

# National Capacity-Building Workshop Promoting cotton by-products in Uganda

14 – 16 March 2018, Golf Course Hotel, Kampala, Uganda

## Report of the workshop

Prepared by

Dr. Fred Muhumuza, National Consultant, Lecturer, Makerere University, Uganda

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This report was prepared by a consultant, Dr. Fred Muhumuza, National Consultant, Lecturer, Makerere University, Uganda. The work was supervised by Ms. Yanchun Zhang, Chief, Commodity Policy Implementation and Outreach Section (CPIOS) with the contributions of Mr. Kris Terauds, Economic Affairs Officer, Commodities Branch.

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## Contacts

For further information on the Commodities Branch, please contact us at:

UNCTAD  
Commodities Branch  
Palais des Nations  
8-14, Avenue de la Paix  
1211 Geneva 10  
Switzerland  
Phone: +41 22 917 1648 / 6286  
E-mail: [commodities@unctad.org](mailto:commodities@unctad.org)

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## Abbreviations and acronyms

ASSP .....	Agricultural Sector Strategic Plan
BUBU .....	Buy Uganda Build Uganda
CDF .....	Cotton Development Fund
CDO.....	Cotton Development Organization
COMESA .....	Common Market for Eastern and Southern Africa
ESA.....	Eastern and Southern Africa
ICAC .....	International Cotton Advisory Committee
MAAIF .....	Ministry of Agriculture Animal Industry and Fisheries
MSME .....	Micro, Small and Medium Enterprise
MTIC .....	Ministry of Trade, Industry and Cooperatives
NAADS .....	National Agricultural Advisory Services
NAP .....	National Action Plan
NARO .....	National Agricultural Research Organization
NaSSARI.....	National Semi-arid Agricultural Resources Research Institutes
NDP .....	National Development Plan
UNCTAD.....	United Nations Conference on Trade and Development
UNECA .....	United Nations Economic Commission for Africa
UGX .....	Uganda Shillings
UIRI.....	Uganda Industrial Research Institute
US\$ .....	United States Dollars
VAT.....	Value Added Tax

## 1. Introduction

The Workshop was organized by the Cotton Development Organization (CDO) and the United Nations Conference on Trade and Development (UNCTAD), in partnership with key stakeholders. The stakeholders included: the Ugandan Ministry of Agriculture Animal Industry and Fisheries (MAAIF), and the United Nations Economic Commission for Africa (UNECA), the Common Market for Eastern and Southern Africa (COMESA), and the International Cotton Advisory Committee (ICAC). The other stakeholders included a range of actors in the sector such as farmers, ginners, millers, textile manufactures, animal feed manufacturers, and academia. A copy of the participants is attached as Annex 1.

### 1.1. Purpose and expected outputs of the workshop

The purpose of the national capacity building and policy workshop was to provide insights on the actions and policy options required to develop products from different parts of the cotton plant, other than lint. For this purpose, the workshop was comprised of two components, with a programme for stakeholders on 14 and 15 March 2018 and one for policy makers on 16 March 2018. The stakeholder component of the workshop aimed to produce: (i) a draft national action plan to develop value added activities on cotton by-products; and (ii) a multi-stakeholder committee to oversee the implementation of these initiatives and other related activities. The policy makers component aimed to agree on policy recommendations in support of the draft national action plan.

### 1.2. Structure and programme for the workshop

The workshop programme comprised: opening remarks by the MAAIF, CDO and UNCTAD; presentation of the survey conducted as part of the project; followed by expert interventions on cotton production and by-products. The workshop also included sharing of individual experiences by farmers, ginners and processors, as well as discussions from the plenary sessions. A copy of the final programme is attached as Annex 2.

## 2. Stakeholder workshop, 14-15 March

The first morning of the workshop focused on setting the scene by introducing the purpose and objectives of the UNCTAD project and hence the workshop. This included contextualizing the cotton sector by highlighting the policy frameworks and development goals of the country, as well as the perspectives of major stakeholders. The later part of the day focused on increasing cotton production by comparing the status quo in Uganda with best practices from elsewhere.

### 2.1. Opening remarks

The opening remarks were made by Ms. Ethel Kamba, on behalf of the Permanent Secretary for the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). She reiterated the importance of agriculture, which employs nearly 70 per cent of the population and is responsible for about 95% of the food and cash crops. The Government had identified the sector as capable of simultaneously reducing poverty and stimulating economic growth. Specifically, the cotton value chain was noted as being important to Uganda because of its great potential to create employment, enhance farmers' incomes, contribute foreign exchange earnings and support import substitution strategies.

The remarks highlighted the existing policies, plans and systems that support agriculture. The Government pronounced agriculture as one of the major focus areas in the 2<sup>nd</sup> National Development Plan (NDP II), which had informed the formulation of the Agricultural Sector Strategic Plan (ASSP) 2015/16 – 2019/20, to guide implementation of the agricultural sector strategies and direct investments. MAAIF was looking forward to the workshop's deliberations on issues related to production, marketing and value addition.

MAAIF pledged to support development of policies and actions required to ensure the successful implementation of the recommendations of the meeting and project outputs. The Government will work with UNCTAD and UNECA, among others, to promote the initiative. The Government also supports increasing cotton production and productivity, as this is fundamental in promoting domestic value addition and move away from exporting raw materials. MAAIF was looking forward to the contribution by the project in addressing the key challenges in the cotton by-products industries, particularly by filling the data and policy gaps that restrain its development in Uganda and the region.

MAAIF expressed gratitude to all the partners and participants for agreeing to work with the stakeholders to achieve the project objectives. After thanking the organizers, the Permanent Secretary declared the Workshop open.

## 2.2. Introduction to the project by UNCTAD

Ms. Yanchun Zhang, Chief of the Commodity Policy Implementation and Outreach Section of UNCTAD, highlighted the purpose of the initiative or Project 1617K, which is aimed at promoting cotton by-products in selected countries of the Eastern and Southern Africa (ESA). The countries are: Uganda, the United Republic of Tanzania, Zimbabwe and Zambia. The project is being implemented by UNCTAD, in partnership with COMESA and UNECA. The project is part of UNCTAD's programme "Breaking the Chains of Commodity Dependence", which assists countries in:

- a) Developing value added activities;
- b) Establishing development linkages between the commodity sector and the rest of the economy;
- c) Promoting diversification into non-commodity activities; and
- d) Promoting integration into global and regional value chains, which involves linking actors and activities across sectors.

## 2.3. Project objective and expected achievements

The overall objective is to strengthen the capacity of beneficiary countries to assess the economic viability of the development of cotton by-products and formulate evidence-based policies that promote value addition activities. It has two expected outcomes:

- 1) Improved capacity of cotton value chain stakeholders (government officials, the private sector and farmers) to assess the potential value, market situation and prospects for cotton by-products.
- 2) Improved capacity of policymakers to (a) formulate evidence-based policies that improve the value added of cotton by-products; and (b) devise investment profiles to attract potential investors.

