CHA Cotton Seed Improvement Program

COTTONSEED SECTOR STUDY

Mission report in Tanzania
March 1st - 11th, 2019

Participants at the Strategic Workshop 1 (Pamba house, Mwanza)

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Towards an action plan for the Tanzanian Cotton seed system

Dates	**March 1 to March 11, 2019**
Main purpose of the mission	Preparing a workplan to support the cottonseed system in Tanzania
People met	**Alliance:** Mr. Boaz OGOLA (General Manager) **Biosustain:** Dr. Riyaz HAIDER (Director) **CHA:** Mr. Tom APINA (Regional coordinator) **Gatsby Africa:** Mr. Donald SAYI **Igunga District Cooperative:** Mr. Erasto KONGA **OLAM:** Mrs. Mariam MWINIYI (Communication) **Quton:** MMr. Phineas CHIKAURA (Manager of the delinting plant); Victorieus MUSUMANJE (Accountant) **Tanzania Cotton Board (TCB):** MMr. Gabriel MWALO (DAF); George MPANDUJI (Board member, farmer rep); Joseph MUHANGWA (Board member, Cooperatives rep); Goronya ALLY (Board member, local gvt rep); Renatus LUPEJA **Tanzanian Agricultural Research Institute (TARI):** Dr. Furaha P. MROSSO (Entomologist, National Cotton Coordinator); Mrs Georgia BUCHUKUNDI (Technician Plant Breeder); MMr. Paul KIBINZA (Phyto-pathologists); Seperatus KAMUNTU (Plant Breeder); Robert KILEO (Agronomist); Mr. E.L. KIBINDA (Geomatics); Dr. George SONDA (Social scientist); Mrs. Epifania TEMU (Entomologist); Joyce RUZZO (Technician Phytopathologist) **Tanzanian Official Seed Certification Institute (TOSCI):** Mr. Albert MANG'WATA (Seed inspector)
Itinerary	Ukiriguru, Mwanza
Authors	Jacques LANÇON (Cirad), Everina LUKONGE (TARI)
Dissemination	CHA: to be completed Cirad: B. BACHELIER, J.M. LACAPE, M. GIBAND, P. GRARD (DR), DGD-RS TARI: to be completed + all the people met during the consultancy

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CONTENT

Acknowledgement

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Our thanks go also:

- to the Head of Ukiriguru TARI, Dr. Simon JEREMIAH, and all the TARI and TOSCI staff for their kind welcoming and availability,
- to the Director General of TCB, Mr. Marco MTUNGA, and his staff for their very active and efficient support,
- and finally to all the stakeholders we met and who did not hesitate to share very valuable information on their activities.

Executive summary

- **Objective of the mission.** It accounted for the second Phase of a CHA-Cirad contract funded by BMZ (Germany) aiming at strengthening the Cottonseed sector in Tanzania. The main objective was to share and validate the diagnosis made by the tandem experts during Phase 1, to prioritize among the actions they proposed, and to elaborate on these priorities with the support of relevant experts and beneficiaries especially farmers.
- **Implementation of the mission.** The Phase 2 mission was implemented between the 1st and the 10th of March 2019. The team, composed of Dr LANÇON (Cirad) and Dr LUKONGE seconded by Dr MROSSO (TARI), who organized two workshops in the premises of the Tanzanian Cotton Board based in Mwanza town. The first workshop, called strategic Workshop 1 (WS1), was held on March 4. The results of the diagnosis study conducted during the Phase 1 program, in October 2018, were presented to the Board by the experts. The Board could then rank and prioritize within a list of proposed actions. The second workshop, called technical Workshop 2 (WS2), was held on March 7. The participants were asked to describe key activities in relation to the actions prioritized by the Board. The results of the process allowed the experts to elaborate an action plan which has been described in this report, and could form the basis for a third phase of the programme.
- **Strategic WS1.** It involved 8 participants, among which representatives of farmers, local governments, ginners and cooperatives. Key persons such as the representative of the textile industry was missing. The 29 initial propositions included measures to enhance the three main categories of resources needed to a successful implementation of activities included human resources, field or laboratory equipment and running costs. In particular, human resources may be strengthened through exchange of experience, conventional training or collective thinking. The participants could rank the actions that were related to the whole cotton sector, cottonseed sector or limited to the plant breeding programme. From this, the tandem experts ranked and identified the themes to be proposed to the technical WS2.
- **Technical WS2.** It involved 15 participants, experts from TCB, TOSCI, BioSustain, Quton, Gatsby-Africa, extension and TARI, in presence of the regional director of CHA for East and Southern Africa. Brainstorming sessions were organized around 6 themes: Fusarium Wilt mitigation, Fusarium Wilt control, Quality mapping, Focused plant breeding, cotton sector Planning and regional research Mutualization. The results of the working groups provided the information which could feed the final action plan.

- **Action plan.** One is proposed at the end of the report. It deals with four aspects: early generation seed (EGS) multiplication, late generation seed (LGS) multiplication, Fusarium wilt control and mitigation, Low input / organic cropping system. For each of the four components, a table provides more detailed activities, responsibilities and a grossly estimated budget for 2019-20 and 2020-21 seasons.

Mission programme

- March 1-2: travel from Montpellier to Mwanza
- March 3: work at TARI (Ukiriguru) with Drs Lukonge and Mrosso
- March 4: workshop 1 (at Pamba House - TCB, Mwanza), then work at hotel
- March 5: work at TARI (Ukiriguru) with Drs Lukonge and Mrosso
- March 6: work at TARI (Ukiriguru) with Drs Lukonge and Mrosso, diner with Dr. D. Sayi (Gatsby-Africa)
- March 7: workshop 2 with experts (at TCB, Mwanza)
- March 8: work at TARI (Ukiriguru) with Drs Lukonge and Mrosso
- March 9: work at hotel, diner with Dr. T. Apina (CHA)
- March 10-11: travel from Mwanza to Montpellier

→ ***Detailed program of WS1 and WS2 at Annex 2 and Annex 4.***

Context

CHA (Cotton Expert House for Africa) has assigned CIRAD in cooperation with TARI to implement an analysis of the cottonseed situation (Phase 1 of the program), and to develop a plan for the 2.5 years period to improve it (Phase 2 of the program). Subsequently, local cotton varieties will be replenished or improved and a seed multiplication program in four African countries, two from South-East Africa and two in West and Central Africa will be established (Phase 3).

During Phase 1 of the project, the study of the Cottonseed sector, including aspects related to the whole Cotton sector, and the Breeding programme, was done by the contracted scientific experts from CIRAD (France) and TARI (Tanzania), Dr Jacques Lançon (Cirad) and Dr Everina Lukonge (TARI).

The outputs of Phase 1 were a mission report and a questionnaire, both delivered on January 8, which highlighted challenges and proposed a series of interventions at different levels: cotton production, plant breeding, seed multiplication, seed processing and storage, marketing, regulatory procedures and seed use by cotton farmers.

Phase 2 was also implemented by the same experts, Dr Jacques Lançon (Cirad) and Dr Everina Lukonge (TARI). The results of Phase 1 were shared with the local actors and a work plan was elaborated with them. Initially the workplan included the following components (a) finalizing the guidelines for the production of good quality cotton seeds, including seed processing and storage, marketing, regulatory procedures and seed use by cotton farmers, (b) formulating together with the local stakeholders a national seed improvement program, based on the recommendations of Phase 1, and (c) elaborating some training modules and initiating breeding activities (purification, trials etc.) on the basis of the main needs identified during the workshop. However, considering the results of the diagnosis conducted during Phase 1, these aspects seemed to be well

known by a variety of actors, including the Research or the Regulatory body, the Tanzanian Cotton Board, and most were in place. We then decided to reformulate the objectives of Phase 2, in order to make propositions that could make actual changes on the ground.

Objectives of the mission

Interactions with key stakeholders were considered as necessary to the successful implementation of Phase 2, and they were organized in two workshops.

The first Worskhop had three specific objectives:

i) Sharing and consolidating the diagnosis formulated by the tandem experts,

ii) Sharing, completing and prioritizing the action plan proposed by the experts,

iii) Identifying the relevant actors of the program (as experts or beneficiaries),

Whereas the second Workshop had only one objective:

iv) elaborating on the priority actions to be proposed for a third Phase.

Strategic workshop 1

Venue

- Organization: **TARI (Tanzanian Agricultural Research Institute)**
- Date of the meeting: **4/03**
- Place: **Mwanza Tanzanian Cotton Board**

This workshop was conducted at the Tanzanian Cotton Board (Pamba House) on Monday 4, from 8 to 15h.

Programme

It was divided in 7 sessions (Registration, Introduction, Results of Phase 1, Diagnosis, Action plan, Actors and Wrap-Up) and ended with a lunch shared with the participants.

→ Detailed program of WS1 at Annex 2 and Presentation at Annex 7.

Participants

The invited participants for this session were directors of the Tanzania Cotton Board (TCB), representatives of farmers' cooperatives, local governments, ginners. Unfortunately, the Chairman and the representative of the textile industry could not attend. TCB was represented by its Director for Finance Administration (DAF) on behalf of the Director General, and Quton Seed Company and TARI were among the participants.

→ List of participants at Annex 3.

Actions proposed by the tandem experts

The actions proposed in Phase 1 (diagnosis) report are recorded in table 1 and classified according to what they aim at improving first: human capital (capacity building), implantation facilities (equipment or lab renovation), or research and field activities (running costs).

Table 1. Type of action required

Type of action	Sub-type description	Cotton sector	Cotton seed sector	Cotton breeding program
Capacity building	Exchange of experience and networking (pairs)	CS-5		BP-3, BP-5, BP-6, BP-8
	Training (expertise needed)	CS-3, CS-6, CS-7, CS-9		
	Multi-actor approaches (experts with diversified skills)	CS-1, CS-2, CS-10, CS-11, CS-13	SS-1, SS-3, SS-4, SS-5	BP-1, BP-10
Equipment	Laboratory or office equipment	CS-7, CS-11	SS-6	BP-4
	Field equipment	CS-10, CS-11	SS-6	
Running costs	Research	CS-7, CS-8, CS-12	SS-3	BP-2, BP-7, BP-9
	Extension / development	CS-3, CS-4, CS-9, CS-10, CS-11	SS-2, SS-6	

Capacity building. It is considered that the performances of the cotton sector could benefit from three types of capacity building:

- The first type is based on the development of **learning capacities**, throughout the sector, based on exchange of experiences among pairs, *ie* people doing the same work in different working environments. As an example, we could think of the staff operating the ginning plants: in 2017 (from TCB), the national GOT could be estimated at 31% (controlled by TCB at 35.4%), when the GOT, estimated by research from on station and on farm trials for the two varieties grown at that time, was 39-40% for UK 91 and 41-43% for UKM 08 respectively. In comparison, table 2 shows the differences which were obtained in Benin in the nineties. But, of course, one can think of many other domain where exchange of experience could be promoted at a small scale (extension staff dealing with organic cotton, seed or gin controllers), or bigger scale (AMCOS, extension staff dealing with conventional cotton, farmers *etc*.).

Table 2. Comparison of GOT obtained on station and on farm trials and GOT obtained at the ginneries (same variety, same 6 years, between 1992 and 1998, saw gins for Benin, Tanzania figures for 2017 as a reminder in the last column)[1]

Variety	STAM F				STAM 18-A		6 years average	Average deviation	Tanzania 2017
Season	1992-93	1993-94	1994-95	1995-96	1997-98	1998-99			
Ginneries	42.03	41.37	41.30	40.44	41.73	41.36	41.37	-	31.0
Control	42.60	42.41	42.50	41.93	43.04	42.52	42.50	+1.13	+4.4
On farm trials	42.24	42.57	42.34	41.98	42.89	42.55	42.43	+1.06	+8.0
On station trials	42.97	42.61	42.67	42.45	43.30	43.17	42.86	+1.49	+11.0

After Hougni *et al* (2000) and TCB (2017)

- The second component is **conventional professional training**. There are many fields where external technical inputs are needed to induce changes and progress. For example, once the professional networks had been identified and formed, it would be possible to identify their specific training needs, and develop adapted curriculae. *Ad hoc*, mostly research and educational institutions (universities and colleges) could be

[1] Le rendement à l'égrenage baisse-t-il au cours du temps ? HOUGNI Alexis, DJABOUTOU Moussibaou, SEKLOKA Emmanuel, LANÇON Jacques (2000). Actes des Journées Coton, Montpellier (France), 17-21 juillet 2000, 85-91.

mobilized, in order to prioritize the most cost-effective way of improvement (local, national, regional or international).

