Cottonseed Supply for Planting in Africa:

A study into the functioning of current structures for research, breeding, multiplication and distribution and their impacts on cotton farmers

Prepared for Traidcraft Policy Unit

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Disclaimer

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Executive Summary

This short study of seed supply for planting in Africa covers two more detailed case studies (Burkina Faso and Uganda) based on desk and field studies (including interviews with farmers and sector stakeholders) and an overview of literature covering cotton and cottonseed research and supply in Africa (with a few additional key informant interviews).

Cottonseed supply to farmers in Africa sits at the heart of a range of issues and problems: subsidies, volatile commodity prices, competitiveness, research funding, infrastructure, environmental issues, industrialisation, logistics, political stability, organisational development, etc.

Seed supply for planting is a foundation of productive cotton farming, but frequently gets drowned out by other aspects of the cotton sector – sometimes because these are more urgent, sometimes because of neglect. This latter is especially a concern when it comes to the introduction of new technologies; a good research and seed breeding structure is essential.

Cotton sector and seed supply strategies need to address long-term and fundamental research, to address basic problems relating to technical capacity, soil fertility, water, access to tools and equipment and access to finance. Maintaining or improving fibre quality to gain better prices is also essential, while stable and rising prices need to be delivered to farmers to make cotton a worthwhile cash crop, especially for those farmers who have few other cash crop options.

Failures in seed quality occur in both more liberalised East African and Anglophone systems and more centralised Francophone systems. The problem is not always or at all poor seed but rather under-funded and disorganised cotton sectors and lack of good quality control.

The interviews conducted for this study highlight weaknesses in research funding, capacity and infrastructure, and show short-term goals taking priority over long-term investment in developing appropriate and adapted seed for cotton farmers in Africa. Is there really a quick fix to the multi-faceted problems of cottonseed supply to farmers or rather a need to address fundamental weaknesses together with – or even before – introducing new elements to an already complex mix?

Going forward, there should be regional and African Union level efforts to support the cotton sector and capacity in seed research and development through research exchanges and capacity building.
Nationally, decision making structures should make sure that farmers are well represented in these bodies and that decision making is independent and not overly influenced by larger or more powerful stakeholders.

Seed research also needs to take a long view of major challenges such as soil, climate and water as the socio-economic reality of farmers. Whatever the decisions taken on introducing GM technology, basic research should continue and be funded on conventional seed research as well as on seed adapted to other sectors such as organic or other so-called sustainable cottons.

Smallholder farmers in particular need research that breeds seed and researches production techniques aimed at lowering costs of production, as well as technological innovation and maintaining different options for farmers based not only on yield output but on the net return and risk level for farmers.
Acronyms and abbreviations

AICB: Association Interprofessionnelle du Coton Burkinabé
AU: African Union
BCI: Better Cotton Initiative
Bt: Bacillus Thuringiensis
CODA: Cotton Development Association (Kenya)
CDO: Cotton Development Organisation (Uganda)
CDT: Cotton Development Trust (Zambia)
CFDT: Compagnie Française de Développement des Fibres Textiles
CIRAD: Centre de coopération internationale en recherche agronomique pour le développement
CMIA: Cotton Made in Africa
CFDT: Compagnie Française de Développement des Fibres Textiles
DAGRIS: Développement des Agro-industries du Sud
ESA: East and Southern Africa
F CFA: Franc CFA (Communauté Financière Africaine)
FT: Fairtrade
FUPRO: Fédération des Unions des Producteurs du Bénin
GCIB: Ghana Cotton Interprofessional Body
GM/GMO: Genetically Modified/Genetically Modified Organism
GPC: Groupement des Producteurs de Coton
Ha: hectare
INERA: Institut National de l’Environnement et des Recherches Agricoles
KARI: Kenya Agricultural Research Institute
KEPHIS: Kenya Plant Health Inspection Services
KCGA: Kenya Cotton Ginners Association
Kg: Kilogramme
LCU: Lango Cooperative Union (Uganda)
LOFP: Lango Organic Farming Promotion
MACO: Ministry of Agriculture and Cooperatives (Zambia)
MoA: Ministry of Agriculture
MT: Metric Tonne
NAADS: National Agricultural Advisory Services (Uganda)
NARO: National Agricultural Research Organisation (Uganda)
NaSARRI: National Semi-Arid crops resources research Institute
NOGAMU: National Agricultural Movement of Uganda
SARI: Savannah Agricultural Research Institute (Ghana)
Socoma: Société Cotonnière du Gourma (Burkina Faso)
SOFITEX: Société Burkinabé des Fibres Textiles
SONAPRA: Société Nationale pour la Promotion Agricole (Benin)
SSA: Sub-Saharan Africa
TCA: Tanzania Cotton Association
TCB: Tanzania Cotton Board
TOSCA: Tanzania Official Seed Certification Agency
UNPCB: Union Nationale des Producteurs du Coton Burkinabé
WCA: West and Central Africa

Unit conversions

Euro-F CFA: 0.00152 (Interbank Rate), 1 Euro = 655.957 F CFA

Acres – Hectares: 0.405, 1 hectare = 1.47 acres

Acknowledgements

This report was prepared by Simon Ferrigno, Jane Nalunga (NOGAMU, Uganda), and Frederic Nébila Bationo (Agence CORADE, Burkina Faso) with support by other staff from the partner organisations (NOGAMU and Agence CORADE). The authors would in particular like to thank Alexis Kaboré of Agence CORADE and Moses Muwanga (NOGAMU), Directors of their respective agencies for their assistance with this study.
1. Terms of Reference: investigation into access to seeds for cotton farmers in Africa

1.1. Background

Traidcraft fights poverty through trade, helping people in developing countries to transform their lives. Established in 1979, we are the UK's leading fair trade organisation. Traidcraft plc is a company importing fairly-traded goods from more than 100 producer groups in over 30 developing countries. Traidcraft is also a charity which supports poor producer groups in developing countries - to grow their businesses, find markets (often domestic markets rather than export markets), and improve their terms of trade.

Traidcraft rates its success by how influential we are overall – which means how much we can influence other actors in world trade.

The Policy Unit is responsible for Traidcraft’s policy analysis, lobbying, advocacy and campaigning. It has a strong record on campaigning on EC trade policy, and influencing the behaviour of big companies, as well as leading thinking within the UK and international fair trade movement. We campaign for change, lobby governments, and work with business and institutions to deliver policies that ensure a better deal for the world’s poor. We have targeted both governments (including the EU) and companies. Further detail is available at:

http://www.traidcraft.co.uk/international_development/policy_work.

1.2. Context

Traidcraft has a number of projects working with small cotton farmers (in India and Kenya). The main thrust of our work is to support small and marginalised cotton farmers to form associations to put them in a stronger position when negotiating with service providers, advocating for their rights etc. To build on this work Traidcraft’s Policy Unit is investigating potential areas for international action and advocacy. One of the most important issues raised by the farmers we work with has been their

1 For example, from field to market: sustainable livelihoods for cotton farmers and labourers’ is a project being implemented by Traidcraft Exchange and its local partners – Agrocel, Navnirman Trust and SEVA in the Raichur district of Karnataka, India. This project focuses on small cotton farmers and labourers in one of the poorest districts in India and aims to support them to form self help groups that enable them to negotiate more effectively with other supply chain actors, as well as raise policy concerns and engage in advocacy activities.
difficulty in accessing appropriate seeds in terms of including price, quality and availability. We have conducted research in India looking at the specific problems and documenting the views of cotton farmers on this topic. We would now like to increase our understanding of the issues facing cotton farmers in Africa. The ultimate aim is to understand whether there are international aspects to these issues which could be challenged through advocacy and campaigning.

1.3. Objective of the research

The objective of the research is to determine, both at the international and national level, the problems faced by African cotton farmers in accessing appropriate cottonseeds, the causes of these problems and potential solutions. We would like the research to cover a range of countries with different experiences (which could be considered representative if possible) of these issues. In each country we also need to cover (where relevant) the use of different types of seeds including Bt, hybrid and conventional/organic.

1.4. Content of the research

1.4.1. Country case studies

For each country we would require the following information (which would need to be collected in such a way to allow cross-country comparison)

An overview of cottonseed supply

- How and where are seeds produced?
- What is the main channel through which farmers access seeds (through traders, through companies directly, via government, via seed exchange/re-use etc.)?
- What choice is available to farmers in terms of Bt, hybrid and conventional seeds?
- What are the main types of seeds used?
- Who are the main seed companies, are they national or internationally owned and what is their market share for different type of seeds in that country?
- What is the cost of different type of seed?

Seed supply problems

An analysis of the main problems that farmers face in accessing cottonseeds. Is it:

- cost?
- quality?
- lack of choice of type of seed?
- other issues?
Farmers views on seed supply problems

To complement the information above we would want to be able to explain the problems faced by farmers ‘in their own words. This research may therefore cover the same ground as section 2, but very much from the view of farmers gained through interviews. We would need direct quotes/interview transcripts, ideally written up in a more journalistic style. Questions could include:

What are farmers’ views of the main problems in accessing cottonseeds? Quality, price, timeliness etc..

• What do they feel are the reasons for these problems?
• How has the sector changed over time (was the seed supply market less concentrated when they first started farming etc.)
• Detailed info on how much of their income they spend on seeds compared to other farm inputs and household essentials.
• What they are doing to tackle the problems.
• What they would like other actors to do.

Causes

• What is causing these supply problems?
• What role does government policy play? This should include an explanation of the main Ministries or parastatals involved.
• Is there seed price control?
• Is there particular legislation that affects access to seeds,
• Do farmers have the opportunity to benefit from self preservation and exchange/barter among themselves, and are they supported to do this?
• What services does or doesn’t government provide.
• What is the status of public research on seeds? What are the conditions in which public and private research on seeds is being done?

Contribution by company behaviour

Are there international aspects to this problem, for example relating to international IPR protection or trade and investment agreement clauses? Please note we are likely to be commissioning a separate piece of research looking in more depth at IPR/seeds and trade issues at the international level, but any insights would be extremely useful.
Solutions/recommendations
What activities/role should governments, research institutes, farmers, donors and seed companies take to address the problem?

1.4.2. Common issues, common solutions
We need a section pulling together the common issues raised by the different country case studies, explaining major disparities where they exist and suggesting common recommendations.

Output
A report answering the main questions for each country along with a section analysing the commonalities and differences, and suggesting common recommendations.

Methodology
It is envisaged that this research can be completed through a combination of desk research, phone and face to face interviews. This is likely to require international travel, however we would strongly support bids that involve local research institutes and link ups with local NGOs to contribute to the sustainability of the work and to ensure that the in-country findings can be taken forward.

Use
Traidcraft will use this research to inform our advocacy and campaign strategy. We would build a lobbying strategy around the findings, including campaigning in solidarity with cotton farmers in the South where possible and taking up issues at the international level where appropriate.

One specific use will be as an input into a resource that would outline the key problems faced by cotton farmers around the world (including India). This is likely to be framed in terms of input problems (seeds) and output problems (low cotton prices affected by developed country subsidies). We hope to be able to communicate these two key problems through the ‘story’ of 3 or 4 cotton farmers in different countries. This research would be an essential component supporting the production of this resource and in the recommendations are included.

2. Methodology
The methodology used for the study was a mixture of desk and field work, including questionnaires and semi-structured interviews with stakeholders in the two selected country case studies and information received from informants in other African countries and international bodies. A desk review of relevant literature was a major part of the study due to budget limitations.
The field work included face to face interviews with key stakeholders in Uganda and Burkina Faso, as well as interviews and group discussions with farmers in each country.

The Terms of Reference were reviewed by the project team and used to develop the questionnaire and analytical framework under the coordination of the principal consultant (see Appendix 11.2.). The partners collaborated and exchanged information via telephone and Skype.

The literature review and field work took place in November and December 2010 and the analysis of individual country studies in December 2010. The overall report was prepared in the second half of December 2010 and finalised in January 2011.

The country case studies assessed the state of each country – interviewing the major actors in each and learning about the experience of farmers with regards to cottonseed supply, quality, reliability, costs, and suitability – and also looked at the adaptation of research – the types of cotton varieties available, the use of technology, and how domestic and external factors impact on the industry. There was no time in the study to look in depth at whether farmers benefit from side industries related to seed, such as cottonseed oil or animal feed.

The Uganda and Burkina Faso studies were led by local country partners, respectively NOGAMU and Agence CORADE, with the continental review and preparation of the overall report prepared by the principal consultant, Simon Ferrigno with support from researchers from each partner.

The National Organic Agriculture Movement of Uganda² (NOGAMU) is an experienced organisation in research and advocacy, which works with all stakeholders in Uganda on policy and market issues.

Agence CORADE³ is a consultancy and training enterprise from Burkina Faso, working in support of business and development in agriculture, natural resource management and artisanal production.

In Burkina Faso, 10 respondents were interviewed at the following institutions: UNPCB, SOFITEX, Fasocoton, INERA, Helvetas and Agence CORADE, with 20 farmers interviewed in the areas around Bobo Dioulasso and Ougadougou.

In Uganda, 15 respondents were interviewed at the CDO, NaSARRI, extension services, NGOs and industry (textiles and ginning) and 80 male and 44 female farmers in Nebbi, Lira and Gulu districts.

² http://nogamu.org.ug
³ http://corade.org/
Responses to questionnaires were received from 7 other respondents covering Ghana, South Africa, Tanzania, Kenya, Uganda, and Burkina Faso while 7 sources gave information relevant to the study including opinions, short comments or review and advice on the methodology (see list in Appendix 11.2.).