## 2.4. Objectives of the national capacity-building workshop

The stakeholder workshop, which was the first component of the three-day workshop, was meant to achieve "improved capacity of cotton value chain stakeholders to assess the potential value, market situation and prospects for cotton by-products".

Expected outputs from the stakeholder component of the workshop included:

- A draft national action plan to develop value added activities on cotton by-products;
- A multi-stakeholder committee proposed to oversee the implementation of these initiatives and other related activities;

For the policy component of the workshop, the expected outputs were a set of policy recommendations to support the national action plan

## 2.5. Message from UNECA

Mr. Komi Tsowou, Associate Economic Affairs Officer at UNECA, noted the decline in cotton production in Uganda compared to levels of 1970s. The fact that countries such as Mali could export 500,000 metric tons of cotton shows that Uganda has room to improve. However, increasing cotton output will require specific and targeted support to farmers.

He informed the workshop that UNECA's African Trade Policy Centre supports countries on trade-related matters through the provision of knowledge. Countries can request support from UNECA and the Centre, so Mr. Tsowou encouraged Uganda to request support tailored to its needs.

Mr. Tsowou also highlighted that, although farmers are key player in the value chain, they are rarely considered when sharing knowledge, information and financial benefits. Farmers need support to resolve pertinent problems, such as access to credit and markets for both inputs and outputs. He pledged the support of UNECA to work with the project and other stakeholders to find inclusive solutions to the challenges facing farmers and the cotton value chain.

## 3. Presentation and discussion of survey results

The presentation of the survey was made by Dr. Isaac Shinyekwa from the Economic Policy Research Centre. This was followed by reactions presented by key stakeholders in the cotton sector, and then discussion with the audience.

### 3.1. Highlights from the cotton sector survey

The session included a presentation on the objectives, findings and recommendations from the survey. The overall objective of the survey was “to examine and enhance the development of cotton by-products in Uganda”.

The conclusions of the study, following a deeper understanding of the development of cotton by-products in Uganda could be summarized as follows:

- a) Farmers aren't responding to current incentives to increase cotton production, the current levels of which remains far below installed ginning capacity, as well as failing to meet latent demand on local and international markets.
- b) Although CDO works closely with ginneries to provide extension services and inputs to farmers, there are still gaps in the provision of both.
- c) There is limited development of the cotton by-products value chain and yet several opportunities exist.
- d) A shortage of modern technology constrains the development of cotton by-products. Other constraints include a shortage of capacities and skills among farmers, entrepreneurs and workers.
- e) Investments and operations in the cotton sector are constrained by a lack of access to affordable credit.
- f) Spare parts remain a challenge, as they are imported and therefore incur additional costs for transport, insurance and foreign exchange.
- g) Electricity is susceptible to load shedding and erratic flows.
- h) Although the Cotton Development Fund (CDF) was created by buyers to support seed cotton production, some of them perceive it as a tax that should provide more benefits.

Based on his analysis of the survey findings, the author recommended the following:

- i. Increase cotton production through improving the provision of extension services, quality inputs and affordable credit to farmers.
- ii. Increase both public and private investments in the development of cotton by-products in order to harness its potential.
- iii. Ensure that cotton prices are stable and attractive to encourage farmers to grow more cotton, especially in light of increasing competition with other crops.
- iv. Support the development of local textile industry to increase the demand for seed cotton, thus generating increased raw material for cotton by-products.
- v. Promote quality by enforcing standards along the entire value chain – from production, to storage, transportation and processing.
- vi. Review government policies on taxation to reduce the unit cost of production, for farmers, ginners and other processors. Taxes could be increased to protect the local industry against imported substitutes.
- vii. Incentivize investments in, and adoption of technologies to harness the value addition opportunities for cotton by-products.
- viii. Ensure a consistent, affordable supply of electricity.
- ix. Increase access to affordable capital loans and lines of credit.
- x. Train and build the capacity of the technical workforce in their respective manufacturing and processing plants to effectively manage the equipment and undertake repairs and maintenance work.

### 3.2. Reactions to the survey results

Several key stakeholders presented their reactions to the survey findings. **Mr. Sekisangu**, who spoke on behalf of the Chair of the Uganda Cotton Processors Association, raised the concerns of oil millers. He observed that, if the oil millers cannot sell cottonseed cake, they cannot break even and their businesses will eventually collapse. He noted the need to promote the use of cottonseed cake in poultry feed, as poultry is the largest livestock market in Uganda. For this to happen, there needs to be a level playing field and enforcement of standards. For example, cheap feed from the Netherlands is currently undercutting the local market, driving local producers to buy only maize as a cheaper, but lower quality raw material.

Secondly, there was a problem of selling adulterated cottonseed cake and use of substandard rice husks and maize cobs. It was observed that the farmers demand cheap products, without much emphasis on quality, creating a market for substandard products. The meeting resolved that farmers should be sensitized to quality considerations, rather than only cost. Furthermore, the meeting noted the importance of sustaining the poultry business as an important strategy for empowering women and youth, since the business was mainly done from home.

The third problem was related to the high cost of credit, with interest rates ranging from 23 to 27 per cent. In addition to the interest rate, other loan terms are incongruous with the seasonal cycle of agriculture – for example, farmers are granted loans with one-year terms, despite their marketing season, i.e. when they can repay the loan, lasting only four to five months.

Finally, he noted that oil crushers are faced with a challenge of old equipment (some of it bought in 1988) that can only be used for single refining, which limits market potential. Modern equipment that supports double refining was expensive, at approximately US\$ 120,000 for a full set of equipment, and could not be easily obtained.

**Mr. Adam Bwambale**, who spoke on behalf on behalf of the Uganda Ginners and Cotton Exporters Association, noted the critical role of the workshop as it highlighted the importance of the cotton industry, which had been left on its own. The industry was largely driven by the ginners. Actors in the sector should therefore be commended for sustaining the industry, despite recent low seed cotton production, historically and relative to other countries.

He noted that provision of adequate extension services is a big problem that needed to be addressed quickly. The few extension staff were supported by the ginners. Government needs to come up and work with the ginners to ensure specific extension staff are devoted to the cotton crop.

He reemphasized the need for more efforts to increase production and productivity. Specifically, there was need to address the price and credit challenges as well as the different charges (e.g. CDF) that were hindering the system, even though they have greatly helped to sustain the sector in the absence of adequate government support. Finally, he noted the need to increase Government's funding for inputs, as is the case with other crops such as coffee and fruits.