- The third component is turned towards **collective action**, and aims at generating collective intelligence by gathering experts from different sectors on cross-cutting issues. For example, there is a multi-disciplinary, multi-actor way of designing new cropping systems in cotton which was conceptualized and tested in three West-African countries (Benin, Cameroun and Mali)[2]. In the cotton sector, this component could be helpful in many instances, although results would vary a lot with the skills of the experts mobilized.

Cotton sector

SWOT validated during the WS

Weaknesses of the cotton sector. 1) the low yield level must be considered as a weakness but it has to be rephrased with a reference to the cropping system (rainfed) and the uncontrolled weather conditions; 2) the high number of ginners can be seen as an opportunity (high ginning potential), but their versatility as a weakness (lack of professionalism and low quantity of seedcotton for ginning); 3) the idea that seeds are not sufficiently multiplied is approved but the word 'adoption' is preferred to 'dissemination'; and finally 4) the value added by the cotton sector is not enough, in particular because a large part of the production is exported as raw fiber.

Opportunities of the cotton sector. There is a political willingness to facilitate the emergence of a cotton industry in order to create jobs and value locally.

[2] An improved methodology for integrated crop management systems.
Lançon J., Wery J., Rapidel B., Angokaye M., Gérardeaux E., Gaborel C., Ballo D., Fadegnon B., 2007. Agronomy for Sustainable Development, 27, 2, 101-110.

Actions prioritized

During the diagnosis phase of the CHA programme, we proposed 13 actions which could strengthen the whole cotton sector. As a result of the ranking exercises conducted during the strategic WS1 (Table 3), actions related to Fusarium wilt control and mitigation were considered as first priority.

Table 3. Cotton sector as a whole, as prioritized according to the challenges during the workshop

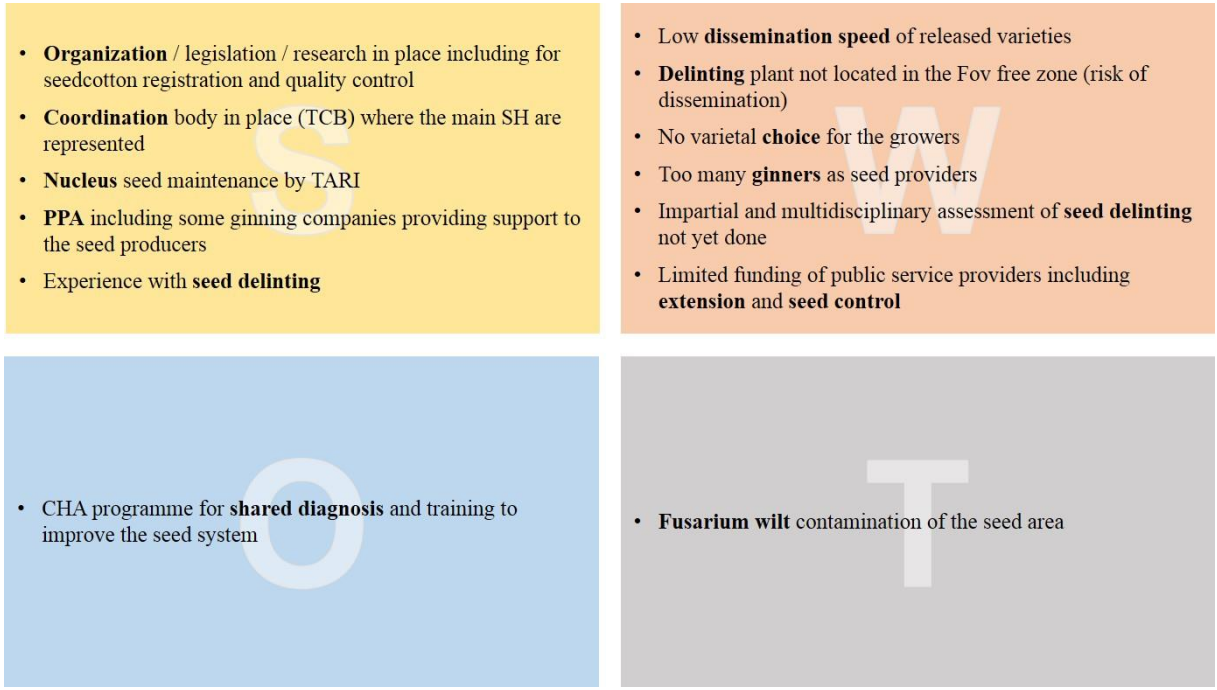
Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost
CS-1	**4**	**FW** - Design a decentralized monitoring of the infestation	D	TARI	Extension + Actors	=
CS-2	**4**	**FW** - Design an interdisciplinary program of mitigation	R	TARI	Extension	+
CS-3	**4**	**FW** – Set up a decentralized monitoring system	D	TCB	Extension + Actors	+
CS-4	**4**	**FW** - Put in place mitigation measures in affected areas	D	Extension	TARI	++
CS-5	**2**	**Training** - Form communities of professional people and identify the potential of training by exchange of experience	D	TCB	Actors	=
CS-6	**2**	**Training** - Develop curriculae for professional people	D	TCB	TARI + Actors	+
CS-7	**3**	**Pests** – Monitor the level of resistance in *H. armigera* and *S. Frugiperda* populations	R&D	TPRI	TARI + Extension	=/+
CS-8	**3**	**Pests** – Test the effect of tipping in rainy seasons	R	TARI		+
CS-9	**2**	**Soil fertility** - Improve the effectiveness of the manure applied (composting)	D	Extension	TARI	+
CS-10	**2**	**Soil fertility** - Develop a comprehensive program on soil fertility improvement	R&D	Extension	TARI	+++
CS-11	**1**	**Statistics on cotton production** – Develop a database on the number of cotton farmers and the acreage they grow.	D	TCB		++
CS-12	**3**	**Organic cotton** - Evaluate scientifically the efficiency of products proposed as alternatives to synthetic insecticides	R	TARI	Org producers on var. crops	+
CS-13	**3**	**Organic cotton** - Set up a plant protection program for organic cropping systems	R	TARI	Org producers	+

Challenge: 1= Statistics, 2= Productivity; 3= Pest control; 4= Disease control (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Cottonseed sector

SWOT validated during the WS

There was no major comment or modification asked on this SWOT which remains similar to the one presented during the meeting.



Actions prioritized

After the diagnosis phase, 6 actions were proposed to support more specifically the cottonseed sector and these were ranked during the strategic WS1, as Fusarium wilt first, followed by Quality and Planning (Table 4).

Table 4. Cotton seed sector, as prioritized during the workshop

Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost
SS-1	**4**	**FW** - Design a program to ensure that the 'free of FW' zones remain unaffected	R&D	TCB	TARI	=
SS-2	**4**	**FW** - Put in place restrictive measures (no seed or soil entry) based on the monitoring results	D	TCB	Actors	=
SS-3	**5**	**Quality** - Map the aptitude of the different regions	R	TARI	TCB + TOSCI + Quton	=/+
SS-4	**5**	**Quality** - Organize the seed multiplication according to the seed quality zoning	D	TCB	TOSCI + Actors	=
SS-5	**1**	**Planning** - Design a method to improve the estimates of the needs in seed and inputs	D	TCB	Alliance?	+
SS-6	**1**	**Planning** - Put in place a method for improving the evaluation of the needs in seed and inputs	D	TCB	Actors	+

Challenge: 1= Statistics, 4= Disease control; 5= Seed multiplication (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

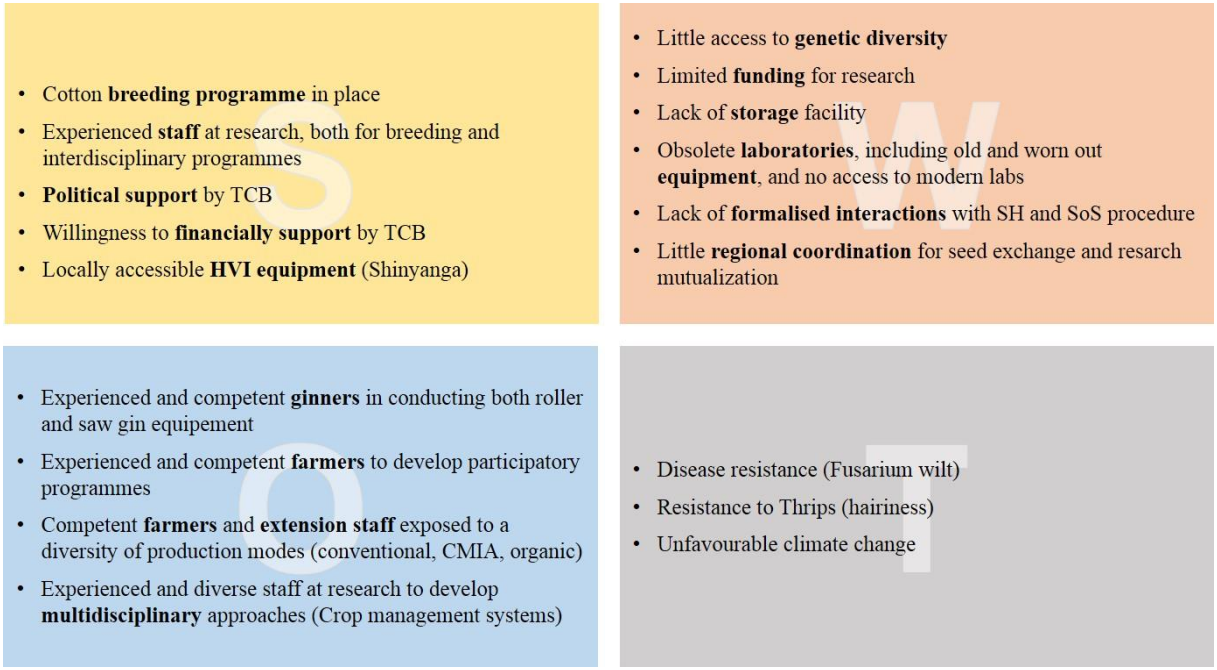
Cotton breeding programme

SWOT validated during the WS

Strength of the breeding programme. TCB is showing strong political support to TARI and its Cotton breeding programme, but it often lacks of resources to support it at the required financial level.

Weaknesses of the breeding programme. The renovation of laboratories should include renewing the ginning or technology equipment.

Opportunities of the breeding programme. The word 'experienced' could be replaced or completed by 'competent'.



Actions prioritized

Among the 10 actions proposed to develop in the frame of the breeding programme, the priority given during the strategic WS1 went to Focus *ie* reshaping the programme to suit specific needs and cropping systems, Equipment and regional Mutualization (Table 5).

Table 5. Cotton breeding programme, as prioritized during the workshop

Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost
BP-1	**2**	**Focus** - Elaborate ToRs for more specific and diversified breeding programs in coordination with the CC actors (different zones, markets, cropping systems such as organic…)	R&D	TCB	TARI + Ginners	=
BP-2	**2**	**Focus** - Put in place specific breeding programs	R&D	TARI	Ginners	+
BP-3	**6**	**Equipment** - Network with local actors to benefit of their skill in servicing the ginning equipment	R	TARI	Actors	=
BP-4	**6**	**Equipment** - Renovate the breeding lab facilities and equipment	R&D	TARI		++

Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost
BP-5	**6**	**Mutualization** - Launch a dialog with other breeding programs at eco-regional African level for increased global efficiency	R	Ministry	TARI + TCB	+
BP-6	**6**	**Mutualization** - Build a regional breeding and research program on cotton	R	TCB	TARI	+
BP-7	**3**	**Pests** – Assess the susceptibility of new lines to insects on farm	R	TARI	Extension	+
BP-8	**4,6**	**Diversity** - Access to more diversified genetic material	R	TARI		=
BP-9	**2,4**	**Diversity** - Increase the genetic diversity in the breeding program	R&D	TARI		=
BP-10	**6**	**Quality** – Organize the testing of new material by classers	R	TARI	TCB lab	=

Challenge: 2= Productivity; 3= Pest control; 4= Disease control; 6= Research (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Selection of actions prioritized during WS1

Among the 29 actions initially proposed, the ranking done by the Board helped us to select the actions at the cotton sector level, actions related to the cottonseed sector, and actions at the Plant Breeding programme level.