3. Introduction: global cotton production

Cotton is grown in 80 countries world-wide, with a total of 100 countries involved in cotton imports and exports. It is sown on 33 million hectares, or 2 to 2.5% of global arable land. Cotton is one of the most important global crops in terms of land area, after wheat (200 million hectares), rice and corn (150 million hectares each) and soybeans (90 million hectares) (Townsend, 2010). The value of fibre from the 2009/10 crop is estimated at US$ 37 Billion.

Cotton production should rise 16% in 10/11, but stocks should also raise dampening prices eventually.

Global cotton production for 2010/11 is projected at 24.90 million tonnes (up 13%), only slightly higher than projected consumption.

Much of the increase in cotton production will occur in the US (36%) together with Turkey, Greece and Francophone Africa. India will produce a record 5.5 million tonnes and China 7.1. There is a decline in cotton yields in many places caused by poor weather among other factors (Ferrigno 2010).
4. Cotton production in Africa

“Seed is one of the most important inputs in the cotton production chain. It must be protected against all forms of aggression that could affect its quality. To achieve good sprouting, the seed must first of all have good germinative capacity. Unfortunately, cotton growers often run into problems of poor sprouting on their farms.” (O.Traore, 2008)

Cotton is a critical crop for many African countries, and the supply of adapted and quality seed to farmers is essential to ensuring productive and remunerative cotton sectors for farmers, traders and states. Seeds are needed that will germinate well, yield well and are adapted to climate and agronomic conditions. Seeds also need to produce fibre that meets the quality requirements of the international market and will deliver the best return in terms of price. This is the building block from which farmers may or may not make money and improve their livelihoods.

Seed supply in Africa takes place in systems ranging from partially state-controlled and very centralised to relatively liberalised and decentralised systems, with most having their roots in colonial era policies. Reforms in African cotton sectors have also been going on for some years, under the influence of the IMF and World Bank. Cotton sectors in Africa are impacted by policies in other regions such as subsidies and by other factors such as fluctuations in world market prices for cotton, which have been very volatile in recent years. Figure 1 shows price fluctuations between 1970 and 2009.
Cotton prices are volatile but have been in relative decline in recent years, although recent price spikes have seen lint prices on the Cotlook A Index rise above $1.00 per pound for only the second time since the American civil war (the more recent $1.00 plus was in 1995). One reason for these rises is that farmers have switched to other crops added to the fall-out from the global financial crisis and bad weather that has affected harvests in Pakistan and China. The average prices for cotton are the highest since 1994/95 but growing production in the coming year will bring averages down again.

“The major challenges faced by the cotton industry ... can be identified as crop production and yields, while quality standards and shipping and logistics infrastructure are also areas of concern.”

(Nath 2009)

Cotton brings export revenues to major cotton producing countries and cash income to millions of cotton farmers across Africa (Tschirley et al., 2009). The importance of cotton in Africa is enormous, especially in West and Central Africa where it is viewed as the “engine of development” and a relative success story; cotton in Africa has seen its share of world cotton exports double between 1980 and 2005 even as Africa’s share of total agricultural trade has fallen (Tschirley et al., 2009). Two million farmers in SSA depend on cotton as their main cash income source while up to 100 million people depend on cotton for their livelihoods in some way (TCB 2010).

However, many of these farmers are struggling with low prices, debt, poor soil fertility and increasing food insecurity (E.g. Williamson 2003) as well as unfavourable exchange rates and the impacts of subsidies paid to cotton farmers in other regions (Tschirley et al., 2009).

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of farmers</th>
<th>Hectares</th>
<th>Production</th>
<th>Average yield (lint)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uganda</td>
<td>250,000</td>
<td>70,000</td>
<td>19,000</td>
<td>264</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>350,000</td>
<td>42,000</td>
<td>152,000</td>
<td>362</td>
</tr>
<tr>
<td>Ghana</td>
<td>13,000</td>
<td>21,000</td>
<td>8,000</td>
<td>363</td>
</tr>
<tr>
<td>Zambia</td>
<td>36,000</td>
<td>254,000</td>
<td>45,000</td>
<td>190</td>
</tr>
<tr>
<td>Benin</td>
<td>175,000</td>
<td>250,000</td>
<td>99,000</td>
<td>382</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>250,000</td>
<td>340,000</td>
<td>104,000</td>
<td>306</td>
</tr>
<tr>
<td>Tanzania</td>
<td>500,000</td>
<td>365,000</td>
<td>84,000</td>
<td>230</td>
</tr>
<tr>
<td>Kenya</td>
<td>46,000</td>
<td>11,000</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td>10,000</td>
<td>8,000</td>
<td>806</td>
<td></td>
</tr>
</tbody>
</table>

Source: compiled by the authors from various sources; in some cases averages are used for recent years.

In recent years, Sub-Saharan Africa (SSA) has increased its share of world cotton exports from 6.9 to 17.4%, with Benin, Burkina Faso, Cote d'Ivoire and Mali growing their production by 7.7% per year (Goreux 2003). Growth is coming from expansion of the production area, however, rather than
increases in productivity. Most of this fibre (85% on average) is exported outside the continent (Goreux 2003). The table below shows the share of cotton in the economies of different African countries.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>52.4</td>
<td>66.7</td>
<td>61</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>59.7</td>
<td>56.6</td>
<td>61</td>
</tr>
<tr>
<td>Mali</td>
<td>61.9</td>
<td>38.1</td>
<td>16.5</td>
</tr>
<tr>
<td>Tanzania</td>
<td>18.41</td>
<td>6.69</td>
<td>6.52</td>
</tr>
<tr>
<td>Togo</td>
<td>21.3</td>
<td>15.6</td>
<td>5</td>
</tr>
<tr>
<td>Cameroon</td>
<td>3.3</td>
<td>4.6</td>
<td>4.5</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>5.01</td>
<td>8.25</td>
<td>3.41</td>
</tr>
<tr>
<td>Zambia</td>
<td>0.28</td>
<td>0.66</td>
<td>3.38</td>
</tr>
<tr>
<td>Ivory Coast</td>
<td>5.3</td>
<td>4.1</td>
<td>2</td>
</tr>
<tr>
<td>Chad*</td>
<td>85.9</td>
<td>75.6</td>
<td>1.3</td>
</tr>
<tr>
<td>Central African Republic</td>
<td>10.3</td>
<td>12.3</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

Share of cotton in the export of African countries (by % of the value of total exports)

* Between 2001 and 2005, Chad’s total exports rose 16-fold, following the start of oil drilling in 2003, while the value of cotton exports remained the same.

Source: FAOSTAT, 2008

Yields in West and Central Africa (WCA) have been stagnating or falling for some time, with causes being linked (depending on the source) to declining soil fertility, lack of intensification, poor research, infrastructure, and lack of new technology adoption. The more decentralised Eastern and Southern Africa (ESA) systems have traditionally seen lower yields due to lower input use, but some improvements have been noted with reforms, for example in Zambia and Tanzania.

As well as low productivity, the production of cotton is increasingly constrained by competition from other crops in addition to low prices for cotton on world markets. According to Nath (2009), in 2007 even with rising prices competing crops were more profitable than cotton.

West and East African sectors have different profiles, reflecting their colonial and post-colonial policies. The figure below (reproduced from Tschirley (2009)) shows the typology of cotton sectors in the region. WCA countries tend to be more centralised and ESA countries more competitive.
West and Central African (WCA) countries are by and large far more dependent on cotton than East and Southern African countries (ESA), and have only recently begun partial privatisation and liberalisation of their cotton sectors. WCA countries have gone through some major financial crises in recent years and are also suffering from declining soil fertility. Cotton productivity is lower in ESA, due to lower intensification in the past. Poor soil fertility is also a common problem, linked to poor management, poor use of inputs or the after effects of conflict (e.g. Northern Uganda). Thus, neither region has an ideal organisational structure or productive base for cotton, even before we consider the issue of seed supply to farmers.

Discussions on the competitiveness and performance of African cotton sectors tend to focus on productivity issues (inputs, soil, etc.) without always considering seed development, breeding and multiplication. Recommendations often look to quick-fix solutions, such as the introduction of new technological innovations (e.g. GM cotton), rather than addressing structural weaknesses in research, infrastructure, and farmer capacity (e.g. access to productive equipment and domestic animals).

Targeted solutions are needed to adapt to the reality on the ground of cotton production in Africa, which is mainly made up of resource-poor smallholder farmers. Improved seed and performance of seed supply require first and foremost investment in research infrastructure and staff, improvement of existing varieties and development of new locally adapted varieties, investment in farm production equipment and basic tools, investment in improved soil fertility management, transport infrastructure, extension services, and so on. The introduction of GM often seems to policy makers to be a short-cut to solving problems, despite reservations by some commentators (e.g. Hillocks, 2009).

In most African countries, seed supply remains fairly regulated and centralised. More general cotton sector studies (e.g. Tschirley 2009) did not identify specific seed supply benefits or weaknesses of any system or research set-up. Essentially, there is no best practice benchmark in Africa, although Zambia pays the best returns to farmers while receiving the best quality premium in the market for its fibre, which might suggest some value in looking at this country again (Tschirley et al, 2009). Zambia has a relatively centralised system with a limited number of private companies, but has limited investment in research into cottonseed development, although this is not viewed as an immediate weakness (Tschirley and Kabwe 2007).
The quality and performance of research and extension are concerns identified by stakeholders for this report; research is under-funded and lacks good infrastructure and capacity, while research goals are often short-term or unduly influenced by a narrow range of interests.

"Declining cotton yields in WCA are commonly explained by (a) a decline in fertilizer use, partly resulting from a reallocation to food crops; (b) a decline in the number of insecticide applications, leading to higher infestation levels; (c) problems with seed quality, often quoted as a reason for declining yields in interviews with farmers in Mali in 2007; and (d) a degradation of soil fertility from continuous cultivation and insufficiently adapted fertilisation formulas" (Tscharley et al, 2009)

These findings are partially backed up by other observers. For Goreux (2003) “an efficient credit system allowing small farmers to acquire quality inputs in a timely manner is a prerequisite for developing the cotton sector and reducing poverty”. He further states that “performances can be improved by giving more power to growers in the management of the sector and a greater participation of the private sector”. Many observers also wish to see a greater involvement of the private sector, including in research. This was raised by several of the interviewees for this study, although some caution is suggested given the virtual monopoly on seed supply now prevalent in South Africa, where seed supply is controlled almost entirely by one private company, Delta and Pineland (a subsidiary of Monsanto), supplying a limited number of varieties.

Finally, while there is clearly plenty to be improved in seed supply for planting to farmers in Africa, many if not all the problems identified have their roots in a wider set of cotton sector problems: insufficient finance, volatile market conditions, poor infrastructure, policy, market barriers within Africa, the lack of industrial capacity to consume cotton locally, competition from other producing countries both fair and unfair, and so on.

5. The context of seed supply to farmers in Africa

The provision of good quality seed supply for planting requires governance and a supporting structure (decision-making – direction and finance) and a process for implementation (research and variety selection – foundation seed breeding – multiplication and quality control – distribution).

While African cotton sectors have different typologies, seed supply for planting is relatively centralised in most countries. There is usually some form of state involvement in research, and sometimes in the breeding and distribution of seed to farmers, as well as in production support and
marketing. South Africa is the biggest exception, with seed supply and development in the hands of the private sector.

There are differences in the role of the private and public sectors, the level of involvement of farmers and their organisations, and whether regulation is by stakeholders or government agencies. Our main case study countries have two different systems. Burkina Faso is regulated by the industry through a partnership between the cotton companies and the national farmer union in the AICB, with research coming under the government's direct control, but financing of research coming from the industry along with the setting of research goals. Uganda’s seed sector is regulated by a government agency, with research under a different body. The private sector is involved in seed retention and multiplication through ginners. Recent changes seem to suggest there is increasing convergence between how seed supply is organised in different countries.

Burkina Faso appears to have a better planned seed development and supply system, but stakeholders highlight areas of concern especially around research and quality, along with many other challenges. Elsewhere, data from Zambia suggests that improvements can be made, but no African country seems to have the policies, infrastructure, finance and staff levels required to increase competitiveness to a global level. As well as national weaknesses, there is no effective collaboration between countries or on a continental level with regards to research on seed for planting.

While no opportunity should be neglected to improve performance of seed supply and thus production, the system should meet the needs of all stakeholders and be geared at least in terms of research towards meeting a range of future challenges, including adapting to different climatic and agronomic conditions and addressing poverty and food security.

5.1. Origins and development of the cotton sectors in Africa

The genesis of the cotton production and support sectors in ESA and WCA countries reflects the different colonial and post colonial experiences of each region. WCA countries' cotton sectors (in the case of Francophone countries but excluding Ghana and Nigeria) grew out of highly centralised systems set up during the decolonisation era, systems which became further entrenched as these countries use the CFA Franc, a currency tied initially to the French Franc and then the Euro.

The Compagnie Française de Développement des Fibres Textiles (CFDT) was the colonial body that founded integrated cotton chains in West and Central Africa post independence. The company and its successors (DAGRIS – Développement des Agro-industries du Sud, now known as Geocoton) are still shareholders in the cotton sectors of several countries including Burkina Faso (SOFITEX and
SOCOMA). Research into new variety development usually took place under the French research sector organisation which became today's CIRAD (Centre de coopération internationale en recherche agronomique pour le développement), from whom for example INERA in Burkina drew their initial seed bank.

The centralised WCA systems are often held up as success stories due to their practice of the 'filière' system (centralised and integrated cotton sectors) although the size of the sectors have led to problems in capacity and management as well as negative impacts on the environment and human health from the intensive use of synthetic chemical pesticides and fertilisers (Williamson 2003).

