



The ICAC Recorder

International Cotton Advisory Committee



Special Issue: The XV Meeting of The Southern & Eastern Africa Cotton Forum (SEACF)

1. Report of The XV Meeting of The Southern & Eastern Africa Cotton Forum (SEACF).....	2
2. Prospects of Organic Cotton in Nigeria	28

Editorial

A recent regional network meeting in Africa focussed on organic cotton. This issue of The ICAC RECORDER is dedicated to cover the proceedings of the meeting. At the meeting, a close friend asked me, why I chose to focus on the organic approach for Africa, when the yields are lowest in the world and it is common knowledge that application of synthetic fertilizers leads to high yields? Indeed, African cotton productivity is the lowest in the world and the lowest use of synthetic fertilizers is often cited as a reason for low yields. Is organic cotton an answer to the problem or will it worsen the crisis of low productivity? Interestingly, the subject of 'prospect for organic cotton in Africa' was greeted with great enthusiasm by researchers and administrators. I replied to my friend that in my considered opinion, organic approach is imperative for Africa. I must explain my reply and discuss the probable reasons for this enthusiasm in Africa, which I intend doing so in the latter part of this Editorial. Overall, kudos to the organizing committee in Mozambique, the African regional network meeting on organic cotton was a grand success.

As mentioned earlier, it is generally believed that low productivity of African agriculture and cotton is because Africa's fertilizer usage is lowest in the world -that is grossly inadequate to replace the soil nutrients consumed every year by crops. The answer to the challenge of low yields, across the globe, is generally sought from synthetic chemical fertilizers, as an elegant and practical solution. Eventually, agriculture in almost all advanced countries has become completely dependent on synthetic chemical fertilizers for enhanced productivity. Should sub-Saharan Africa pursue the route of chemical intensive farming, or organic methods to address the woes of low cotton productivity? The tilt towards 'organic' emanates from the fact that synthetic chemical fertilizers are unaffordable and not easily available in Africa. For example, the cost of 50Kg bag of urea is less than US\$ 4.0 in India, but more than US\$50 in majority countries of Africa thus making it tough for Africa to compete in international markets. Fertilizer prices are known to have almost doubled in a year in many countries including Zimbabwe, Malawi, South Africa and Tanzania. This is not just unaffordable and unsustainable, but also unviable in the long term. With the recent Russia-Ukraine crisis, the fertilizer problem is expected to worsen. Russia is the world's top exporter of nitrogen fertilizers. It is also the second largest supplier of potassium and the third-largest exporter of phosphorus fertilizers. The International Fertilizer Association (IFA) says that the 'biggest drop in fertilizer usage next season will be in sub-Saharan Africa, with a decline of as much as 23%'. The pertinent question to ask against this backdrop is -are there any viable options to combat the fertilizer crisis? Interestingly, more and more researchers are now increasingly voicing their preference for regenerative agricultural practices over chemical intensive methods to improve soil fertility and soil health. For example, legume cover crops which are components of regenerative agriculture, are known to fix 50 to 200 kg nitrogen per hectare in a single season at a fraction of the cost of a bag of urea. Similarly, biopesticides are known to maintain insect pests below damaging thresholds while conserving beneficial insect biodiversity that sustains natural pest control all through the season, in contrast to most synthetic pesticides that strongly disrupt the ecosystems to cause cyclic resurgence of insect pests. Therefore, it is worth exploring such feasible natural organic solutions and many more similar practices as expeditiously as possible to circumvent the imbroglio of 'chemical-intensive-farming'. Organic farming embodies approaches that build soil health and strengthen biodiversity.

Mounting recent research evidence clearly shows that viable alternative options for soil fertility, sustainable soil health and conservation of biodiversity are available in regenerative agricultural practices that form the bedrock of organic farming. Sustainable agriculture primarily aims to improve carbon reserves in the soil; and as the World Food Prize winner, Prof Rattan Lal says, 'carbon is essential for the utilization of the nutrients in the soil, whether they are native or applied.' Prof. Lal elaborates further that 'the concentrations of organic carbon in the soil, should be approximately 2.0% in the top 8 to 12 inches. Maintaining this level of soil carbon is essential for water retention and for controlling soil erosion and leaching. It's also critical for nutrient cycling and improved soil structure'. African soils have far less than 1.0% carbon that leads to poor soil health. A healthy soil supports a healthy crop which is critical for a good harvest. Ironically, application of synthetic fertilizers may lead to better yields, but are known to disrupt soil health. Therefore, long term sustainable 'soil health' solutions offered by regenerative agriculture and organic farming not only look viable, but also appear to be more appropriate and apt for the bio-diversity rich African continent. Tanzania has been leading the way in Africa on organic cotton. There are good examples of happy organic farms and success stories of a healthy ecology and a sound environment. As Prof Rattan Lal who worked for several years in Africa says "Agriculture, if done properly, has to be a solution to environmental issues." It is becoming clearer over time that doing agriculture properly means improving soil carbon content, improving soil health and improving biodiversity; and all of these approaches have the potential to not only improve yields but also to combat and mitigate the ill effects of climate change.

This issue contains proceedings of the XV Meeting of the Southern and Eastern African Cotton Forum (SEACF) which was held from 29 June to 1 July 2022 in Maputo Province, Mozambique. The meeting was jointly conducted by the ICAC and the Mozambique Institute for Cotton and Oilseed (IAOM). Delegates discussed on 'Prospects for Organic Cotton in Africa'. The lectures have been summarized and presented here. Happy reading.

– Keshav Kranthi



Report of The XV Meeting of The Southern & Eastern Africa Cotton Forum (SEACF)

29 June to 1 July 2022, Maputo, Mozambique.

INTRODUCTION

The XV Meeting of the Southern and Eastern African Cotton Forum (SEACF) was held from 29 June to 1 July 2022 in Montebello Indy Maputo Congress Hotel, Maputo Province, Mozambique. The meeting was jointly conducted by the ICAC and the Mozambique Institute for Cotton and Oilseed (IAOM). The theme of the meeting was 'Prospects for Organic Cotton in Africa'. 95 delegates from twelve countries, namely Colombia, Germany, India, Kenya, Mozambique, Nigeria, South Africa, Switzerland, Tanzania, UK, Zambia and Zimbabwe participated in the meeting.



Figure-1 Visit of the SEACF delegates to MCM Spinning mill.



Figure-2 Meeting in progress

SESSION-1: INAUGURAL

The inaugural session of XV SEACF meeting was held on 30th June 2022 at Montebello Indy Congress Hotel. The following dignitaries addressed the participants- General Inspector of Agriculture, Mr. Rui Mapatse who represented the Minister of

Agriculture and Rural development Mr. Celso Correia, Dr. Yolanda Goncalves, Director General of Mozambique Institute for Cotton and Oilseeds, IP, Dr. Dercia Guedes, Director of Central Services for Research, Planning and Projects from Mozambique Institute for Cotton and Oilseeds, Mr. Francisco dos Santos, president of the cotton association of Mozambique and executive Director of the cotton company JFS and Mr. Kai Hughes, Executive Director, International Cotton Advisory Committee.



Figure-3 Traditional dance



Figure-3a Traditional dance

Beginning the inaugural Mr. Edson Tanga gave an overview of the geographical location of Mozambique and its cropping patterns. He presented a SWOT analysis in which market volatility was a major threat. The program was envisioned to reach out to 200K producers producing 200K tonnes of cotton.

Mr. Rui Mapatse, General Inspector of Agriculture and Rural Development welcomed the participants of SEACF and appreciated the initiative of promoting the organic subsector in Mozambique and mentioned that the initiative fitted well in

the agriculture development policy of the country. He expects organic cotton production to increase revenue of households in Mozambique. The General Inspector of Agriculture, on behalf of the Minister for Agriculture and Rural development appreciated the need for the meeting in the backdrop of 3F shortages, a consequence of the war- i.e., Fuel, Fertiliser and Food and he expressed concern that Africa would likely be affected the most. Climate change and sustainability are issues that need urgent attention, he said. He congratulated the Mozambique Institute of cotton and Oilseeds and the ICAC for coming together to address an important issue of the prospects of organic cotton in Africa especially for the timeliness in meeting the current challenges and concerns.



Figure-4 SEACF Core Organizing Committee



Figure-5 Mr. Rui Mapatse: Inaugural address

Mr. Kai Hughes, Executive Director, informed the audience about the ICAC and its new initiatives. He mentioned that the organization had recruited a textile expert and had identified a coordinator for Southern and Eastern Africa. He mentioned the new digital initiatives of the ICAC, on the VR films and the APP. He spoke in detail on the formation of the PSAC (Private sector Advisory Council) and on the importance of the private sector in cotton production and its value and supply chain. He drew attention of the participants and researchers, to the forthcoming World Cotton Research Conference in Egypt from the 4th to 7th October 2022 as well as to the World Cotton Day to be celebrated globally on the 7th of October each year.



Figure-6 Address by Mr. Kai Hughes

Dr. Yolanda informed the audience that organic cotton cultivation was new to Mozambique. 'We look forward to developing protocols for organic cotton cultivation during the course of this meeting,' she said. She also emphasized the important role of the private sector in this endeavor. It was stated that the IOAM would take up the responsibility for resolving regulatory issues. This event she said, could help Mozambique address the challenges arising in agriculture and cotton.



Figure-7 Address by Dr. Yolanda Goncalves

Dr. Dercia informed the house of the low cotton productivity of 350Kg/Ha in Mozambique. She stressed the importance of three action points- operation of collective sales that will help a rapid response, the importance of a digital marketplace and to devise amelioration strategies for cyclone affected agriculture.



Figure-8 Address by Dr. Dercia Guedes



Figure-9 Address by Mr. Francisco Ferreira dos Santos

Mr. Francisco Ferreira dos Santos, President of the cotton Association of Mozambique (AAM) emphasized that development of the organic cotton subsector would not only strengthen cotton production but would also encourage utilization as well as the development of the value chain. Organic cotton production and processing not only meets the national requirements but would also encourage export.



Figure-10 Mr. Benison Simoco: Welcome address

The National forum of cotton producers (FONPA) president, Mr. Benison Simoco mentioned that the strategic plan 2021-25 has 4 pillars of production, productivity and profitability followed by having policies in place facilitated by organizational development thereby ensuring financial sustainability for the stakeholders. He envisioned development of the organic cotton subsector was in line with the strategic plan.



Figure-11 Mr. Helder de Souza: Cotton status in Mozambique.



Figure-12 Mr. Noberto Mahalambe addressing the gathering



Figure-13 Mr. Osvaldo Catine interacting with the audience

Mr. Helder de Sousa, Technician of the Cotton and Oilseeds Institute of Mozambique presented the status of cotton in Mozambique. Mr. Osvaldo Catine, Member of the Mozambique Cotton Association interacted with the delegates on the role of the association in promoting cotton. Mr Noberto Mahalambe, provided guidance for the meeting proceedings.



Figure-14 Delegate interactions

Global Status of Organic & Sustainable Cotton

Kai Hughes

International Cotton Advisory Committee,
1629 K Street, NW. Washington DC. USA.



Figure-15 Mr. Kai Hughes

Organic cotton production has been increasing in many regions of the world and is estimated to continue its growth well into the future. Consumer demand for specialty cotton has been increasing and demand for organic cotton is showing strong signs of continued growth around the globe. Organic cotton production has benefits not just for farmers but also for sustainability and in particular soil health.