Table 6. Type of action required (only priority actions maintained)

Type of action	Sub-type description	Cotton sector	Cotton seed sector	Cotton breeding program
Capacity building	Exchange of experience and networking			**Equipment** - Network with local actors to benefit of their skill in servicing the ginning equipment **Mutualization** - Launch a dialog with other breeding programs at eco-regional African level for increased global efficiency
	Training	**FW** – Set up a decentralized monitoring system		
	Multi-actor approaches	**FW** - Design a decentralized monitoring of the infestation **FW** - Design an interdisciplinary program of mitigation	**FW** - Design a program to ensure that the 'free of FW' zones remain unaffected **Quality** - Map the aptitude of the different regions **Quality** - Organize the seed multiplication according to the seed quality zoning **Planification** - Design a method to improve the estimates of the needs in seed and inputs	**Focus** - Elaborate ToRs for more specific and diversified breeding programs in coordination with the CC actors (different zones, markets, cropping systems such as organic…)

Type of action	Sub-type description	Cotton sector	Cotton seed sector	Cotton breeding program
Equipment	Laboratory or office		**Planification** - Put in place a method for improving the evaluation of the needs in seed and inputs	**Equipment** - Renovate the breeding lab facilities and equipment
	Field		**Planification** - Put in place a method for improving the evaluation of the needs in seed and inputs	
Running costs	Research		**Quality** - Map the aptitude of the different regions	**Focus** - Put in place specific breeding programs
	Extension / development	**FW** – Set up a decentralized monitoring system **FW** - Put in place mitigation measures in affected areas	**FW** - Put in place restrictive measures (no seed or soil entry) based on the monitoring results **Planification** - Put in place a method for improving the evaluation of the needs in seed and inputs	

Note: the priority actions have been selected as 4 at the cotton sector level, 6 at the seed sector level (all) and 5 at the breeding program level

Technical workshop 2

Venue

- Organization: **TARI (Tanzanian Agricultural Research Institute)**
- Date of the meeting: 7/**03**
- Place: **Mwanza Tanzanian Cotton Board**

This workshop was conducted at the Tanzanian Cotton Board (Pamba House) on Thursday 7, from 8.30 to 14.30.

Programme

It comprised 5 sessions (Registration, Introduction, Presentation of the proposed actions and the ones prioritized by the Board, Group works towards and action plan and Wrap-Up) and ended with a lunch shared with the participants.

→ Detailed program of WS2 at Annex 4 and Presentation at Annex 8.

Participants

The invited participants for this session were experts, some being selected among the people interviewed during Phase 1. The meeting could benefit of the presence of two representatives of TCB, as well as experts from TOSCI, BioSustain and OLAM (Ginning company), Quton (Seed company), Gatsby-Africa (NGO), and extension. Several TARI scientists could also contribute with their expertise in Agronomy, Breeding,

Phytopathology, Plant protection or Sociology. We had also the pleasure to welcome the regional representative of CHA, Dr. Tom Apina, based in Nairobi.

→ ***List of participants at Annex 5.***

Group works on selected actions

Actions proposed

From the priority list of actions established during the strategic WS1, we proposed to concentrate on the first 4 actions at the Cotton sector level, all 6 actions at the Cottonseed sector level and 5 at the Breeding programme level. These 15 priority actions were then regrouped and reorganized in 6 main topics which were submitted to the WS2 participants:

- Fusarium Wilt mitigation
- Fusarium Wilt control
- Quality (of seed and fiber)
- Focus
- Planning
- Mutualization

Four groups were formed to brain-storm on the 4 first issues, and share results in the plenary session. They were given the following instructions:

- To have detailed activities to be implemented (action plan)
- To think of the human resources needed (as coordinator, as contributor, specific skills and their availability at local, regional or international levels …)
- To evaluate the financial needs and their source (specific actor, sector, govt, donor)

The two remaining actions, Planning and mutualization, were only touched in plenary after the groups had reported their work.

Group 1 – Fusarium Wilt mitigation

Activities proposed by this group under **'Design an interdisciplinary program of mitigation'**: identifying the areas infested by FW and the FW free zones; testing the most tolerant varieties against FW; developing and adopting improved Fusarium wilt management procedures; breeding for FW resistance or tolerance; continuing research on mitigation measures (use of lime ..)

Activities proposed under **'Put in place mitigation measures in the FW affected areas'**: uprooting, crop rotation, restricting the movements of farm implements, creating programme of awareness creation and measurements on FW; growing improved seeds; frequent surveying for early detection; using chemicals to prevent and control

Activities proposed under **'Design a program to ensure that the 'free FW' zones remain unaffected'**: sourcing seed from non FW infected sources; need for lab tested, have specific ginneries for seed source

Activities proposed under **'Put in place restrictive measures (no seed or soil entry) based on the monitoring results'**: restricting movements of soil or plant material; introduce restriction measures by law or local laws

Human resources, requirement (skills): extensionist, researcher, soil lab technologist, international specialist.

Financial resources requirement (source): mainly from Tanzanian government, International organizations, CSDP - Gatsby ?

Group 2 – Fusarium Wilt control

The four actions proposed to this group were **'Design a decentralized monitoring of the infestation'**, **'Set up a decentralized monitoring system'** and as for the previous group **'Design a program to ensure that the 'free FW' zones remain unaffected'** and **'Put in place restrictive measures (no seed or soil entry) based on the monitoring results'**.

With the same objective in mind, this group used different formulations and summarized their work in table 7.

Table 7. Results of the work done by Group 2 on the control of FW

Elements of control	Responsible actors / institutions	Funding mechanisms
Initial seed multiplication (selection of disease free area, breeder seed)	TARI – TCB	Own resources TARI – TCB (levy) – royalties – projects (CHA or Gatsby) ?
Seed multiplication (from basic to certified II) in disease free areas	Farmers – Ginners – Local gvts – TCB	Ginners involved in Seed Multiplication (SM), or any professional seed company
Strengthening seed certification system	TOSCI – TCB	Fees (from inspection) or levy
Training aspects	Farmers - Extension – Ginners Farmers – Ginners – Local gvts – TCB	Levy (TCB) or Ginners or dev partners or local gvts or chemical companies
Monitoring and reporting system (training for reporting)	Farmers – Extension staff – Local gvts – Ginners – TCB – TARI and TOSCI	Levy, dev partners or local gvts
Breeding for resistant/tolerant varieties or use of different measures to control FW including chemicals	TARI and TCB	TARI, levy, dev partners

Group 3 – Quality

Activities proposed by this group under **'Map the aptitude of the different regions'**: Region / District: Tabora / Igunga, Simiyu / Meatu, Singida (from Quton experience)

Activities proposed under **'Organize the seed multiplication according to the seed quality zoning'**: complying with seed act and regulations by the companies and seed growers; training of seed growers and ginners (TOSCI financed by Ginners); using scratching labels to guarantee the origin of the seed; supplying seed growing areas with irrigation in case of drought occurrence (Government); securing the mode of financing of the seed quality control chain from the regulatory sector (TOSCI – TCB – TARI Breeder); training of extension staff and farmers on the relationship between quality (of seed or fibre) and harvest conditions, in particular the number of pickings; awareness of ginners (fibre remains with seeds) and training on the setting of machines during seedcotton ginning.

Group 4 – Focus

With the global objective of better framing the Cotton Breeding programme, Group 3 summarized their work as follows (Table 8).

Table 8. Priority targets listed by Group 4 for the action 'Elaborate ToRs for more specific and diversified breeding programs in coordination with the CC actors (different zones, markets, cropping systems such as organic…)'

	Breeding Priorities	Specifics
1	Breeding for specific agro-ecologies (to be identified)	Early and late maturing varieties Low use of inputs (Fertilizer, pesticides)
2	Cropping systems (organic farming)	Use of IPM technologies -that use organic materials to control insect pests
3	Targeting specific markets	Varieties with oil content and other products. Fibre quality
4	Diseases	Fusarium wilt Alternaria disease
5	Insect pest	Jassids

Activities proposed under **'Put in place specific breeding programs'**: (i) identifying potential stakeholders to discuss and prioritize areas for research as listed above and modality of funding, then set the Terms of References (ToRs), (ii) sourcing material to start the program / CIRAD to facilitate materials to widen our genetic base, (iii) starting crossing program with two seasons per year and use of modern technologies to shorten breeding process.

Human resources requirement (skills): international specialist in biotechnology to back-up.

Equipment needed: (i) irrigation to be established on a small plot), (ii) need equipment / material (ginning and laboratory)

Financial resources requirement (source): TCB/Gatsy/Other developing partners – CHA etc

Discussion Planning and Mutualization

Under **'Design and put in place a method to improve the estimates of the needs of seed and inputs'**, the participants thought it could be possible to use digital mechanisms (phones, drones) to collect data, such as cotton acreage, cotton growers with the assistance, for instance, of the TCB inspectors or village officials, or agricultural extension officers in each district as they already hold such registers. This would need IT experts (*e.g.* from DSM University) assisted with expertise of end-users (TCB-TARI, Extension, local gvts, Ginners).

Under **'Launch a dialog with other breeding programs at eco-regional African level to build a regional breeding and research program on cotton for increased global efficiency'**, the participants said that discussion had already started with Mali, Burundi and Kenya (under ABC but at a slower pace).

Proposed action plan after WS2

Process. Considering the information collected during the first and the second phase of the programme, we have designed an action plan which could integrate several actions, ranked 1 to 4, by order of priority. This does not mean that all should be supported by a single donor, as most can benefit to the whole cotton sector, specific subsectors such as organic, the government or other funding organizations. Some could even be conducted at no or limited cost (see also table 3, 4 and 5).

General vision. Our general feeling is that the Tanzanian cotton sector could be in a better shape if it could develop mechanisms, complementary to those already in place, to promote **cooperation** among the actors (towards more efficient practices) as well as **competition** (to reward the good players and discard the bad ones). It is important to play equally on both aspects, however, in this report, one will mainly find aspects based on cooperation among the actors of the cotton sector, as the rules that could drive competition are not very specific to this sector and related to more global national policies. Cooperation is favored among actors which have a common interest to share information, practices, experience *etc*., then contributing to the improvement of the cotton sector while getting also a personal benefit for themselves.

Presentation. In the following pages, each of the four components of the action plan is briefly described and some cost elements are indicated. The costs will have to be detailed and estimated more accurately if the component is to be funded.

Action plan. Table 9 provides a global summary of the action plan's components. It recalls the main proposed activities, the total duration of the component, and the estimated cost.

Table 9. Summary presentation of the action plan (4 components).

Component	**1**	**2**	**3**	**4**
Title	EGS Multiplication of UKM08, UK171 and UK173	LGS multiplication of UKM08	Fusarium wilt control and mitigation	Low input / organic cropping system
Main activities	• Nucleus seed • Breeder's seed • Pre-Basic seed • Training of trainers	• Training of extension staff • Training of progressive farmers	• Monitoring the FW infestation • Training • Equipment • Control • Agronomic mitigation • Breeding	• Breeding • Equipment • Plant protection • Agronomy
Expected total duration	Permanent	Occasional	5 years	8 years
Estimated budget for 2019-20 (€)	133,780	-	45,500	27,000
Estimated budget for 2020-21 (€)	138,520	59,000	71,000	9,000
TOTAL 2 years	**272,300**	**59,000**	**116,500**	**36,000**

Component 1: EGS Multiplication of UKM08, UK171 and UK173

The first proposed action to prioritize is to secure the multiplication of the early generation seeds (EGS) in order to finalize the elimination of UK 91 seed and speed up the dissemination of the two varieties which should replace soon UKM 08. The different stages of EGS are Nucleus, Breeder's and Pre-Basic. At present, they are all produced by TARI – Ukiriguru from seeds obtained in the research plots (table 10).

Table 10. EGS multiplication at TARI for the present and next seasons.

