n.d.). What is a pesticide? https://www.epa.gov/minimum-risk-pesticides/what-pesticide

[18] Zambrano, Marielis & Pawlak, Joel & Daystar, Jesse & Ankeny, Mary & Cheng, Jay & Venditti, Richard. (2019). Microfibers generated from the laundering of cotton, rayon and polyester based fabrics and their aquatic biodegradation. Marine Pollution Bulletin. 142. 394-407. 10.1016/j.marpolbul.2019.02.062.

[19] Merriam-Webster. (n.d.). Synthetic fiber. Merriam-Webster. https://www.merriam-webster.com/dictionary/synthetic%20fiber.

Sources and relevant further reading

The following reading suggestions are all from verified, trusted sources of information that supplement the research and writing that's included in this guidebook.

Ecotextile News' own guide on the cotton sustainability landscape, updated in 2020: Ferrigno, S., ***The Inside Guide to Cotton & Sustainability.*** MCL News & Media 2020 **https://www.mclnews.com/guidebooks/insider-s-guide-to-sustainable-cotton**

The UN FAO sustainable agriculture pages are a good place to learn more about what it is, and the challenges faced around the world. ***Food and Agriculture Organization of the United Nations (UN FAO)*** accessed 15/7/2024 **https://www.fao.org/sustainability/en/**

This book/report goes into detail on the ways and means to reduce chemical use and implement agroecology, with practical experience at the roots. By Meriel Watts with Stephanie Williamson ***Replacing Chemicals with Biology: Phasing Out Highly Hazardous Pesticides with Agroecology*** Executive Summary **https://pan-international.org/wp-content/uploads/Phasing-Out-HHPs-with-Agroecology-ExecutiveSummary-en.pdf**

A good textbook on agroecology is the one by Miguel Altieri and Clara Nicholls, from University of California – UN university textbook: ***Agroecology and the search for a truly sustainable agriculture***, 1st edition, PNUMA, Basic Textbooks for Environmental Training (2005) **http://www.agroeco.org/doc/agroecology-engl-PNUMA.pdf** – there is also plenty more on agroecology at the ***Agroecology in Action*** website, which features the work of Altieri and others, including links to websites and books: **https://agroeco.org/publications/** and see also this history of the concept Miguel A. Altieri & Clara I. Nicholls (2017)

Agroecology: a brief account of its origins and currents of thought in Latin America, ***Agroecology and Sustainable Food Systems*,*41:3-4***, 231-237, **http://dx.doi.org/10.1080/21683565.2017.1287147**

Another Altieri paper to note as an introduction is "Agroecology: principles and strategies for designing sustainable farming systems" which can be found here: **https://biosafety-info.net/articles/sustainable-systems/ecological-agriculture-food-security/agroecology-principles-and-strategies-for-designing-sustainable-farming-systems/**

An overview of discussions on regenerative agriculture is this one, by Giller, K. E., Hijbeek, R., Andersson, J. A., & Sumberg, J. (2021). ***Regenerative Agriculture: An agronomic perspective***. Outlook on Agriculture, ***50(1)***, 13-25. It argues that regenerative is a reframing of agroecology and sustainable intensification and can be found here: **https://doi.org/10.1177/0030727021998063**

IPES Food's study on agroecology, regenerative agriculture, and nature-based solutions is an overview of the conflicting framings of what regenerative is. The study can be found here: **https://ipes-food.org/_img/upload/files/SmokeAndMirrors_BackgroundStudy.pdf**

For an introduction to the ***Integrated Pest Management (IPM)*** area, the UN FAO has a website with a lot of information. It contains definitions and a wealth of case studies, and links for ways to use it with specific examples. The link to follow is here **https://www.fao.org/pest-and-pesticide-management/ipm/integrated-pest-management/en/**

For the European Union's view on what IPM is, it has a page and definition as part of its ***Farm to Fork1 programme***. The page links to much other useful information. See **https://food.ec.europa.eu/plants/pesticides/sustainable-use-pesticides/integrated-pest-management-ipm_en**

For discussion on what sustainable intensification is, a good read is ***FAO. 2014. The State of Food and Agriculture*** (see **https://openknowledge.fao.org/server/api/core/bitstreams/f6b32ac3-74c8-4c4b-ac6b-60a21d74202f/content**). This is based on Pretty J, 2009. Agricultural sustainability: concepts, principles and evidence. ***Phil Trans Royal Soc B: Biol Sci*** 363(1491):447-65. See: **https://royalsocietypublishing.org/doi/10.1098/rstb.2007.2163**