Global organic cotton production

On a global scale, there are currently 21 countries producing organic cotton. In the most recent data available, there are over 229,280 farmers producing more than 249,153 tonnes of organic cotton globally, which is around 1% of the global cotton production. The production of organic cotton fibre has increased 3.9% from the previous year's production numbers.

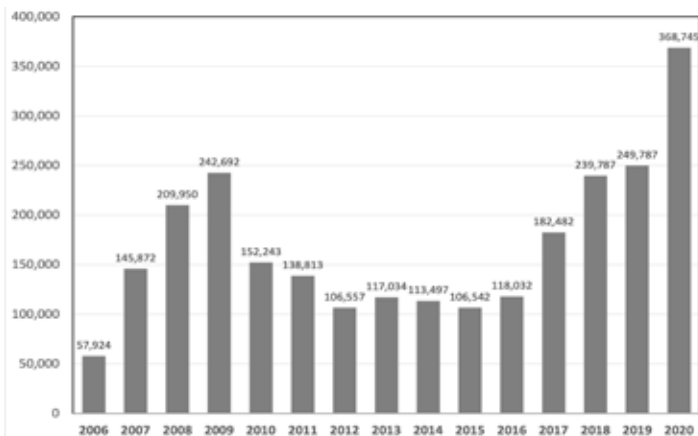


Figure-16 Global organic cotton production (tonnes)

The total land under organic cotton production is 588,425 ha. The 14-year historical trend shows a mixed picture for organic

cotton. However, since the 2016/17 season, organic cotton production has been increasing progressively and is estimated to hit an all-time high of 368,746 tonnes in the 2020/21 season.

Organic cotton countries

In the 2019/20 season, India was the leader in organic cotton production with 124,244 tonnes followed by China with 30,589 tonnes, and Kyrgyzstan, Turkey and Tanzania round out the top five with 29,415, 24,288 and 10,471 tonnes, respectively. Kyrgyzstan and Tanzania witnessed an impressive growth rate in the production of organic cotton with Tanzania moving from the sixth to the fifth largest producer in the 2019/20 season. Four countries experienced a decrease in production in 2019/20: Tajikistan (-14%), Egypt (-17%), Thailand (-17%), and China (-26%). China and Tajikistan's decreases had the most significant impact on the global total as they are the second and sixth (previously fifth) largest producers, respectively.

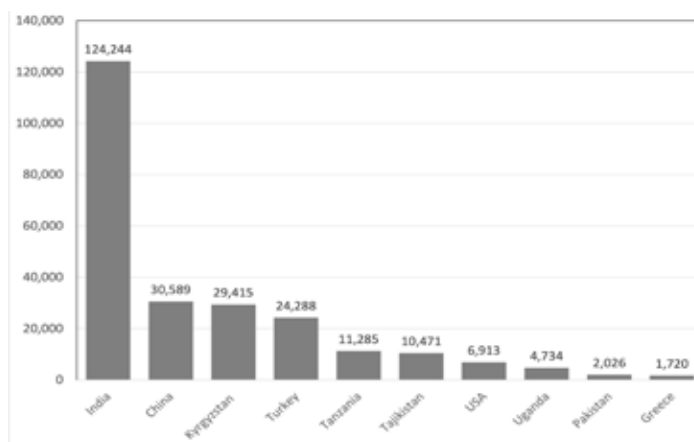


Figure-17 Organic cotton production (tonnes) in the top 10 countries

Sustainable cotton

While sustainable cotton initiatives accounted for about 29% of all cotton produced globally in 2019/20, organic cotton production accounted for only 1% of the total. Amongst all the sustainable Initiatives, Better Cotton Initiative is the largest cotton sustainability programme in the world. Cotton produced under the BCI standard - including the partnership with Cotton made in Africa, the Responsible Brazilian Cotton programme in Brazil and the MyBMP programme in Australia - reached 6.2 million tonnes in 2019/20, accounting for nearly 83% of total sustainable cotton produced during that season. In terms of countries, Brazil, India, Pakistan, China and the United States produced about 87% of the total sustainable cotton production in the world.

Sub-Saharan Africa

In the 2019/20 season, Africa had nearly 58,400 farmers producing 18,200 tonnes of Organic Cotton. This is a very impressive year-on-year growth rate of 91% and this regional growth rate is estimated to continue into the 2020/21 season. Production for 2020/21 is estimated to increase by 93% over the preceding seasons data. Africa currently holds a share of 7.3% of

the entire global organic cotton production. If the current trends hold, it is likely that, this percentage will increase substantially into the future.

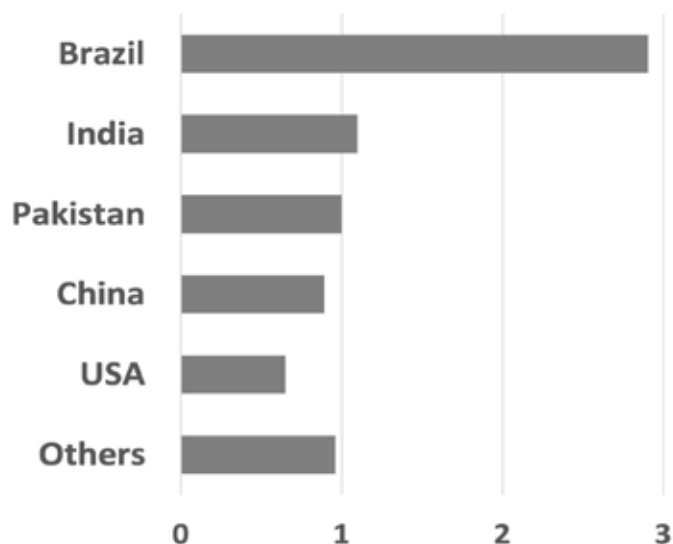


Figure-18 Production of sustainable cotton (Million tonnes)

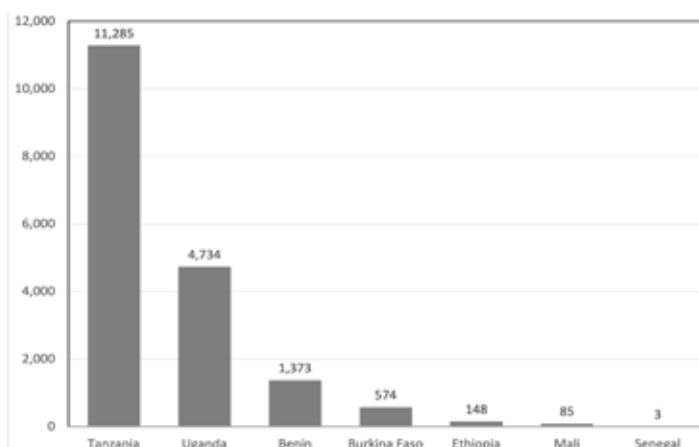


Figure-19 Organic cotton production in sub-Saharan Africa

The five-years trend in the data shows that organic cotton production has been increasing over the past few seasons. Tanzania has increased their production by an impressive 114% over the previous season and is estimated to continue that trend into the 2020/21 season with an estimated growth rate of 135%. Uganda witnessed a production growth rate of 83% and like Tanzania is estimated to increase their 2020/21 production numbers by 27%. Both Benin and Burkina Faso are also estimated to increase their production numbers in the 2020/21 season.

Of special note, Zambia is currently engaged in a Pilot Project related to organic cotton production. The project is actively evolving but initially has 1,000 farmers registered who are growing cotton on 500 ha of land. The project aims to grow organic cotton in four districts of the country. The districts weren't previously growing any cotton and the government has now made these districts "exclusion zones" meaning any cotton grown in the area must be organic.

Why CmiA and Organic are a 'Perfect Match'

Britta Deutsch

Aid by Trade Foundation (AbTF), Hamburg Germany



Figure-20 Ms. Britta Deutsch

Introduction

Organic Cotton is an opportunity for Africa from CmiA's perspective. The Aid by Trade Foundation with its Cotton made in Africa (CmiA) initiative sees great potential for organic cotton cultivation, especially in East and Southern Africa. Taking the growing demand from brands and retailers and the willingness to finally pay of organic premiums, AbTF is committed to supporting its partners in the transition to organic cotton cultivation.

The Aid by Trade Foundation follows a social business approach with smallholder farmers in the centre: Improving their livelihoods while preserving the environment they live in.



Figure-21 The CmiA cotton supply chain

On the African continent, Cotton made in Africa is the most widely used standard for sustainable cotton.

The CmiA Standards System includes all necessary elements to enable implementers to be fit for organic certification.

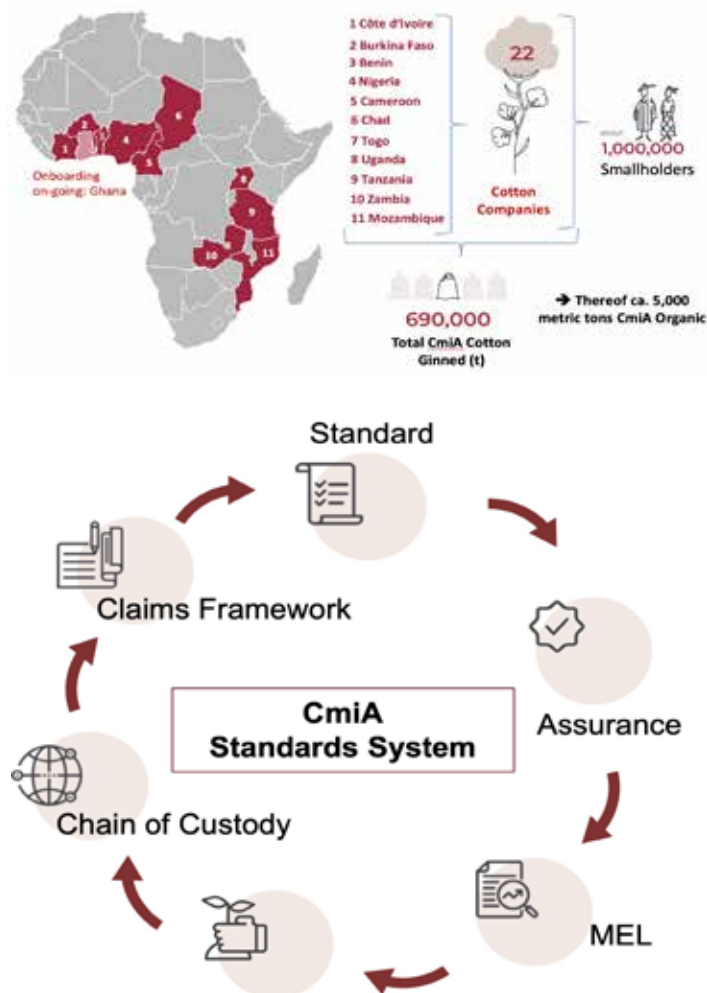


Figure-23 The CmiA standard systems

Management

- Responsible business conduct
- Verification process
- Commitment to CmiA values

Planet

- Most pressing environmental issues
- Mitigates negative impacts for nature
- Increasing resilience of agroecosystem and the environment of communities

People

- Define CmiA's understanding of smallholder farmers
- Ensure decent working conditions on ginning mill level
- Empowerment and development of women and children

Prosperity

- Enable cotton farmers to acquire fundamental business skills
- To Sustainably increase productivity and quality.
- Communities to improve their livelihoods and resilience

Why CmiA believes a strategically well-set approach towards “certified organic” is attractive to African smallholder farmers.