**Mr. Ogen Bob Alberto**, a farmer, noted that much of the cotton comes from northern Uganda, which did not produce cotton for over two decades during the civil war. During this time, many ginneries were destroyed. Farmers had only recently started growing cotton again. This partly explains the current low production compared to the historical levels.

He highlighted the importance of growing cotton as a major source of income for the farmers, contributing to peaceful coexistence. Cotton had a ready market and a guaranteed price, although it was facing competition from other crops such as cassava, sunflower and sorghum. He noted the importance of price stability, which had been affected by low international lint prices. The introduction of a guaranteed price floor had helped the farmers. However, he cautioned against using a buffer stock scheme to stabilise the price.

It was noted that about 90 per cent of the cotton is exported as lint, which undermines the development of a local textile industry, as well as value added activities for cotton-by-products. Development of local cotton industries would, in addition to adding more value to local lint production, also substitute imports, such as used clothes.

He defended the CDF that is used to subsidize the production of cotton seed. There were alternative views on whether this was a subsidy since inputs were provided on credit, which is recovered from farmers when they deliver their seed cotton. It was, proposed that a true subsidy would involve an injection of additional resources by the Government, such as the subsidies it offers to spinners.

He appreciated the extension services that are largely funded by the sector and rely on local people. The extension system faced a structural problem, with a shortage of established farmer groups. Groups don't exist in some areas and, in others, they break up.

He proposed a revival of the cooperatives, which had more knowledge of about their members and to whom they provided a range of benefits such as access to additional alternative credit.

He shared his experience from Zambia, where farming households were adding value to cotton by weaving various types of handicrafts. He urged the team to ensure implementation of the decisions coming from the workshop in order to improve the cotton sector, which contributes over UGX 10 billion (approximately US\$ 2.8 million) per year to the economy.

### 3.3. Plenary discussion

The Chair of the session emphasised the need for collecting more views and ideas from the farmers and traders in the meeting who had a wealth of practical experience. The messages from the farmers should help to realign the provision of inputs and extension services among others. He observed that the inputs were still expensive since farmers were only getting guarantees and not subsidies like with other crops, for which the National Agricultural Advisory Services



(NAADS) was providing free planting materials. For example, farmers were asked to contribute UGX 140,000 or half the price of an ox plough, which was high without corresponding guarantees on the price of cotton.

**Dr. Joshua Mutambi (MTIC)** noted that the revival of cooperatives did not require Government alone, but members' proactive engagement. These are member-based organizations and could be restarted even without the involvement of Government. He noted the lack of involvement among youth in the cooperative movement, leaving cooperatives dominated by older members. There is need to encourage young people who are more creative and energetic. Accordingly, he cautioned participants against bemoaning poverty in the sector, as that is not an attractive message to the youth, who want to join vibrant and profitable sectors. Besides, it was contradictory to claim, on one hand, that the sector earns billions for farmers and, on the other hand, that cotton is a poor person's crop.

**Mrs. Jolly Sabune**, noted that competition with other crops was undermining groups of cotton farmers, as many of them were abandoning the crop or giving it less attention. Similarly, extension staff were being taken away to service other crops, in other areas, thereby weakening the support structures for cotton farmers. Moreover, there were very few extension staff covering wide areas and, quite often, they could not help all farmers in a timely fashion. These two observations were corroborated by the different cotton farmers in the workshop.

**Farmers from Bulambuli and Sironko**, despite devoting sufficient land to cotton, were constrained by the late and insufficient provision of quality inputs. For example, pesticides were either delivered late or not at all. Spraying equipment was not readily available in the whole district, which had only one pump. There was also a problem of the high cost of procuring technicians from Kampala to repair machines in upcountry ginneries. It was recommended that Government and other stakeholders should work together to increase skills capacity outside Kampala.

**There is a shortage of financial services adapted to farming enterprises.** For example, credit extended for planting is often due before harvesting, and is often disbursed late and in the incorrect amounts. It was noted that, quite often, the ginners only extend credit to groups, rather than individual farmers. This emphasises the importance of strong farmers groups and insures ginners against the risk of side selling to other cotton buyers.

The presence of imported cottonseed cake, mainly from the United Republic of Tanzania, and other processed inputs for making stockfeed was undermining the market for local cottonseed cake. Members wonders if Government should not consider introducing taxes on such imported products. Ensuring a market for cottonseed cake is fundamental to the viability of ginners' businesses, since cottonseed is their main product, by volume, and less than 10 per cent is reserved for planting.

CDO was requested to partner with other agencies, including farmers, to promote good agricultural practices using demonstration farms. It was agreed that CDO will continue to work with scientists at National Semi-arid Agricultural Resources Research Institutes (NaSSARI) to develop plant varieties and technologies that contribute to increased production and yields.

The meeting noted the higher levels of volatility in yields in Uganda compared to elsewhere. This was partly due to weather effects, mainly drought, and diseases. Uganda was also still growing bigger plants, which are a disadvantage, since current best practice favours smaller plants, which devote a higher proportion of nutrients to cotton bolls.

**Adulteration of seed cotton by farmers to add weight was also undermining quality.** In this regard, the meeting recommended that CDO and ginners emphasise to farmers the importance of seed cotton quality in outreach and extension programmes, as quality attracts higher prices and gross incomes.

**There was concern that the producer price of seed cotton was one of the major factors affecting production levels.** The ginners are struggling with the cotton price and have fixed it at UGX 1,500. Other factors are the volatility in the international lint price, as well as the rotational season in Uganda, which begins from the south, north and Kasese/western region.

The UNCTAD project will not undertake any specific interventions on the producer price. Nevertheless, the development of cotton by-products would increase demand for raw material, i.e. seed cotton, as well as add new income streams in the value chain, which would contribute to increased producer prices. For example, improving the market for cottonseed cake would increase ginners' revenues, which is factored into the formula they use to calculate the seed cotton producer price. Meanwhile, commercialising cotton stalks into particle boards or briquettes would create a new, direct income stream for farmers.

This does not prevent stakeholders in Uganda from pursuing price interventions. For example, in Zimbabwe, stakeholders agreed to include a price stabilisation fund as an initiative under their National Action Plan to develop cotton by-products. Although the UNCTAD project is not equipped to work on this initiative, the stakeholders viewed it as important to implement alongside the by-products initiatives they chose.

Finally, workshop participants noted the problem with availability and access to data in the country. The lack of farm-level records that could be compiled into national statistics resulted in reliance on international data. CDO should enhance the collection, compilation and use of local data to guide analysis and informed decision making in the country.