The WCA sectors remain dependent on receiving state support and economic dependency on cotton has also become very high even as management inefficiency remains a concern (Tschirley et al., 2009).

Farmer organisations such as UNPCB now play a role both in sector management (AICB for example) and service provision (e.g. seed distribution). These changes are part of attempts to reform the WCA systems and introduce more competition and thus efficiency. As a result, UNPCB has shares in all three cotton companies in Burkina Faso as well as 50% of seats on the board of the national governance platform, AICB. The aim is to have farmers take over some activities and to have co-management between cotton companies and farmers organisations in WCA. However, there is a risk of conflict of interests, as the national farmer bodies could become more concerned about revenue generation than supporting members, and some functions should be kept separate. The WCA sectors are large and quite unwieldy, and do not have the access to capital that international cotton companies do. SOFITEX and CMDT (Mali) are the largest cotton companies in Africa.

Tschirley et al. (2009) note that Burkina Faso’s governance body, the AICB, remains weak because of the residual size and influence of SOFITEX (and through it the government which also controls the banks financing the sector) and the small size of the two private companies. This is borne out by the Burkina Faso case study reported in Section 7.

Cotton in ESA (with the exception of Mozambique) grew out of colonial era commercial and/or missionary activities (Tschirley et al., 2009) and so the government traditionally had a smaller role. Governments were not involved in production, trading or ginning, although they were involved in research and seed multiplication. The state's role grew after independence in most ESA countries, and farmer cooperatives were established in some countries to coordinate activities (e.g. Tanzania and Uganda). Government control over the farmer cooperatives and political instability as in Uganda led to many problems and cotton production declined. East Africa lacks “proper seed distribution
programs” so that it is not possible for “seeds (to) reach the farmers in good time for sowing” (Nath 2009). Seed quality is generally poor as is the timeliness of seed distribution, although less so in countries like Zimbabwe and Zambia which have state bodies overseeing quality (Nath 2009). Nath further states “the quality of seeds used in this region is very poor, mostly because no Bt seed is allowed to be used”. Zimbabwe and Zambia have better yields because of state controlled oversight of quality of the seed (although neither uses GM cotton). This suggests Bt is not the answer so much as improving the management of the sector and the quality control of seed supply.

The high involvement of states in cotton research and seed supply in Africa is in contrast to the increasingly privatised and concentrated nature of agricultural research globally. Some 10 companies now control over half the global seed industry according to ETC (2005), including Monsanto, the major owner of cotton genes. Monsanto is the largest seed company in the world, and is the major investor and player in genetically modified cotton. In the US, analysis has shown that market concentration tends to lead to less research intensity, while public investment in research had a stimulating effect on private research (Schimmelpfennig et al., 2002).

![Private expenditures on crop variety R&D have exceeded those of the public sector since the late 1980s](image)

Source: Fernandez-Cornejo and Schimmelpfennig, 2004

In South Africa, where the liberalisation trend is most pronounced, cotton yields have increased but small farmers are almost absent now from cotton production, and overall the cotton area has declined. In a continent with so many smallholder farmers dependent on agriculture, this raises question about what shape cotton research should take in Africa. There is a strong case for a pro-poor and pro-smallholder policy which requires continued participation by the state as well as donors, in order the meet the needs of small cotton farmers.

In South Africa, Delta Pine/Monsanto now control 90% of the seed supply, while in Burkina Faso the introduction of Bt cotton into national cultivars seems to be reducing the choice available to
farmers. Some studies have also argued that intellectual property laws “currently threaten to stifle innovation” along with “the domination of seed and fertiliser markets by multinational companies.” (IAASTD 2008).

5.2. GM seed

Many countries in Africa are now introducing or considering introducing Genetically Modified (GM) cotton, with more or less ability to manage this complex technology. While many now claim that GM technology is ‘pro-poor’ (Raney 2006), this remains in dispute and may reflect that alternative views are not published or recorded; for example, one interviewee in Burkina Faso raised concerns about the suitability of the technology for resource-poor smallholder farmers but worried that any negative findings might not be published under agreements with technology providers. Integrating the technology also requires a functional and well-funded national research network and a certain degree of autonomy of research structures, as indicated by the example of China according to Raney (2006). Recent cases of pest resistance in GM cotton in China also indicate benefits may be short lived (Qiu, 2010).

Burkina Faso’s experiment with GM cotton is a hybrid. While there is no independently developed GM technology as in China, the agreement with Monsanto allows INERA to integrate Bt genes into national cultivars. This means that Burkina Faso retains ownership of the base seed and shares ownership of the Bt hybrid with Monsanto, and so will benefit should other countries want to use this same variety. It also means that Burkina Faso remains able to continue conventional research using the same varieties. Nevertheless, any pursuit of the use of GM technology needs to be in parallel to maintaining and improving the national and regional research capacity, a statement backed up by researchers interviewed. Monsanto accounted for 63.5% of global GM cotton in 2004 (ETC, 2005), and the risk of ending up dependent on a single supplier should be of concern to policy makers.

Seed development needs to reflect the needs and constraints of the production system where it is to be used; it needs to adapt to the type of farming system (e.g. organic or conventional), the climate and soils. This is why so often there can be yield drops when a new system is introduced as farmers need to learn new production techniques. Sam Page of CABI Biosciences has said: “Most varieties cultivated today have been bred to suit high input systems. It is very important that breeding programmes are making selections that will give farmers new cotton varieties to suit lower inputs.” (quoted in Toulmin, 2007). This is important for two reasons. One, small farmers need low cost systems to help them manage costs and revenues, and secondly, the ICAC reported in 2010 that cotton yield improvements have hit a plateau, and so yield increases can no longer be expected to
offset rising costs of fertilisers in particular (ICAC, 2010). Further points to consider for policy makers regarding cottonseed supply for farmers are that the upfront costs of expensive seeds are a huge risk:

“Paying the higher price for GM seeds remains a risky choice, especially for cash-poor farmers”

(Glover, 2003)

The same report stresses that:

“Most seed varieties only remain competitive for a few seasons, before giving way to newer and better ones. The length of time required to negotiate intellectual property rights, carry out biosafety testing and bring GM varieties to the market can mean that the background variety into which the transgene is inserted may be ‘out of date’ by the time it is available. This may mean that they do not perform as well as some conventional varieties, despite having the advantage of being genetically modified “ (Glover, 2003)

Other sources suggest that results so far :

“...suggest that farmers in developing countries can benefit from transgenic crops, but for the poorest farmers in the poorest countries, where institutional conditions are weak, ensuring access will remain a formidable challenge” (Raney, 2006)

Even if GM seed successfully raises yields over time and reduces costs, this does not address many farmer concerns such as low prices for cotton, rising costs of fertilisers and climatic variations. Farmers, especially smallholders, want lower costs, reduced debt exposure and more diversification of income.

In Africa, the weaknesses of infrastructure and capacity mean smallholders receive little support and poor information. The production system is “...far from best practice” The introduction of Bt is not going to address the weaknesses of the system but farmers will “...have paid considerably more for the seed”(Hillocks 2009). Hillocks adds that the conditions in Africa are different from those in India and so expectations that Bt cotton in Africa will perform as it is said to have in India are misplaced as pest pressures are much lower.
“Well before the commercial release of GM varieties, plans need to be in place for seed multiplication and seed separation” (Hillocks, 2009).

Hillocks also stresses the importance of keeping Bt and non-Bt strains separate. However, problems of GM contamination are already reported in Burkina Faso. Countries looking at Bt need to take note and plan accordingly.

A word of caution in relying on technology is given by Raney (2006):

“...studies confirm that institutional factors such as national agricultural research capacity, environmental and food safety regulations, intellectual property rights and agricultural input markets matter at least as much as the technology itself in determining the level and distribution of economic benefits.”

6. The organisation and research for seed supply for planting across Africa

Most African countries have some form of organised seed supply and research. The type of seed, how much choice is available, how it is treated and how quality is monitored vary widely. The level of stakeholder and farmer participation and the actual amount of good quality seed varies between and within countries. Even where good planning exists, all seed supply sectors in Africa have fundamental and common problems such as late delivery of seed, poor germination of seed, poor storage, poor management of seed multiplication, insufficient volumes of seed, under-funded research and seed development structures, and short-term approaches to seed development.

6.1. Governance, organisation and farmer participation

The governance of cotton sectors in Africa is moving towards greater stakeholder participation, although some countries remain state led and centralised, such as Mali.

Zambia, on the other hand, has already introduced several reforms and as mentioned earlier is achieving some good results. Zambia is creating a cotton board for regulation along with a code of conduct for operators. Kenya has also started down this road and has a regulatory body, the Cotton Development Authority (CODA), which is in charge of overseeing the cotton industry under the country’s revised legal framework (Ikitoo, 2008). CODA works with other stakeholders such as the Ministry of Agriculture (MoA), Kenya Agricultural Research Institute (KARI), Kenya Plant Health Inspection Services (KEPHIS), the Kenya Cotton Ginners Association (KCGA), the Cotton
Manufacturers Association, and others in the industry (Ikitoo, 2008). The government is involved in seed supply through the Kenya Agricultural Institute (KARI). The MOA and CODA develop policy but work together with cotton stakeholders including ginners, cotton farmers associations and donor projects. Variety approval is via the MoA, while farmers’ associations sit on the CODA committee and participate in seed distribution through their associations and groups.

Tanzania set out to address declines in cotton production with the first Cotton Sector Development Strategy (2000), which attempted to reverse problems linked to excessive liberalisation (including the abandonment of quality management) and increased productivity in competitor countries (TCB, 2010). The Tanzania Cotton Board (TCB) is charged with overseeing the sector with Local Government, under the Ministry of Agriculture, Cooperatives and Marketing (governed by the Cotton Industry Act, as amended in 2009). Other organisations in the sector include the Tanzania Official Seed Certification Agency (TOSCA), the Tropical Pesticides Research Institute (TPRI), the National Environment Management Council (NEMC) and the Tanzania Bureau of Standards (TBS) (TCB 2010). Two other groups form The Tanzania Cotton Association (TCA), the ginners and exporters along with the Tanzania Cotton Growers Association (TACOGA). The TCA, founded in 1997, has 50 members including 35 ginners, 1 exporter, 4 cooperative unions, 1 grower association and 2 farmers. According to one source, the process has been facilitated as “state intervention is now acceptable again”, after the financial and economic global crises of recent years. The TCB’s role is to advise the government on the development of the cotton industry including research, and a mandate to protect farmers, monitor stakeholders and regulate the quality of seed and lint. Efforts so far have been successful in reducing the mixing of seed and improving the quality of seed in use.

In Mali, the national cotton company CMDT (Compagnie Malienne de Développement des Fibres Textiles) combines traditional cotton company activities (seed supply, inputs, credits, cotton purchase and marketing) with a mandate to promote rural development. Mali’s cotton sector is undergoing reforms on a similar basis to Burkina Faso (beginning in 2008) but these have been delayed by various economic factors (although the government has adopted a legal framework for reform). There is no farmers union as of yet. The privatisation plan includes dividing CMDT into 4 subsidiaries, with some 60% of each company going to private investors, 20% going to the new National Union of Malian Cotton Producer Co-operatives (UNCPC), 2% to CMDT staff and 17% remaining with the state. Each company, as in Burkina Faso would operate in a reserved zone, to purchase cotton and supply inputs and training to farmers (Behrendt 2006).

The cotton sector in Benin has been liberalised perhaps more than most in the Francophone West Africa region, even though there is still a strong central influence. The country’s cotton sector, like
Burkina Faso and other countries, has a stakeholder platform (AIC – Association Interprofessionnelle du Coton) governing it and bringing together the main stakeholders. Actors include the FUPRO farmers’ union, the SONAPRA cotton company (a parastatal that manages 50% of the country’s cotton) and some private gins. The AIC is regulated under the Ministere de l’Agriculture, de l’Elevage et de la Pêche (MAEP). Benin has a financial clearing house (CSPR) for the sector which ensures timely payment to farmers (Goreux, 2003).

The cotton sector in Ghana is governed by Ghana Cotton Sector Policy Regulatory Framework. This framework regulates the zoning of cotton production, the financing of the sector and ensures the registration of cotton companies, of which there were 12 in 2002 (Goreux, 2003). Research is done by the Savannah Agricultural Research Institute (SARI) and is funded by the government, but not sufficiently (Stevenson, pc, 2010), so Ghana ends up importing seed from neighbouring countries without proper quality control. Policy and sector regulation is done by the Ghana Cotton Inter-professional Body (GCIB), mandated to regulate activities in the cotton sector, negotiate cotton prices based on world market prices, and to moderate the zoning of cotton producing districts between cotton companies. The GCIB holds annual meetings during which issues are discussed and decisions taken. Private cotton and textiles companies participate, as well as cotton farmers’ associations. The GCIB has the responsibility for variety approval, but “due to its weak capacity in those terms, the main decision making body is the SARI and the Ghana Cotton Company (which evolved out of the Ghana Cotton Development Board which existed from 1965 until 1998)” (Stevenson pc, 2010). Farmers and their organisations are represented through the GCIB, but no farmers’ associations or federations are involved in input supply or seed supply. There are no mechanisms for redress for farmers, and companies are said to use “divide-and-rule tactics to keep the farmers divided and disunited”.

“Cottonseed supply is monopolised and fully controlled by cotton companies. Farmers have no say on choice of variety, and other genetic characteristics of the seeds. No clear assessment can be made about the quality of delivery of seeds to farmers, but generally farmers say they are not satisfied with seed choice, delivery and other issues such as costs, etc.” (Stevenson, pc, 2010)

The Ghana Cotton Sector Policy Regulatory Framework System has been in place since 1965, when the Ghana Cotton Development Board was established. This body became Ghana Cotton Company Limited.