Current and future challenges

- Increasing costs for (imported) inputs
- Climate crisis increases risks for extreme weather events
- Low yields caused by various factors

Opportunities for an organized shift to organic

- Using ecosystem services free of monetary costs
- Organic Standards already incorporate many technical aspects in their requirements
- Due to systemic lack of access and affordability of (imported) inputs, decrease in yields during transition period may not be encountered

Knowledge transfer and constant support and encouragement of farmers are key success factors.

- “Organic by default” is not an option for CmiA.

The Cotton made in Africa initiative supports its partners to implement sustainable practices under the “planet pillar” in various ways.

Implementation is supported via

- Provision of training materials
- Support to Training of Trainers for the extension staff of cotton companies, or
- Other co-financed project activities (e.g., with public donors or in collaboration with ACF)



Figure-24 Focus on soil health



Figure-25: Example of ToT on composting by a soil expert

Challenges for African organic cotton from a demand side perspective

- Brands and retailers are demanding to track back the supply chain down to the farmer to ensure their intended impacts are achieved
- Regulation, oversight, and reliability of control bodies are still weak across Africa
- Certification of the entire farm is a significant investment but can also be an opportunity if a market can be found for the other crops

Opportunities for African organic cotton from a demand side perspective

- Brands and retailers are increasing their demand for sustainable cotton as well as organic (e.g., more than 50% increase of CmiA uptake in 2021)
- Due to legal regulations and requirements by international finance institutions brands and retailers need to invest into due diligence measures – recognized standards can play an important role to meet such requirements.
- Increasing willingness to pay organic premium, which gives the opportunity to increase income of farmers



Figure-26: Joint CmiA-ACF workshop with sub-grantees presenting their projects for knowledge exchange and shared learning

Role of African Cotton Foundation (ACF) in Promoting Sustainable Cotton Production in Africa

Belinda Edmonds

African Cotton Foundation, Geneva Switzerland



Figure-27 Ms. Belinda Edmonds

ACF is focused on improving the lives of cotton farmers by creating shared value along the entire value chain. The foundation envisions a sustainable, modern, and thriving African cotton sector – where farmers are profitable, cotton-growing communities are empowered, human rights are respected, and the environment is conserved. The mission of ACF is to support African cotton farmers and their ecosystem partners in improving their livelihoods, sustainability, and resilience. ACF creates shared value and achieve transformative systems change through multi-stakeholder partnerships and investments, R&D, policy dialogue, joint learning, and knowledge-sharing. ACF has set its goal by 2025, to increase the productivity and incomes for at least two million African cotton farmers and their ecosystem partners through stronger supply chains, income diversification, policies, market linkages, financial services, and technical support.

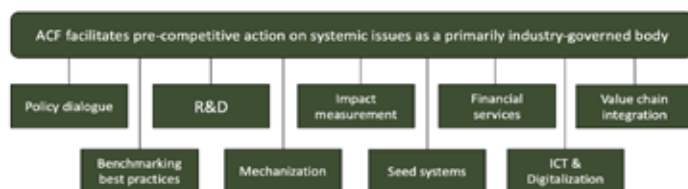


Figure-28 ACF serves as a strategic coordinator & project implementer

ACF serves as a strategic coordinator, project implementer and is not a certification body, but activities are compatible with and supportive of the certification system. ACF provides thought leadership, a consultative body, and a common industry voice. It aims to facilitate and coordinate development agency and resource mobilization through practical activities to maximize impact in rural areas where cotton is grown. ACF provides the

critical and extensive last-mile delivery infrastructure to reach rural smallholder farming. The ACF members operate in 9 African Countries; employ > 5,000 Agronomy /Extension /Training Officers to reach > 880,000 smallholder farmers. ACF is exploring innovations to change how cotton is grown considering the unprecedented challenges due to climate change, soaring Fertilizer Prices and looming Food Shortages. ACF perceives the need to restrict or reduce the most detrimental practices and provide support to farmers primarily via training and community upliftment initiatives.



Figure-29 Spinning mill in Mozambique

ACF recognizes that No “Cure All” or “one size fits all” system – but there are several techniques already practiced on a variety of crops in Africa (and the world) which are suitable/adaptable for cotton in the context of African small-holder farming. Healthy Soil Eco-Systems are essential for all crops, are consistent with all sustainability standards and are critical to meaningful carbon sequestration.

Cotton Companies’ personnel and the farmers they work with have a deep desire to learn. Resources (knowledge and inputs) are available internationally, online, and in Africa. An opportunity exists to enhance and expand these on a regional/continental basis. Examples of ‘increased productivity’ resulting in higher farmer incomes and greater food security exist. There is a need to learn from other agricultural sectors especially foods and flowers.

ACF believes that there is a positive future for organic cotton not only because of increased market demand, but also because it will become increasingly attractive, and in some cases the only, viable alternative for farmers. Adoption of organic and regenerative practices develops farmer resilience through inherent diversity of crops and improved nutritional value of associated food crops. The capacity of healthy soil eco-systems to sequester carbon facilitates the potential for monetization of carbon for small holders. “No-Till” systems ultimately reduce labour intensity therefore reducing the demand and need for conventional mechanization options.

ACF builds collaborations, facilitates, and implements training programmes which include technical trainings (Agronomists and Extension Teams), upgrade ‘transfer of technology’ knowledge and expertise. ACF develops technical resources and facilitates practical farmer trainings that respect specific conditions and cultures. It encourages continental expansion of bio-based input providers and infrastructure and explores solutions to systemic challenges such as quality of seed, desire for mechanization, access to finance and risk management mechanisms

Returning The Value – Organic Soil Fertility Via Composting

Inka Sachse

Soil and More, Munchen, Germany



Figure-30 Ms. Inka Sachse

Composting starts from and with soil. We need to take care of our soil, protect it and keep it fertile, respective, making it fertile.



Figure-31 Compost preparation



Figure-32 Small-scale local composting methods

This is, where our Agricultural Consulting comes in. The goals of composting are nutrient recycling, humus build-up, increasing water retention capacity, reducing disease pressure, improving soil biological & structural quality, recycling and sanitizing organic wastes, selling compost, and reducing greenhouse gas emissions from rotting wastes.



Figure-33 Compost preparation in a village

The limiting factors for composting are resources (Carbon/Nitrogen materials, water, labour), logistics, time & space, cost, quality of incoming material, sanitation/weeds/foreign materials, technology/scalability, market demand, legal, social & political issues. Compost starter and tea applications depend on the type of crops and are specific for different purposes such as nutrient availability, soil life stimulation and disease suppression. Trainings are imparted not only on composting but also on various aspects with objectives to ensure stable yield, mitigate the effects of severe weather, prevent erosion, increase water retention, and reduce disease pressure.



Figure-34 Mulch composting

Promotion of Organic Cotton in Africa

Mathilda van der Westhuizen

Agricultural Research Council – Institute for Vegetables, Industrial Crops and Medicinal plants. South Africa



Figure-35 Dr. Mathilda van der Westhuizen

Organic cotton covers about one percent of the total cotton production in Africa. Promotion of organic cultivation will be advantageous for human and planet protection, but before an effort can be made to promote organic cotton in Africa, an in-depth investigation must be taken into some of the challenges of organic cotton production.

Organic cotton seed is scarce, and not many cultivars are available. Organic cotton seed scarcity and low yields of organic cultivars are factors that affects the increase in and conversion to organic cotton production in Africa. Seed forms the starting point of any agricultural value chain and the continued growth of the organic cotton sector depends highly on the availability of good quality organic cottonseed. A new possibility to be explored for African organic cotton cultivars is the cotton germplasm of the South African Agricultural Research Council. Two of the possible cultivars included in this unexplored germplasm (1700 accessions) are named Gariet VERTOL 1 and Gariet VERTOL 2. These cultivars and some other should be evaluated at different localities in Africa and seed of the best performers should be multiplied. Characteristics of Gariet VERTOL 1 and 2 are that they are hairy cultivars that are jassid resistant and has deep root systems that ensures drought tolerance.

Weed control is another important organic challenge, with losses of up to 20 % in cotton yields when weeds cannot be controlled due to rain and wet soils. In a survey done by Delate et al., 2021, sixty percent of organic farmers reported that weed control is their main problem. Several weed control strategies should be followed, namely, firstly, start with a clean seedbed! After starting with a clean seedbed, mechanical methods such as traditional hand hoeing (the most common and effective way

of controlling weeds), should be followed diligently. Vinegar sprays and/or boiling water can be applied on post emergence weeds. Flame weeding is a possibility, but the author feels engineering invention should be done to produce a safe instrument that can be directed on weeds between cotton rows. Cover crops have traditionally been used with success to suppress weeds. Crops such as vetch, peas, lupin, red clover, rye, and cowpeas with high biomass suppresses weeds very effectively.



Figure-36 Weed problem in organic cotton



Figure-37 Hairy vetch as a cover crop

Organic farmers are responsible to maintain and improve soil health. However, little research and information is available on specific combinations of organic amendments, crop types, sequences, rotation duration, or weed management strategies that will lead to improved soil health in organic systems.

A need exists for organic cotton farmers in Africa to be trained on science-based management strategies. Not all organic farmers are close to cattle farms, therefore they must be trained in the production of vermicompost and breeding of compost larvae, to apply to planting holes when planting cotton seed, or as a side dressing.

Training on the advantages of cover crops should be emphasized, especially the use of legumes as cover crops as a source of N that can increase soil mineral N following decomposition. Stacked practices should be followed for example the use of cover crops and additional additions with composted manure or compost additions. Currently a new foliar feed is on the brink to be organically certified and produced in South Africa namely, Agri-

Boost, which consists of Ceres certified sterilized cattle blood meal and bone meal as main ingredients and fortified with sea kelp, fulvic acid, humic acid, nano micro elements and soil microorganisms.

Due to higher organic matter in soils, organically managed soils have higher water holding capacity, porosity, and aggregate stability which can buffer precipitation variability. Water harvesting methods should be explored and the technology should be transferred to organic farmers in Africa.

A South African study in 2008, done by van der Westhuizen, included four water harvesting methods namely a straw mulch, ploughing, ridges, and rip on row double skip methods. The rip on row method resulted in double the yield than the other three methods. A successful farmer in Tanzania uses contours in his crop, to harvest rainwater, and these success stories should be shared with upcoming organic farmers.

For organic insect control, the efficiency of Bt-Dipel and Neem sprays at the correct dosages and application frequencies should be tested and refined to ensure that insect control is done with success.

Food sprays as attractants made of fermented maize, and rows of maize can be a haven for several insects, trapping insects to not attack the main crop cotton and to attract beneficiary insects. Crops such as sunflower, coriander and dill can be inter-plant every twenty meters in cotton rows to attract insects away from cotton.

To summarize, sourcing and breeding of organic cotton cultivars, training on soil health practices to emphasize the importance of cover crops and crop rotations, efficient weed and insect control strategies will ensure increases in organic cotton yield in Africa and lead to more farmers converting to organic cotton.

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Figure-37a Q&A session

Organic Cotton Pest Management

Sandhya Kranthi

International Cotton advisory Committee,
1629 K Street NW, Washington DC.