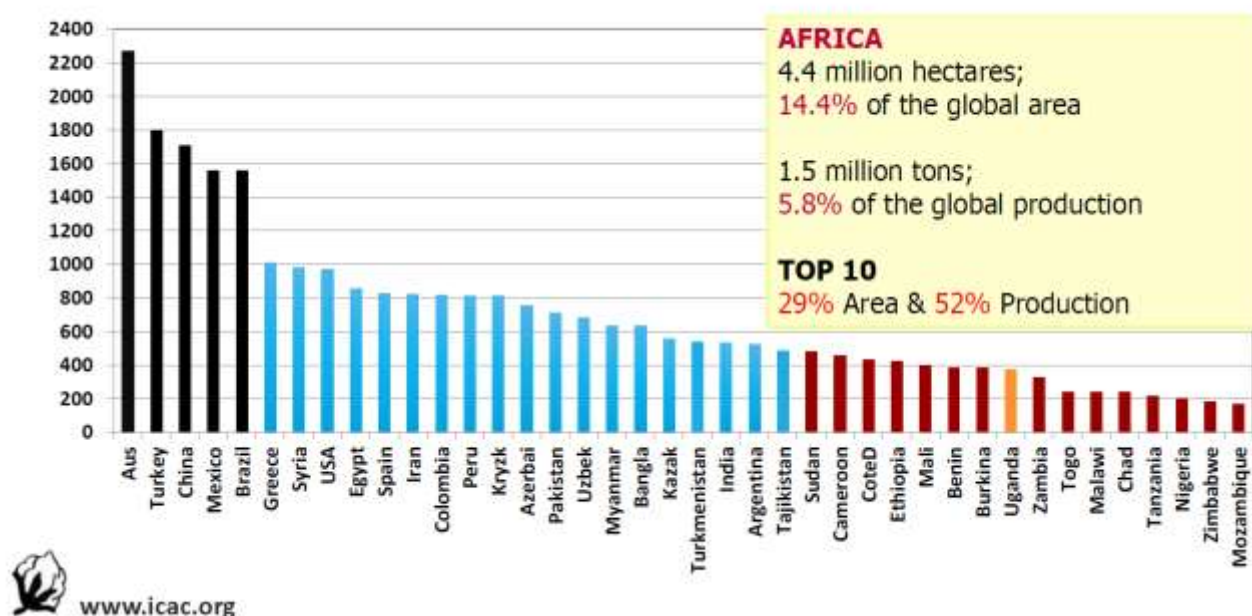
## 4. Increasing cotton production in Uganda

Mr. Keshav Kranthi, Head of Technical Information at the International Cotton Advisory Committee (ICAC), shared ideas on techniques that can be adopted to boost productivity in Uganda. Viable cotton by-products businesses require a sufficient supply of raw materials, for which improved yields are an important factor. Accordingly, this presentation focused on understanding the reasons for low yields and how best they can be reversed best practices from other countries.

### 4.1. Accounting for yield trends in Africa

Figure 1 below shows the average yields per hectare for different countries in the world. Apart from Egypt, most African countries have very low yields.

Figure 1: Yields per hectare for 2017



Note: Reprinted from the presentation at the workshop by Dr. Keshav Kranthi, Head of Technical Information, ICAC

Mr. Kranthi made the following observations about the low yields in Uganda and Africa:

- Yields in Africa stayed relatively constant between 1945 and the 1980s, after which there was a slight increase. In 2017, Africa had about 4.4 million hectares of cotton, which was 14.4 per cent of the global acreage. With low yields, this area produced only 1.5 million metric tonnes (MT), or 5.8 per cent of global production. By contrast, the top 10 producing countries worldwide had 29 per cent of the total area under cotton, which yielded 52 per cent of total production. Furthermore, apart from Brazil, there was no country in the tropics with yields of over 500 kg/ha, with many of them averaging 360 kg/ha or less.
- Brazil increased its yields starting in the mid-1990s with the introduction of 200,000 plants per ha and the use of machines for picking. Uganda still has less than 40,000 plants per ha.
- Brazil now has an average yield of 3,500 kg/ha of lint, compared to 5,005 kg/ha in China, which is close to the potential yield of 5,000 kg/ha.

Reasons for increased yields in the top producing countries included the following:

- Better management.
- Use of the right type of more fertilizers.

- Application of more water.
- Better control of pesticides.
- Large scale production as in Australia where small farmers had over 3,500 ha and had to use airplanes.
- Use of more advanced technologies.

The above reasons notwithstanding, the greatest contribution to yields was canopy management – changing the architecture of the plant. The adoption of plants with smaller leaves and slimmer stalks produce proportionally more lint and use water, nutrients and sunlight more efficiently. For example, in China, they have 330,000 plants per ha, which cannot be achieved in the tropics, where the preference is for bigger plants with large bolls. In the United State of America, the plants are controlled by spraying to not exceed 75 cm, which allows their bolls to get adequate aeration, sunlight and food.

## 4.2. Proposals for increasing yields

He recommended adoption of technologies based on the following parameters:

- The height of the plant, which should be restricted to 60 – 90 cm and should not exceed the spacing between plants.
- Uganda should target a short season of 150 days.
- Restrict the number of branches and cotton bolls on each plant. There should only be 9-10 fruiting branches, to allow all the nutrients to go into the boll. If the branches are growing, they should be sprayed. Pluck off the unproductive branches let more food go into the plant.
- Allow only 15 – 20 bolls per plant, although in Australia the limit is on 12 bolls per plant. Target 45 – 60 bolls per plant in the case of a longer growing season.
- Inter-node length should be restricted to 4 – 5 cm between branches.
- During the first 45 days, the plant should get as much water and possible, or else it will drop the bolls. In Uganda, the critical window lasts for 120 – 150 days.
- On a fruiting branch, maintain the 1st boll (60 per cent), 2nd is 30 per cent and 3rd is 10 per cent. Nutrients do not travel far from the main stem, implying that 1st boll should be a priority.
- Crop duration for the long season is between 140 and 160 days, distributed as follows: 50 days vegetative; 120 days of fruiting – the critical period that requires water, nutrients and no boll worms; followed by 40 days of maturation. Similarly, the duration for the short season is: 40 days of vegetative; 70 days of fruiting; and 40 days of maturation.

The basic differences that seem to account for the variation in yields between the world's top 10 countries and Africa/India are described in Table 1 below.

Table 1: Notable causes of variations in yields in the Top 10 countries and Africa/India

	Top 10 countries	Africa & India
Varietal architecture	Compact	Bushy
Duration days	150	160-200
Harvest index	0.4 – 0.5	0.2 – 0.25
Planting geometry	76x10	90x60
Planting density	>111,000 plants/ha	<16,000 plants/ha
Water, nutrients, pesticides	precise	indiscriminate
Canopy management	yes	no

Source: ICAC.