Stage	PYT	NPT	AFT	Nucleus	Breeder's	Pre-Basic
Area	18 m²	36 m²	100 m²	1-2 ac	15-16 ac	75-80 ac
Multiplication rate	-	-	-	> ~~1~~20~~?~~	15	5
Purity maintenance	Selfing	Selfing	Selfing	Selfing	Isolation	Isolation
Selection	Phenotypic	Phenotypic	Phenotypic	Roguing	Roguing	Roguing
Duration	1	2	3	Every 3 years	Each year	Each year
2018-19		UKM 08 UK 171 UK 173	UKM 08 UK 171 UK 173	UKM 08	UKM 08	UKM 08
2019-20		UKM 08 UK 171 UK 173	UKM 08 UK 171 UK 173	UK 171	UKM 08	UKM 08
2020-21		UKM 08 UK 171 UK 173	UKM 08 UK 171 UK 173	UK 173	UKM 08 UK 171	UKM 08
2021-22		UKM 08 UK 171 UK 173	UKM 08 UK 171 UK 173	To be confirmed	UK 171 UK 173	UK 171

PYT stand for Preliminary yield trials; NPT for National productivity trials, AFT for Advanced on farm trials

Comment. Note that the variety UKM 08 has been selected from the line Nta-93-21 (IER, Mali). Although it was only reselected under selfing for 3 years, it should not express a high level of heterozygosity, and thus not be subject to significant drift once released and multiplied.

→ ***Official description of the released varieties at Annex 6.***

Comment. Details of component 1 of the action plan are provided at table 11. Note that the activity of seed multiplication will generate some funds through the sale of seed and fiber. These have to be estimated and used either to fund the EGS multiplication in the following year, or contribute to the maintenance of the research station.

Table 11. EGS multiplication at TARI for the present and next seasons.

Activity	Description	Responsible / beneficiary	Estimated cost (€)	
			2019-20	2020-21
Nucleus seed	1. Installing an irrigation facility 2. Seed production	TARI/TARI TARI/TARI	2,000 320	- 320
Breeder's seed	1. Terracing to prevent soil erosion 2. Seed production	TARI/TARI TARI/TARI	12,000 4,800	12,000 9,600
Pre-Basic seed	1. Terracing to prevent soil erosion 2. Seed production	TARI/TARI TARI/TARI	64,000 25,600	64,000 25,600
Training of trainers	Seed quality formation and management (including the production of a training support)	Cirad/TOSCI-TARI	25,000	25,000
TOTAL			133,720	138,520

Component 2: LGS multiplication of UKM08

The following multiplication stages, *ie* Basic and Certified I and II are done on farm and supervised by the Ginning companies. With the EGS, they complete the seed multiplication plan (Table 12).

Table 12. Complete seed multiplication plan for 2017 (theoritical).

Year	1	2	3	4	5
Stage	Breeder's	Pre-Basic	Basic	Certified	Commercial
Area (ac)	2	75	2,000	55,000	2,000,000
Del seed needs (kg)	8	300	12,000	220,000	8,000,000
Exp yield (kg/ac)	550	379	397	303	
Exp SC (t)	1.1	28.4	794	16,670	
Exp Fuz S (t)	0.56	17.0	450	10,000	
Exp Del S (t)	0.42	12.0	338	8,000	
Exp Mutipli. Rate	52	40	28	36	

The extension staff in charge of supervising the production of cotton in the districts that are devoted to seed multiplication would benefit of being trained on issues related to seed production (quality, rules, production…). This action could be organized by the persons trained in component 1 with a light support by Cirad at distance as well as TOSCI and TARI, for helping to design the content and the support. The estimated costs (Table 13) could be shared with the companies that operate in the seed production area.

Table 13. Late stage multiplication for the present and next seasons.

Activity	Description	Responsible / beneficiary	Estimated cost (€)	
			2019-20	2020-21
Training of extension staff	1. Seed quality, seed multiplication, cotton production (6 sessions)	TARI-TOSCI / Ginners	5,000	15,000
	2. Production of a support for the trainees	Cirad-TARI / TARI-TOSCI	5,000	8,000 - 6,000
Training of progressive farmers	1. Seed quality, seed multiplication, cotton production (15 sessions)	TARI-TOSCI-Gin Comp / Farmers	-	25,000
	2. Production of a support for the trainees	TARI-TOSCI / Farmers	-	5,000
TOTAL			-	59,000

Component 3: Fusarium wilt control and mitigation

Component 3 is targeting the control of Fusarium wilt, which was identified as a major threat for the whole cotton sector. It aims at monitoring the epidemic, ensuring that the free zone remains free of FW, and mitigating the damages when FW has already settled.

In order to design and develop a method to collect and process the information from the fields, there will be need to answer questions such as what kind of information to collect (picture, plant number, localization?), who collects the information, how to prepare a database, how to draw the FW infestation map, what is the use of the information). As it should take at least two years to get a comprehensive picture of the whole WCGA, appropriate measures can only be foreseen after 2021.

This component is also targeting at the mitigation of Fusarium in the already infested zones of the Western Cotton Growing Areas (WCGA). It is necessary to design one or several agronomic interventions including integrated crop management system (ICMS), that could be promoted in the FW infested areas. It has to be noted that the inoculum of the disease builds up in the soil when a susceptible variety is grown and once the inoculum is built, only fully resistant crops may be grown in this field. In order to avoid growing susceptible varieties in the FW infested areas, it is necessary to make available resistant or highly tolerant genetic material. The inception of a FW breeding programme could involve a mission of qualified breeder and biotechnologist to Cirad in Montpellier, in order to (i) screen the gene bank or look for other sources of resistant material, and (ii) design a breeding programme with the support of Cirad breeders and other scientists.

Table 14. Designing OCMS activities and costs for the present and next seasons.

Activity	Description	Responsible / beneficiary	Estimated cost (€)	
			2019-20	2020-21
Monitoring the FW infestation	1. Design a method to get and process the information collected from the fields	TARI- and Cirad like org	25000	
	2. Develop the method	TARI -Kenya?	-	50,000
Training	Field training the relay persons in the field on FW identification	TARI / extension staff	-	15,000
Equipment	Specific phone requirement might be needed (after 2021)	Gin companies / extension staff	-	-
Control	1. Based on the FW map, design the measures to secure the free area	TARI, TCB	-	-
	2. Implement the new measures			
Agronomic mitigation	1. Design an integrated ICMS to limit the impact of FW	TARI-Cirad / TARI	5000	-
	2. Prototype the IMCS-FW (on station or on farm)	TARI / TCB	5000	5000
	3. Disseminate in a pilot area	TCB / Farmers	-	-
	4. Change scale	TCB / Farmers	-	-
Breeding	1. Acquire FW resistant material	Cirad-TARI / TARI	-	-
	2. Design a programme (Montpellier)	Cirad-TARI / TARI	8,000	-
	3. Install a greenhouse	? / TARI	2,500	-
	4. Implement the programme (crosses, selection)	TARI / TCB	-	1,000
	5. On station tests of lines (greenhouse)	TARI / TCB	-	-
TOTAL			45,500	71,000

Component 4: Low input / organic cropping system

Component 4 aims at launching an interdisciplinary programme with specific dedication to organic or low input cotton growing. It describes the first activities to develop in relation with plant breeding, plant protection and agronomy. Their implementation will require a good cooperation between TARI scientists themselves, and with the actors of the organic subsector. If this programme is launched, the cost could be shared with the companies that operate in the subsector of organic cotton, and even the whole sector as the research done could benefit to most of the producers who are under low-input cropping system.

Table 15. Organic Cotton: designing a crop management system (OCMS), activities and costs for the present and next seasons.

Activity	Description	Responsible / beneficiary	Estimated cost (€)	
			2019-20	2020-21
Agronomy	1. Design an integrated OCMS	TARI-Cirad / TARI	8000	-
	2. Prototype the OCMS on station	TARI / Org sector	5000	5000
	3. Prototype the OCMS on farm	TARI / Org sector	-	-
	4. Disseminate in a pilot area	Organic sector	-	-
	5. Change scale	Organic sector	-	-
Plant protection	1. Test of biological insecticides	TARI / Org sector	3,000	3,000
	2. Design an IPM programme	TARI / Org sector	-	-
Breeding	1. Design an 'ideotype'	Cirad-TARI / TARI	1,000	-
	2. Acquire adapted genetic material	Cirad-TARI / TARI	-	-
	3. Design a breeding programme (Montpellier)	Cirad-TARI / Org sector	8,000	-
	4. Implement the breeding pgm (crosses and selection)	TARI / Org sector	-	1,000
Equipment	Irrigation facility and greenhouse for inter-season	Gin companies / extension staff	5000	-
TOTAL			27,000	9,000

The breeding activity could start with designing a target 'ideotype' *ie* the ideal plant (or genetic structure) suited for organic cotton growing, taking into consideration the specific sets of constraints and criteria for low input or organic cropping systems (LICMS). It would then be necessary to design a full breeding programme, find the genetic source, cross and finally develop varieties through selection[3]. The whole process could take about 10 years, but a greenhouse equipped with irrigation facilities could speed up the process by 1-2 years.

Box 1. What about insect control without synthetic insecticides or GMOs (after P. Silvie, Cirad)?

Worldwide, about one quarter of the pesticides are used on cotton, whereas the crop is only representing 2-3% of the total agricultural area. Pesticides are an important component of the production costs for small scale farmers. Potential alternatives include:
(i) bio-pesticides (Neem, Carapa procera, *etc.*): slow-acting (ingestion, but also contact or repellent), not selective, and their efficiency has not systematically been tested, in particular for their unintentional effects (including toxicity)
(ii) cropping system management (rotation, residues, density, fertilization, field margins),
(iii) trap (*eg* Hibiscus) or push plants (*eg* Desmodium): difficult to put in practice,
(iv) use of beneficial organisms (*eg* Trichogramma), natural enemies, entomopathogens, parasitoids, predators
(v) pheromons: needs rather big plots and used mainly in monitoring
(vi) resistant varieties. *after P. Silvie (Cirad)*

[3] Breeding new cotton varieties to fit the diversity of cropping conditions in Africa. Sêkloka E. and *al.*, 2008. Experimental Agriculture, 44, 2, 197-207

ANNEX 1. Acronyms

AMCOS	Agricultural Marketing Cooperative Societies
BMZ	The Federal Ministry for Economic Cooperation and Development (Germany)
CHA	Cotton expert House for Africa
Cirad	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
EGS	Early Generation Seed
FW	Fusarium Wilt due to *Fov* (*Fusarium oxysporum vasinfectum*)
GOT	Ginning – Out – Turn
ICAC	International Cotton Advisoryb Committee
ICMS	Integrated Crop Management System
IER	Institut d'Economie Rurale (Mali)
LGS	Early Generation Seed
LICMS	Low Input Crop Management System
OCMS	Organic Crop Management System
R&D	Research and Development
SWOT	Strengths, Weaknesses, Opportunities and Threats
TARI	Tanzania Agricultural Research Institute
TCB	Tanzania Cotton Board
TOSCI	Tanzania Official Seed Certification Institute
WCGA	Western Cotton Growing Area
WS	Workshop

ANNEX 2. Workshop 1: programme

Venue: Tanzania Cotton Board (Pemba House), Mwanza, March 4, 2019

Monday March 4th – Workshop with TCB

8h00 – 9h20	**REGISTRATION** - Participants welcome
9h20 – 9h50	**INTRODUCTION** - Introduction (round table) - Welcome (by TCB DG) - Presentation of the CHA programme (by JL) - Agenda of the day, objectives, expected results (by EL)
9h50 – 10h30	**RESULTS of Phase 1** - Cotton in Africa (by JL) - Diagnosis for Tanzania (by EL) - SWOTs (by EL)
10h30 – 11h15	**DIAGNOSIS** - Discussion with the group to improve and validate the diagnosis and the SWOT
11h15 - 11h35	**Tea break**
11h35 – 13h00	**ACTION PLAN** - Actions proposed (by JL) - Discussion with the group to complete the action plan proposed by the experts - Prioritization of the actions
13h00 – 13h15	**ACTORS** - Identification of the main beneficiaries of the actions - Identification of the main implementers of the actions
13h15 – 13h30	**WRAP-UP** - Summary of the main results - Closure
13h30 – 14h30	**Lunch Buffet**

ANNEX 3. Workshop 1: list of participants

Participants 7

CHA Cotton Seed Improvement Programme

Ws1 – TCB 04/03/2019

S/N	NAME	ORGANIZATION	COMING FROM	CONTACT	SIGNATURE
1.	FURAHA P. MROSSO	TARI UKIRIGURU	UKIRIGURU	0754 365725	
2.	GEORGE MPANDUJI	TCB-BOARD	CHA-TO	0767039082	
3.	BOAZ OGOLA	ALLIANCE GINNERIES	TCA REP	0767461986	
4.	Gabriel Mwalo	TCB	MZA TCB	0784850296	
5.	Jacques LANÇON	CIRAD	Montpellier (France)	+33689477516	
6.	Joseph Mihangwa – TCB Board		Shinyanga	0713526972	
7.	Goronya Ally	TCB Board	Bariadi	0754078805	
8.	PATIENS LOTIKARA	QUTON	MZA	0765970906	
9.	VICTORIEUS MSUMANGE	QUTON	MZA	0766085737	
10.	EVELINE LUKONGE	TARI HQ	DODOMA	0754430675	
11.	JOHN BUHONDO	TARI	UKIRIGURU	0754024924	
12.	JOSEPH MANGE	TARI	"	0757484206	
13.					
14.					
15.					