Figure-38 Dr. Sandhya Kranthi

Cotton ranks fourth as a commodity crop that consumes the highest pesticides across the globe. The world average of insecticide consumption in cotton is US\$ 94 per hectare (ICAC Cotton Databook 2021) and most countries in Africa use insecticides well below this global average.

Cotton pest management is one of the most important subjects that needs to be addressed, especially when cotton needs to be cultivated organically. It is agreed that managing insect pests, diseases or weeds is difficult in cotton especially when chemical pesticides are prohibited from use. For organic cotton plant protection, management of insect and crop diversity holds the key to success. Having a healthy ecosystem where the insect diversity remains undisturbed is essential especially when the crop is young.

A few important steps are being suggested as critical for organic cotton plant protection. These are in line with the basic principles of Integrated pest management which involves the intelligent selection and use of pest management tools. These steps being Africa centric are not exclusive to organic cotton but can be used in conventional cotton too.

1. Choose a sucking pest tolerant early maturing, short duration variety.
2. Gas de-lint or mechanically de-lint the seeds.
3. Treat the seeds with available organic inputs produced in your backyard,
4. Plant under high density planting systems with single seed per hole.

5. Use indigenous botanicals (Neem, *Tephrosia*, *Tithonia*, Pyrethrum, Butterfly pea) or biopesticides (*Beauveria bassiana*, *Verticillium lecani*, *Metarrhizium anisopliae*, NPV, Bt) for cotton crop protection
6. Use mechanical, light and/or pheromone traps for monitoring and mass trapping.
7. Use trap crops (Okra Marigold), intercrops (Sorghum, Red gram, Mung bean, cowpea etc), border crops (castor, sorghum), crop rotations (with legumes and cereals) for pest management.



Figure-39 *Tithonia diversifolia* flowers



Figure-40 Light trap in IPM



Figure-41 Boll weevil pheromone trap

Advancements in the areas of formulations of biopesticides and botanicals was also presented. Ease of preparation of new biopesticide formulations and the development of women entrepreneurship around this was discussed. The audience were introduced to *Gossypium arboreum* with elite fibre traits that is suitable for organic cultivation. The presentation concluded that in the absence of use of harmful chemical pesticides, the ecosystem heals itself to make cotton production more sustainable and for Africa, importantly, not only is it relatively easy but is the way forward.

Challenges & Potential of Organic Cotton Sourcing Supply Chain in Africa

Saner Philippe and Baenninger Marco

Reinhart, Switzerland.



Figure 42. Mr Saner Philippe



Figure-43. Mr Baenninger Marco

Minority ownership of cotton gins in Burkina Faso, Ivory Coast, Tanzania, Zambia and Zimbabwe. Reinhart is a major contributor in the development and the trade of certified and sustainable cotton. Among others, through our existing projects in Africa. Main origins for organic cotton: Tanzania, Turkey, Benin, Kyrgyzstan, Tajikistan, Zambia (exp. 2023). About half of our organic volume from Tanzania – all CmiA/USDA-NO, EU, GOTS certified (main suppliers Alliance Gineries, Bio Sustain)

- In 2022, Reinhart supports physical traceability of African Organic Cotton (bottom-up approach)
- Reinhart linked up with traceability service provider Haelixa to use a DNA marker embedded in fibres for the first ever physically traceable tamper-proof organic cotton from Tanzania in partnership with Alliance gineries.
- The project is currently supporting 6,205 organic cotton farmers (1809 women), 4,475 of which are already certified organic. Organic certification applications have been made for 1730 in-conversion farmers and recruitment is ongoing for new cotton farmers.
- Following the completion of the baseline survey in 2021, in which 300 cotton farmers were interviewed in the project sites, on average, organically certified cotton farms had a 222% higher net income from cotton than conventional cotton farms during the 2020/21 cotton season. This large difference is mainly due to higher production costs for the conventional farmers, particularly from high fertilizer and pesticides costs.
- Organic farmers were also doing significantly better than conventional farmers for other crops, with net income from

other main cash crops, namely, cashew, soya, maize, being 103%, 43% and 65% higher, respectively.

- 3957 tonnes of organic seed cotton were ginned following the 2021 cotton season.

Internal Analysis		External Analysis	
Strength	Weakness	Opportunities	Threats
– Agricultural know-how deeply embedded in society – A strong story (CmiA branding)	– Input dependent yield – Capacity development on farming practices – Digital literacy	– Regenerative practices – No tillage / No burn – Decarbonisation	– Volatile demand for organic cotton – Competition from other sustainable initiatives – Climate change – Social aspects (child labor)

Figure-44 Challenges and Potential of Organic Cotton Sourcing Supply Chain in Africa

Productivity and Economics of Organic Cotton

Lorena Ruiz

International Cotton advisory Committee,
1629 K Street NW, Washington DC.



Figure-45 Ms. Lorena Ruiz

Yields

- Conversion Period: 2-3 years
- Farmers cannot longer use chemical fertilisers, pesticides or growth regulators - farmers may experience a temporary drop in yields
- Yields are likely to be more resilient to the extreme weather - climate change
- Organic farming is also knowledge-intensive - time and support to adapt

Data reporting

Organic cotton is grown within a rotation system. The same certified land may also grow a variety of other crops. For example, in 2019/20, the total certified organic cotton area was 588,425 hectares with a reported production of 249,153 tonnes of lint, which translates to 423 Kg lint per hectare.

Many respondents admit that the certified land was also used in mixed cropping systems wherein cotton may have been cultivated in a lesser area of the certified land than the total area reported.

Country productivity

Organic cotton yields vary significantly across countries from 100 to 2000 Kg/ha, depending on management practices and production conditions such as irrigated or rainfed. At least five countries, namely, Turkey (2,103 Kg/ha), China (1,928 Kg/ha), Kyrgyzstan (1,597 Kg/ha), Tajikistan (1,286 Kg/ha) and Egypt (1,202 Kg/ha), harvest more than 1200 Kg/ha of organic fibres. Uzbekistan (855 Kg/ha), Ethiopia (851 Kg/ha), Greece (800 Kg/ha) and Peru (757 Kg/ha) also get good productivity of organic cotton which is higher than the world average of all cotton fibres. Most of the high yielding countries grow organic cotton under irrigated conditions. However, yields in rainfed farms of India, USA, Brazil and Africa are low. Low yields are often cited as the reason why organic cotton cannot be scaled up.

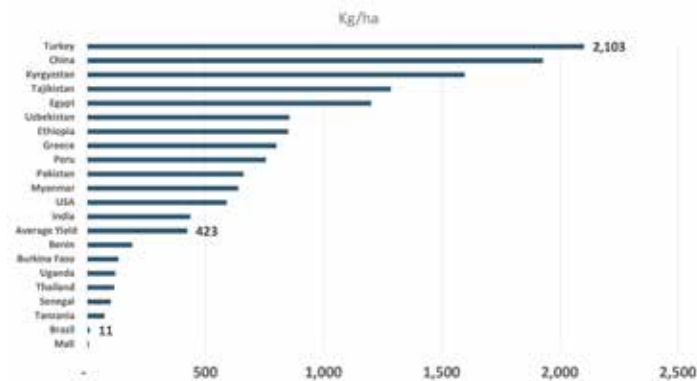


Figure-46 Organic cotton yield in different countries across the world

Market and supply chain

The global market worth of organic cotton was \$519 million in 2020 and is estimated to have reached \$640 million in 2021. Demand for organic cotton comes from two primary sources.

Consumers who are making a lifestyle choice to support organic food and fibre and brands and retailers who want to reduce their carbon, water and chemical footprint by adopting the use of more sustainable fibres and materials. Farmers want committed buyers, premium price, financing, risk management, easier certification and inexpensive testing.

Manufacturers want committed customers, reliable sourcing and product integrity, clear targets for sustainability, risk sharing and value sharing. Brands require supply security, consistent quality and pricing, product integrity and reliable data.

Economics

Organic cotton has been receiving a premium value in trade. Compared to the mid-point annual market prices of Cotlook A index, organic cotton was valued at 16% higher premium price in 2018/19 and at 31% higher value in 2019/20.

The cost of production is generally reported to be low in organic cotton, but with a higher proportion of manual labour involved in the costs.

For example, majority of the total costs were towards labour for planting, thinning, gap filling, stalk destruction, weeding and harvesting in Tanzania.

Data shows that organic cotton farming can be profitable while also improving the environmental impacts of cotton farming.

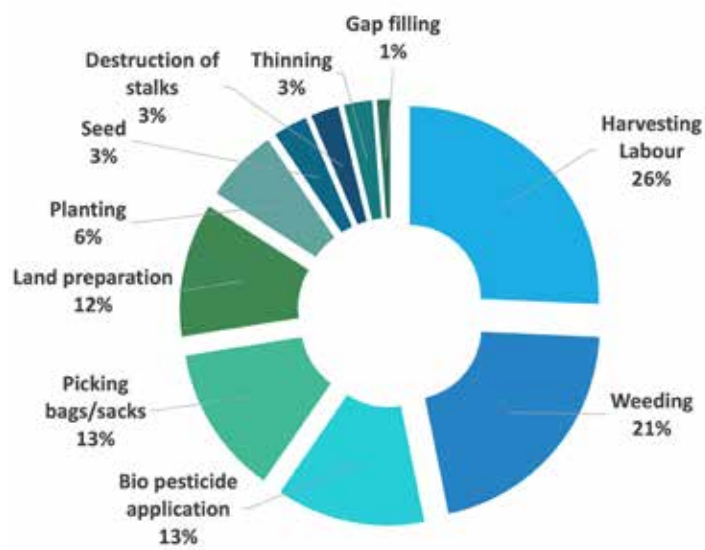


Figure-47 Proportion of production component costs in organic cotton

Challenges

- Incentives for farmers to transition to organic production are lacking. Develop programmes to support farmers and through the conversion phase.
- Weak Research Support
- Developing Reliable traceability techniques

Prospects

The rising costs of synthetic fertilizers and pesticides, especially in recent times, leave no choice for the resource-constrained African farmer, but to resort towards alternative inexpensive biological fertilizers and biopesticides.

Thus, under the current conditions of high input prices, organic cotton may be a viable alternative for the smallholder rainfed African farmer compared to the expensive conventional farming production systems.

Cotton Cultivation by Small-Holder Farmers in Ecologically, Environmentally and Economically Depressed Regions of India

Arun Ambatipudi

Chetna Organic, Hyderabad, India.



Figure-48 Mr. Arun Ambatipudi

Smallholder cotton farmers in India face several challenges that include extreme poverty, social exploitation, debt trap and production risks due to erratic rainfall. Chetna organic started in 2004 with a mission to promote 'Agro-ecological Agriculture' based on the three principles of sustainability (Social, Environment and Economic) for livelihood enhancement. The first project started as an organic and fairtrade cotton supply chain intervention pilot in India on 1250 acres with support from the Dutch Government fund in collaboration with local Government agencies, NGOs, and experts.

Chetna Organic Farmers Association is a not-for-profit Farmers' Support Organization while Chetna Organic Agriculture Producer Co. Ltd. Is a wholly (100%) small farmer owned social enterprise (through membership subscription by cooperatives. Chetna Organic currently operates in Odisha, Maharashtra, and Telangana states where cotton is grown by small holders predominantly under rainfed conditions. Chetna organic covers 86,188 acres grown by 35,000 farmers as 1,989 farmer self-help groups by 14 Farmer cooperatives and 14 registered FPOs in 528 villages of 9 districts.