It was noted that Uganda can increase, and even double her yields by following the best practices described above. In 1975, Uganda had 1 million hectares under cotton, but is now down to 130,000 ha. The country has potential for high yields because it has: excellent rainfall; ideal weather for cotton; good soil fertility; and very good quality, short duration, wilt-resistant varieties that produce big bolls of between 4.5 – 6 grams each. The cotton in the country has a high ginning outturn and is complemented by good legume crops that fix nitrogen content in the soil and control pests, reducing the need for fertilizers and pesticides.

### 4.3. Recommended actions for Uganda

- Implement plant architecture management
- Implement square and boll retention management
- Adapt the growing season to the rainfall pattern, especially for the all-important fruiting stage
- Use a compact architecture and a short season of 150-160 days
- Adopt a spacing of 70x10 cm for a high-density population
- Apply conservation tillage and ridge sowing for moisture management

Best practices in pest management include the use treated seeds and pest-resistant varieties; as well as limited or no application of sprays against sucking pests, during the first two months, since during this period most of these pests are controlled by insects and birds.

## 5. Strategies for developing cotton by-products in Uganda

The second day of the workshop focused on products that can be derived from the parts of the cotton plant, other than lint. This was the major focus of the UNCTAD project and workshop. The adoption of this initiative was expected to increase farmers' incomes and alternative uses of cotton plant and its products. The session also involved a discussion of resolving some of the key challenges that could undermine the initiative.

### 5.1. Possible by-products for development

Participants discussed the feasibility of developing in Uganda several cotton by-products that have been successfully commercialised in other countries. The session began with a presentation by Dr. Patil from the Central Institute for Research on Cotton Technology (CIRCOT), in India. He described the various possible cotton by-products, as shown in Figure 2. Specific attention was given to cottonseed cake, absorbent cotton and the use of cotton stalks in the production of mushrooms, particle boards and briquetting, among others.

The presentation began with a description of the Indian experience in cotton growing and the technology used to remove gossypol from cotton. In 2017-18, the cotton sector in India involved 5 million farmers who cultivated 12.3 million hectares of cotton that yielded 6.2 million MT of cotton, 12.1 million MT of cottonseed, and 30 million MT of cotton stalk. The cottonseed cake was mostly feed to ruminants given the gossypol content of 0.6 – 1.15% compared to 0.05 – 0.7% that is free of gossypol.

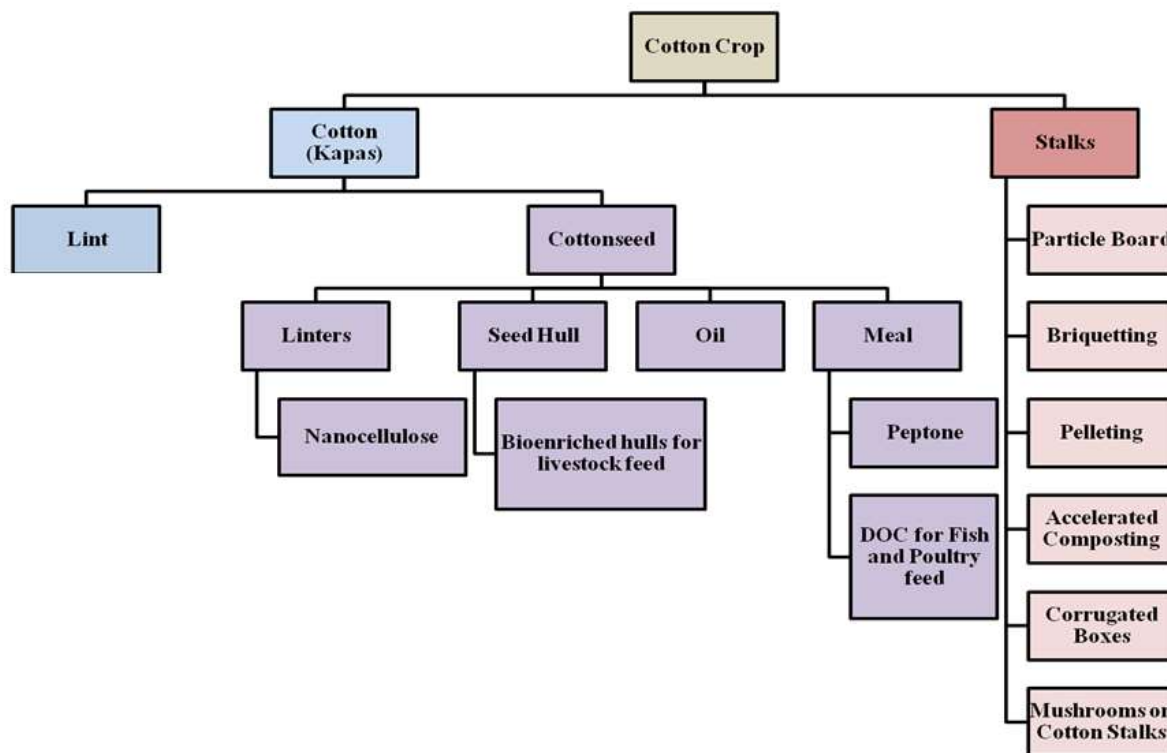
CIRCOT had developed a technology for small-scale production of de-gossypolised cottonseed cake for non-ruminants like fish and poultry. The technology involved a microbial process that resulted in the following: reduction of free gossypol content (80%); reduction of bound gossypol (60%); reduction of crude fibre (30%); improvement of protein content (40%); and improvement of lysine content (25%).

In addition, India was using linters or shot fuzzy fibres from cottonseed to produce: cellulose nitrate (explosives); cellulose acetate (films, membranes, etc.); high grade paper (currency notes and security); medical grade cotton (absorbent); micro crystalline cellulose (filler in tablets); and food casings. Short-staple and comber noil cotton was available to the level of 0.25 million MT annually. Its commercial uses included: surgical cotton, medicated cotton, cotton ball, ear buds, and currency notes.

Finally, he described the commercial utilization of cotton stalks in about 110 briquetting plants, each with a daily production capacity of 20 MT. The briquettes were used as substitutes for coal when firing boilers in industries and brick kilns, among others. The raw material of 150,000 MT of cotton stalks lasted for four months, and was supplemented by soybean, saw dust, wood chips and bagasse, among other biomass sources. The benefits included low cost as briquettes were about 80 per cent of the price of coal, are a renewable source and provided additional income to the farmers. He provided information about the required capital investments, operating expenses and net annual income for a briquetting plant in India. The average payback period was 23 months, with a return on investment of 43.5 per cent.

The discussions after the presentation centred on the following by-products: particle board, briquettes, pellets and mushrooms from stalks; and cottonseed cake.