The example of Ghana indicates clearly that the high ideals of participatory and inclusive cotton sector governance struggle to make a real impact due to structural and financial weaknesses in the
African cotton sectors. Nevertheless, the examples of the far reaching reforms in Benin and Tanzania and the relative success in Zambia suggest that good governance and reform can achieve results in improving the wider cotton sectors and the seed supply sub-sector if managed with rigour and attention.

6.2. Cottonseed research

"Public investments in agronomic and seed breeding research and extension services have been important sources of farm productivity growth all over the world" (Tschirley and Kabwe, 2007)

While research in WCA countries tends to be more centralised, state involvement exists in all countries. In WCA, research units tend to have more staff and higher budgets (Tschirley et al, 2009), but this might reflect the generally larger size of their cotton sectors. Nevertheless, research funding and staffing seem to be insufficient according to many sources.

Research in the more centralised cotton sectors in WCA is traditionally done by national institutes, with support from organisations such as CIRAD in the case of ex-French colonies (who also promote some cooperation across WCA) (Goreux, 2003). The rate of new variety development has slowed in WCA, and there have been no new varieties launched in Uganda for some years. Agricultural research is also generally very unresponsive to farmers needs. A citizen’s jury (on GM seeds) in Mali reinforced this point: “No fewer than 5 out of 26 recommendations ... called for agricultural research to be re-organised to better serve the needs of small farmers. Jurors asked for a fundamental re-orientation of public research ... to improve local seeds and land races, and to regenerate local food systems and markets” (Pimbert et al., 2010). The IAASTD (2008) has called for more recognition of the role of agro-ecological and smallholder agriculture in policy making.

In Benin, cotton sector reforms have meant that stakeholders are consulted on setting research criteria and approving varieties. This has moved research priorities away from a narrow focus on ginners’ needs (fibre outturn, market qualities) towards addressing other stakeholder needs. Goreux (2003) estimates this made the last new variety launched more suitable for all parties.
In Zambia, cottonseed research is done through non-profit making such as the Cotton Development Trust (CDT); however, this organisation only had one researcher in 2008 (IFPRI, 2010). IFPRI suggest that around a quarter of research funding came from the non profit sector in 2008. Zambia does not yet grow GM cotton.

In Zimbabwe, to date all cottonseed varieties have been bred by the Cotton Research Institute, CRI, but the Quton Seed Company has started its own breeding programme. Most cotton planted in Zimbabwe is Albar SZ 9314, whose characteristics include higher potential yield, larger bolls, improved ginning outturn and stronger fibre. Quton is also testing Zimbabwe varieties in other African countries, including Malawi, Tanzania and Mozambique.

Kenya’s cotton research comes under the Kenya Agricultural Research Institute, which needs to invest in recruiting research staff and develop research programmes, including the development of drought resistant seeds (Ikitoo 2008). Kenya has been experimenting also with GM cotton.

Tanzania has two research institutes, the Lake Zone Agricultural Research Development Institute (LZARDI) and the Ilonga Agricultural Research Institute (IARI). Both are government owned. The research sector is underfunded, and recruiting and retaining new staff is a problem (TCB, 2010). Seed research in Tanzania is currently using genetic markers to identify breeding opportunities that meet the needs of farmers, markets and agro-climatic conditions.

In Ghana, seed supply is the responsibility of the GCIB and the SARI Seed Testing Unit of Ghana Cotton Company. SARI is responsible for cottonseed research and variety development while the “Ghana Cotton Company is the determinant of seed parameters based on experiences in neighbouring Burkina Faso and Cote d’Ivoire (Ivory Coast)”. Research priorities are “yield and pest resistance”. There is only a small genetic base for research in Ghana, and seed purity is poorly maintained.

While Tschirley et al. (2009) suggest that freeing up research from central control could lead to more responsive research, the interviews in Burkina Faso suggest that the influence and domination of the research agenda by cotton companies leads to short-term interventions, and priority being given to the needs of industry over those of smallholder farmers. Due to underfunding, long-term research is often not taking place at all. Ideally, research should focus on two main paths, one addressing short-term goals and the other focusing on meeting long-term challenges as well as farmer needs. Future challenges in Africa include adapting to climate variability, water shortages and poor soils. These latter areas need public sector finance. Otherwise, if research is to be fully independent yet responsive, those funding research, e.g. companies, need to be held at arm’s length from the final
agenda setting, and all parties and stakeholders, especially farmers, need to be fully involved in decision making.

Generally, cotton research sectors in Africa lack funds, accountability, incentives, links between country research programmes and have slow integration of new technologies.

According to Happymore Mapara of Cottco (Zimbabwe, 2008), improvements can be made, such as improving the capacity of research institutions and the need to develop “disease, drought resistant and better yielding varieties”.

6.3. Breeding, multiplication, treatment and distribution to farmers

Seed breeding for foundation seed is usually controlled by the country research institutes; what happens next has more variation, with some countries seeing multiplication controlled by the same state structures, and others devolving this to other institutions, to ginners or farmers.

In WCA, cottonseed is usually supplied with some form of package including inputs, credit and some training. Seed may or not be delinted⁴, and quality varies between and within countries. In ESA countries, Zambia and Zimbabwe both deliver treated seed while Uganda's system sets out to deliver treated and high quality seed. As in several countries, the rhetoric and the reality are often different.

Seed distribution in WCA often remains quite centrally controlled. However, liberalisation can lead to near collapse of seed distribution and multiplication, as has been the case for example with Ghana (Goreux, 2003).

In South Africa, seed supply and distribution is almost entirely privatised. All cottonseed is distributed by Delta and Pineland (a subsidiary of Monsanto), and 90% of cotton is GM cotton. Oversight of the sector is done by Cotton South Africa, a not-for-profit company which took over from the Cotton Board of South Africa in 1997. Cotton SA works with the Research Institute to test cotton cultivars and gives recommendations to farmers on planting and production. There is a Cotton Cultivar Committee, and a National Technical Research Committee “…who monitor and oversee the applicable research cotton projects that might be

⁴ Delinting removes the fuzz, or remaining fibres, from the seed, which improves the quality of the seed by making it more likely the seed will germinate, all other items also being equal.
involved at any one given time” (Schroder, pc, 2010). Cottonseed in South Africa is distributed by cooperatives, which are supplied by Delta and Pineland.

In Zambia, the two leading cotton companies (Cargill and Dunavant) are involved in seed distribution. This system is considered to deliver good quality seed to farmers, leading to overall increased performance in the sector, although the entry of new operators is causing some problems with credit recovery (Tschirley et al., 2009). Ginners or their agents distribute most cotton inputs including seed, which is grown by farmers under contract and certified by the Seed Control and Certification Institute (SCCI), which is the government certification body under the Ministry of Agriculture (MACO) (Tschirley and Kabwe, 2007). Cargill has imported seed from South Africa but the company is now updating their varieties domestically.

In Zimbabwe, Quton Seed Company (a subsidiary of Cottco, the Cotton Company of Zimbabwe) provides planting seed (Cottco, 2010). SeedCo⁵ also markets cottonseed (this company is part owned by AICO Africa Limited, the parent company of Cottco). Quton also plays a role in research. The Cotton Research Institute (CRI) breeds foundation seed and controls the release of new seed varieties. CRI is a department of the Ministry of Lands, Agriculture and Rural Resettlement. Its work is exclusively with cotton research, breeding and testing. Varieties in use are licensed to Quton for “multiplication, processing, packaging and selling to growers” (Cottco 2010). The company pays a royalty to the government against receiving fresh breeder seed each year, to ensure purity and maintain quality of seed supply.

Quton has a certified seed grower network including mostly large commercial farmers and some smallholders planting altogether between 10 and 11,000 hectares of cotton for seed. These farmers

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⁵ http://www.seedcogroup.com/
are monitored and have to adhere to strict standards. Cotton for seed is ginned separately and labelled. It is tested for germination as well as purity, strength and other criteria, and must show at least a 70% germination rate. Quton, according to its website, aims for 85% germination and claims an average even higher than this. Tests are done by the government’s Seed Services laboratory to International Seed Trade Association standards\(^6\). Certification is by the Ministry of Lands, Agriculture and Resettlement. Ginners sell seed on to farmers “on condition that they adhere to the industry-agreed areas of production designated for each variety” (Cottco 2010).

In Kenya, seed supply was previously managed by the Cotton Lint and Seed Marketing Board working with ginners for treating and distribution. Certified seed production is now being introduced along with the wave system. This means the breeding of foundation seed, seed multiplication, certification and distribution of cottonseed for planting is a continuous three-year cycle, which is segregated and monitored (Ikitoo, 2008). KARI provide breeder seed, while the Cotton Development Authority (CODA) oversees the farmers involved in multiplication. Inspection is by the Kenya Plant Health Inspectorate Services. Final distribution is through both private and public actors, including the Kitui Ginnery (42%), Ministry of Agriculture (36%) and Agrovet stores (22%) (Fairtrade Cotton Kenya, 2009).

The MOA purchases seeds from the gins for free supply to farmers. KARI is the main research body, and determines research parameters with CODA. There used to be different varieties of cotton for different geographic areas, but varieties have been mixed over the years, losing their genetic purity. There has been no delinting or treating in the last two seasons. No seed is certified and registered, it is all gin saved, meaning poor propagation and low yields although seed is sufficient in volume.

“Lack of a seed multiplication system denies the industry the opportunity to access improved seeds with better fibre characteristics;” (TCB 2010)

The Tanzania cottonseed sector has a single seed policy. This causes problems for actors like BioRe (an organic cotton project) who would like to use longer and finer staples. However, problems of deterioration of seed quality have been turned around following efforts by Ukiriguru Agriculture Research Institute and the TCB, so progress has been made. Interventions include both research of improved seed varieties and multiplication and distribution of seed to farmers. The Institute has identified two varieties that are promising for the future: UKM08 and UK08 (Gatsby, 2 2010). Reforms supporting improvements include an agreement with Quton, the Zimbabwe seed company,

and seed is also delinted. The new contract farming plan in Tanzania involves ginners supplying a minimum input package with seed, fertilisers, pesticides, clean bags, and provision of extension services. The pilot programme is to be rolled out in 2011 with new legislation. Multiplication work is due to be taken over by the Quton company, who will link with Ukiriguru on research. The TCB strategy emphasises improving testing of cotton, developing “multi-adversity resistant (MAR) cotton varieties” (e.g. drought and pest) and specifically pest resistant varieties (TCB, 2010).

In Benin input supply is done at least partly via FUPRO, the farmers organisation. There are dedicated farms for seed multiplication. However, there is insufficient land, trained staff, equipment and finance. Input supply including seed allocation is based on recommendations starting at the level of producer groups (AIC Infos, 2010).

Seed farms contract with the AIC to produce seed. Variety selection and foundation seed breeding take place in Research Centres, (Centres Permanents d’Experimenteration (CPE)), which themselves come under the Cotton and Fibre Agricultural Research Centre (Centre des Recherches Agricoles Coton et Fibres (CRA-CF)) of the National Agricultural Research Institute, INRAB (Institut National de Recherches Agricoles du Benin) (AIC Infos, 2010).

In Ghana, breeder (or foundation) seed is supplied by SARI, while Ghana Seed Company Ltd. is responsible for multiplication and certification. There is no private participation in cotton research, breeding and seed multiplication. In other crops in Ghana, seeds are multiplied by seed growers trained by their respective associations. Cottonseed supply usually falls short in quality if not quantity. This means seed produces mixed results as certified and non-certified seed is distributed.

“Certified and grower seeds are treated with fungicides and insecticides, but other planting seeds ...are delinted and supplied to farmers without any treatments, sometimes these seeds are poor quality as reflected in the poor germination and performance of the cotton crop” (Stevenson, pc, 2010).

Over 80% of cottonseed supplied in Ghana may be untreated, with less than 20% from certified growers. The best seed is said to be “mostly supplied to elite cotton farmers (cotton farmer leaders)”. Most farmers in Ghana choose to grow cotton because of the inputs supplied to them and “their ability to declare losses with little punitive action against them”.
6.4. Quality control

“Under present arrangements farmers have no access to inputs, or credit to buy them, or incentive to invest or improve quality” (Tanzania Gatsby Trust 2007)

In Zambia, products imported are controlled by different bodies including the Phytosanitary Unit (PU) of the Ministry of Agriculture and Cooperatives (MACO), the Environmental Council of Zambia (ECZ), and the Zambia Bureau of Standards (ZABS) (Tschirley and Kabwe, 2007). In Zambia, the Cotton Companies ensure cottonseed is kept separate to maintain quality and purity. Cargill and Dunavant treat their seed although others are reported not to (Tschirley and Kabwe, 2007). Kenya on the other hand has no quality certification, and the cotton classification system also needs to be improved (Ikitoo, 2008). On the other hand, Tanzania’s strategic plans convincingly makes a case for greatly increasing production by paying attention to seed quality. Tanzanian staple is a good medium variety which has suffered from contamination, and organic cotton shows examples of how improvements can be made. Organic projects are seen to offer “...extension services are more frequent; better crop and farm management practices are applied; and yields are correspondingly higher” (TCB, 2010). In Ghana, there is no competition in the sector or oversight although “ the GCIB is expected to oversee and harmonise all activities in the Ghana Cotton Sector’ (Stevenson pc 2010). There is no body mandated to monitor quality of seed, and GCIB ”is more interested in fixing of cotton prices than in regulating quality, timeliness, etc. of seed supply”.