Figure-49 On-farm training on preparation of biopesticide from neem



Figure-50 Training for a women group

Trainings and field-based programs through convergence

- Pre-season, mid-season and end-of-season intensive TOT for staff and Lead Farmers
- Fortnightly Socio-technical Trainings at SHG /village Level
- Natural Resources Management (Watersheds, SWC, RWH, Agroforestry, etc.)
- Waste Land Agriculture Development (WADI) in the commons
- Diversified Based Irrigation Systems (DBI)
- Regenerative Organic Cotton Farming Systems
- Non-GMO Cotton Seed Breeding & Multiplication Program
- Landscape Approaches



Figure-51 Rainwater harvesting: farm pond



Figure-52 Compost preparation on the farm

Certification systems

- Group Certification Systems where interventions at Farm Level are Recorded in Individual Farm Dairies Year-on-Year
- Internal Audit and Risk Assessment is carried out 2 times a year and managed through an Internal Control Systems (ICS)
- GMO Testing using Strips at each farmer level and qPCR testing carried out in external labs
- Third Party Audits by External Certification Bodies (CB)
- Closure of Non-Compliances
- Issuance of Field Level Scope Certificates
- GOTS & OCS Certification of Contracted Gins and Warehouses
- Issuance of Transaction Certificates (TCs) to Buyers



Figure-53 On-farm training on organic seed sourcing



Figure-54 On-farm training on materials for the preparation of liquid manures

Chetna organic & fairtrade cotton supply chain

- More than 25 small-medium committed brands associated through their partner facilities (garment facilities and non-innated spinners)
- Partner Brands & Facilities - Paid Members of 'Chetna Coalition' (CHETCO) – A Shared Value Chain Community (incorporated in NYC, USA)
- Off-Take Agreements, Contracts, Loans (interest free) and Guarantees /Assistance signed in advance
- Partner brands pre-finance for procurement of seed cotton and payment to farmers
- Partner Brands Invest in Field Trainings, Certification, Non-GMO Seed & Other Inputs, Livelihoods & Community Development, Building /Strengthening Farmer Cooperatives, Development, Education, Vocational Trainings and Enterprise Development

- Built on 100% Traceability and Transparency from each and individual member farmer to fiber supply
- All impact captured through 'Source Trace' MIS Systems



Figure-55 An interactive training in a village

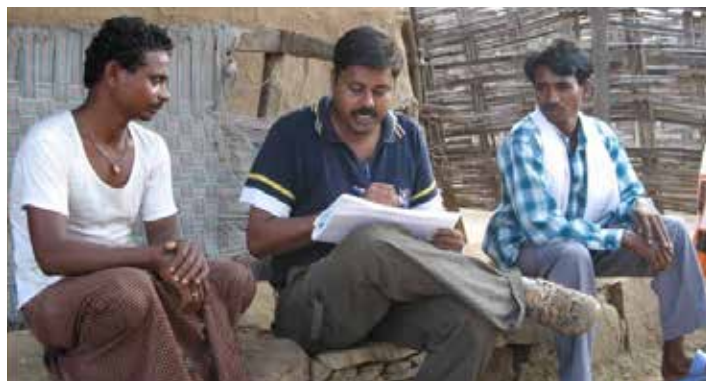


Figure-56 Interview and survey assessment

Learnings

- Organic Cotton' is again commodification of cotton and continues to be male centric
- Organic Cotton Farming Eco-Systems where Economies of Scope as opposed to Economies of Scale
- Organic Farming requires substantial investments on par with or even more than conventional farming.
- Minimalist Technical Extension to Comprehensive Agri-based Livelihoods Approach.
- Single Commodity Supply Chain vs. Integrated Supply Chains.
- Small is also beautiful and 10 smalls make a big and helps in risk diversification.
- Farmers as equal owners in the supply chain as opposed to being recipients.
- Premiums vs. paying for Ecosystem Services.
- Corporate Ethical Responsibility as opposed to Corporate Ethical Practice (CEP) and Long-Term Investments.
- Convergence.... Collaboration.... Partnerships
- BIODIVERSITY.... BIODIVERSITY... BIODIVERSITY.... SOILS.... SOILS.... SOILS....
- Certification is just another tool and not a guarantee to address fraud; and as an industry can be as exploitative as the seed and pesticide industry.



Figure-57 Setting up traceability systems at the ginning stage



Figure-58 Markers for fibre tagging



Figure-59 Small-holder organic farm

Partnering with the West African Sourcing Coalition (through SICOT) Knowledge Partner

- Value-Chain Coalition Building and Management
- FPO Management Training, Livelihood Development Programs, Quality Control
- Data Gathering and Management, Traceability Monitoring, Communications
- Financial Planning
- Off-Take Agreements, Contracts, Loans and Guarantees Assistance

Profit in Agriculture Through Unity

Manish Daga

Cotton Guru, Mumbai, India.



Figure-60 Mr. Manish Daga

Farmers are at the mercy of nature's vagaries and fluctuating prices. Cotton yields are decreasing while input costs continue to increase every year.

The main challenges for cotton farmers are as follows:

1. Inputs: Seeds, fertilizers, pesticides, manure, etc
2. Outputs: Cotton harvest, storage, processing, etc
3. Technology: Farm mapping, soil health analysis, transparency, traceability, mechanization, mobile application, weather stations, etc
4. Marketing: Lack of finance, lack of market information, lack of processing units and storage facility, price fluctuation, challenges in aggregation and low capacity

There is a need to reduce the cost of cotton cultivation and increase the technology intervention to make it more affordable for the farmers. Simultaneously, there is a need to develop effective marketing strategies and policies for cotton to ensure sustainability of income to the farmers. Development of 'Farmer producer organizations (FPOs)' offers one of the most elegant solutions to the crisis of fluctuating market prices and increasing input costs. FPO is an association group of farmer-producers that provide support to small farmers with end-to-end services covering almost all aspects of cultivation from inputs, technical services to processing and marketing. India has seen a tremendous growth in FPOs in recent years. The farmers' producers have good bargaining power in the form of bulk suppliers of inputs and buyers of produce. FPO is a legal entity incorporated under the Companies Act or Co-operative Societies Act of the concerned States. FPO is a proven strategy to help small producers rise to emerging markets. The combined power of negotiation helps to reduce cost of inputs, bargain for better prices for output and in better application of technology. Thus, FPOs enable small producers to pool their capital and establish successful businesses which would eventually improve their incomes and reduce risks.

Experiences with Production, Certification, Establishing Linkages and Sourcing of Sustainable Cotton

Amitabh Singh

Farmer Association for Rural Management (FARM), India.



Figure-61 Mr. Amitabh Singh

The 'organic' and 'sustainable' cotton supply chains extend from farm to fashion, with different standards and credentials and are laced with challenges of traceability & transparency. In a scenario where there are about 50,000 Farmers in the cluster who produce 30,000 tonnes of sustainable fibre with different sustainable standards, the challenges need efficient solutions. Thus, fashion backward and fashion forward at all levels, many standards and credentials are required. A systematic approach towards establishment of a new organic cluster are as follows:

- Step 1: Develop an organic system plan and select your cluster.
- Step 2: Implement the organic system plan on farm and get it reviewed by a certifying agent.
- Step 3: Organise inspection (Internal and third party)
- Step 4: Develop a Continuous Improvement Plan
- Step 5: Receive Scoping
- Step 6: Purchase and Sell of certified quantity

Increased consumer awareness on fashion, climate, gender, water utilization, biodiversity etc., mandates transparency and traceability.

The key issues and challenges are

- Processors, Fashion brands and Consumer demand quality but do not pay adequate premium for organic production
- Certification of the processes, documentation and supply chain has become a complicated and costly service.
- Farmers are not well informed or aware
- Availability and accessibility of good quality non-GMO Seed
- Limited certification and accreditation bodies which provide one-stop certification service for farm to fashion

While in the conventional value chain systems, the role of farmers is almost ignored, new approaches ensure that farmers are

included as core suppliers in the supply chain, while retailers and manufacturers support and promote ethical practices; maintain transparency, establish traceability while building and environmentally and ethically responsible product base. The environmental benefits are also communicated to users and the society.



Figure-62 A women farmer harvesting cotton in her organic farm



Figure-62a A women farmer

Promotion of Organic Cotton and Rotational Crops In Tanzania

Riyaz Haider and Tawanda Mutonhori

BioSustain Tanzania Limited



Figure-63 Mr. Riyaz Haider



Figure-64 Mr. Tawanda Mutonhori

Principles and practices

Organic cotton in Tanzania is promoted by BioSustain through several principles that enrich soil health and biodiversity. The main strategies deployed in organic cotton production systems are crop rotation with legumes and maize, following a three-year rotation. Legumes used include mung beans, green grams & groundnuts; minimum tillage, planting on ridges, intercropping with cover crops, contour planting and fallows; application of liquid manures and cow urine; seed treatment with cow dung; composting; moisture conservation through tied ridges, mulching and potholing; use of molasses traps; pest scouting and bio-pesticide preparation using neem leaves and *Solanum incanum*.

Activities

The main activities of organic farming in Tanzania are provision of planting seeds to farmers; production and provision of organic botanical pesticides to farmers for free; training farmers on organic agriculture mechanisms and IPM (Integrated Pest Management) under Good Agronomic Practices (GAP); farmer training on soil Health through the preparation and application



Figure-65 Rotation of cotton with peanut crop



Figure-66 *Solanum incanum* berries growing in the wild

of liquid manure using cow dung, cow urine and Biological Indigenous Microorganisms and training on preparation and application of compost and farm yard manure. Training is done through organic farmer groups at village level and is based on the entire cropping Calendar of activities for organic cotton production and rotational crops.

Challenges

- Hailstorms
- Delayed planting due to delays in the onset of the first effective planting raining
- Mid-season dry-spells
- Pest attack e.g., *Helicoverpa armigera* bollworm and sucking pests
- Slow rate of adoption

Prospects

The environmentally friendly organic farming systems lead to a sustainable economic prosperity and social developments for the rural population. Farmers get higher incomes and become independent of traders for their farm inputs. Organic farming provides food security and good health to farmers their families and the environment.

Value of Organic Farming Health and Sustainability

Marco Paul

Remei BioRe, Tanzania Limited



Figure-67 Mr. Marco Paul

Organic farming is emerging as a way of life for many small holder farmers in Tanzania. For the people to have good health, clean and safe food shelters and sustainable land, organic farming is the best solution. Global population is increasing, but the land is still the same; that means some measures are needed to be taken to make the land sustainable and productive for the existing and coming increased population. Organic farming can combat this situation. It is the best way to fight the ill effects of climate change that can affect the existing and the coming generations.



Figure-68 Monitoring an organic farm

Organic inputs.

The organic inputs used in Tanzania especially pesticides are *Pyrethrum*, *Vuruga biocide*, *Neem Extracts* and *Sodom apple*. Organic yields range from 250Kg to 400kg per acre depending on the management practices in the field. The comparison between Organic and Conventional is always conflicting with results that show advantages either way.



Figure-69 Pest monitoring

Challenges.

Although biological pesticides are available there is a need for different types of biopesticides, especially the most effective ones for pest control. It is my call for researchers to work on this area so that farmers have access to a wide range of bio pesticides for them to exercise a choice and obtain better yields.