Figure 2: Potential cotton by-products



Source: Presentation by Dr. Patil, CIRCOT on possible cotton by-products

### 5.1.1. Briquettes from cotton stalks

The product has viability given the big market for biofuels in Uganda. Participants discussed the potential supply volumes of stalks in the different cotton-growing regions, as well as potential customers for briquettes, with a view to identifying the ideal locations for a briquetting plant. Based on the Indian example, a briquetting plant should ideally be able to source its stalks within a radius of 70-100 km. Given that one hectare of cotton yield approximately 2-3 MT of stalks, participants considered the potential of the following cotton-growing areas:

- In Kasese it was possible to gather about 120,000 tonnes per year (MT/yr) of cotton stalks. The potential customers for briquettes included households, breweries, a tea factory and a cement factory.
- In the south eastern part of the country, it was possible to gather 120,000 MT/yr of cotton stalks. Cement factories and breweries were potential customers for briquettes.
- In Lango and Acholi sub-regions of northern Uganda, it was possible to gather about 150,000 MT/yr of cotton stalks.
- The eastern part of Soroti could generate about 120,000 MT/yr of cotton stalks.
- Finally, the West Nile region could generate 200,000 MT/yr of cotton stalks.

The total supply of cotton stalks for Uganda was estimated at 900,000 MT/yr from an estimated area of 121,000 hectares.

To remain economically viable, a briquetting plant would require raw material throughout the year. Outside of the cotton harvesting season, other biomass feedstocks in the cotton-growing areas could include: soya bean, sunflower, sorghum, maize, millet, banana fibre, rice stalks and husks.

Based on the above discussions, participants recommended the following parameters for establishing a value chain for cotton stalks, together with a briquetting plant:

- a) **Transportation costs** for the given collection radius of 70-100 km. Stalks are bulky but relatively light (semi-dry) and hence can be chipped at the farm to a length of 20 cm, to enable an average lorry to carry about 6 MT. It was noted that the cost of transporting chipped stalks may be close to the case in India of US\$ 23 per MT.
- b) **Participation of farmers:** The small scale of a briquetting plant and the need for it to be near a sufficient supply of stalks mean it could be feasible for farmers to operate one. A feasibility study would need to establish if households, cooperatives or farmers groups had the technical capacity to do so.
- c) **Blochar**, an organic fertiliser made from biomass, was introduced in Uganda in 2014 and should be incorporated into the value chain for cotton stalks.
- d) Implementation should start around **Kasese**, where there are already ongoing efforts in using cotton stalks. The proposed oversight committee will work on the details.

### 5.1.2. *Mushroom production using cotton stalks*

There big potential to produce mushrooms using cotton stalks and cotton waste offers additional viable option of cotton by-products. There was a growing market for mushrooms in the country partly because of their taste, protein content and perceived medicinal attributes. The Uganda Industrial Research Institute (UIRI) was already engaged in growing mushrooms using other products and hence could take lead in this venture.

There is need to improve the technology, compute associated costs, as well as enhance the technical capacity within the specific areas for such a business. It was noted that the returns are quite high, as capital and operating costs are low.

### 5.1.3. *Removing gossypol from cottonseed cake*

The process of removing gossypol from cottonseed cake isn't present in Uganda. As such, the initial phases of implementation should focus on introducing the business and health benefits. Establishing this awareness will be necessary for de-gossypolised cottonseed cake to compete with adulterated products, which are cheaper.

Participants recommended installed the de-gossypol process at several existing oil crushers, to pilot its commercial viability in Uganda.

### 5.1.4. *Absorbent cotton*

There are six companies involved in the production of absorbent cotton in Uganda. They are small in scale due to the small volumes and seasonality of raw material, including short-staple cotton and gin waste, for example. As a result, most absorbent cotton products in Uganda are imported.

Participants recommended revisiting the SATU variety of cotton plant, grown in the 1990s but no longer in cultivation, as it yielded a short-staple fibre. Additional research on the SATU variety could establish whether it is a feasible source of short-staple lint for absorbent cotton producers. If so, CDO could coordinate with producers to contract farmers to grow the SATU variety for them.

## 5.2. National Action Plan

Participants agreed on a National Action Plan (NAP) for developing cotton by-products in Uganda. The Plan comprises the three initiatives described above, namely:

1. Extend the market for cottonseed to the non-ruminants feed segment by implementing de-gossypol technology;
2. Increase domestic production of absorbent cotton; and
3. Develop a new value chain for cotton stalks, to produce charcoal briquettes; and
4. Scale up commercial mushroom production using cotton biomass.

### 5.3. Composition of the oversight committee

To guide the implementation of the National Action Plan, participants recommended that CDO convene and chair an oversight committee comprised of the following stakeholders: ginners; farmers; traders; producers of absorbent cotton, stockfeed and edible oil; as well as research institutions UIRI and NARO.

## 6. Policy workshop, 16 March

The third day of the workshop was specifically dedicated to making policy recommendations to support the implementation of the National Action Plan and its commercial initiatives. The discussion began with a session of examining the current policy environment to identify gaps that require attention. The policy gaps identified generally related to the priority by-products selected in the Plan.

### 6.1. General policy gaps

The general gaps discussed in the sessions included: the lack of a coherent vision and policy treatment for the cotton value chain; trade policy that favours imports over local products; and a lack of intellectual property protection for innovators. Each of these is highlighted below.

1. The participants noted that there was no coherent policy for the promotion of value added activities in the cotton sector. This was partly due to lack of an apex organisation or association to coordinate the various value-added processors and liaise with the Government. The Cotton Development Act mandates CDO to regulate seed breeding and production. CDO also convenes the actors responsible for value addition and participates in these discussions but has no formal mandate or budget to regulate downstream activities. As a result, oversight of the downstream value chain is spread among the agriculture, industry, trade and finance ministries, among others.
2. There was no comprehensive value chain strategy for the cotton sub-sector. Such a strategy would detail, for example: (a) clear roles and coordination among the Government, private sector, research and financial institutions; (b) the priority activities for development at the different nodes of the chain, from production, to the lint and by-products chains; and (c) establishment of a communications strategy.
3. The current design and practice of trade policy has created an unfair environment that favours imported products and inputs that were out-competing local products. For example, imports of second-hand clothing were deemed to be undermining the local textile industry. Secondly local cottonseed incurs Value Added Tax (VAT), while imports are duty-free. Similarly, imports of edible oil, which are subsidised in the country of production, enter Uganda duty-free, undercutting local edible oil products.
4. There is a poor policy environment for the application of patents for the protection of innovators and copyright holders or licensees.