ANNEX 4. Workshop 2: programme

Venue: Tanzania Cotton Board (Pamba House), Mwanza, March 4, 2019

Monday March 4th – Workshop with TCB

8h00 – 9h20	**REGISTRATION** - Participants welcome
9h20 – 9h50	**INTRODUCTION** - Introduction (round table) - Welcome (by TCB DG) - Presentation of the CHA programme (by JL) - Agenda of the day, objectives, expected results (by EL)
9h50 – 10h30	**RESULTS of Phase 1** - Cotton in Africa (by JL) - Diagnosis for Tanzania (by EL) - SWOTs (by EL)
10h30 – 11h15	**DIAGNOSIS** - Discussion with the group to improve and validate the diagnosis and the SWOT
11h15 - 11h35	**Tea break**
11h35 – 13h00	**ACTION PLAN** - Actions proposed (by JL) - Discussion with the group to complete the action plan proposed by the experts - Prioritization of the actions
13h00 – 13h15	**ACTORS** - Identification of the main beneficiaries of the actions - Identification of the main implementers of the actions
13h15 – 13h30	**WRAP-UP** - Summary of the main results - Closure
13h30 – 14h30	**Lunch Buffet**

ANNEX 5. Workshop 2: list of participants

CHA Cotton Seed Improvement Programme

Ws2 – TCB, PHASE III

S/N	NAME	ORGANIZATION	COMING FROM	CONTACT	SIGNATURE
1.	Dr Riyaz Haider	Biosustain (T) LTD	Singida	0715883786 haider@biosustain.de	[signature]
2.	Dr. Furaha Mrosso	TARI Ukiriguru	Ukiriguru	0754365725	[signature]
3.	Donald Sayi	Gatsby Africa CSDP	DAR	0754750541	[signature]
4.	Georgia Buchukundi	TARI Ukiriguru	Ukiriguru	0754892103	[signature]
5.	Seperatus Kamuntu	TARI-Ukiriguru	Ukiriguru	0759437241	[signature]
6.	Erasto Konga	Igunga DC	Igunga	0784784439	[signature]
7.	Renatus Luneja	TCB -	Mwanza	0755860725	[signature]
8.	Mariam A. Mwinyi	OLAM	Bunda	078226925 4	[signature]
9.	Joyce Ruzzu	TARI Ukiriguru	Ukiriguru	0754015531	[signature]
10.	Albert Mangwata	TOSCI-MZA	Ukiriguru	0713-726644 albertvm27@gmail	[signature]
11.	Eveline Lukonge	TARI HQ	Dodoma		
12.	Jacques Lançon	CIRAD	Montpellier FRANCE	+33689477516 +33467614418	[signature]
13.	George Sonda	TARI-Ukiriguru	Ukiriguru	0757394356	[signature]
14.	Robert Kileo	TARI-Ukiriguru	Ukiriguru	0754382403	[signature]
15.	Tom Apina	CHA	NRB	0722940789	[signature]
16.	~~Mashaka~~ K.				
17.	Phineas Chikaka	Quton	MZA	0765970906	[signature]
18.					
19.					
20.					
21.					
22.					

ANNEX 6. Official description of the varieties released by Ukiriguru

COTTON NTA 93-21 (UKM 08)

Year of release	**2008**
Origin	Mali materials (progenies evaluated at Ukiriguru)
Cultivar Pedigree	[(Allen x Half and Half x DPMA) x ISA 205]
Number under which tested	NTA 93-21
Agency responsible for testing	TOSCI
Agency responsible of maintenance	ARI Ukiriguru
Agency to which seed is handed	TOSCI
Proposed elevation	900 – 1372masl
A. SEEDLING	
1. Anthocynin coloration	Green
2. Leaf colour	Dark green
3. Leaf texture	Not smooth (pubescence – strong)
4. Number of main branches	18-22
5. Number of nodes on main stem	16-18
MATURE PLANTS	
1. Plant hairiness	Strong
2. Plant vigour	Vigorous
3. Plant height	135 cm
C. INFLORENCE	
1. Days to flowering	56 - 63 days
2. Petal colour	Cream
3. Pollen colour	Cream
Year of release	**2008**
1. Days to 1st mature boll	112 days
2. Number of bolls per plant	31
3. Boll colour at maturity	Green
4. Shape of boll	Ovate
5. Number of locuses per boll	4
6. Number of seeds per boll	37
D.SEED	
1. Seed fuzz	Medium fuzz
2. Seed colour	Black
3. 100 seed weighty	10.4
4. Seed size	Medium
5. Seed dormancy	NONE
6. % Seed oil content	19.19%
7. Yield (potential)	2500 Kg/ha
E. OTHER CHARACTES	
1. Low temperature	Not tested
2. High temperature	Not tested
3. Drought	Not tested
4. Acid soils	Not tested
5. Insect Pests	
(a) Jassids	Resistance
(b) American bollworm	Susceptible
(c) Lygus	Susceptible
(d) Aphids	Susceptible recovers quickly when conditions improve
6. Diseases	
(a) Fusarium wilt	Medium tolerant
(b) Bacterial blight	Medium tolerant
(c) Alterinaria	Medium tolerant
7. Other remarks Low N.P.	Susceptible

PROPOSAL FOR RELEASE OF NEW COTTON VARIETIES

1. A) Name of the crop — Cotton
   B) Botanical name — *Gossypiumhirsutum*L.
   C) Genus name — *Gossypium* L.
   D) Family name — Malvaceae
   E) Chromosome number — (2n=4x=52
   F) Mode of application — 97% self pollinated
   G) Other basic information — None

2. A) Proposed name: — UKM 08
   B) Name under which tested: — NTA 93-21
   C) Agency responsible for development: — Mali/ Ukiriguru
   D) Initial crosses including advanced Field Selection were made at Mali Research Institute of Rural Economics by Dr. AmadouYattara. The material was brought in Tanzania (Lake Zone) under Farming System Research Project and evaluated in the Lake Zone by Ukiriguru Research Institute.

Research Team: As in Project Proposal: Mali research and ARI Ukiriguru
Technicians: Mali research and ARI Ukiriguru
Cultivar pedigree: [(Allen x Half and Half x DPMA) x ISA 205]

3. A) proposed area for release: Lake Zone
   B) Proposed elevation: 900 – 1372 masl
   C) Agency responsible for supply of breeder's seed: ARI Ukiriguru
   D) Agency responsible for maintenance of seed: ARI Ukiriguru

4. Distinguished characteristics
a) Leaf, stem, inflorescence, flower, seedlings, others.
Leaf: Dark green
Stem: Reddish
Flower (petal colour): Yellow
Pollen colour: cream
Stigma position: above
Bolls: Ovate
b) Major distinguished characters from other released varieties: High GOT, fibre length and fibre strength

c) Points of merits: Good yields acceptable

5. Economic and quality attributes: Good fibre quality

6. Agronomic characters

a) Sowing date: Mid November to end December
b) Seed rate: 25 kg/ha
c) Plant population: 55,000 – 58,000 plants/ha
d) Maturity: 146 - 148 days
e) Fertilizer: As recommended for cotton production in the Lake Zone
f) Crop height: 135 cm
g) Irrigation needs: Not evaluated
h) Consumer acceptability: Good
i) Others: None

7. Yield data/comparison trials (as given in tables)
a) Yield compared to check variety (on station)
b) Yields in farmers' fields compared to check variety

8. Any other information: None

Date: 3/10/2007
Institute: ARI Ukiriguru

COTTON L10(78)250 (UK O8)

Year of release	**2008**
Origin	Crosses of UK materials (progenies evaluated)
Cultivar Pedigree	Mwanza Local, Albar 5MB, Reba 296, Aubarn 56 (Okra + UK77)
Number under which tested	L10(78)250
Agency responsible for testing	TOSCI
Agency responsible of maintenance	ARI Ukiriguru
Agency to which seed is handed	TOSCI
Proposed elevation	900 – 1372masl
A. SEEDLING	
1. Leaf colour	Green
2. Leaf texture	Rough (hairy)
3. Number of main branches	23
4. Number of nodes on main stem	18-21
MATURE PLANTS	
1. Plant hairiness	Strong
2. Plant vigour	Vigorous
3. Plant height	140 cm
C. INFLORENCE	
1. Days to flowering	63 – 70 days
2. Petal colour	Cream
3. Pollen colour	Yellow
Year of release	**2008**
1. Days to 1st mature boll	116 days
2. Number of bolls per plant	37
3. Boll colour at maturity	Green
4. Number of locuses per boll	4-5
D.SEED	
1. Seed fuzz	Medium fuzz
2. Seed colour	Black
3. 100 seed weight	10.5g
4. Seed size	Medium
5. Seed dormancy	None
6. % Seed oil content	Not tested
7. Yield (potential)	2000 Kg/ha
E. OTHER CHARACTERS	
1. Low temperature	Not tested
2. High temperature	Not tested
3. Drought	Low Tolerant
4. Acid soils	Not tested
5. Insect Pests	
Jassids	Medium resistance
American bollworm	Susceptible
Lygus	Medium tolerant
Aphids	Susceptible recovers quickly when conditions improve
6. Diseases	
Fusarium wilt	Tolerant
Bacterial blight	Tolerant
Alternaria	Susceptible
7. Other remarks Low N.P.	Susceptible

PROPOSAL FOR RELEASE OF NEW COTTON VARIETIES

1. A) Name of the crop — Cotton
   B) Botanical name — *Gossypiumhirsutum*L.
   C) Genus name — *Gossypium* L.
   D) Family name — Malvaceae
   E) Chromosome number — 2n=4x=52
   F) Mode of application — 97% self pollinated
   G) Other basic information — None

2. A) Proposed name: UK 08
   B) Name under which tested: L10(78)250
   C) Agency responsible for development: Ukiriguru
   D) Initial crosses including advanced Field Selection were made at ARI Ukiriguru (Lake Zone)

Research Team: As in Project Proposal: ARI Ukiriguru
Technicians: ARI Ukiriguru
Cultivar pedigree: Mwanza Local, Albar 5MB, Reba 296, Aubarn 56 (Okra + UK77)

3. A) proposed area for release: Lake Zone
   B) Proposed elevation: 900 – 1372masl
   C) Agency responsible for supply of breeder's seed: ARI Ukiriguru
   D) Agency responsible for maintenance of seed: ARI Ukiriguru

4. Distinguished characteristics
a) Leaf, stem, inflorescence, flower, seedlings, others.
Leaf: Green
Stem: Reddish green
Flower (petal colour): Yellow
Pollen colour: Yellow
Stigma position: same
Bolls: Conical
b) Major distinguished characters from other released varieties: Many bolls, High GOT and fibre length

c) Points of merits: Good yields and good GOT

5. Economic and quality attributes: and Good fibre quality acceptable

6. Agronomic characters

j) Sowing date: Mid November to end December
k) Seed rate: 25 Kg/ha
l) Plant population: 55,000 – 58,000 plants
m) Maturity: 165 - 180 days
n) Fertilizer: As recommended for cotton production in the Lake Zone
o) Crop height: 140 cm
p) Irrigation needs: Not evaluated
q) Consumer acceptability: Good
r) Others: None

7. Yield data/comparison trials (as given in tables)
a) Yield compared to check variety (on station)
b) Yields in farmers' fields compared to check variety

8. Any other information: None

Date: 3/10/2007
Institute: ARI Ukiriguru

VARIETIES DESCRIPTION:

A. COTTON lineNTA93-4/82(01)3

1. **Name of the crop:**Cotton
2. **Botanical name**:Gossypium hirsutum
3. **Genus name:** Gossypium
4. **Family name**: Malvaceae
5. **Pedigree**: Bred clone parental genotypes Crosses of UK materials with NTA varieties.
6. **Proposed name**: UK 171
7. **Name under which it is tested**: **NTA93-4/82(01)3**
8. **Agency responsible for development**: LZARDI
9. **Proposed area for release:**Low, Medium to high altitude
10. **Proposed elevation**: 900 – 1372 masl
11. **Agency responsible for supply of breeder seed**: LZARDI
12. **Agency responsible for maintenance**: LZARDI
13. **Yield potential:**2800-3000kg/ha
14. **Maturity:** 160 days
15. **Proposed year of release:** 2017
16. **16. Chromosome number 2n=4x=52**
17. **17. Mode of application 97% self pollinated**

B. COTTONlineNTA 90-5/82(01)4

1. **Name of the crop:**Cotton
2. **Botanical name**:Gossypium hirsutum
3. **Genus name:** Gossypium
4. **Family name**: Malvaceae
5. **Pedigree**: Bred clone parental genotypes Crosses of UK materials with NTA varieties.
6. **Proposed name**: UK 172
7. **Name under which it is tested**: NTA 90-5 X UK 82
8. **Agency responsible for development**: LZARDI
9. **Proposed area for release:**Low, Medium to high altitude
10. **Proposed elevation**: 900 – 1372 masl
11. **Agency responsible for supply of breeder seed**: LZARDI
12. **Agency responsible for maintenance**: LZARDI
13. **Yield potential:**2300-2500kg/ha
14. **Maturity:** 160 days
15. **Proposed year of release:** 2017
16. **Chromosome number** 2n=4x=52
17. **Mode of application** 97% self pollinated

C. COTTON line F-135/91(01)4

1. **Name of the crop:** Cotton
2. **Botanical name**:Gossypium hirsutum
3. **Genus name:** Gossypium

4. **Family name**: Malvaceae
5. **Pedigree**: Bred parental genotypes Crosses of UK materials with F135 varieties (F-135 X UK 91).
6. **Proposed name**: UK 173
7. **Name under which it is tested**: F-135 X UK 91
8. **Agency responsible for development**: LZARDI
9. **Proposed area for release:**Low, Medium to high altitude
10. **Proposed elevation**: 900 – 1372 masl
11. **Agency responsible for supply of breeder seed**: LZARDI
12. **Agency responsible for maintenance**: LZARDI
13. **Yield potential:**2500-2800kg/ha
14. **Maturity:** 170 days
15. **Proposed year of release:** 2017
16. **Chromosome number** 2n=4x=52
17. **Mode of application :** 97% self pollinated

ANNEX 7. Workshop 1: ppt presentation

Cotton Seed Improvement Program

Tanzania:
Jacques LANÇON (Cirad),
Everina LUKONGE and Furaha Mrosso (TARI)

Second Phase: feeding the action plan

PLAN

The Cotton Seed Improvement Program

Phase 2 - Program

Cotton in Africa

Elements of diagnosis

Preliminary propositions

Description of the Program

General objective

- Assisting stakeholders *(Ministry of Agriculture, cotton sub-sector, certification body, cotton research, producers, extension services, cotton companies from the public and private sectors…)* to improve the national **cottonseed sectors**
  - In **four** African countries: Burkina Faso, Côte d'Ivoire, Tanzania, Zambia

Description of the Program

Specific objectives

- Evaluating and improving the **seed multiplication** schemes
- Up-grading the **breeding** program
- Recovering the **integrity/purity** of the commercial varieties

Description of the Program

Implementation

- Funded by **BMZ** *(Federal Ministry for Economic Cooperation and Development, Germany)* through GIZ *(Agency for International Cooperation, Germany)*
- Led by **CHA** *(Cotton expert House Africa, Germany)*
- Technical expertise by **CIRAD** *(Centre for International Cooperation in Agronomic Research for Development, France)* and, in Tanzania, by **TARI** *(Tanzanian Agricultural Research Institute)*

Description of the Programme

Implementation

- Phase **1** (Q4-2018): Implementing a **Cottonseed Sector Study** (CSS)
- Phase **2** (Q1-2019): Sharing results of the CSS with local actors and elaborating a **work plan** …
- … for a possible Phase **3** (2019-20?)

Description of the Programme

Expected results

- Questionnaire on the cottonseed sector
- SWOT analysis of the cottonseed sector
- A Cottonseed Multiplication Program with detailed **work plan** and training plan, description on the set-up and maintenance of cottonseed multiplication plots within the time frame until December 2020

PLAN

The Cotton Seed Improvement Program

Phase 2 - Program

Cotton in Africa

Elements of diagnosis

Preliminary propositions

Objectives of the second phase

First workshop (TCB) 4/03:

i. Sharing and consolidating the diagnosis formulated by the tandem experts,
ii. Sharing, completing and prioritizing the action plan proposed by the experts,
iii. Identifying the relevant actors of the program (as experts or beneficiaries),

Second workshop (Experts) 7/03:

iv. Elaborating on the priority actions to be proposed for a third Phase.

Program of the first WS

8h00 – 8h30	REGISTRATION - Participants welcome
8h30 – 9h15	INTRDUCTION - Introduction (round table) - Welcome by TCB DG - Presentation of the CHA programme - Agenda of the day, objectives, expected results
9h15 – 10h00	RESULTS of Phase 1 - Cotton in Africa (JL) - Diagnosis for Tanzania (EL) - SWOTs (EL)
10h00 – 10h30	DIAGNOSIS - Discussion with the group to improve and validate the diagnosis and the SWOT
10h30 - 10h45	Tea break
10h45 – 11h45	ACTION PLAN - Actions proposed - Discussion with the group to complete the action plan proposed by the experts - Prioritization of the actions
11h45 – 12h15	ACTORS - Identification of the main beneficiaries of the actions - Identification of the main implementers of the actions
12h15 – 12h30	WRAP-UP - Summary of the main results
12h30 – 13h30	Lunch Buffet

Program of the second WS

8h00 – 8h45	ACTION PLAN (plenary) - Agenda of the day, expected results - Short presentation of the diagnosis (Phase 1) - Presentation of the action plan (Workshop 1)
8h45 – 10h15	DISCUSSION (plenary) - Discussion with the Participants to improve and validate the action plan
10h15 - 10h30	Tea break
10h30 – 11h30	ACTIONS (in groups) - Description of the actions to be put in place - Identification of resources, including human, to be mobilized at local, regional or international levels
11h30 – 12h15	SHARING (plenary) - Presentations from the groups and discussion
12h15 – 12h30	WRAP-UP (plenary) - Summary of the main results
12h30 – 13h30	Lunch Buffet

PLAN

- The Cotton Seed Improvement Program
- Phase 2 - Program
- **Cotton in Africa**
- Elements of diagnosis
- Preliminary propositions

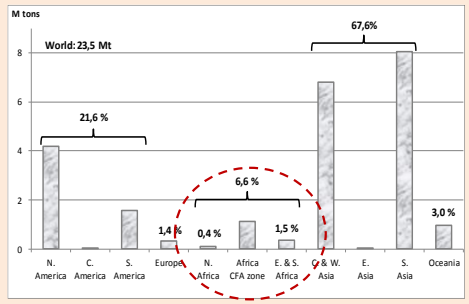
Cotton production in Africa (source ICAC)

- ~ **28** producing countries
- ~ **4.5** M ha
- > **1.5** M tons of fibre
- > **3** M small-holder cotton farms…
- … that support **20+** M people

Cotton production in Africa (source ICAC)

- Low on a worldwide scale (**< 7%**) but economically and socially important for the countries in areas where there are not many alternatives to reach the market

World production of cotton fiber (source ICAC)



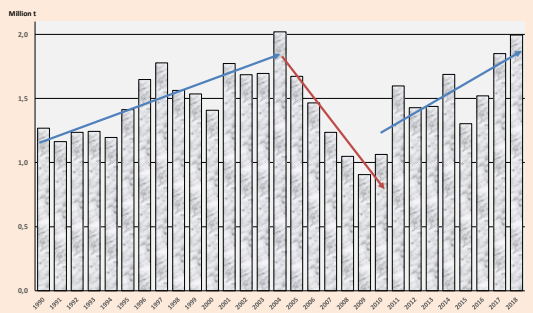
Cotton production in Africa (source ICAC)

- Low worldwide (**< 7%**) but economically important
- Largely **exported** as unprocessed raw fibre (> 87%)

Cotton production in Africa (source ICAC)

- Low on a worldwide scale (**< 7%**) but economically important on an African scale
- Largely **exported** as unprocessed raw fibre (> 87%)
- Quickly **increasing** after a sharp **drop**

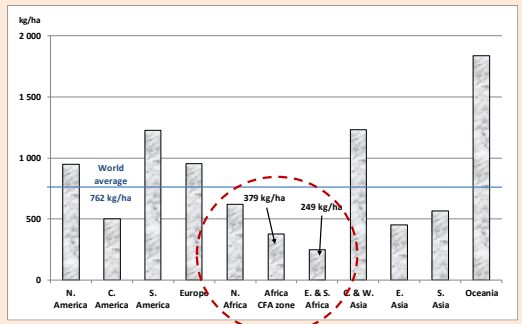
Cotton fibre production in Africa (source ICAC)



Cotton production in Africa (source ICAC)

- Low on a worldwide scale (**< 7%**) but economically important on an African scale
- Largely **exported** as unprocessed raw fibre (> 87%)
- Is quickly **increasing** after a sharp **drop**
- A huge potential but the **lowest** yields in the world

World yields of cotton fiber (source ICAC)



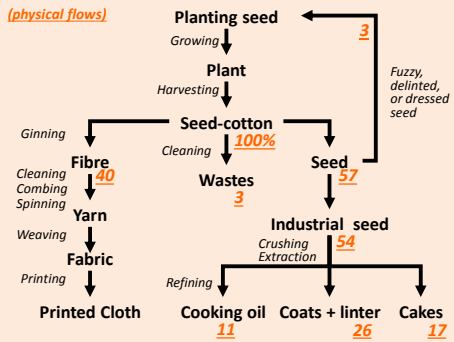
Constraints faced by the African cotton sector

- Lack of input **financing** for small-holder farmers
- Low seed-cotton **productivity** (income per ha)
- Low seed **quality** (purity, germination…)
- Limited **research** and **technology** development
- Limited extension and dissemination services
- Lint contamination
- …

PLAN

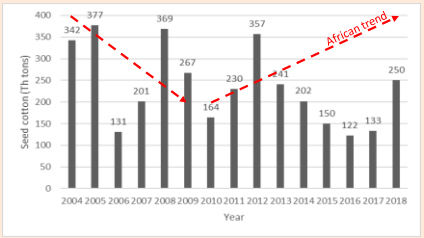
Tanzania: the main cotton growing areas

The commodity chain



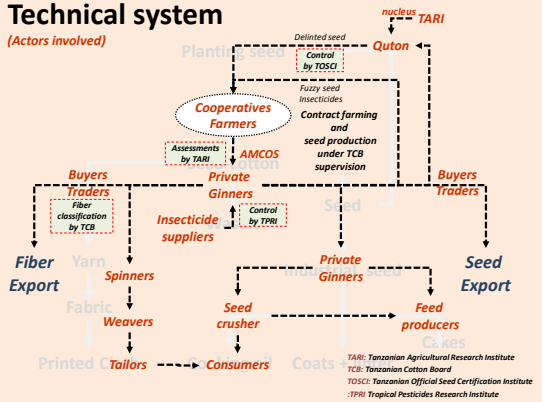
Production trend

- 250,000 tons in 2018 by 350,000 farmers
- Very **low** yields

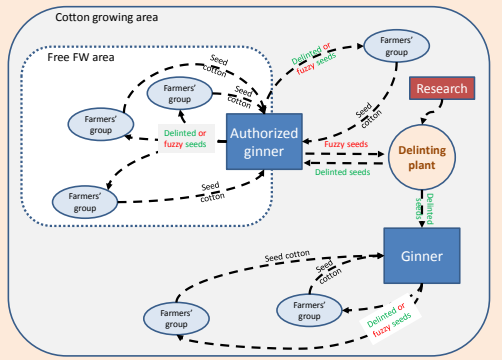


Technical system

(Actors involved)



Seed circulation



Major actors

- **Regulation (P-P)**
  - Tanz. Cotton Board (TCB)
- **Public players**
  - Ministry of Agriculture (MoA)
  - Tanz. Agricultural Research Institute (TARI)
  - Tanz. Official Seed Control Institute (TOSCI)
  - Tropical Pesticide Research Institute (TPRI)
  - Local governments
- **Private sector**
  - Farmers' associations
  - Quton (seed delinting)
  - Ginners (25-45 depending on year) represented in the Tanz. Cotton Ginners Association (TCGA)
  - 23 textile companies (spinning, dying, weaving, knitting…)
  - NGOs (*e.g.* Gatsby)