Market

Organic market is growing; there is high demand of organic produce in the world market. At Remei Tanzania we have a good market access to the cotton we produce.



Figure-70 Cotton farmers with their harvest

Realities About Organic Cotton Sub-Sector in Eastern Africa

Ben Sekamatte

Consultant, Cotton made in Africa, Tanzania



Figure-71 Dr. Ben Sekamatte

In their development agenda, Tanzania & Uganda have adopted the 2030 Agenda for Sustainable Development that embraces the principles for sustainable development namely people, planet, prosperity, peace, and partnerships. Example of Tanzania: SDGs 1 (No poverty), 2 (Zero hunger) and 8 (Decent work and economic growth) were identified as key SDGs for the 2025 Development Plan.

Organic Cotton in Eastern Africa

- Reality #1: A sub-sector with huge “Economic-ecological” potential – But weakly coordinated stakeholders
- Reality #2: High potential to significantly contribute to key SDGs of the region but increase in farm yields alone will never guarantee decent work status
- Reality #3: Promoted/ operating within a larger sector managed as if effects of climate change Do Not exist
- Reality #4: Able to form the backbone of knowledge-driven smallholder agro economy & diversity of value addition opportunities.
- Reality #5. Home grown Science + Indigenous K gaps lacking to boost sustainable innovations

The untapped potential of the Organic cotton sub-sector – large volumes of un-exported horticultural crops rotated with cotton in East Africa.

Disturbed landscapes due to natural resource degradation pause sustainability challenges for organic production

- Overpopulation.
- Deforestation and the Destruction of Ecosystems leading to loss of biodiversity.
- Mining of Minerals and Oil.

- Technological and Industrial Development.
- Erosion.
- Pollution and Contamination of resources.
- BUT WHY this extent??

Proposed Way Forward

- Production: Good Organic Agriculture Practices
- Coordination: Training, Awareness, Information dissemination, Collaboration
- Climate -smart Policies & Regulations: Consider the broad ramifications of organic production systems & upgrade current policies to include realities of landscape & homestead chaos.
- Investment in Common Good National & regional facilities: Centralized organic Centers of excellence for training & related services e.g., produce inspection, for both local & export and certification
- A responsive, demand-driven Research system: Private sector is currently leading in generating organic innovations, notably for pest and soil fertility management. Public research systems have not yet matched the speed.

Recommendations for better coordination & efficient economic-ecological organic Cotton sub-Sector

- Foundations on regulation, food / fibre hygiene, compliance to sustainability best practices
- Focus on training for good organic agriculture practice, build linkages between inter agencies (regulatory agencies and research). Have, co-ordinated approach between private sector and moa
- Bio-pest / fertilizer application development / commercialization: water stewardship, controlled environment
- Perfect crop rotation & develop markets and value addition
- Branding and marketing East Africa’s organic cotton & rotation crops to niche tertiary global value chains.

Conclusions

- A sub-sector in infancy of transitioning from production by default
- The potential of organic cotton to contribute to development goals is real but is more constrained than two decades ago by complexities of institutional disconnectedness, challenges of markets for rotation crops and climate change effects on landscapes
- Limited demand-driven research and integration of Indigenous Knowledge constrains innovations for sustainable pest & soil fertility techniques
- National and regional efforts needed to support growth of the sub-sector

Sustainable Cotton in Africa

Emmanuel Mukua

International Cotton Advisory Committee (ICAC)



Figure-72 Mr. Emmanuel Mukua

Challenges

African cotton production systems face tremendous challenges. Weather vagaries include late commencement of rainy seasons, insufficient rainfall, flooding, fluctuating temperatures and increasing frequent extreme weather conditions. Africa lacks modern farming tools & technologies, sound agricultural inputs & solutions and failure to implement standards & policies. African cotton faces competition from other crops, mainly food crops and other more profitable cash crops in comparison to cotton e.g., soya beans in the case of East & South African Regions. The fluctuating world cotton market prices, characterized by price uncertainty from the time of planting poses a serious challenge to cotton producers in Africa.

Possible mitigation measures

Invest in research and development to help in areas such as: 1. Development of new seed varieties to counter effects of climate change and 2. Introduction of bespoke inputs that are friendly to the environment and humans e.g., use of biopesticides and organic fertilizers in place of synthetic chemical fertilizers and pesticides.

Investment is needed in extension services to facilitate farmer trainings on modern farming tools & techniques. There is a need to make cotton growing attractive to the youth – skills transfer and development for continuity. Development of textile industries in the continent – reduces the risk of international price fluctuations, creates jobs, earns foreign exchange. Adoption of mechanized Farming i.e., for tillage, sowing & weeding can boost production and productivity.

Advantage Africa

African cotton remains more sustainable & greener than cotton from any other origin because more than 90% of cotton produced in Africa is rainfed – minimal irrigation; Africa has the lowest usage of synthetic pesticides compared to the other regions in the world – good for environment, soils & health; Africa has the lowest usage of chemical fertilizers compared to the other regions in the world – good for soils & environment and Africa has lowest use of mechanization in its production – low carbon foot print.

Pursuit of Sustainable Cotton Through Elimination of Synthetics Economism

Washington Mubvekeri

Cotton Research Institute, Kadoma. Zimbabwe



Figure-73 Dr. Washington Mubvekeri

Synthetics economism

makes the concerns for nature's wellbeing and its relations to means of production (artificial fertilizers and pesticides) subservient to the development and use of the means of production.

Synthetic inputs are given prominence, and regarded as the only key option to increased wealth creation

Economic progress/wealth creation is regarded as fundamental.

Man's dependence on the natural world and his stewardship of nature is ignored.

Agriculture must fulfil at least 3 tasks

1. To keep man in touch with living nature. Reconciling man with the natural world is a necessity and that can be achieved by changing our agriculture in favor of environmental vitality and health.
2. To bring forth the foodstuffs and other materials which are needed for a becoming life (Schumacher, 1974).
3. Protecting natural resources and growing crops to clothe the world is a balancing act that cotton growers manage every day. Soil, water, plants, animals, and air are all part of what makes a dynamic and healthy cotton farming system."

The history of synthetic pesticides

- Ancient agriculturalists relied almost entirely on the use of natural remedies and preparations derived from them to combat pests.
- The use of synthetic pesticide began in the 1930s and became popular after 1945 because of increased yields.
- 1950s and early 1960s' Green Revolution saw the resurgence of synthetic pesticides and fertilizers.
- 1970s: The birth of IPM after DDT was found in the food

chain, pest developed resistance, water quality and wildlife and human health were compromised.

- IPM sought to minimize risk of synthetic inputs to people and the environment.
- IPM began with the realization that the use of synthetic pesticides brought about certain unintended consequences (Frank G. Zalom, 2010)
- 1990s: Commercialization of *Bt* crops.
- Green Chemistry, referred to as sustainable chemistry
- Green pesticides/botanical pesticides are plant extracts and plant-based pesticides used as repellents, nematocides, insecticides, fungicides
- The greatest successes in chemical science caused extremely dangerous and unpredictable consequences.
- Trying to solve one problem by creating other problems.
- The soil has limited capacity to deal with synthetic pesticides.
- What is the point of economic progress when the only earth we have is being contaminated and the only lives we have been being threatened?
- So far scientific progress has been brutal on nature.

Action now

- The talk about organic cotton and all other sustainable cottons is useful only if it leads to action now.
- But we must get off the hook-Addiction to synthetic pesticides

We think that we are not acting economically if we do not use artificial fertilizers and pesticides

We continue to look for excuses for the many abuses that are currently going on in the management of land, in our pursuit for dominance over nature.

Let us stop the violence

Use of natural pesticides will increase sustainability of agriculture because they are environment friendly.

Researchers need to develop:

- Technologies that are compatible with human and ecological health.
- Technologies that safeguard human and environmental wellbeing.
- The challenge that humanity is facing cannot be addressed by marginal adjustments as in IPM and to IPM.
- They cannot be addressed by fine tuning synthetic inputs to make them safer.
- Cotton should be turned into a stewardship crop
- Organic Cotton Production (OCP) guarantees human and the environmental health because it excludes reliance on harmful synthetic inputs.

Sustainable Cotton in Africa

Ibe Achimugu

Arewa Cotton, Nigeria



Figure-74 Ms. Ibe Achimugu



Figure-75 Mr. Ayodeji Raji-Ayoola

Sustainable production of the cotton crop is central to the sustainability of the sector. Going into organic cotton farming is a three-year chemical free process. Water stewardship, biodiversity, soil regeneration and reduction of carbon footprint are very important features that we need to keep central in our projects.



Figure-76 Trainees examining insects in the field

Good data collection for our processes from farm to ginnery is only half the story. The supply chain from farm right to the consumer must be environmentally and human right friendly.

Arewa Cotton is a ginning company with its headquarters in Abuja, Nigeria. The ginning processes are largely done in Wawa, Niger State, in the North Central part of Nigeria where the ginnery is located. Seed cotton is the primary raw material in the Cotton, Textile, and Garment sector. At Arewa Cotton, we would like to see our cotton traceable, organic, child labour free and produced sustainably by all genders, while providing a living wage to the small holder farmer. Arewa Cotton's transitioning to organic cotton from conventional cotton farming will be a phased approach, as it involves research and development, the introduction of new policies and certification, new farming culture, accountability and increased farmer advocacy and training. Achieving this would provide new areas of employment and revenue generation within the CTG sector.



Figure-77 Training session under a neem tree

Where we are in the journey to organic farming

We are at the research and development stage. Having partnered with Real IPM through a collaboration with African Cotton Foundation (ACF) and Cotton made in Africa (CmiA) to develop a suitable bio pesticide protocol, it will be tested in 4 different regions in Nigeria this 2022 cotton cropping season.



Figure-78 Visit to Real IPM biological control laboratories in Kenya

Activities

- Four staff have been trained in integrated pest management concentrating on biopesticides with Real IPM in Kenya
- Sixteen new Extension Officers have been trained in Nigeria, 4 per project region to enable wide dissemination of knowledge, awareness of zero tolerance to forced labour and child labour.
- Training on biodiversity and water stewardship using the CmiA manuals
- Translations of the manual into Hausa and Yoruba ready for printing and distribution
- Climate change has delayed planting and hence pushed back our start date. Knowledge sharing during international conferences and regional trainings organised by ACF and CmiA have helped us understand better how to mitigate against climate change.
- We are now creating visuals for farmers to follow on how to practice organic cotton farming.
- The next phase in our project is Farmer training
- So far, we have distributed conventional cotton seeds for planting and have observed an increase in the number of women farmers taking up cotton farming.



Figure-79 Field surveys and training

Challenges

- Longevity of commitment by both partners and farmers
- Quality of seeds, currently using recycled seeds. We need to use seeds from organic farms or untreated conventional seeds using established procedures
- High cost of production due to high cost of inputs, training materials etc.
- Change in culture e.g., mono-cropping and use of chemical fertilizers
- High labour cost and transportation cost in recent times
- Down the line, meeting buyer's recommendations regarding staple length and creating sustainable allies.

The authors' gratitude goes to all our partners and project staff for all their commitment to the journey to organic cotton farming in Nigeria.

Organic Techniques for High Yields

Keshav Kranthi

International Cotton Advisory Committee,
1629 K Street, NW. Washington DC. USA



Figure-80 Dr. Keshav Kranthi

High yields depend on a number of factors that are related to soils, weather, seeds, inputs and management practices. There is a general belief that yields from organic farms are less than those obtained from conventional farms that use chemical inputs. However, there are many cases where a good variety gives the same level of yields in both Organic and conventional farms.