### 6.2. Cotton stalks

A new value chain for cotton stalks would require a new policy framework, mapped from relevant existing policies, with new ones added, where necessary. Participants identified the following policy areas for attention:

- There are no standards for carbonised biomass briquettes and mushrooms, which are the two products identified for cotton stalks.
- UIRI has developed technologies to produce briquettes and mushrooms, but lacked the funds to disseminate them widely.
- There is no comprehensive strategy in Uganda for biomass fuels, including cotton stalks and hulls, which should identify priority applications in the household, commercial and industrial sectors, as well as create incentives for users to buy biomass fuels, in place of fossil fuels and wood-based charcoal, which is linked to deforestation.
- Linking the contribution of biomass (e.g. cotton stalk) briquettes to related policy priorities, such as:
  - Renewable energy;
  - Rural development;
  - Management of harmful emissions;
  - Deforestation; and

- Import substitution, including the Buy Uganda Build Uganda (BUBU) campaign.

### 6.3. Cottonseed cake

The trade policy in Uganda does not provide a level playing field for locally produced cottonseed cake. For example: (i) imports of cottonseed cake are adulterated with hulls or sawdust, eroding market prices and quality standards; and (ii) local cottonseed incurs VAT, whereas imports are duty-free.

Furthermore, the enzyme gossypol in cottonseed inhibits growth in non-ruminants, such as poultry, and poses health risks to humans if introduced into the food chain. Nevertheless, cottonseed cake containing gossypol is freely sold for poultry feed production in Uganda.

In addition, there is limited enforcement of standards for the cottonseed value chain, including:

- Handling, storage and processing of cottonseed;
- Composition and nutritional characteristics of stockfeed, especially feed derived from cottonseed;
- Quality of imported cottonseed cake and stockfeed;
- Human consumption of poultry feed with feed derived from cottonseed cake containing gossypol; and
- Finally, to support compliance with standards, a sensitization campaign is needed.

### 6.4. Absorbent cotton

Among the policy gaps relating to absorbent cotton, trade policy contributes to a competitive disadvantage for local products, with respect to imports.

Since the National Action Plan proposes reintroducing into circulation the SATU variety of cotton, with its shorter staple of fibre, policy makers must provide for additional research on this variety and its potential applications for absorbent cotton.

### 6.5. Policy recommendations

In response to the gaps identified, and to support the implementation of the National Action Plan to develop cotton by-products in Uganda, the participants agreed on the following four policy recommendations:

1. Create a sustainable market for cottonseed
2. Replace polluting and non-renewable fuels with biomass briquettes
3. Promote mushroom cultivation from cotton biomass
4. Extend the mandate of CDO to oversee the entire value chain

## 7. Closing remarks

Mr. Fredrick Kasozi, SCO of the Ministry of Trade, Industry and Cooperatives, delivered the closing remarks. He expressed appreciation for the President's 2016 directive to the Uganda Prisons Service to grow cotton on its lands, which is a strong message about the importance of cotton in Uganda. He expressed appreciation for UNCTAD's support in arranging this workshop, where a lot of knowledge was shared. The experts from India and ICAC were acknowledged for the valuable knowledge they shared, which must now be disseminated.



## 8. Annex 1. List of participants

#	Dr/Mr / Ms	Name	Title	Institution
1	Ms	Acen Beatrice	Farmer	
2	Mr	Akash	Director	G.M.Sugar Ltd
3	Ms	Akello Caroline kella	Farmer	
4	Mr	Amdan Khan	Managing Director	Rwenzori Cotton Ltd
5	Mr	Amit Bhatt	Finance officer	Southbase Agro industries ltd
6	Mr	Anyama Ben	Board Chairman	CDO
7	Ms	Apophia Alleluya	Project Coordinator	UIRI
8	Mr	Aryong Akulep Mathew	CDO Board member	CDO
9	Ms	Aseno Jesca	Farmer	
10	Mr	Bishaka Edmund	PAO-FC	MAAIF
11	Mr	Bright Rchard Kimuli	Ag- Director	UBOS
12	Mr	Bwambale Adam	Secretary Manager	Nyakatonzi Growers Cooperative Union
13	Mr	Byabasajja Mareki	Farmer	
14	Prof	Charles Kwesiga	ED	UIRI
15	Ms	Colline Nahurira	Resarch Assistant	CDO
16	Mr	Edgar Barjunaki	GM	Pasha Oil Mill Ltd

17	Ms	Ethel Kamba	Undersecretary	MAAIP
18	Ms	Grace Angela Kirabo	Executive Director	TEXDA
19	Mr	Hitesh Panchmatia	Managing Director	Bon Holdings Ltd
20	Mr	Itungulu Fredrick	Ginning Engineer	CDO
21	Ms	Jane Etyang	Farmer	
22	Ms	Jolly. K. Sabune	M.D	CDO
23	Dr.	Joshu Mutambi	Commisioner P&M	Minstry of Trade , Industry & Cooperative
24	Ms	Judith Kateme	Intern /PDU	CDO
25	Ms	Kabugho Sanet	Farmer	
26	Mr	Kalema Solomon Musisi	Senior Communication Officer	Ministry of Agriculture Animal Industry and Fisheries
27	Mr	Kandarp Kinariwalla	Director	Southbase Agro industries ltd
28	Mr	Kanene. L. Brian	Quality Assurance Officer	NYTIL
29	Mr	Kasozi Fredrick	SCO	Minstry of Trade , Industry & Cooperative

30	Ms	Kihika T. Beatrice	Finance and Administration Manager	Western Uganda Cotton Co Ltd
31	Mr	KISEKKA Brian	Production Manager	Ekiryata-bala General Merchants Ltd
32	Ms	Komuhendo Jennifer	Personal Assistant to Managing Director	CDO
33	Ms	Loyce Kukunda	Research Technician	UIRI
34	Ms	Lubwama Damalie	PMIM	CDO
35	Mr	Lugojja Fred	MIMO	CDO
36	Mr	Martin Luther Munu	Research Analyst	EPRC
37	Mr	Michael Ugen	DOR	NARO-NaSSARRI
38	Mr	Muhumuza Fred	Facilitator	Makerere University
39	Mr	Munaaba Geoffrey M.	Farmer	
40	Mr	Mwesigye Edwin	MD	Mutuma Commercial Agencies Ltd
41	Ms	Nakimu Susan	General Operations Manager	Ugachick
42	Ms	Naluvuye Gorreth	Senior information scientist	Ministry of agriculture , Animal industry and Fisheries
43	Ms	Nambuya Petua	Farmer	

44	Ms	Namirimu Bushrah	SPRO	Ministry of Agriculture Animal Industry and Fisheries
45	Ms	Namwanje Diana	Intern	EPRC
46	Ms	Nansubuga Josephine Faith	Programme Associate	UNDP
47	Mr	Narendra Patel	Director	C.N.Cotton Ltd
48	Mr	Ngisi Alex	Farmer	
49	Dr.	Nibikora Ildephonse	Head of Department of Textiles & Ginning	Busitema University
50	Ms	Nitusiima Doreen	Research Technician	UIRI
51	Mr	Obonyo Walter	Operations Manager	Western Uganda Cotton Company
52	Mr	Obote Acellam Karlmark	Chairman	East Acholi Cooperative Union
53	Ms	Odongo Michael	Farmer	
54	Mr	Ogen Bob Alberto	General Manager	West Acholi cooperative Union
55	Mr	Olietho Godfrey.O	Chief Technician	Busitema University
56	Mr	Oryem Charles	Farmer	
57	Mr	Osege Matias. Simeo	Farmer	
58	Mr	Owachi William	BS/FAM	CDO