6.5. Seed and research sector finance

Finance for the cotton sector, and seed research and supply, usually includes a mixture of state, company and donor sources in Africa. Research in particular often seems to be suffering from shortfalls. Cargill, a private seed supplier and cotton trader, for example, funds training in Zimbabwe, Malawi, and Zambia, and provides some financial services, although this is often complemented by donor funds (Cargill 2010). In 2006, their programmes invested US$ 4 million in supporting 60,000 farmers (equivalent to US$ 67 per farmer). Cargill’s website states:

“We are working with farmers to preserve and maintain stocks of high quality planting seeds to safeguard and sustain germination rates. In Zambia we are working in partnership with the Seed Control and Certification Institute on an extensive seed improvement program, which is enrolling farmers in entire cotton growing areas and identity preserving breeder seed.”

These are laudable aims and the notions of farmer involvement and partnership with institutions appear right – yet the need for donor funding and the small amount of funding per farmer highlight
how difficult it is to improve the situation in a world market of volatile cotton prices and low returns. It must also be noted that many farmers do not even benefit from this level of support.

Tanzania and Mozambique use levies on cotton to pay for research. In Burkina Faso, cotton companies pay into a research fund. In Zimbabwe, exclusive rights for multiplication belong to the Quton Seed Company, a subsidiary of the Cottco cotton company. Quton pays royalties on seed sales back to CRI to fund research although this system worked poorly, so Quton now has its own research programme.

Research funding in WCA is usually done via the sectoral associations such as AICB. State funding only covers some of the costs and external funds or those provided by cotton companies are insufficient to cover all needs (Tschirley et al., 2009). In Benin, cotton companies finance “critical functions” of the sector, such as “Grading, research and new institutions”, with up to 10% of seed cotton price going to these functions. The new system is complex, it is heavily regulated, but is said to work (Goreux, 2003) although it still needs large state subsidies. However, funding was sufficient to see a new variety (H289.1) introduced for the 2002/03 season.

The Zambian CDT, established in 1999, is funded in part by the government, donors and some cotton sector groups such as the Zambia Cotton Ginners Association. The Trust also does seed multiplication in Zambia. The long-term challenge in Zambia is that the sector is not large enough to sustain a good breeding and development programme for cottonseed (Tschirley and Kabwe, 2007), and this will affect competitiveness in the long run unless financing is found.

The sector in Zimbabwe is organised so that farmers pay more than average for cottonseed and transport, but investments are made by the industry to ensure the quality of the country’s cotton so that it also fetches a premium on world markets.

The strategy in Tanzania is meant to be financed using available institutions, such as Rabobank, which has a share in a local bank. In the pilot programme (Gatsby, 2010), contract farming arrangements saw one gin achieve 100% repayment rates from farmers.

The CSPR in Benin is an interesting innovation - a clearing house for all financial transactions dealing with the sale of cotton inputs and seed cotton (Goreux, 2003), and which guarantees farmers’ will be paid on time. Late payment is a commonly reported problem across West Africa. Against this guarantee, farmers in Benin have to sign agreements to respect rules including following production methods and keeping to reserved areas. Benin has better yields than regional competitors. The cotton area is increasing and in 2010 some 5,491 tons of seed was distributed to farmers for planting. Payments have also been reasonably timely (USDA FAS, 2010).
In Ghana, each cotton company supplies seeds to their farmers, and finance for credit comes from the Agricultural Development Bank and private commercial banks.

The examples above all highlight a strong continuing role for state and donor funding for cotton sector development, especially given the relative under-development and poor competitiveness of African cotton, its economic importance, the volatile financial environment regarding prices and so on.

6.6. Seed varieties and choice

Many countries practice a one variety policy (such as Kenya and Benin), although this variety may be treated and prepared for different production systems. Some countries have varieties available for different agro-ecological zones (as is the case in Burkina Faso). In South Africa, farmers are said to have choice but most cotton sown is GM and the main cottonseed supplier, Delta and Pineland, is a subsidiary of GM seed supplier Monsanto.

Monsanto’s website for South Africa does not show what cottonseeds are available for sale, but mentions both Bollgard and Roundup Ready GM cotton. The website of Cotton South Africa shows 8 cultivars available in South Africa, of which 5 are GM7. Opponents suggest that GM adoption owes more to the consolidation in seed supply and the reduction in public research than to the qualities of the seed. Of 6 varieties approved for the 2009/10 growing season, only one is not a GM variety, and was developed by the Agricultural Research Council “specifically and exclusively for conditions in the Lower Orange River region” (ACB, 2010). The only non-GM cotton grown in South Africa is a small amount of organic cotton. Cotton production in South Africa has fallen, as has the area and number of farmers.

In South Africa, larger farmers pay higher technology fees for GM seed than small farmers – “R600 (US$86) per 25kg bag of seed” against “R230 (US$33) per 25kg bag” (Gouse et al., 2004). Delta and Pineland have exclusive rights to Monsanto’s technology and seed distribution and the other seed company, Clark Cotton, a ginner, has almost no market left as a result (Gouse et al., 2004).

The cost of seed to farmers in Africa remains relatively low compared to other producing regions. However, the profile of most African farmers is also different, which makes the higher cost of improved seed a risk for many smallholder farmers. There are some difficult policy choices to make,

7 These are DP210 BRF (GM), Delta 12 BRF, NuOPAL RR (GM), NuOPAL (GM), Delta OPAL RR (GM), Delta OPAL, ACALA OR3, DP Lebombo BG/RR (GM).
and these require more consideration of how to make seed strategies work for different groups of farmers and how to protect the most vulnerable.

6.6.1. The costs of cotton production

The costs of cotton are rising whether with regards to seed cotton or cotton lint (after ginning). The costs of production for seed cotton have risen US$ 34 cents per kilo in 2006/07, to US$ 43 cents in 2009/10 and the cost of lint is now US$ 1.22. However, there remains a competitive advantage for Africa in a lower unit cost of US$ 0.91, against a cost on the US of US$ 1.96 per kilo, for example. The biggest factors in rising costs are rises in fertilizer costs and weed control costs (Ferrigno, 2010).

6.7. Strategies and reforms

Different practices and strategies exist across the African continent. In Egypt, there have been many improvements in productivity and fibre quality over recent decades. The sector in Egypt is centrally managed under the Ministry of Agriculture and seeds are assigned to different zones based on how well adapted they are to the conditions in the zone. The quality of seed is maintained by ensuring a steady supply of new seed starting from breeder seed. Seed is certified and redistributed annually. New varieties are constantly being developed and released taking into account the 10-year seed breeding process required for each (Aziz, 2008). This system is similar to those being implemented in several SSA countries and is hopefully an indication of potential good results there – if finance is sufficient to back up the reforms.

Where the state systems have failed the issue of improving cottonseed is becoming critical for stakeholders. According to Christoph Kaut of the Aid by Trade Foundation, “Cottonseed supply is indeed a critical issue for some cotton companies ... as it affects yield and income of smallholders” (pc, 2010). Giving more freedom to cotton companies and projects such as CMiA to manage seed supply could help redress very poor systems, according to Mr Kaut.

For Happymore Mapara (2008), the solutions are to invest in research, increase funding, accelerate technology transfer and develop drought and disease resistant varieties.

The Tanzania strategy explicitly addresses seed availability, for example by focusing on “timely availability of certified cottonseeds at village level” (TCB, 2010). The strategy also aims at “supporting sustained investment in a durable system for seed production, multiplication, processing and distribution”. The lack of private investment for seed hybridisation and multiplication is considered a serious problem. Seed quality has declined due to much mixing and insufficient renewal of foundation seed. Introducing GM cotton and encouraging new seed companies are some of the strategies under consideration, and seed quality control is also featured.
“Contract farming has proven a viable vehicle through which to enable greater investment in cotton production and the most likely model through which other innovations, such as improved seed, usage of planters, initiatives to improve quality issues can be introduced into the sector.” (Gatsby 2010)

In Benin, despite improvements, there remain problems of trust in the sector, and farmers have “asked for a reorganisation of the cotton producers rural associations to restore trust among them”. The reform is in the hands of the secretariat of the AIC which is introducing Cooperatives Villageoises de Producteurs de Coton (Rural Cooperatives of Cotton Producers or CVPC).

In South Africa (see table below), one consequence of reforms is the drop in cotton area even as yields have risen. Many small farmers may have been forced out of cotton production, and this is a risk in other countries following similar strategies, even though some actors may consider this desirable, as focussing cotton on larger and more resource rich farmers will immediately improve the productivity of the cotton sector and cut costs of cotton companies.

<table>
<thead>
<tr>
<th>MARKETING YEAR</th>
<th>HECTARES</th>
<th>HECTARES</th>
<th>TOTAL</th>
<th>YIELD*</th>
<th>YIELD*</th>
<th>AVERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>IRRIGATION</td>
<td>DRYLAND</td>
<td>HECTARES</td>
<td>IRRIGATION</td>
<td>DRYLAND</td>
<td>YIELD*</td>
</tr>
<tr>
<td>1998:99</td>
<td>20 361</td>
<td>69 578</td>
<td>89 939</td>
<td>2 724</td>
<td>5.80</td>
<td>1 065</td>
</tr>
<tr>
<td>1999:00</td>
<td>31 263</td>
<td>67 356</td>
<td>98 619</td>
<td>2 680</td>
<td>5.45</td>
<td>1 222</td>
</tr>
<tr>
<td>2000:01</td>
<td>10 486</td>
<td>40 282</td>
<td>50 768</td>
<td>3 107</td>
<td>7.77</td>
<td>1 258</td>
</tr>
<tr>
<td>2001:02</td>
<td>18 539</td>
<td>38 153</td>
<td>56 692</td>
<td>3 455</td>
<td>5.93</td>
<td>1 529</td>
</tr>
<tr>
<td>2002:03</td>
<td>9 791</td>
<td>28 897</td>
<td>38 688</td>
<td>3 538</td>
<td>5.15</td>
<td>1 280</td>
</tr>
<tr>
<td>2003:04</td>
<td>10 322</td>
<td>12 252</td>
<td>22 574</td>
<td>3 482</td>
<td>4.75</td>
<td>1 850</td>
</tr>
<tr>
<td>2004:05</td>
<td>18 269</td>
<td>17 450</td>
<td>35 719</td>
<td>3 455</td>
<td>4.92</td>
<td>2 007</td>
</tr>
<tr>
<td>2005:06</td>
<td>12 897</td>
<td>8 866</td>
<td>21 763</td>
<td>3 791</td>
<td>5.21</td>
<td>2 459</td>
</tr>
<tr>
<td>2006:07</td>
<td>9 720</td>
<td>8 394</td>
<td>18 114</td>
<td>3 633</td>
<td>4.85</td>
<td>2 174</td>
</tr>
<tr>
<td>2007:08</td>
<td>7 700</td>
<td>2 863</td>
<td>10 563</td>
<td>3 674</td>
<td>5.41</td>
<td>2 825</td>
</tr>
<tr>
<td>2008:09</td>
<td>5 979</td>
<td>3 242</td>
<td>9 221</td>
<td>4 067</td>
<td>8.25</td>
<td>2 927</td>
</tr>
<tr>
<td>2009:10**</td>
<td>4 849</td>
<td>1 965</td>
<td>6 814</td>
<td>4 329</td>
<td>7.57</td>
<td>3 295</td>
</tr>
</tbody>
</table>

* Kg seed cotton per hectare
** Estimates

The cotton system in Ghana can be said to have strengths in that the monopoly situation can help guarantee regulation and availability of seed, but has also failed to introduce high yielding varieties. The main issues going forward are the lack of competition, productivity, pricing, and seed and input supply. The current system is failing. “Ghana’s cotton industry is now a far cry from what it was in the early 1990’s”.

For Mr Stevenson (pc 2010): “There is strong need to introduce new high yielding, disease/pest resistant cottonseed varieties to improve cotton yields and profitability for farmers. Low yields and
inflexible packages as well as corruption (diversion of inputs, inflation of acreages planted, under-declaration of yields, etc.) should be addressed to win farmers interests and participation in Ghana’s wobbling cotton industry”.

Other sector problems in Kenya and elsewhere include recurring droughts, lack of credit, lack of farm inputs, lack of farming knowledge, tools (tractors, spraying equipment). Recommendations in Kenya are also for the development and distribution of high yielding, drought resistant seed.

7. Case study 1: Burkina Faso

“Increase the price of seed cotton and reduce the cost of cottonseed” (Farmer, Burkina Faso)

The cotton sector in Burkina Faso was reorganised in the past decade, with oversight and regulatory powers devolved from the state to the AICB (Association Interprofessionnelle du Coton du Burkina Faso) and the cotton company, SOFITEX, split into three independent companies working in assigned zones. Nevertheless, the state, and the previously state-owned cotton company SOFITEX (Societe des Fibres textiles du Burkina Faso) remain major powers in the sector. Figure 9 shows how the different cotton companies, farmer groups and the state link into the AICB.

Cotton is a critically important economic sector in Burkina Faso. The numbers of farmers growing cotton are between 300,000 and 350,000 each year, with numbers fluctuating from year to year. Farm households include an average 11.9 people, of whom less than 3 are literate and 8 are economically active. Farm sizes average 8.41 hectares, with average yields around 1 tonnes per hectare. Cotton farms see an average of 45% of their area devoted to cotton cotton. Some 35% of farms are not equipped with animals or tractors and practice manual cultivation, 40% have a cart
and animals, 25% also have ploughs while less than 1% also have a tractor (Agrer, 2007). Constraints to yield increases include low levels of tools and equipment as well as low literacy, the low prices for seed cotton and rising costs of production, which leads to farmers maximising risk reduction over productivity in their strategies (Agrer, 2007). The table below summarises statistics as of 2007 and shows the producers covered by each of the three cotton companies.