While everything that is used in organic farms can be also used in conventional farms, there are a few things that are forbidden for use in organic farms. Organic farms primarily differ from conventional farms in at least three key components: 1. Synthetic nitrogenous fertilizers 2. Synthetic chemical pesticides and 3. GM varieties. Genetically modified (GM) varieties are forbidden in organic farming. Organic farms can use mineral sources of potassium, phosphorous and micronutrients, with the main source of nitrogen obtained from legume plants, manures and composts.

Improving soil organic carbon content through regenerative agricultural practices is one of the main objectives of organic farming practices. Higher levels of organic matter are known to increase soil fertility, nutrient access to plants and plant pre-disposition to combat pests, diseases and aberrant weather.

Effective pest management in organic farms is achieved by conserving the natural occurring biological control by avoiding broad spectrum chemical insecticides that are used in conventional farming and managing pests and diseases using biological control methods that do not disrupt natural pest control.

If agronomy, soil fertility and pests are managed properly, there is no reason why organic farms should yield less than

conventional farms.

This article describes a few protocols that are commonly used in organic farms to obtain increased yields by improving soil health, controlling insect pests and diseases effectively with biopesticides and through high density planting and canopy management. The main steps in agronomy for high yields are sowing of seeds at proper spacing of generally 90cm between rows and 10-15cm between plants within a row. Orienting the rows in north to south direction helps the crop to capture sunlight better. The next important step is to plant a legume as a cover crop so that it fixes nitrogen, leaves a biomass as mulch and also hold the topsoil with its residual roots. Clipping of the plant apex is carried out at cut-out stage for canopy management.

Sowing

- Seeds are sown on the ridges prepared in north-south direction the Demo fields at a row-to-row distance of 80cm.
- Single seed is sown per pocket
- Seeds are sown at 1.5-2.5cm depth and covered with soil.
- The spacing between seeds within a row can be 8cm if the germination per cent is 50-70%.
- The spacing between seeds within a row can be 10cm if the germination per cent is more than 70%. At this high density, plants will produce a greater number of fruiting branches and very few number of vegetative branches.

Preparation of bio-pesticide

Neem seeds contain azadirachtin and other chemicals that are bitter. They act as antifeedants. The concentration of azadirachtin is 0.1 to 0.3% in neem seeds. Oil contains very less azadirachtin, but like many vegetable oils can be used as an effective bio-pesticide against sucking pests. Tender mango leaves (purplish colour) have flavonoids that can protect botanicals from UV-rays of sunlight.

Materials required:

20 litres bucket, neem seeds, neem oil, tender mango leaves, water and botanical liquid soap.

Protocol

The protocol to prepare neem seed kernel extract (NSKE) is described below:

- Step-1: Crush 0.5 Kg neem seed kernels (after removing seed coats).
- Step-2: Add the crushed neem seed powders to a drum containing 10 litres of water.
- Step-3: Add 200g of crushed tender mango leaves to the solution
- Step-4: Stir well and keep it for a day with occasional stirring.
- Step-5: Filter the solution.
- Step-6: Add 100ml of crude neem oil to this solution.
- Step-7: (optional, if available) Add 100ml *Carapa procera* oil.

- Step-7: Add 5 to 10ml of botanical liquid soap for emulsification
- Step-8. Spray the solution in the demo plot at 60 days, 80-90 days and at 110 days.



Figure-81 Preparation of neem biopesticide

Enriching soil organic carbon

Soil organic carbon is vital for good soil health. Soil degradation is the biggest challenge for agriculture across the globe. Improving soil organic carbon in the topsoil will help to revive populations of soil organisms and microorganisms to rejuvenate soil health. A few commonly used methods to build soil health are based on using 'biochar' together with compost, green manures, legume crops and a biofertilizer extract called Jeevamrut.

Biochar is inert carbon that helps to strengthen soil structure, increase water holding capacity and cation exchange capacity of the soil. Biochar can be used as an aerated matrix for effective composting by preparing a fertile biochar mix to increase soil fertility.

An aerated bed to prepare a 'fertile-biochar mix' can be made by mixing the following components:

1. Crushed Biochar: Two tonnes
2. Compost/Manure: Eight tonnes
3. Dry hay: 200-500 Kg
4. Green Manure leaves: 2 tonnes
5. Mix with topsoil to make a raised flat bed of 15-20cm
6. Sprinkle Jeevamrut: 50 Litres
7. Broadcast legume seeds (cowpea or mung beans) on the raised bed.
8. Use a mulch with biochar or dry grass.
9. Allow the crop to grow until flowering
10. Incorporate the legume crop into the topsoil.
11. Use the mixture to prepare rows/ridges in the fields in which cotton seeds are planted.

Jeevamrut

Jeevamrut is rich with soil microorganisms and is used as an inoculant for compost preparation or to enrich soils. A solution of jeevamrut is prepared by mixing 500 ml of cow urine in 20 litres of water. Add, 2 Kg of cow dung, 1 kg of forest soil,

200 grams of jaggery and 200 grams of legume seed powder to the solution. Ferment the mixture for 3 to 4 days. Sprinkle the solution on a composting heap or filter, dilute 5 times in water and spray in one acre field as frequently as possible.

Biochar

The most common and efficient structures to prepare biochar are KON-TIKI cone or a cone pit that is dug in the soil. The sizes of KON-TIKI and the cone pit vary depending on the material available and the requirements. Dig a conical shaped pit to a depth of about one metre or more. Fill the bottom to 20cm height with dry cotton stalks or dry branches. Ignite the material and allow it to burn till you observe a thin layer of grey ash on the surface of the stalks. Add another 20 cm layer of cotton stalks as bundles and also free sticks over the fire to pack the layer touching the borders of the pit. Allow the upper layer of stalks to burn until you observe a thin grey layer of ash on a few stalks on the top surface. Add another pile of stalks to fill the layer up to another 20cm and repeat the process. When the stalks on the topmost layer start showing a thin layer of ash, pour water to stop burning. Take care that when each layer is filled with fresh stalks it should cover the layer below as tightly as possible to prevent oxygen from reaching the lower layers. Biochar can be prepared within a few hours with this method.

Some of the ways that application of biochar can help to improve soil quality include improvement in soil structure to increase water retention. Biochar prepared from cotton stalks is alkaline and is an excellent material that can be used to reduce soil acidity. Application of biochar helps to improve microbial activity and cation exchange capacity that helps to supply macronutrients to plant roots.

Compost

Organic matter contains nutrients. But it must be decomposed by microorganisms through composting methods to build microbial populations so that the nutrients are available to plants easily. Composting is a process wherein organic matter is degraded by soil microorganism to produce compost that can be used to strengthen soil health. Organic matter contains microorganisms such as bacteria, actinomycetes and fungi which feed and decompose organic material. These microorganisms need oxygen, water, air, warmth, carbon, nitrogen and other minerals for their survival. The efficiency of composting depends on the population and composition of different types of microorganisms, the carbon to nitrogen ration (30:1) in the feedstock material, oxygen levels (5%), moisture levels (40-60%), temperature (40-60°C), the physical structure of the material and pH (6-8). Microorganisms degrade organic matter to produce compost which has dark brown humus-like material which is an excellent soil conditioner.

Earthworms can be used for vermi-composting to convert farm waste and cattle manure into compost. Cement or polythene layered pits are made so that earthworms do not escape into the soil. The materials required for composting are any biological materials, manure, lime or gypsum, water and earthworms. Vermi-wash is yet another most popular technique used in

India. Layers of materials such as bricks, coconut coir, sand, pebbles, soil with earthworms, cattle dung and farm waste are layered in a water tank. Compost is allowed to form in 2-3 months and the tank is watered regularly; later in an excess amount so that vermi-wash liquid can be collected at regular intervals and applied to fields. Generally, a tank of 200-300 litres is supposed to provide a good source of vermi-wash for one acre.



Figure-82 Sieving vermicompost

Cover crops

Cover crops are meant mainly to hold the soil to prevent erosion and degradation under conservation tillage. They help in improving soil fertility, weed management and integrated pest management. Some of the common cover crops used in organic cotton production systems are cereals such as rye, oats, wheat and sorghum or Brassicas such as rapeseed, mustard, radish and turnip and finally nitrogen fixing legumes such as *Mucuna* beans, hairy vetch, cowpea, alfalfa, *Stylosanthes*, *Calopo*, *Glyricidia*, cluster beans, sunn hemp and *Sesbania*. The legume crops fix a good amount of nitrogen.

There are several legumes that can be used either as rotation crops if adequate soil moisture is available or in fallows for nitrogen fixation when sowing is taken up with post cotton-season rains. The list of the cover crops is soybeans, pigeonpeas, faba beans, velvet beans, *Stylosanthes*, *Calopo*, *Gliricidia* and vetches. Each of these legume crops requires a specific species of *Rhizobium* for better nitrogen fixation. Some crops need *Rhizobium leguminosarum* and some need *Bradyrhizobium* species. Legume crops can fix as high as 250 Kg of nitrogen per hectare.

A legume cover crop is sown between the rows of the cotton crop to enrich the soil with nitrogen, to provide a mulch or fodder or vegetable and to create a root cover to hold the topsoil.

- Step-1: When the cotton plants are 15 to 20 days old, sow two rows of cowpea seeds or any other locally available legume seeds between two rows of cotton. Generally, 4 Kg of the cover crop seeds will be required for the Demo plot.
- Step-2: The cover crop row will be 30 cm away from the cotton row and with 20 cm between the two rows of the cover crop.
- Step-3: Allow the legume crop to grow for 60-70 days.
- Step-4: Cut the legume crop at the base and layer the cover

crop residues over the soil as a bio-mulch. Alternatively, when the legume crop is 60-70 days old, allow farm animals to graze or the leaves may be used as vegetables, if applicable.

- Step-5: If newspapers are easily available, a layer of paper may be placed between the cotton rows to act as much and also to prevent weed growth.

The cowpea roots fix the nitrogen that will be available for the cotton crop and the biomass will serve as a mulch and provide other nutrients.

Green manure

When biomass is incorporated into the soil each tonne of the green biomass contributes to 10 to 20 Kg of nitrogen, phosphorus and potassium to the cotton crop. Green manure crops can either be grown as border or as intercrops and the leaf cuttings used as a green mulch between the cotton rows. Some of the green manure is also obtained from trees that are available near the fields. The most common green manure sources are as follows: *Ipomoea carnea*, *Jatropha curcas*, *Neem* (*Azadirachta spp.*), *Glyricidia sepium*, *Cassia tora*, *Vitex doniana* / *V. simplifolia*, *Leucaena leucocephala*, *Delonix regia*, *Cassia Occidental* and *Hibiscus esculentus* / *H. sabdariffa*.

Clipping of plant terminals

When the crop reaches 110 days start monitoring to decide on the best day to clip the terminals of plants. This stage is called cut-out. Clipping is done to prevent competition for green bolls from freshly formed squares, so that bolls are well formed to obtain higher yields and good quality fibre.

Plant monitoring to identify the best time for 'cut-out' is started, generally when the cotton crop reaches 110 days stage.

There are three criteria for cut-out.