The ***World Economic Forum*** has also looked down at the regenerative concept from its mountain heights. It does show the breadth of interest in the concept, and links to other sources of information too. See: **https://www.weforum.org/agenda/2022/10/what-is-regenerative-agriculture/**

A recent project by ***Cotton Diaries*** and A growing Culture, Cotton at the Source, has three stories featuring farming projects implementing the farming concepts discussed in cotton farming. See: **https://www.cottondiaries.com/stories-from-ground**

The definition of regenerative agriculture, and the reasons why it is being implemented, are discussed by ***Regeneration International***, **https://regenerationinternational.org/2023/12/22/the-definition-of-regenerative-agriculture/** and the organisation also gives its own definition. See: **https://regenerationinternational.org/why-regenerative-agriculture/**

[1] https://food.ec.europa.eu/index_en

Magazine Mongabay – well worth reading – has also published on cotton and agroecology, and how it is implemented in practice, and its impacts. See **https://news.mongabay.com/2022/01/farmers-in-brazils-cerrado-cotton-on-to-the-benefits-of-agroecology/**

The Savory Institute is one of the pioneers of regenerative – which it also calls holistic management, and so its approach and definition are well worth looking at. It also has more information and training, as well as a sourcing option. See: **https://savory.global/holistic-management/**

The Rodale Institute is one of the organisations credited with conceptualising regenerative, but is also a well know organic research institute. It offers a definition of regenerative organic farming, and is one of the organisations behind Regenerative Organic Certified. See: **https://rodaleinstitute.org/why-organic/organic-basics/regenerative-organic-agriculture/**

The ***British Ecological Society*** has also looked into regenerative agriculture, with a report on the definitions and meaning of the term, and the emergence of new certifications. It also tracks coverage, and seeks to define the concept from an ecological perspective. See: **https://www.britishecological-society.org/wp-content/uploads/2022/10/BES-Report-on-Regenerative-Agriculture_final.pdf**

Robert Rodale's thinking on regenerative and organic was recorded in a 1983 paper called "***Breaking New Ground: The Search for a Sustainable Agriculture***", which is hard to track down online but widely cited. **https://eric.ed.gov/?id=EJ275343** See also more here **https://rodaleinstitute.org/blog/original-principles-of-regenerative-agriculture/**

The ***Dutch Ministry of Foreign Affairs*** has a section on requirements for entering European sustainable cotton markets. See: **https://www.cbi.eu/market-information/apparel/sustainable-cotton/market-entry**

The ***EU Strategy for Sustainable and Circular Textiles*** can be read here: **https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52022DC0141**

More information on the EUs ***REACH regulations*** can be found here. It links on to further details if needed. See: **https://echa.europa.eu/regulations/reach/understanding-reach**

The ***International Organization for Standardization*** offers information on certification and conformity assessment, and accreditation, on its website. It links on to the relevant standards. See: https://www.iso.org/certification.html and the committee on conformity assessment here: **https://www.iso.org/committee/54998/x/catalogue/p/1/u/0/w/0/d/0**

ISEALs code of good practice for sustainability systems can be found on its website, along with guidance, and links. See: **https://www.isealalliance.org/defining-credible-practice/iseal-code-good-practice**

Information on the ***Globally Harmonized System of Classification and Labelling of Chemicals*** is available online, and links to more information and the most recent version of the GHS itself. See: **https://unece.org/about-ghs** and information on updates here **https://unece.org/transport/dangerous-goods/ghs-rev10-2023**

The ***Convention on Persistent Organic Pollutants*** (Stockholm Convention) explains what they are, why their persistence, distribution, toxicity and accumulation are problems, and the website offers the latest information on those registered. See: **https://pops.int/TheConvention/ThePOPs/tabid/673/Default.aspx**

Pesticide Action Network offers its own list of Highly Hazardous Pesticides, which is also widely used. **https://pan-international.org/wp-content/uploads/ PAN_HHP_List.pdf**

The European Chemicals Agency has an explainer on the European regulations on the trade in chemicals covered by its Prior Informed Consent regulation. It implements the Rotterdam, or PIC, convention in the EU. See: **https://echa.europa.eu/regulations/prior-informed-consent/understanding-pic**

The ***UN Convention on Prior Informed Consent*** continues to be updated, and this website features updates and links to other relevant conventions. See: **https://pic.int/default.aspx**

The ***EUs Corporate Sustainability Due Diligence Directive*** is an essential to understand new tool in the sustainability space. The links cover summary, and links to regulations now in force, including who is covered. See: **https://commission.europa.eu/news/new-rules-fostering-sustainable-and-responsible-corporate-behaviour-enter-force-2024-07-25_en - https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401760 –** This paper looks into how the directive might create change. See: **https://www.lse.ac.uk/granthaminstitute/news/how-the-eu-corporate-sustainability-due-diligence-directive-csddd-can-be-harnessed-to-promote-a-just-transition/**