Cotton is a large source of foreign exchange for Burkina Faso, and contributes around 4% of GDP. Production reached 712,000 tonnes in 2005-06, and made up an average of 70% of exports during the period 1999-2005. Thirty percent of the cotton area was under Bt cotton by 2009/10.

The table below summarises information on the three main cotton companies established after reforms in 2004. SOFITEX is by far the largest and benefits from being in the best production zones.

**Tableau 1 : Distribution des producteurs dans les zones cotonnières**

<table>
<thead>
<tr>
<th>Zones cotonnières</th>
<th>Membres</th>
<th>GPC</th>
<th>Villages</th>
<th>Départements</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOFITEX</td>
<td>234 758</td>
<td>9 598</td>
<td>4 874</td>
<td>212</td>
</tr>
<tr>
<td>FASO COTON</td>
<td>41 539</td>
<td>1 128</td>
<td>683</td>
<td>48</td>
</tr>
<tr>
<td>SOCOMA</td>
<td>48703</td>
<td>1 528</td>
<td>2 448</td>
<td>36</td>
</tr>
<tr>
<td>Total général</td>
<td>325 000</td>
<td>12 254</td>
<td>8 005</td>
<td>296</td>
</tr>
</tbody>
</table>

Source : d’après données sociétés cotonnières et UNPCB, 2007

<table>
<thead>
<tr>
<th>SOFITEX SA</th>
<th>Faso Coton SA</th>
<th>SOCOMA SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established Capital</td>
<td>1979</td>
<td>2004</td>
</tr>
<tr>
<td>4,400,000,000 F CFA</td>
<td>State (60%), DAGRIS/Geocoton, Banks (BIB, BiCIAB), UNPCB</td>
<td></td>
</tr>
<tr>
<td>Shareholders</td>
<td>Paul Reinhart AG (31%), Ivoire Coton (29%), UNPCB (10%), SOBA (20%), AMEFERT 10%</td>
<td></td>
</tr>
<tr>
<td>Zones Gins Delinting plants</td>
<td>West</td>
<td>Centre</td>
</tr>
<tr>
<td>14 (405,000 tonnes)</td>
<td>1 (45,000 tonnes).</td>
<td>3 (100,000 tonnes)</td>
</tr>
<tr>
<td>Staff</td>
<td>1,300 permanent, 2,900 seasonal, (300+ production related staff)</td>
<td>(39 field staff)</td>
</tr>
<tr>
<td>Registered producers Area under cotton (Hectares)</td>
<td>234,500</td>
<td>24,000</td>
</tr>
<tr>
<td>Registered producers Area under cotton (Hectares)</td>
<td>558,611 (2007)</td>
<td>41,620 (2005/6)</td>
</tr>
</tbody>
</table>
7.1. Issues Affecting Access to Appropriate Seeds for Cotton Farmers in Burkina Faso: Problems and Potential Solutions

Burkina Faso's reforms were almost immediately affected by a severe financial crisis in 2005-06, which continues to cause shocks in the sector.

In recent years Burkina Faso has seen the introduction of organic, Fairtrade and Cotton Made in Africa (CMiA) programmes, with Bt cotton also now grown. As a result of the introduction of Bt
cotton, CMiA is reported to be winding down its programme, as it does not accept the use of GM cotton and does not feel able to guarantee integrity of its GM-free status. The Fairtrade-organic programme shares concerns over GM contamination but is trying to develop its own seed breeding programme.

The cotton sector is regulated by different decrees and regulations of which the central one is the agreement setting up the AICB, the inter-professional agreement between the cotton companies and UNPCB for joint management of the cotton sector. There are further laws governing the opening of the cotton companies to new capital, the establishment of the UNPCB and the import and trade of pesticides and fertilisers. Most of the current rules came into force or were amended in 2004 when SOFITEX lost its monopoly and two new cotton companies were established, each with their own zones. Cotton prices are set by decree annually.

The problem in Burkina is that while the theoretical organisation of the sector should guarantee seed of different types, free of contamination and of good quality, the transfer between theory and practice is constrained by lack of capacity, finance and infrastructure. Political manoeuvrings are also a feature of the cotton sector.

Bt cotton is strongly supported by cotton companies, for example, as they hope it will reduce their costs in terms of pesticides, which they report having to subsidise. Short-term needs linked to the fiscal crisis are driving the sector, rather than long-term needs, according to many stakeholders interviewed.

For most farmers, the main concern is obtaining seed that is adapted to their farming systems and affordable. Minimising the risk of debt is very important to farmers, especially the smallest ones in the face of volatile prices and rising costs.

Donors funding cotton activities in Burkina are focussed on programmes linked to price stabilisation (AFD), Quality (USAID WACIP), organic and Fairtrade cotton (ICCO) and CMiA (GTZ).

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8 Marc Leynaert pc
7.1.1. GM cotton in Burkina Faso

Burkina Faso is now planting Bt cotton on a commercial scale. The Bt gene has been inserted into the two cotton varieties grown in the country. Regarding GM cotton, farmers interviewed varied from supportive (especially larger farmers) to worried about the suitability to their own systems (one farmer said “Bt does not like the flats”, meaning it was sensitive to water-logging), to unwilling to grow it. Women farmers have expressed concern about GM and its impact on food security\(^9\), as it will reduce focus on food crops by promoting increased intensification and monoculture of cotton farming and not really increase incomes.

There are concerns that Bt cotton is being unduly promoted without sufficient regard to the concerns and needs of most farmers for affordable seed and reduced risk as well as reduced costs. There is also a tendency to promote GM cotton as a technical fix towards farmers.

GM cotton in Burkina Faso is regulated by the Agence Nationale de Biosecurité, which was established in 2003. This Agency is supervised by two committees, one a scientific committee involving ministries (Research, Agriculture, Environment, Animal Husbandry, Health, Defence, Commerce...) and the other an observer committee with 30 members, representing farmers, civil society, religious groups, and traders.

GM cotton has to be traced, to ensure it does not contaminate other seed. It is especially important that farmers do not save Bt seed and that none is illegally exported (Lanting, 2009). Some 118,000 hectares are planted with Bt cotton as of 2009.

Profits from the seed sales are distributed as follows: 60% to seed farmers, 28% to Monsanto and 12% to research (Hien, 2009). The aim is to rapidly see GM reach 60% of the cotton area in Burkina Faso. Cotton companies are very keen on this, although some farmers are refusing (Misser, 2009).

GM seed costs 27,000 CFA for one hectare (Lanting, 2009).

For researchers, the priority in cotton research is developing seed that meets international market requirements and is adapted to a changing climate and soil fertility challenges.

SOFITEX is now essentially re-nationalised with the state increasing its share of capital to 60%. The recapitalisation of the cotton sector cost some 100 million Euros, or 1% of Burkina Faso’s GDP (Lanting, 2009).

\(^9\) CORADE, Kabore pc
7.1.2. Table 2: Seed and production costs in Burkina Faso per ha

<table>
<thead>
<tr>
<th>Activity</th>
<th>Bt Cotton</th>
<th>Conventional Cotton</th>
<th>Organic/FT cotton</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed costs/hectare</td>
<td>27,000 CFA</td>
<td>3,000 to 3,500 CFA</td>
<td>3,500 CFA</td>
</tr>
<tr>
<td>Fertiliser/ha</td>
<td>No data in survey, assumption similar to conventional</td>
<td>18,000 CFA</td>
<td></td>
</tr>
<tr>
<td>Pesticides/ha</td>
<td>18,000 CFA (6 sprays)</td>
<td>8,000 to 25,000 CFA (8 sprays)</td>
<td></td>
</tr>
<tr>
<td>Labour 800 to 1000 kg/ha</td>
<td>300 CFA/day</td>
<td>300 CFA/day</td>
<td>300 CFA/day</td>
</tr>
<tr>
<td>Yield 700 to 1500 kg/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: The data in this table comes from the stakeholder interviews undertaken by the authors in November 2010 and may not be representative.

7.2. Seed distribution

<table>
<thead>
<tr>
<th>Activities</th>
<th>Actors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed cotton production</td>
<td>Producers, Producers groups</td>
</tr>
<tr>
<td>Extension</td>
<td>State, UNPCB, SOFITEX</td>
</tr>
<tr>
<td>Cotton research</td>
<td>INERA, SOFITEX and cotton companies (finance and direction)</td>
</tr>
<tr>
<td>Purchase, collection, ginning, seed cotton marketing and by-product marketing</td>
<td>SOFITEX and other cotton companies, producer groups</td>
</tr>
<tr>
<td>Financing of cotton sector</td>
<td>Local and foreign banks, Donors, SOFITEX and other companies, State, Support funds</td>
</tr>
<tr>
<td>Linked activities: farmer organisation, transport, public works... etc.</td>
<td>Support bodies, Ministries, SOFITEX, Private transporters, NGO</td>
</tr>
<tr>
<td>Seed research</td>
<td>INERA</td>
</tr>
<tr>
<td>Seed breeding</td>
<td>INERA and contracted farmers</td>
</tr>
<tr>
<td>Seed multiplication</td>
<td>INERA, cotton companies, UNPCB, contracted farmers</td>
</tr>
<tr>
<td>Seed distribution</td>
<td>Cotton companies</td>
</tr>
</tbody>
</table>

Source: www.sofitex.org and authors
INERA (Institut National de l’Environnement et des Recherches Agricoles) is the main body for research in Burkina Faso, and the organisation responsible for producing breeding seed. INERA has 112 staff (including 10 researchers, 40 technicians, 31 observers, 12 labourers and 8 support staff).

Cottonseed supply to farmers in Burkina Faso is not organised separately from the main cotton sector, but comes into the remit of the main players along with INERA, the research institute. INERA manages the process of production and multiplication of base seed and its certification, but against the requirements of the cotton companies and UNPCB. There are no private actors in the sector, so there is a single management system and a centralised value chain. In the context of Burkina Faso, SOFITEX remains the dominant player, partly by habit and partly because of its much larger size relative to the other cotton companies.

The stakeholder body AICB (which groups the cotton companies and the farmers’ organisation UNPCB) is the main funder and decision maker for seed research. Research is governed by the Appui à la Recherche Cotonnière (ARC) convention, which has been in place since 1995. The annual budget for research is 300 million FCFA (457,000 Euros) of which 80% comes from the cotton companies, 8% from the state and some 2% from private companies (e.g. Monsanto).

INERA acts in four main programmes: variety improvement, agronomy, plant protection and agro-economics. They aim to launch a new cotton variety every 3 years. However, there is serious doubt in some quarters over the future of research and the affordability of new technologies for some farmers (AGRER, 2007).

Seed is multiplied by the cotton companies, especially SOFITEX. INERA always produce the base or foundation seed, which is then passed on to the cotton companies, who have special farms and areas set aside for breeding. UNPCB supervise some seed farmers also. The cotton companies tend to keep a close eye on reproduction and multiplication as they have an interest in good quality seed.

GM seed is only multiplied by SOFITEX, who thus are gaining a further strengthening of their gatekeeper role in seed breeding. Monsanto financed some GM development, and Burkina Faso retains ownership of the local varieties that GM genes were inserted into. This is a world first, according to interviewees. INERA has one cotton research centre at Farakoma station. Final seed distribution to farmers is done by the cotton companies in their respective zones. The table below shows the 2007 seed supply statistics for SOFITEX.
Further reforms are occurring in Burkina Faso, with a 'fonds de lissage' (stabilisation fund) being introduced to manage price volatility. The stabilisation fund works by setting a price at the beginning of the cotton season, based on an average price over previous seasons and with a floor price for seed cotton. A sales price is then set at the end of the season, which determines if additional payments can be made to producers, whether funds need to be withdrawn or added to the stabilisation fund to cover cotton prices and distribution of any additional margin to stakeholders (producers and cotton companies) (AFD, 2009).

Seed quality is assured by the Centre National de Semence Forestière. This certification concerns purity of the variety and germination rates. This is managed by SOFITEX and the Agence Nationale de Biosécurité. Under the regulations no seed with a germination rate less than 95% should be supplied to producers, even if this happens frequently according to producers. Monsanto finances variety purity work for GM, and shares its experience in this area.

### 7.2.1. Financing of research and production

The cotton companies are responsible for financing cotton research under a protocol with INERA. Companies seek credit with both national and external banks for all their needs, and there is no specific data available for seed finance.

### 7.3. Types of seed produced: quality, accessibility and costs

There are three types of seed produced in Burkina Faso. They all come from the same two varieties of base seed used in different regions, FK37 (West) and Stam59 A (East). The three types are conventional, organic and Bt. The Bt types are known as FK95BG2 (based on FK37) and FK96BG2 (based on Stam59A). The national production rates for these seeds are around 75% for GM and 25% for the others, with most of the latter for conventional.
The costs for seed per 100kg bag are:

- 27,000 FCFA for Bt seed
- 4,000 FCFA for conventional seed
- 3,500 FCFA for organic seed

Farmers report that while they nominally have a choice, they have little power or real influence on what type of seed they grow.

7.3.1. Union Nationale des Producteurs du Coton Burkinabé (UNPCB)

Producers in Burkina Faso are shareholders in the cotton companies via the UNPCB. UNPCB plays some role in input supply, planning, support, and extension. UNPCB is said to have been instrumental in pushing for GM research and took part in the trials. It also participates in setting the agenda for research (Lanting, 2009). UNPCB covers 325,000 farmers, grouped into 12,000 local groups, 280 federated departmental level groups and 26 provincial groups (Lanting, 2009).