Varieties

- 1 Tanz. variety (**UKM08** with NTA genes, released in 2008), still coexisting with the former UK91
- Indian **hybrid** varieties being tested
- Cotton seed multiplication under the control by TOSCI and done by:
  - Public research (**TARI**) for Breeders and Pre-basic
  - Seed producers under contract with ginners through Cooperatives (**AMCOS**), coordinated by **TCB** for Basic and Certified
  - Varieties registered by a **National Committee**, and released under the control of the MoA

SWOT of the cotton Sector

- **Organization** / legislation / research in place including for quality control (seed and fiber)
- **Coordination** body in place (TCB) where the main actors are represented
- **Political support** for cotton production
- **PPA** including some ginning companies deploying development programmes
- **Experience** with seed delinting
- Large use of **ox draught**
- **HVI** equipment managed by TCB
- **Enough land** for seed multiplication

- Low yields and **low productivity** at the field (rainfed) or plant level (GOT)
- **Scattered** cotton growing area with regards to the production
- High **number** of small ginners
- Ginning capacity **under-utilized**
- Under representation of **farmers** in the Coordination body
- Risk of **confusion** between private and public stakes
- Impartial **assessment** of seed delinting not yet done
- Low **dissemination speed** of released varieties
- Good **agricultural practices** limited
- Limited **funding** of public service providers including research and extension
- Little **regional** coordination in research

- Popular crop with **experienced** farmers
- Commodity identified as a **priority** in the ASDP
- Main African exporter of **organic** cotton
- Significative **local consumption** by the national textile industry
- **Ginning** equipment ready to absorb a much bigger production
- Cotton as a draught tolerant crop **suitable for WCGAs**

- Low **genetic exchange** to increase diversity
- **Fusarium** wilt
- **Pest control**: efficiency seems to have been declining over the past seasons
- **Soil fertility**: its decline is especially noted in the older part of the CGA, the Lake zone
- Climate **change** effect

SWOT of the Seedcotton multiplication system

S
- **Organization** / legislation / research in place including cottonseed registration and quality control
- **Coordination** body in place (TCB) where the main SH are represented
- **Nucleus** seed maintenance by TARI
- **PPA** including some ginning companies providing support to the seed producers
- Experience with **seed delinting**

W
- Low **dissemination speed** of released varieties
- **Delinting** plant not located in the FW free zone (risk of FW dissemination)
- No varietal **choice** for the growers
- Many **ginners** as seed providers
- Impartial and multidisciplinary assessment of **seed delinting** not yet done
- Limited funding of public service providers including **extension** and **seed control**

O
- CHA programme for **shared diagnosis** and training to improve the seed system

T
- **Fusarium wilt** contamination of the seed area
- Rainfed dependence

SWOT of the cotton Breeding programme

S
- Cotton **breeding programme** in place
- Experienced **staff** at research, both for breeding and interdisciplinary programmes
- Political and financial **support** by TCB
- Locally accessible **HVI equipment** (Shinyanga)

W
- Little access to **genetic diversity**
- Limited **funding** for research
- Old and worn out **equipment**
- Lack of **storage** facility
- Obsolete **laboratories** and no access to modern labs
- Lack of **formalised interactions** with SH and SoS procedure
- Little **regional coordination** for seed exchange and research mutualization

O
- Experienced **ginners** in the maintenance of both roller and saw gin equipment
- Experienced **farmers** to collaborate with in view of developing participatory programmes
- Experienced **farmers** and **extension staff** exposed to a diversity of production modes (conventional, CMIA, organic)
- Experienced and diverse staff at research to develop **multidisciplinary** approaches (Crop management systems)

T
- Difficulty to get resistant material (Fusarium wilt)
- Difficulty to get resistant material to Jassids (hairiness)
- Unfavourable climate change

Major challenges 1/2

- The annual cotton acreage is not known **precisely**, as well as the yield (some ginners are testing a GPS-based methodology)
- Low **productivity** for producers and the whole chain (low yield, low density of extension personnel…)
- Farmers feel that **cost** of cotton production are high
- Little **control** in the multiplication system until 2016 (mix of varieties, part of seeds intended for oil mills are re-used for sowing)

Major challenges 2/2

- High incidence of **FW** (*Fusarium oxysporum* wilt)
- Difficulty to control the **cotton pests** in 2018 (Jassids, Thrips and Pectinophora frugiperda): loss estimated at 60% of the crop
- Lack of **genetic diversity** in the germplasm used by the breeders
- Insufficient **sustainable funding** and human resources for the cotton sector (incl. research and cotton breeding)

PLAN

Preliminary propositions

*Building first on **existing** skills*

- Cotton sector:
  - **FW**: launch a program of mitigation in affected areas, including decentralized monitoring
  - **Soil fertility**: improve the effectiveness of the manure applied (composting)
  - **Organic**: test scientifically the products proposed as alternatives to synthetic insecticides
  - **Training**: curriculae for professional
  - **Pest control**: monitor the resistance of pests, test tipping

Preliminary propositions

*Building first on **existing** skills*

- Seed multiplication:
  - **FW**: make sure that the 'free of FW' zones remain free (no seed or soil entry)
  - **Planification**: improve the estimates of seedcotton needs
  - **Quality**: map the aptitude of the different regions

Preliminary propositions

*Building first on **existing** skills*

- Plant Breeding:
  - **Diversification**: focus on more specific and diversified breeding programs in coordination with the CC actors (different zones, organic…)
  - **Diversity**: facilitate the access to more diversified genetic material, at the regional level (West African countries with East and South African countries) as well as international
  - **Renovate** the lab and equipment
  - **Mutualization**: to be increased at eco-regional African level
  - **Quality**: include classers in the tests of new material

… to be finalized during Phase 2

Table 1. What can be done soon with no or limited supplementary resources
(Note that Cirad could provide support to TARI in most aspects if required)

	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost	Who supports
Cotton sector	4	**FW** - Design an interdisciplinary program of mitigation	R	TARI	Extension	+	
	4	**FW** - Design a decentralized monitoring of the infestation	D	TARI	Extension + Actors	=	
	2	**Soil fertility** - Improve the effectiveness of the manure applied (composting)	D	Extension	TARI	+	
	3	**Organic cotton** - Evaluate scientifically the efficiency of products proposed as alternatives to synthetic insecticides	R	TARI	Org producers on var. crops	+	
	2	**Training** - Form communities of professional people and identify the potential of training by exchange of experience	D	TCB	Actors	=	
	3	**Pests** – Monitor the level of resistance in *H. armigera* and *S. frugiperda* populations	R&D	TPRI	TARI + Extension	=/+	
	3	**Pests** – Test the effect of tipping in rainy seasons	R	TARI		=	
Seed Multiplication	4	**FW** - Design a program to ensure that the 'free of FW' zones remain unaffected	R&D	TCB	TARI	=	
	1	**Planification** - Design a method to improve the estimates of seedcotton needs	D	TCB	Alliance?	+	
	5	**Quality** - Map the aptitude of the different regions	R	TARI	TCB + TOSCI + Quton	=/+	
Breeding	2	**Focus** - Elaborate ToRs for more specific and diversified breeding programs in coordination with the CC actors (different zones, markets, cropping systems such as organic…)	R&D	TCB	TARI + Ginners	=	
	6	**Diversity** - Access to more diversified genetic material	R	TARI		=	
	3	**Pests** – Assess the susceptibility of new lines to insects on farm	R	TARI	Extension	+	
	6	**Equipment** - Network with local actors to benefit of their skill in servicing the ginning equipment	R	TARI	Actors	=	
	6	**Mutualization** - Launch a dialog with other breeding programs at eco-regional African level for increased global efficiency	R	Ministry	TARI + TCB	+	
	6	**Quality** – Organize the testing of new material by classers	R	TARI	TCB lab	=	

Challenge: 1= Statistics, 2= Productivity; 3= Pest control; 4= Disease control; 5= Seed multiplication; 6= Research (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Table 2. What can be done later, sometimes with increased resources
(Note that Cirad could provide support to TARI in most aspects if required)

	Theme	Action	Type of action	Who leads	Who contributes	Estimated cost	Who supports
Cotton sector	4	**FW** - Put in place mitigation measures in affected areas	D	Extension	TARI	++	
	4	**FW** – Set up a decentralized monitoring system	D	TCB	Extension + Actors	+	
	2	**Soil fertility** - Develop a comprehensive program on soil fertility improvement	R&D	Extension	TARI	+++	
	3	**Organic cotton** - Set up a plant protection program for organic cropping systems	R	TARI	Org producers	+	
	2	**Training** - Develop curriculae for professional people	D	TCB	TARI + Actors	+	
Seed Multiplication	4	**FW** - Put in place restrictive measures (no seed or soil entry) based on the monitoring results	D	TCB	Actors	=	
	1	**Planification** - Put in place a method for improving the evaluation of seedcotton needs	D	TCB	Actors	+	
	5	**Quality** - Organize the seed multiplication according to the seed quality zoning	D	TCB	TOSCI + Actors	=	
Breeding	2	**Focus** - Put in place specific breeding programs	R&D	TARI	Ginners	+	
	2	**Diversity** - Increase the genetic diversity in the breeding program	R&D	TARI		=	
	6	**Equipment** - Renovate the breeding lab facilities and equipment	R&D	TARI		+	
	6	**Mutualization** - Build a regional breeding and research program on cotton	R	TCB	TARI	+	

Challenge: 1= Statistics, 2= Productivity; 3= Pest control; 4= Disease control; 5= Seed multiplication; 6= Research (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Aknowledgement

We thank all the people interviewed during the consultancy and TCB in particular for its strong interest and support

The team visiting Biosustain (Singida)

ANNEX 8. Workshop 2: ppt presentation

Cotton Seed Improvement Program

Tanzania:
Jacques LANÇON (Cirad),
Everina LUKONGE and Furaha Mrosso (TARI)

Second Phase: feeding the action plan

PLAN

The Cotton Seed Improvement Program

Phase 2 - Program

Actions prioritized by WS1

Working groups

Description of the Program

General objective

- Assisting stakeholders *(Ministry of Agriculture, cotton sub-sector, certification body, cotton research, producers, extension services, cotton companies from the public and private sectors...)* to improve the national **cottonseed sectors**
  - In **four** African countries: Burkina Faso, Côte d'Ivoire, Tanzania, Zambia

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Specific objectives

- Evaluating and improving the **seed multiplication** schemes
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- Recovering the **integrity/purity** of the commercial varieties

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- Technical expertise by **CIRAD** *(Centre for International Cooperation in Agronomic Research for Development, France)* and, in Tanzania, by **TARI** *(Tanzanian Agricultural Research Institute)*

Description of the Programme

Implementation

- Phase **1** (Q4-2018): Implementing a **Cottonseed Sector Study** (CSS)
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- … for a possible Phase **3** (2019-20?)

Description of the Programme

Expected results

- Questionnaire on the cottonseed sector
- SWOT analysis of the cottonseed sector
- A Cottonseed Multiplication Program with detailed **work plan** and training plan, description on the set-up and maintenance of cottonseed multiplication plots within the time frame until December 2020

PLAN

The Cotton Seed Improvement Program

Phase 2 - Program

Actions prioritized by WS1

Working groups

Objectives of the second phase

First workshop (TCB) 4/03:

i. Sharing and consolidating the diagnosis formulated by the tandem experts,
ii. Sharing, completing and prioritizing the action plan proposed by the experts,
iii. Identifying the relevant actors of the program (as experts or beneficiaries),

Second workshop (Experts) 7/03:

iv. Elaborating on the priority actions to be proposed for a third Phase.