The ***EU Ecodesign for Sustainable Products Regulation*** is another regulation that will become more relevant to sustainable textiles, as it will "enable the setting of ecodesign requirements and information for almost all categories of physical goods that come onto the EU market." See: **https://commission.europa.eu/news/new-law-make-products-eu-market-more-sustainable-2024-07-19_en**

These pages explain more about the ***Product Environmental Footprint (PEF)*** and its methodology. See: **https://green-business. zec.europa.eu/environmental-footprint-methods/pef-method_en - https://eplca.jrc.ec.europa.eu/EnvironmentalFootprint.html**

Green Claims are another emerging area of regulation development. These pages cover EU approaches and proposals. See: **https://www.consilium.europa.eu/en/press/press-releases/2024/06/17/green-claims-directive-council-ready-to-start-talks-with-the-european-parliament/ https://environment.ec.europa.eu/topics/circular-economy/green-claims_en - https://environment.ec.europa.eu/publications/proposal-directive-green-claims_en**

The US is leading on regulating ***forced labour from Xinjiang***, which applies to cotton. Information and explainers can be found at these links. Other developments are covered in the final links. See: **https://www.cbp.gov/trade/forced-labor/UFLPA https://www.cbp.gov/trade/programs-administration/forced-labor/xinjiang-uyghur-autonomous-region-wro-frequently-asked-questions - https://www.business-humanrights.org/my/latest-news/investors-human-rights-groups-call-on-us-to-enact-a-regional-ban-on-cotton-imports-from-xinjiang-based-on-evidence-of-forced-labour/ https://guidepostsolutions.com/insights/blog/how-the-uk-high-court-decision-on-forced-labor-impacts-your-supply-chain-due-diligence/**

This site has more information on ***Green Claims***. See: **https://www.europarl.europa.eu/topics/en/article/20240111STO16722/stopping-greenwashing-how-the-eu-regulates-green-claims**
This website covers the covers the 2022 updated ***EU Organic Policy***. See **https://agriculture.ec.europa.eu/farming/organic-farming/future-organics_en** with the legislation itself here **https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018R0848**

EU Organic Farming rules are also summarised and link on from here and the ITC standards map. See: **https://agriculture.ec.europa.eu/farming/organic-farming_en** and **https://www.standardsmap.org/en/factsheet/777777/overview?products=Cotton%20%26%20fibers** – this page also offers a quick summary. See: **https://agriculture.ec.europa.eu/farming/organic-farming/organics-glance_en**

Rules on ***organic imports into the EU.*** See: **https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R2306 with latest update here: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02021R2306-20220701**

This paper explains ***radiation-induced crop mutations***. See: **https://link.springer.com/chapter/10.1007/978-981-16-9720-3_23** and these pages talks about irradiation for product safety. See: **https://www.fda.gov/food/buy-store-serve-safe-food/food-irradiation-what-you-need-know** and **https://www.food.gov.uk/safety-hygiene/irradiated-food**

More information on ***EU organic products*** and the regulation is available here. See:

https://agriculture.ec.europa.eu/farming/organic-farming/organic-production-and-products_en

A compendium of rules on the ***EU plant health and crop protection*** can be found here: **https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017R0625**

IFOAM Europe has a website dedicated to organic textiles. See: **https://www.organic-seurope.bio/what-we-do/organic-textiles/**

This website has the ***US organic regulations***, and relevant links and information. See: **https://www.ams.usda.gov/rules-regulations/organic**

To learn more about what ***High Conservation Values*** are, this is the site. It includes a library of information, and methods. See: **https://www.hcvnetwork.org/hcv-approach**

These pages are for the ***International Labour Organisations*** conventions on child labour, and link onwards to other information. See: **https://www.ilo.org/international-programme-elimination-child-labour-ipec/what-child-labour/ilo-conventions-child-labour See also for example here: https://www.ilo.org/ilo-declaration-fundamental-principles-and-rights-work**

An excellent resource for a high-level guide on Textile labels – including cotton – and new and impending environmental regulations, see the ***Textile Standards & Legislation 2024*** guidebook from MCL News & Media. See: **www.textilestandards.com**

Further reading and links of interest

A few suggestions that are not about standards and cotton as such, but do relate to or are relevant to sustainability.