59	Mr	Oyugi Jackson	Chairperson	West acholi coperative Union
60	Mr	Oyungi Kenneth Franco	Farmer	
61	Mr	Padmanabh Paraoukar	PPC & MIS Manager	NYTIL
62	Mr	Patrick Ilukat	Principle Cotton Classifier	CDO
63	Mr	Sabiiti Godfrey Bonny	Manager - Oil Mill	Nyakatonzi Growers Cooperativ e Union
64	Mr	Satvinder Singh Poonia	Officer	Olam (U) Ltd
65	Mr	Sekisambu George	Oil miller	UCOPA
66	Dr.	Serunjogi Lastus K	Technical Advisor	CDO

67	Dr.	Shinyekwa Isaac	Research Consultant	EPRC
68	Mr	Tabula Silas	Director	Katade Poultry Farm
69	Mr	Thummoni Bharat	Director	Lukonge Cotton Ltd
70	Mr	Timothy Kyambadde	Director	W.K.Ranc h Feeds
71	Mr	Tsowu Komi	Economist	UNELA
72	Mr	Wamanya Rogers	Accountant	CDO
73	Mr	Zizinga Ali	Officer	Wamala Growers Cooperativ e Union

## 9. Annex 2. Final programme of the workshop

### 1. Stakeholder workshop, 14-15 March

*Day 1, 14 March*

*Chairperson: Dr. Lastus Serunjogi Katende, Plant Breeder, CDO*

8:45-10:30	Opening session
	Facilitator: Mr. Ben Anyama, Chairman, CDO Board
	Opening statement: Ms. Ethel Kamba, Under Secretary, MAAIF
	Introduction to the project: Ms. Yanchun Zhang, Chief, Commodity Policy Implementation and Outreach Section, UNCTAD
	Remarks from UNECA: Mr. Komi Tsowou, Associate Economic Affairs Officer
10:30-10:45	Coffee break
10:45-12:30	Session 1: Presentation of survey results
	Facilitator: Mr. Ben Anyama, Chairman, CDO Board
	Survey results: Mr. Isaac Shinyekwa (author)
	Discussant: Mr. Kanakulya Lubinga, Chairman, Uganda Cotton Oil Producers Association
	Discussant: Mr. Adams Bwambale, Director, Uganda Ginners and Cotton Exporters Association
	Discussant: Mr. Ogen Bob Alberto, Secretary Manager, West Acholi Cooperative Union
	Moderated discussion
12:30-14:00	Group photo, followed by lunch
14:00-15:30	Session 2: Increasing seed cotton production in Uganda
	Facilitator: Mrs. Jolly Sabune, Managing Director, CDO
	Expert presentation: Dr. Keshav Kranthi, Head of Technical Information, ICAC
	Discussion
15:30-15:45	Coffee break
15:45-16:30	Session 3: Increasing seed cotton production in Uganda (continued)
	Facilitator: Mrs. Jolly Sabune, Managing Director, CDO
	Expert Q&A: Dr. Keshav Kranthi, Head of Technical Information, ICAC
	Discussion
	Agreement of recommendations
	<i>Deliverable</i>

*Day 2, 15 March*

*Chairperson: Dr. Lastus Serunjogi Katende, Plant Breeder, CDO*

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8:45-10:30 Session 4: Priority cotton by-products activities for development

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Facilitator: Prof. Charles Kwesiga, Executive Director, UIRI  
Expert presentation: Dr. P. G. Patil, Director, Central Institute for Research on Cotton Technology (CIRCOT), India  
Discussion of priority by-products

10:30-10:45 Coffee break

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10:45-12:30 Session 5: Priority cotton by-products activities for development (continued)

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Facilitator: Prof. Charles Kwesiga, Executive Director, UIRI  
Expert Q&A: Dr. P. G. Patil, Director, Central Institute for Research on Cotton Technology (CIRCOT), India  
Agreement of priority by-products

*Deliverable*

12:30-14:00 Lunch

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14:00-15:30 Session 6: Strategies for developing priority cotton by-product activities

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Facilitator: Mrs. Jolly Sabune, Managing Director, CDO  
Priority products (from session 5)  
*Deliverable*

15:30-15:45 Coffee break

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15:45-17:15 Session 7: National action plan and oversight committee

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Facilitator: Mrs. Jolly Sabune, Managing Director, CDO  
Agreement on draft national action plan<sup>1</sup>  
Agreement on a multi-stakeholder oversight committee  
*Deliverables*

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17:15-17:30 Closing session

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Adoption of deliverables  
Closing statement: Mr. Ben Anyama, Chairman, CDO Board

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<sup>1</sup> Including both recommendations to increase seed cotton production (Session 3) and strategies for developing priority cotton by-product activities (Session 6).

## 2. Policy workshop, 16 March

*Chairperson: Dr. Lastus Serunjogi Katende, Plant Breeder, CDO*

8:45-10:30 Opening session

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Facilitator: Mr. Fred Mayanja, Acting Commissioner of Agriculture Planning and Development, MAAIF

Opening statement: Dr. Joshua Mutambi, Commissioner of Processing and Marketing, MTIC

Expert presentation: Mr. Godfrey Atuhaire, Research Officer, UIRI (Charcoal briquettes)

Expert presentation: Ms. Jennifer Mayamble, Head of Mushroom Technology, UIRI

Review of draft national action plan

10:30-10:45 Coffee break

10:45-12:30 Session 1: Gap analysis

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Facilitator: Dr. Fred Muhumuza, Lecturer, Makerere University

Seed cotton production

Cotton by-products value addition

12:30-14:00 Lunch

14:00-15:30 Session 2: Policy proposals

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Facilitator: Dr. Fred Muhumuza, Lecturer, Makerere University

Seed cotton production

Cotton by-products value addition

15:30-15:45 Coffee break

15:45-17:15 Session 3: Policy proposals (continued)

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Facilitator: Dr. Fred Muhumuza, Lecturer, Makerere University

Seed cotton production

Cotton by-products value addition

*Deliverable*

17:15-17:30 Closing session

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Facilitator: Dr. Fred Muhumuza, Lecturer, Makerere University

Adoption of deliverables

Closing statement: Mr. Fredrick Kasozi, SCO, MTIC