UNPCB was created on April 15 1998, under law no. 014/99/AN of 15 April 1999 which covers regulation of cooperatives and groups. It is the overarching body for producer groups at different levels (GPC, UDPC, UPPC).

It has two main functions:

1. as a union representing producers and defending their moral and material interests and
2. as an economic actor intervening in seed cotton marketing, input supply, credit management and information and training services.

UNPCB is also a shareholder in the three cotton companies.

7.4. Stakeholders views: SOFITEX and UNPCB

SOFITEX and UNPCB are the main 'governors' of the Burkinabé cotton sector through the AICB (Association Interprofessionnelle du Coton Burkinabé). INERA is not part of the AICB, except as an observer and witness. While being a state institution, the cotton research work of INERA is 80% funded by the industry. INERA does research in cotton on seeds, technical innovations, production systems and technical training itineraries as well as on socio-economic aspects of the sector. Technical advice is passed to cotton companies who themselves should pass this on to producers via extension programmes. The AICB, representing the main users of cotton, defines the parameters for research, such as required market characteristics and productivity.
The state is responsible for strategies and policies in the cotton sector. Its role may involve thinking forward to plan for changes, or facilitate new innovations, such as the introduction of Bt cotton.

Communication in the cotton sector under the AICB runs in theory between producers, cotton companies and research. Many factors need to be taken into account in research and seed development, including agronomic and climatic factors. Burkina Faso currently has two varieties in use, FK37 and STAM59A, and two or three in development and trial. There are two main agro-climatic production zones in Burkina, and each variety is adapted to one of these (there is no suitable cotton variety at present for the low rainfall in the Sahelian zone). Factors such as climate and rainfall are taken into account when developing new varieties. The two varieties in use have both had the Bt gene added, but remain available also as non-GM seeds and are bred for organic cotton production as well.

It takes 4 to 6 years to select a new variety and up to 10 to introduce one to full scale production. Foundation seed is produced by INERA, with SOFITEX and other cotton companies then using specialised farmers to multiply seed. These farmers are supported by Specialist field staff and also UNPCB. This multiplication process leads to the first generation of seed, which can be distributed to all farmers.

The strengths of the cotton sector in Burkina Faso are the synergies and cooperation between all parties. There are improvements that can be made such as tracking the cohabitation between conventional, Bt and organic cottons where contamination and mixing have to be avoided. The process for this involves seed agents, producers and UNPCB.

The seed plan is well organised. In the case of SOFITEX, 7 seed regions are delineated with a person responsible for cottonseed reproduction and distribution in each. Field agents set up production zones, including segregation (e.g. to produce seed for organic farming or to maintain Bt seed separate). Refuges and separation for GM cotton are also in place to delay insect resistance.

SOFITEX operate a certified laboratory for quality control. They check for Bt contamination, and seeds are also tested for genetic purity. Only fields of which the seed has received a good quality rating are allowed to harvest seed for planting. The lab certifies seed before it is released. Seed farmers are trained to let cotton mature, pick it at optimum times and so on. Gins are cleaned before processing seed for planting and only some seed makes it though as seed for planting. Storage is also closely monitored. Quality is the object of this intensive process.

After harvesting and ginning, seed for planting is delinted (a chemical process for which SOFITEX has two factories). Delinting is followed by treatment with fungicides and pesticides. Then there are
germination tests and seed indexing and further purity tests. The target for seed for planting is to have 85% germination rates. This is not always achieved in which case recommendations are made as to how many seeds farmers should put per pocket.

UNPCB uses a similar process for organic seed (which is based on the same variety as conventional). Once the volume of required seed is determined, multiplication starts. Seed is additionally tested for GM contamination. There are plans for a seed farm for organic.

Seed research is financed by industry, up to 90%. Each cotton company contributes. SOFITEX prepares seed for other companies under contract as well as for its own needs. Monitoring all this is an intensive process requiring staff, producers and financing. There is not always enough equipment for the seed production process, especially as they have demand for seed from neighbouring countries.

The choice of seed such as Bt or conventional is determined in theory by the village groups known as GPCs, or Groupement Villageois du Coton. Bt cottonseed is more expensive than conventional at 27,000 F CFA per hectare.

Fresh seed supply is technically free in case of problems linked for example to weather destroying crops. SOFITEX report some abuses of this free re-seeding by farmers, who claim crop loss to then use the additional seed to plant a greater area with cotton.

While the seed cost for Bt is higher, SOFITEX suggest that the final production costs of Bt cotton will be lower as it will require fewer pesticides sprays, saving them a total of 4,000 F CFA per hectare. Bt cotton should need only 6 sprays against 8-10 for conventional cotton. Farmers could choose to do some Bt and some conventional but would need a 100 metre separation distance between both crops, an almost impossible requirement for smallholder farmers.

Research direction in future will be shaped by both conventional and GM imperatives, with a focus on seed adapted to climate variation and to climatic conditions. According to SOFITEX, the seed sector has good prospects for future developments and external collaborations, such as with Brazil. The seed bank is well stocked.

7.5. **Stakeholders views: Mr Tiouri, farmer (Vice President, UNPCB).**

Mr Tiouri is a seed farmer in the SOFITEX zone. He plants 10 to 18 ha for cottonseed each year. He prepares a production plan with other stakeholders, and grows BT FK 37 seed. He has a 40 ha farm with maize, millet, niebe, red millet, peanuts, and sorghum in Boromo, 180 km from Bobo Dioulasso.
He is a newly elected official at UNPCB. Each of the senior elected officials has to spend a week by rota at the UNPCB head office, as the officials are working farmers giving their time. As an official, he helps others in the committee manage problems and grievances for producers. These might be about prices, and late payments from cotton companies, for example. Many farmers may, for example, have to sell cereals to compensate for low cotton prices. Generally, cottonseed quality is good, but cotton prices have been low at 145 CFA. Input subsidies do not compensate. Farmers need more help accessing organic manure otherwise rising costs of fertiliser would increase debt. Up to 10 tonnes of organic manure are required per hectare. Mr Tiouri himself has a tractor which enables better management. He has compost pits and uses animal manure.

UNPCB monitor changes in soil organic matter content. Water is needed for the pits, they are very rain dependent, and good water supply is a need for all farmers.

7.6. Stakeholders views: Fasocoton

Fasocoton is one of the two new private cotton companies set up after liberalisation with assets from SOFITEX and input from private investors. Fasocoton is involved in cottonseed supply and distribution, some seed multiplication as well as input supply, credit provision, extension services and of course buying and selling lint. The company might breed from the same seed up to 4 times. Fasocoton, by its small size, ends up as a client of SOFITEX and also sources Bt seed from them. The role of Fasocoton in seed is thus being reduced and that of SOFITEX increased with the push for Bt. Fasocoton operates in a delineated zone (as do SOMACO and SOFITEX). Fasocoton certify all their seed in their own laboratory. They produce around 1,000 tonnes of cottonseed presently, but as Bt use increases, this amount will diminish. Farmers are not keen on the Bt refuge system and plant it late if at all.

The Cotton Made in Africa\textsuperscript{10} (CMiA) programme was established in the FASOCOTON zone, but this programme is being phased out by its promoters due to the presence of GM, which is not allowed under CMiA rules. However, the criteria for CMiA are in place across the FASOCOTON zone and the company plans to keep them in place, despite having no plans for any kind of labelling of their own. Fasocoton has promoted organic composting in its zone, partly driven by rising costs of fertiliser.

Some 54\% of the cotton area in the Fasocoton zone is now planted with Bt cotton, on 9,000 hectares. There is a little organic cotton as well as CMiA. UNPCB manage organic seed multiplication

\textsuperscript{10} The programme monitors changes at the farm level (incomes, environmental and social changes) and licenses its cotton, using fees to invest in programmes with farmers. See http://www.cotton-made-in-africa.com/Home/en
for this programme. Choice is currently available to farmers but the demand from them is for GM at present. Farmers are not allowed to save seed of any kind by law, but probably some do.\(^\text{11}\)

Monsanto has a certain oversight of its technology but no central role. Burkina Faso owns the varieties Bt is inserted into. This is a new approach to the introduction of Bt which gives Burkina more control than usual.

Challenges for the future of seed supply in Burkina Faso include poor germination, which is why strong quality control systems are needed. Seed supply needs to insure against climatic risks such as excess rainfall by holding reserves in order to react rapidly. It is important to be in close touch with farmers, which is why UNPCB is an important partner in helping channel information from farmers to the cotton companies. The strengths of the current system are the central control, oversight, proximity to producers, and holding certified stocks.

Seed prices were raised in 2009 to reflect the real cost of seed production. The recommendation is for farmers to plant one bag per hectare (45kg). Farmers can buy seed either on credit or outright. They do not have to take a package of inputs but most do. Fertiliser is often subsidised by cotton companies as well as the government.

In terms of the future, funding is required to support research into and the introduction of lower cost production methods like organic composts, while finance could also be used to develop more resilient varieties of cotton adapted to the local conditions, such as variable rainfall and poor soils. More cross-border collaboration could also be encouraged with research institutes in neighbouring countries.

7.7. Stakeholders views: Organic and Fairtrade – Helvetas and UNPCB programme

Helvetas have been involved in organic/Fairtrade cotton since 2004 in Burkina Faso. They partner with UNPCB, which itself plays many of the functions of a cotton company in this programme. Helvetas supports UNPCB with technical and financial support. UNPCB is responsible for seed and input supply, e.g. supplies biopesticides, equipment, and manages the Internal Control System (ICS) for certification. They also manage primary marketing and producer payments. Some activities take place under service contracts with SOFITEX. These arrangements are informal derogations.

\(^\text{11}\) Seed saving promotes deterioration of seed quality as there is no longer any selection and breeding from ‘pure’ seed. Seed saving would also vastly increase the risk of Bt contamination of conventional and organic seed.
In the long term, to become sustainable, the organic and Fairtrade sectors need to be part of the AICB. There are conflicts now.

Production of Fairtrade/organic cotton was 2,200 Metric Tonnes in 2008, but has fallen partly because of the arrival of GM and partly as some cotton companies wanted to slow things down, especially Faso Coton and SOCOMA who see FT/organic as a threat given their relative small size. Political pressure is a concern. There is a need for projects to manoeuvre delicately and diplomatically given the politics of the sector.

In 2010, planned production of cotton for Burkina is 400,000 tonnes of seed cotton, and organic will only reach around 700 tonnes. One problem is that there is insufficient organic seed available. It needs to be tested like normal seed and now further needs to be certified GM free. Helvetas and UNPCB introduced a seed plan in 2008 following the introduction of Bt cotton. There are 150 farmers involved in multiplication on 10-12 hectares. There is a contract with INERA for the supply of foundation or breeding seed. However, the volume is not yet sufficient so lower quality seed has had to be used, e.g. seed retained post ginning. Before they used to use conventional seed that had not been treated, but with Bt and contamination risks this is no longer possible. GM tests done so far show that conventional cottonseed is contaminated with Bt. Helvetas may look to import seed from neighbouring countries if need be. The heavy promotion of GM and strong support for it among cotton companies has made life difficult for Fairtrade/organic projects and so farmer demand is also slowing. There have also been rumours spreading about organic cotton that have affected its reputation, while the requirements for 100 metre separation distances between organic and GM cotton are also challenging in a smallholder context. Farmers are not always clear on what Bt and Fairtrade-organic are. Organic seed has no quality certification as yet.

The plan for organic seed called for 130 tonnes but only some 87-89 tonnes were produced. To grow production back up requires finding new zones for organic farming, perhaps ones where cotton is not grown at the moment. Seed production also needs to increase.

According to Helvetas, there are no restrictive practices as such, rather omissions that do not take into account programmes like Fairtrade, organic and CMiA; there is a planning deficiency. There is no attempt to secure a place for alternatives, such as through zoning. Bt is almost everywhere and there is also bad-mouthing of organic cotton by some actors. On the positive side, organic cotton was bolstered by the entry of the Victoria's Secret brand as a buyer of organic cotton.

The cotton sector needs a secure and sustainable seed supply for organic cotton, that is contamination free, and an independent seed supply sector. The sector also needs research on
adapted varieties and to look for seed varieties with natural resistance to pests as well as drought resistant varieties. Increasingly deficient rainfall might lead to some regions abandoning cotton altogether. Collaborations are needed with institutes with the larger capacity needed to lead this type of research.

7.8. Stakeholders views: Research in Burkina Faso

INERA is Burkina Faso’s main agricultural research institute, with a division working on cotton in the areas of genetics, crop protection, agronomy, and agro-economics.

The genetics section works on crossing varieties, using the knowledge base and seed banks in-house.

Once a new variety is crossed or bred, in year 2 (F2) it is fertilised (basically, manual fertilisation by a worker), and the best plants are chosen to reproduce seed termed F3 to F6. These next generations are compared to a test plant to evaluate performance. If the testing shows good results, it can be distributed for multiplication. Testing mainly tries to see if the variety is adapted to the agricultural and climate conditions in Burkina Faso. In the 6th year, the variety will be named and it is then given to farmers to see how it performs in the real world. Samples are taken from farmer fields and are tested for ginning, seed index (weight of 100 grams of seed), analysis of fibre quality and tenacity. If this is positive, more tests with farmers will establish the technical itinerary for best growing methods (e.g. planting times, crop protection, etc.). There is then another sample analysis. If this is good again, then the seed is kept and used. The goal is seed purity. INERA have a foundation seed farm of their own.

The variety used in the east and centre of the country is Stam 59A. On the seed station they get yields of 3.5 tonnes per hectare and 3 tonnes with FK37, the variety for the West of the country. Stam is adapted to areas of relatively low rainfall (e.g. 600-800 mm) and FK to 800mm or more.