Science-fiction writer Kim Stanley Robinson visits the near future to see how we might intervene at scale and regenerate the world in ***The Ministry for the Future***. It's a bit overoptimistic in some ways, but it does use examples of solutions that get talked about, including rewilding, and also addresses the problem of excess heat, the dreaded "wet bulb" effect. See: **https://en.wikipedia.org/wiki/The_Ministry_for_the_Future**

Where we came from, what we really did, and something of why we're here now. ***The Dawn of Everything – A New History of Humankind*** is one of those books that will challenge your thinking, and in sustainability, that can be a good thing. Farming, when we started, how much we actually farmed full time, land care, and so on. See **https://en.wikipedia.org/wiki/The_Dawn_of_Everything**

"***Losing Earth: the decade we could have stopped climate change***" goes into the policy failures which lead us to needing cotton standards and soil carbon sequestration now on such a scale. It's a part of the story of how we fell so far into the mire. See: **https://en.wikipedia.org/wiki/Losing_Earth**

The ***Uninhabitable Earth***, on the other hand, looks at the consequences of that failure and particularly of continued failure. See **https://en.wikipedia.org/wiki/The_Uninhabitable_Earth_(book)**

Although not about cotton, ***The Naked Neanderthal*** is about a world where the climate changed several times, and indeed references a period where humans lived at +4C. This is relevant to sustainability. See **https://www.prospectmagazine.co.uk/views/people/64630/neanderthal-hunter-ludovic-slimak-each-site-is-a-miracle** (and if you can, read it in French)

Other essential reading includes ***from Transformers Foundation***: **www.transformersfoundation.org/cotton-report-2021;** ***Cascale/Cotton Inc methodology:*** **www.cascale.org/resources/press-news/press-releases/cascales-higg-msi-unveils-new-cotton-lca-methodology**; and ***Cotton Today***: **www.cottontoday.cottoninc.com**

Back to the serious stuff…

Weeds and Herbicides: PAN Europe Alternative Methods in Weed Management to the Use of Glyphosate and Other Herbicides, PAN Europe and part funded by Greens in the European Parliament, **https://www.pan-europe.info/resources/ reports/2017/10/alternative-methods-weed-management-glyphosate-and-other-herbicides**

The potential sustainability benefits of disruptive innovations: Stuchtey M.R., Enkvist P.A., Zumwinkel K., ***A Good Disruption Redefining Growth in the Twenty-First Century,*** Bloombury: 2016.

Chemicals management: UNEP. 2013. ***Costs of Inaction on the Sound Management of Chemicals***. United Nations Environment Programme, Geneva.

Rewilding: Porras I. Et al., Reforestation, carbon sequestration, and agriculture, IIED: ***2015*** **https://pubs.iied.org/16601IIED/**

Fixing Fashion: Clothing Consumption and Sustainability, 2019 **https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1952/report-summary.html**

A challenge to certification: ***Changing Markets Foundation: The false promise of certification***, 2018, Changing Markets Foundation.

Cotton and carbon emissions: Lanier Nalley L., Danforth D., Niederman Z., Gray Teague T., A Scan Level Cotton Carbon Life Cycle Assessment: Has Bio-Tech Reduced the Carbon Emissions from Cotton Production in the USA? ***The Journal of Cotton Science 17:80–88 (2013) 80*** **http://journal.cotton.org**, © The Cotton Foundation 2013

Fairtrade impacts: ***NRI and IDS Fairtrade Cotton***: Assessing Impact in Mali, Senegal, Cameroon and India, Natural Resources Institute (NRI) and Institute of Development Studies (IDS) - **http://www.nri.org/project-websites/livelihoods-and-institutions/fairtrade-cotton-assessing-impact-in-mali-senegal-cameroon-and-india**

SEEP Measuring Sustainability in Cotton Farming Systems: executive summary, ICAC 2013.

Silici L. ***Agro-ecology: what it is and what it has to offer*** IIED Issue Paper IIED: London 2014.

Land degradation: **https://www.ipbes.net/news/media-release-worsening-worldwide-land-degradation-now-%E2%80%98critical%E2%80%99-undermining-well-being-32**

Amera T., ***A comparative study of impacts of cotton IPM in the Rift Valley of Southern Ethiopia 2008 Institute for Sustainable Development Ethiopia*** and PAN UK: Addis Ababa and London 2008.

Pretty J., Toulmin C. and Williams S., Sustainable Intensification in African Agriculture, 2011. Int. J. of Agr. Sustainability ***9(1)*** 2011, pp. – 24, **www.earthscan.co.uk/journals/ijas** accessed May 2011.

Settle W., and Garba H., ***The West African Regional Integrated Production and Pest Management (IPPM) Programme***, FAO 2009.

Notes

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