- Step-1: Check for open bolls in 20 plants. If 10 out of 20 plants have one or more open bolls, go to the next step. If there are no open bolls, wait for a few. More days.
- Step-2: Count the number of green bolls on 20 plants. If the number is more than 120, go to the next step.
- Step-3: Locate the topmost branch which has a flower. Count the number of fruiting branches above this branch. If the number is 3 or less, you may start clipping the plant terminals. If the number is 4 or more, wait for some more days till the number reaches 3 or less.

The methods described are based on the local resources that are generally available in most countries of Africa. These are compatible with the local practices and with organic farming concepts. Good yields in organic farms depend on a good variety that shows resistance to sucking pests and that which has an aggressive root growth. If soil health, agronomic techniques and organic pest management technologies for such a variety are standardized properly to adapt well to the local ecology, organic farming can establish itself as a sustainable system that can consistently provide good yields.

Prospects of Organic Cotton in Nigeria



Ibe Achimugu

Unit Head Gender Mainstreaming and Special project, Arewa Cotton. Mohammadu Buhari Way, Central Business District, Abuja, Nigeria.

Ibe Achimugu, is a trained Microbiologist now working for Arewa Cotton as the Unit Head Gender Mainstreaming and Special project since April 2019. Arewa Cotton is a Nigerian cotton Farming, Ginning and Trading company and have been in co-operation with Cotton made in Africa (CmiA) since November 2018. Ibe directs projects focused on improving the livelihoods of small holder farmers by promoting education, health, gender mainstreaming and the elimination of child labour. She is currently working on a special project with CmiA, African Cotton Foundation (ACF) and Real IPM Kenya, in the use of beneficial insects in 4 regions in Nigeria. Ibe's passion is to see Arewa Cotton produce certified organic cotton sustainably.

INTRODUCTION

Nigeria is a country blessed with arable land, fallowed and virgin lands, availability of labour and favourable climatic conditions so allowing the cultivation of cotton in 33 out of the 36 States of the country. These factors along with the high cost and non-availability of synthetic farm inputs are driving both large- and small-scale farmers to produce organic cotton though without observance of the laid down protocols.

In Nigeria, Agricultural techniques and systems have not fully embraced organic farming protocols; this is because organic agriculture is still in its infancy, there are however few cases of other commodities such as sesame seeds, ginger, tiger nut, turmeric etc that are being produced according to established organic protocols.

Organic cotton farming in Nigeria is still at the research and development stage. For instance, Arewa Cotton and Allied products (Arewa Cotton) has partnered with Real IPM in collaboration with African Cotton Foundation (ACF) and Cotton made in Africa (CmiA) to develop a sustainable and suitable Integrated Pest Management which will support organic pest management. This partnership and a Zero-Chemical approach branded KONG by Arewa Cotton has opened a gateway into the conversion process from conventional cotton farming to organic.

The conversion process to organic cotton is being practiced currently in four (4) different regions in Nigeria. The regions include Kano (North-West Nigeria), Gombe (North-East Nigeria), Niger (North-Central Nigeria) and Ogun (South-West Nigeria) States. The scale to which the conversion to organic cotton is being practiced is quite small when compared to conventional cotton production practices. The target here is 3,000 organic cotton farmers across the four (4) regions with each farmer cultivating at least half a hectare with an expected average yield of 800kg per hectare by 2025.

To be fully organic, the farmland conversion period for annual crops such as cotton is 3 years. Natural or agricultural areas

should be free of products unauthorized for organic production for at least 3 years. The use of only organically produced seeds and propagating materials is important. Zero tillage, mixed cropping and use of cover crops is strongly advised to preserve the soil structure. Arewa Cotton is yet to reach these milestones.

Interviews of key stakeholders in the cotton sector were carried out to establish the efforts made in organic cotton farming in Nigeria.

Yarima Alhaji Ubah

An interview with Yarima Alhaji Ubah, Deputy Director Oilseed, Legume and Fibre, Federal Ministry of Agriculture and Rural Development (FMARD), revealed he was not aware of any organic cotton farms in Nigeria rather they have concentrated on developing Bt cotton and conventional seed cotton. He added that former President Olusegun Obasanjo started organic farms in Nigeria but not sure if cotton was one of the crops. The Government is currently supporting Borno, Yobe and Jigawa States on pilot projects of 10 hectares each on organic sesame seed production, all to be certified by NICERT. He admitted the process of organic farming is tedious but good for the environment and very sustainable, especially with the high cost of fertilizers small holder farmers can use locally available inputs. He sees organic certified seeds as the major support needed for the successful transition to organic cotton farming in Nigeria and that if this can be achieved there is a large export market and a premium for organic crops.

Dr Rose Gidado

Dr Rose Gidado, National Biotechnology Development Agency (NABDA), highlighted that organic production is an Agronomic practice. Products from organic production are very expensive and cannot be practiced by subsistence farmers in most cases. However, organic cotton is better practiced with small holder model farmers. Dr Rose Gidado admitted she has not

done much work on Organic Farming in Nigeria, but however acknowledges the efforts of the Government of Nigeria in encouraging Organic farming. She is interested in visiting the farms to gain more knowledge and hands on experience in organic cotton production.

Anibe Achimugu

The National President, National Cotton Association of Nigeria (NACOTAN), Mr Anibe Achimugu confirmed that there are no certified organic cotton farms in Nigeria and no formal policy has been put in place to advance the process of organic cotton farming. FMARD and specifically Institute for Agricultural Research (IAR), ABU Zaria, have the mandate for the national development of cotton in Nigeria. He believes with the help of IAR/FMARD, organic protocols can be put in place to enable the processing of commercial licences to sell produce and sell organic cotton seeds. Organic cotton farming will attract premium price so enabling the farmer to appreciate the price differential between conventional cotton and organic cotton. Though a tedious process, major benefits will be to protect the environment, the soil especially, since excessively toxic chemicals are used in agriculture. The market will have a variety of cotton, organic and non-organic, giving buyers the opportunity to make informed buying decisions. To be tagged as an organic cotton producing country has its benefits. He also stressed the importance of how the protocols need to be defined clearly for cotton to remain within organic protocols from cultivation to harvesting. The availability of organic cotton seed and inputs for commercial farming is crucial for the success of organic farming in Nigeria. Farmyard manure is readily available, composting can be done in a controlled manner, neem seed-based formulations can be processed at home by small holder farmers for use as insecticides etc. Nigeria is ready to produce organic cotton, but it is extremely necessary for policy and decision makers, especially on the side of Government, to be actively involved to set the pace.

Israel Olayinlara

In an interview, Mr. Israel Olayinlara, expert on organic agriculture on EU and US standards, and Lead Trainer with NICERT, commented on the sector by saying that for the Nigeria Organic Sector, Organic products/commodities are tailored towards premium market and most of the organic projects in Nigeria are private sector driven by those who have the market intelligence. The end point for organic produce is majorly for export. For organic cotton, there is no certified operation in Nigeria. Mr. Israel Olayinlara concluded by saying the market opportunity should be established first because there is no market for organic cotton in Nigeria.

Further Discussions

Factions of Organic Production: We have two major factions for organic in Nigeria namely

- International Federation of Organic Agricultural Movement (IFOAM) that's the associations standard which is the

general standard.

- EU or Foreign Standard: The major operators of organic agriculture in Nigeria (those who are selling and making money off the investment) don't comply with the IFOAM standard. They go with third party certification (EU Standard). That is known and accepted everywhere in the World.

Certification for Organic Cotton:

Certification for organic cotton project depends on how far an operator or an organisation intends to go. For a Cotton Organic Project, certification is awarded at two production level namely.

- Certification for primary production: Here, the operator grows cotton in line with the organic standard for the choice of land to use, seeds, bio-fertilizers, bio-pesticides, weeding method, post-harvest handling etc. Certification for primary production cannot suffice for ginning and further processing.
- Global Organic Textile Standard (GOTS) awards certification for ginning and further processing.

Criteria/ Eligibility for GOTS Certification:

- NICERT-ECOCERT Certification for Primary Organic Production.
- Expression of Interest Via Mail to NICERT in Partnership with ECOCERT on getting GOTS Certification for your Ginnery.

Procedures for Obtaining NICERT-ECOCERT and GOTS Certification:

- Profile all the Organic Farmers.
- Codify or generate a traceability code for all the organic farmers.
- Training of the farmers using the TOT-step down training model on how to grow organic cotton.
- Book-keeping on the corresponding documentation.

Africa Market for Certified Organic Cotton:

Certified Operations in Africa include:

- Egypt (Certified in Manufacturing and Trading Only).
- Tanzania (Highest producer of Organic Cotton in Africa with 6 Different Operators)
- Benin Republic (1 Operator)
- Uganda (4 Operators)
- GOTS is a standard that will be certified by ECOCERT, Control Union or LACON
- Other certification bodies approved by GOTS to certify organic cotton farming other than ECOCERT include 1. Control Union 2. LACON.

Amongst all the above-mentioned certification bodies, ECOCERT is the cheapest because they have local auditors in Nigeria unlike Control Union where an organisation seeking to go into organic

cotton will have to shoulder the cost of international travels to have a Control Union expert come supervise production activities. ECOCERT Certification could cost US\$ 1,500 to US\$ 5,000. For other commodities like cocoa, Organic Certification for Production can equally cover for processing unlike Cotton.

Recommendations

- Policy makers in the cotton sector in Nigeria can facilitate the process of setting standards for certifying local organic cotton production.
- It is important to Identify a market that is committed to the process and can work with standards to outline a road map to establishing an organic cotton supply chain.
- Organic cotton production in Nigeria can be private sector driven and ginneries can begin to prepare for GOTs Certification.
- Identification and cultivation of virgin lands.
- Overcoming psychological barriers occurs in any change process and organic cotton farming is no exception, deliberate and gradual advocacy could be used to overcome constraints in knowledge and experience. Sceptic farmers can visit pilot projects to clear doubts.
- High level of awareness and sensitization of farmers.
- Traceability of the crop and the use of relevant technologies must not be ignored.
- The production of organic cotton can help mitigate against climate change and help Nigeria meet some of the sustainable development goals. Efforts made towards the conversion from conventional cotton farming to organic should be strongly supported by Government and other relevant agencies.

Limitations

- Farmers willingness to transition into organic cotton production from the convention type of production.
- Most small-scale farmers focus on short term goals which is a major problem incompatible with organic cotton farming, farmers need to be patient to get the desired results.
- Seed multiplication, extension services, good governance and traceability are paramount to the sustainability of organic cotton production in Nigeria.

Conclusion

The Nigeria Government is working hard to encourage and boost organic farming under the Export Expansion Facility Project (EEFP) where a lot of associations were supported through training and certification. Organic cotton farming is more sustainable for an existing operation with a wider scope rather than a new start-up venture or a fresh business partner. A sustainable support system in training, monitoring and input distribution is highly needed in the journey to organic cotton in Nigeria. There is no certified organic cotton production in Nigeria now, but the journey has begun. From the interviews above with key stakeholders, there is a willingness to learn and farm organic cotton, the right certifiers are available to complete the process, but the cost of certification and implementation is another barrier to overcome.

Agriculture remains viable in Nigeria and the Government is willing to support initiatives in this regard. Efforts to learn more and develop the right protocols in organic cotton farming by Arewa Cotton is ongoing. Arewa Cotton is dedicated to the vision using existing platforms and Zero -Chemical farming to establish organic cotton farms in Nigeria.