Program of the second WS

8h30 – 9h00	ARRIVAL - Participants arrival
9h00 – 9h30	INTRODUCTION (plenary) - Presentation (round the table) - Opening speech (TCB) - Agenda of the day, expected results
9h30 – 10h15	ACTION PLAN (plenary) - Short presentation of the diagnosis (Phase 1) - Presentation of the action plan (Workshop 1) - Discussion with the Participants to understand the action plan
10h15 - 10h30	Tea break
10h30 – 11h30	ACTIONS (in groups) - Description of the actions to be put in place - Identification of resources, including human, to be mobilized at local, regional or international levels
11h30 – 12h15	SHARING (plenary) - Presentations from the groups and discussion
12h15 – 12h30	WRAP-UP (plenary) - Summary of the main results
12h30 – 13h30	Lunch Buffet

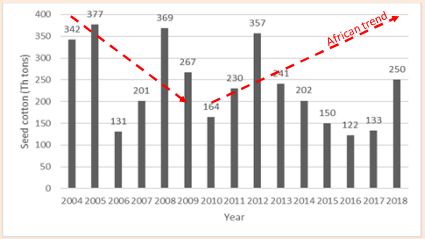
PLAN

- The Cotton Seed Improvement Program
- Phase 2 - Program
- **Actions prioritized by WS1**
- Working groups

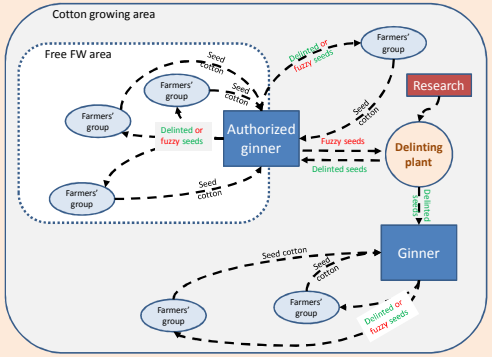
Targeting WGCAs

Production trend

- 250,000 tons in 2018 by 350,000 farmers
- Very **low** yields



Seed circulation



Major actors

- **Regulation (P-P)**
  - Tanz. Cotton Board (TCB)
- **Public players**
  - Ministry of Agriculture (MoA)
  - Tanz. Agricultural Research Institute (TARI)
  - Tanz. Official Seed Control Institute (TOSCI)
  - Tropical Pesticides Research Institute (TPRI)
  - Local governments
- **Private sector**
  - Farmers' associations
  - Quton (seed delinting)
  - Ginners (25-45 depending on year) represented in the Tanz. Cotton Ginners Association (TCGA)
  - 23 textile companies (spinning, dying, weaving, knitting…)
  - NGOs (*e.g.* Gatsby)

Strengths and weaknesses of the cotton Sector

Strengths	Weaknesses
• **Organization** / legislation / research in place including for quality control (seed and fiber) • **Coordination** body in place (TCB) where the main actors are represented • **Political support** for cotton production • **PPA** including some ginning companies deploying development programmes • **Experience** with seed delinting • Large use of **ox draught** • **HVI** equipment managed by TCB • **Enough land** for seed multiplication	• Low **yields** as compared with other rainfed cropping systems • Low **GOT** as compared with the variety potential • **Scattered** cotton growing area with regards to the production • **Versatility** of some ginners • Ginning capacity **under-utilized** • Under representation of **farmers** in the Coordination body • Risk of **confusion** between private and public stakes • Low **adoption rate** of released varieties • Good **agricultural practices** limited • Insufficient **value added** locally • Limited **funding** of public service providers including research and extension • Little **regional** coordination in research

Strengths and weaknesses of the Seedcotton multiplication system

Strengths	Weaknesses
• **Organization** / legislation / research in place including for seedcotton registration and quality control • **Coordination** body in place (TCB) where the main SH are represented • **Nucleus** seed maintenance by TARI • **PPA** including some ginning companies providing support to the seed producers • Experience with **seed delinting**	• Low **dissemination speed** of released varieties • **Delinting** plant not located in the Fov free zone (risk of dissemination) • No varietal **choice** for the growers • Too many **ginners** as seed providers • Impartial and multidisciplinary assessment of **seed delinting** not yet done • Limited funding of public service providers including **extension** and **seed control**

Strengths and weaknesses of the cotton Breeding programme

Strengths	Weaknesses
• Cotton **breeding programme** in place • Experienced **staff** at research, both for breeding and interdisciplinary programmes • Political and financial **support** by TCB • Locally accessible **HVI equipment** (Shinyanga)	• Little access to **genetic diversity** • Limited **funding** for research • Lack of **storage** facility • Obsolete **laboratories**, including old and worn out **equipment**, and no access to modern labs • Lack of **formalised interactions** with SH and SoS procedure • Little **regional coordination** for seed exchange and research mutualization

Major challenges 1/2

- The annual cotton acreage is not known **precisely**, as well as the yield (some ginners are testing a GPS-based methodology)
- Low **productivity** for producers and the whole chain (low yield, low density of extension personnel…)
- Farmers feel that **cost** of cotton production are high
- Little **control** in the multiplication system until 2016 (mix of varieties, part of seeds intended for oil mills are re-used for sowing)

Major challenges 2/2

- High incidence of **FW** (*Fusarium oxysporum* wilt)
- Difficulty to control the **cotton pests** in 2018 (Jassids, Thrips and Pectinophora frugiperda): loss estimated at 60% of the crop
- Lack of **genetic diversity** in the germplasm used by the breeders
- Insufficient **sustainable funding** and human resources for the cotton sector (incl. research and cotton breeding)

PLAN

The Cotton Seed Improvement Program

Phase 2 - Program

Actions prioritized by WS1

Working groups

Table 3. Cotton sector as a whole, as prioritized during the workshop

Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost	Who supports
CS-1	4	FW - Design a decentralized monitoring of the infestation	D	TARI	Extension + Actors	=	
CS-2	4	FW - Design an interdisciplinary program of mitigation	R	TARI	Extension	+	
CS-3	4	FW – Set up a decentralized monitoring system	D	TCB	Extension + Actors	+	
CS-4	4	FW - Put in place mitigation measures in affected areas	D	Extension	TARI	++	
CS-5	2	Training - Form communities of professional people and identify the potential of training by exchange of experience	D	TCB	Actors	=	
CS-6	2	Training - Develop curriculae for professional people	D	TCB	TARI + Actors	+	
CS-7	3	Pests – Monitor the level of resistance in H. armigera and S. Frugiperda populations	R&D	TPRI	TARI + Extension	=/+	
CS-8	3	Pests – Test the effect of tipping in rainy seasons	R	TARI		+	
CS-9	2	Soil fertility - Improve the effectiveness of the manure applied (composting)	D	Extension	TARI	+	
CS-10	2	Soil fertility - Develop a comprehensive program on soil fertility improvement	R&D	Extension	TARI	+++	
CS-11	1	Statistics on cotton production – Develop a database on the number of cotton farmers and the acreage they grow.	D	TCB		++	
CS-12	3	Organic cotton - Evaluate scientifically the efficiency of products proposed as alternatives to synthetic insecticides	R	TARI	Org producers on var. crops	+	
CS-13	3	Organic cotton - Set up a plant protection program for organic cropping systems	R	TARI	Org producers	+	

Challenge: 1= Statistics, 2= Productivity; 3= Pest control; 4= Disease control; 5= Seed multiplication; 6= Research (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Table 4. Cotton seed sector, as prioritized during the workshop

Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost	Who supports
SS-1	4	FW - Design a program to ensure that the 'free of FW' zones remain unaffected	R&D	TCB	TARI	=	
SS-2	4	FW - Put in place restrictive measures (no seed or soil entry) based on the monitoring results	D	TCB	Actors	=	
SS-3	5	Quality - Map the aptitude of the different regions	R	TARI	TCB + TOSCI + Quton	=/+	
SS-4	5	Quality - Organize the seed multiplication according to the seed quality zoning	D	TCB	TOSCI + Actors	=	
SS-5	1	Planification - Design a method to improve the estimates of the needs in seed and inputs	D	TCB	Alliance?	+	
SS-6	1	Planification - Put in place a method for improving the evaluation of the needs in seed and inputs	D	TCB	Actors	+	

Challenge: 1= Statistics, 2= Productivity; 3= Pest control; 4= Disease control; 5= Seed multiplication; 6= Research (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Table 5. Cotton breeding programme, as prioritized during the workshop

Nb	Challenge	Action	Type of action	Who leads	Who contributes	Estimated cost	Who supports
BP-1	2	Focus - Elaborate ToRs for more specific and diversified breeding programs in coordination with the CC actors (different zones, markets, cropping systems such as organic…)	R&D	TCB	TARI + Ginners	=	
BP-2	2	Focus - Put in place specific breeding programs	R&D	TARI	Ginners	+	
BP-3	6	Equipment - Network with local actors to benefit of their skill in servicing the ginning equipment	R	TARI	Actors	=	
BP-4	6	Equipment - Renovate the breeding lab facilities and equipment	R&D	TARI		++	
BP-5	6	Mutualization - Launch a dialog with other breeding programs at eco-regional African level for increased global efficiency	R	Ministry	TARI + TCB	+	
BP-6	6	Mutualization - Build a regional breeding and research program on cotton	R	TCB	TARI	+	
BP-7	3	Pests – Assess the susceptibility of new lines to insects on farm	R	TARI	Extension	+	
BP-8	4,6	Diversity - Access to more diversified genetic material	R	TARI		=	
BP-9	2,4	Diversity - Increase the genetic diversity in the breeding program	R&D	TARI		=	

Challenge: 1= Statistics, 2= Productivity; 3= Pest control; 4= Disease control; 5= Seed multiplication; 6= Research (see Phase 1 report); Type of action: R for Research or D for Development; Estimated cost: = (no or very limited) to +++ (quite significant)

Table 6. Type and sub-type of actions

Type of action	Sub-type description	Cotton sector	Cotton seed sector	Cotton breeding program
Capacity building	Exchange of experience and networking (pairs)	CS-5		BP-3, BP-5, BP-6, BP-8
	Training (expertise needed)	CS-3, CS-6, CS-7, CS-9		
	Multi-actor approaches ('unpair' experts)	CS-1, CS-2, CS-10, CS-11, CS-13	SS-1, SS-3, SS-4, SS-5	BP-1, BP-10
Equipment	Laboratory or office equipment	CS-7, CS-11	SS-6	BP-4
	Field equipment	CS-10, CS-11	SS-6	
Running costs	Research	CS-7, CS-8, CS-12	SS-3	BP-2, BP-7, BP-9
	Extension / development	CS-3, CS-4, CS-9, CS-10, CS-11	SS-2, SS-6	

Actions selected in WS1

*Building first on **existing** skills*

- 6 main topics, 4 groups to brain storm:
  - **Fusarium Wilt mitigation**
  - **Fusarium Wilt control**
  - **Quality (of seed and fiber)**
  - **Focus**

  And also, planification and mutualization

Group 1: Fusarium wilt

*Building first on **existing** skills*

- 4 actions to mitigate FW:
  - Design an **interdisciplinary program** of mitigation
  - Put in place mitigation **measures** in affected areas
  - Design a **program** to ensure that the 'free of FW' zones remain unaffected
  - Put in place **restrictive** measures (no seed or soil entry) based on the monitoring results

Group 2: Fusarium wilt

*Building first on **existing** skills*

- 4 actions to control FW:
  - Design a decentralized **monitoring** of the infestation
  - Set up a decentralized monitoring **system**
  - Design a **program** to ensure that the 'free of FW' zones remain unaffected
  - Put in place restrictive **measures** (no seed or soil entry) based on the monitoring results

Group 3: Quality control

*Building first on **existing** skills*

- 2 actions to better control quality of seeds:
  - Map the **aptitude** of the different regions
  - Organize the seed **multiplication** according to the seed quality zoning

Group 4: Focus

*Building first on **existing** skills*

- 2 actions to better frame the breeding programme:
  - Elaborate **ToRs** for more specific and diversified breeding programs in coordination with the CC actors (different zones, markets, cropping systems such as organic…)
  - Put in place **specific** breeding programs

Planification and Mutualization

*Building first on **existing** skills*

- 2 actions to better program the sector:
  - Design a method to improve the **estimates** of the needs in seed and inputs
  - Put in place a method for improving the **evaluation** of the needs in seed and inputs
- 2 actions to increase research efficiency:
  - Launch a **dialog** with other breeding programs at eco-regional African level for increased global efficiency
  - Build a **regional** breeding and research program on cotton

Reminder

*Building first on **existing** skills*

- Each group:
  - Detail the **activities** to be implemented (action plan)
  - Think of the **human resources** needed (as coordinator, as contributor, specific skills and their availability at local, regional or international levels …)
  - Evaluate the **financial** needs and their origin (specific actor, sector, govt, donor)

Somebody to take notes and report at the plenary

Aknowledgement

We thank all the people interviewed during the consultancy and TCB in particular for its strong interest and support