Some farmers are reporting poor yield by weight from Bt after delivery, which is causing farmers to refuse it. From the research point of view, Bt is good as it reduces the number of sprays needed and gives a good yield. Conventional cotton needs 6 sprays. Costs with Bt should be lower. There are also more bees with Bt as there are fewer pesticides sprays, so this should result in more honey production. Farmers do not always think Bt is better. Some regions can plant both Bt and non-Bt (e.g. 1 ha of each) but this is not recommended and separation distances of 100 metres are required. Maintaining seed purity is important. Different varieties are separated by fields of maize, for example. The Bt cotton development process took 4 or 5 years, it was shorter than the usual breeding process. Both existing varieties in use received the Bt gene. The Western area Bt is FK95 BZB, the East and central area variety is now called FK96 BZD.
Seeds in the seed bank at INERA are stored in freezers, and varieties are renewed every 2 or 3 years to maintain the lines.

Future research directions will continue with both GM and non-GM as it is important to maintain conventional research, and market requirements may change. INERA also keep an eye on market demand for organic, Fairtrade, CMiA and BCI.

Finance for research comes mainly from SOFITEX (with contributions from other cotton companies but SOFITEX is dominant). SOFITEX also loan vehicles and diagnostic equipment when available as the research institute no longer has vehicles and is under-funded. There is no state funding for research (just basic salaries and buildings), and 'donors are only a rumour'! It is hard to do proper work when travel is constrained and there is little funding for general and applied research. Research priorities coming from the cotton sector tend to be market focused and responding to short-term priorities. There is no 'blue sky' money.

INERA did start work on organic cotton, but there are no more funds. It is not easy to start organic farming as it needs a lot of work, access to animal manure for farmers, and good application of farming techniques. Pest management techniques need more research, e.g. the use and suitability of them.

Quality control is done by INERA. They receive samples from cotton companies after multiplication to test germination. SOFITEX sometimes runs short of seed, especially if germination is poor, as they then need to give more seed out. Seed quality can be affected by poor storage conditions, e.g. if cotton is picked too soon after rainfall and has a high moisture content, then during storage this will affect seed, which is bagged and stored according to which picking it comes from. Tests will determine if any picking is poor and so this seed should not be used for sowing.

INERA works with farmers and also through the technical staff of SOFITEX. They usually always work with the same farmers, unless seed breeding and testing is needed in new areas. Farmers involved are usually selected for their knowledge and enthusiasm, and receive compensation. The system is good within its funding constraints, e.g. results are acceptable. Weaknesses are logistics: transport, equipment, ability to travel and check on progress of experiments and tests.

“Cotton needs research, the state needs cotton”.

Cotton research is vital to the state of Burkina Faso and to its people, researchers say, and so the government and the cotton sector should support research. Having more agencies involved in
research and seeds could stimulate competition and innovation and drive more change, but this is a risky approach.

Budgets are not always sufficient, and cotton companies are always looking for applied solutions with short-term needs taking precedence over basic and fundamental research. The laboratory and long-term research need is under-financed. The state does not fund any research but does pay salaries and building costs. However, it no longer pays for transport and vehicles so much field research is neglected as researchers are dependent on others for transport, and have no funds of their own for this. Much research is thus invalid as no proper follow up is done. There are also equipment deficiencies.

INERA operates as a research and study body, and has the monopoly on research although it does collaborate with other institutions. It has a monopoly on cotton.

Monsanto is a new arrival. There is a research convention between INERA and Monsanto, but INERA are not allowed to do research on Bt on their own. Monsanto monitor the Bt seed breeding and multiplication process. They check stock levels and distribution, and also check germination rates. Germination must be around 95%. Monsanto get 72% royalty per bag; the rest goes to the country. Monsanto have a subsidiary in Burkina Faso.

Monsanto contributes to the INERA budget for work to purify the Burkina Faso Bt seeds, which are hybrids between national varieties and US varieties. The Burkina varieties now need to continue to be purified of US genes.

The advantage of the system at present is that INERA maintains the gene banks and has research oversight. There are more than 100 varieties held of which around 60 are refreshed every year. INERA has gene banks including inheritance from the IRCT (a French institute). There are native and hybrid varieties.

INERA is not part of the AICB. INERA may be called as expert witnesses to meetings but are not called on to set or approve budgets.

Other funding sources of INERA’s budget include the USAID WACIP\textsuperscript{12} programme and PAFICOT\textsuperscript{13} from the African Development Bank. Helvetas funded research up to 2005 for the organic

\textsuperscript{12} The WACIP programme focuses on yields and incomes (see http://pdf.usaid.gov/pdf_docs/PDACK365.pdf)

\textsuperscript{13} The PAFICOT programme is an African Development Bank project for the cotton and textiles sectors (see http://www.afdb.org/en/)
programme. The Burkinabe varieties work alright in organic but research into possibilities for better results using other existing varieties could be interesting.

Farmers have some choice in seed supply. The law says that 20% of cotton grown in the country must be non-GM, so the maximum GM cotton area can only be up to 80%. The refuge law is complex to manage given the small cotton plots of most farmers, so when a farmer GPC accepts to grow Bt the practice is to have some farmers be completely non-Bt and some Bt. Smaller farmers with less equipment are encouraged to plant refuges as the risk from high seed price makes them vulnerable if any problems arise. Some GPCs have refused Bt altogether and many farmers are suspicious, even though cotton companies are pushing farmers towards Bt. Cotton companies are seeking to reduce the use of inputs as they are costly, and they have to partially subsidise them. They are also hoping for yield increases, although these may not be as much as expected. Yield problems in the past are due to poor management and cultural practices, and the question must be whether this will change with Bt. Bt might address poor crop protection practices, but not other issues underlying production shortfalls.

“For small farmers Bt is a big risk, as the cost of seed is a fixed cost whereas inputs in conventional can be managed, i.e. not taken, or sold to manage risk or debt. Bt is better for resource rich farmers.”

There are no private actors in the seed sector. However, Monsanto might seek to sell the Burkina Faso Bt seed elsewhere, which would give Burkina a share of royalties.

INERA have collaborated with South Africa, and hold an annual open day which is attended by researchers from across the region. Collaborations with Brazil and India are proposed.

Future research might be oriented towards drought resistance both in conventional and GM. Other research needs are for basic and long-term research funding, finance budgets for transport, staff and equipment for field trials and training and staff recruitment (e.g. only one seed selector left).

7.9. Stakeholders views: Farmers’ voices in Burkina Faso

It was difficult to obtain formal agreement to undertake farmer interviews in Burkina Faso via SOFITEX. Even the other cotton companies and UNPCB suggested SOFITEX needed to give formal permission for any field visits. SOFITEX occupy a gatekeeper position even if this is not formally recognised in the sectoral agreements, and all parties defer to them. SOFITEX kept pushing back meeting times until the lead researcher ran out of time during the country visit.
Some formal and informal field visits were done in the end, and some farmers were met in other locations such in the town of Bobo Dioulasso and another field visit was done subsequently in an area to the South of the capital, Ouagadougou.

In the Orodora district in the province of Kenidougou, some 30 km to the North of Bobo Dioulasso, three groups of farmers were interviewed. One group was growing Bt cotton and the other two were growing conventional cotton. The first group included 7 men (including three members of the GPC), the other included two men and one woman, and the third group was made up of two men.

Women were under-represented in these groups, but farmers reported that women may farm a small plot of their own, even if the land is usually registered in the name of a husband or relative. This is common in conventional cotton in West Africa, and is a custom probably dating back to colonial times when only men were recognised as cotton producers by the cotton structures.

Women's cotton plots are generally quite small (¼ hectare), but they grow a range of other crops, especially subsistence crops. Women also work on their husband's plots when required, for example at harvest. The farmers interviewed were growing between 1 and 3 hectares of cotton and most had no access to animal traction and transport. As well as cotton, they grow maize, millet, and sorgho in rotation, and also rice and peanut (usually grown by women). They are fairly typical when compared to Burkina Faso statistics. One farmer was a migrant who moved to the area some 10 years ago but most were from the area.

The Bt farmers refer to conventional cotton as 'l'ancien', or the 'old' crop. For those growing Bt, it seems they were not given any choice over what type of seed to grow, and they did not seem to understand the concept of a refuge as a tool to reduce the risk of pest resistance developing. Bt seed is priced at 27,000 CFA for a bag, and they have to pay if they need to re-sow, e.g. after flooding (although officials say re-seeding is free). Many farmers have withdrawn from cotton recently because of high costs and low prices.

The second set of interviews took place nearer to Ouagadougou and included farmers involved with or known to the Helvetas/UNPCB programme.

7.9.1. Gognon

The farmers in this small village were all waiting to go to town to the presidential election rally taking place that day. Three of them were representatives of the GPC, or village cotton producers' group (president, secretary and treasurer). The farmers present in this group included the GPC president and the the village councillor for the municipality. The farmers included Siaka Traore
(President), Mussa Traore (Councillor), and Adama Traore, Goulia Yacouba, Gissou Traore. There were two others whose names were not given. The farmers were aged between early 30s and 50s.

Problems with seeds occur especially when there are excess rains early in the season, washing away seeds or seedlings and requiring a second sowing. They also do not have enough fertilizer. Although they have some compost pits following a project, there are not enough of these to support need. There are seed problems with maize as well. They say, “seed quality is important, but farmers also need to work well”.

The largest farmer is growing 3 hectares of cotton, with around 120 hectares planted by all farmers in the village. Most are limited because all work is done by hand, and they do not have draught animals or carts.

This is the first year they have planted Bt cotton. One farmer observes, “GM cotton does not like the flats”. This suggests Bt cotton is sensitive to water-logging as rains were heavy early in the season (however, the same might have happened to a conventional seed). The farmers say Bt needs to be planted where water run-off is good, for example on sloping ground.

Their seed is supplied by SOFITEX to the village group (the GPC). Prices are given to the GPC by SOFITEX and farmers learn how much they owe after they have planted. Farmers are not allowed to save seed. Farmers also receive fertilisers and pesticides (which the farmers call ‘poison’ in French) from SOFITEX. The largest farmer, who planted 3 hectares used 100 kgs of seed.

The total expected yield for the village is 120 tonnes, although many farmers have dropped out of cotton. These farmers are part of a GPC with 43 members, of whom only 23 planted cotton this year, as prices for seed cotton were low (farmers expect prices to rise next year). Women in the village have their own groups and grow cotton as well as food, and even make soap.

They use some compost including animal manure. It takes 25-50 carts per hectare (these are small hand-carts that may not take more than 100 kgs of manure).
All farmers in this village are planting Bt and were not sure what a refuge was.

Farmers talked about inputs arriving late, especially fertilizer, which sometimes is delivered after the flowering of cottonseed. The seed itself is very expensive at 25,000 CFA per bag for 1 hectare (the price the farmers mentioned is lower than that reported by SOFITEX and others). This year the rains were also late which has caused problems. Farmers say they had to pay for replacement seed. Some farmers planted late and some on time, but in any case most farmers saw crop loss, except those who planted early and whose crop had germinated before the late rains.

There is no real choice on seed, the farmers say. SOFITEX are the only supplier so they “have to listen” even though they nominally might have a choice.

Their main problems for the future are the cost of seed, weather-related crop losses, and credit problems linked to the ‘caution solidaire’ system, which makes all members of the GPC responsible for debts of individuals. There is no safety net for them and high seed prices make things even riskier for them.

More choice of seed suppliers and buyers would enable them to make choices of what they are offered. They are willing to work but have no means to help themselves.

The village has had a school since 2005 although it has no building yet, so children go to the village literacy hall.

7.9.2. Pendjen village

These farmers are based outside the village of Pendjen. The couple are Lacena Ouattara and Marianne Traore, but the other farmer present did not give a name. They are in their 20s and making a start in their life as farmers. The female farmer grows her own ¼ hectare cotton plot, sown with conventional cotton. She and her husband are also in the SOFITEX zone. Mrs Traore plants two cottonseeds per pocket after the rains. The other male farmer plants 3 hectares, while Mr Traore has 2 hectares, on which his wife also helps. They have had problems with late rains this year.
The GPC has 20 members, but many did not plant cotton this year because of the rains. Most farmers plant 1 to 2 hectares. There is not enough fertiliser. They receive 1 bag for each hectare. Fertiliser is getting more and more expensive but they don't have any other options. The low prices they get for their seed cotton does not help. They say: “Farmers have no real choice in seed and inputs”. They don't have information on other cotton although they have heard of Bt cotton. They will grow what is brought to them, they say.

The long-term problem is the rising cost of inputs versus the low prices they receive for cotton. They pay 18,000 CFA per hectare for fertiliser and 8,000 CFA for pesticides, for a yield of maybe 700 kg/ha. They also employ labour for weeding and harvesting. Family labour is used for other activities.

They would like to grow more cotton to earn more, so that they can grow the farm and support the family better, to have a bigger house, as well as more carts and animals. They have two children who are already at school.

7.9.3. Bapara

Dao Adama and Abou Traore grow 2 and 1 hectare of cotton each. The cotton is conventional this year. Their GPC here has 30 members and their wives grow ¼ hectare each. They have heard of GM cotton but it has not arrived yet.

It takes 8 bags of fertiliser for 2 hectares of cotton. The yield is variable depending on weeds, it can be between 1 and 1.5 tonnes per hectare. Seed costs 3,000 CFA per bag, which can seed 1 hectare. The seed quality is generally alright. This year they took extra seed as the rains were late but in the end did not need it and so returned it to the GPC. They have been growing cotton for 15 years. Seed comes from SOFITEX. Prices for cotton are no longer enough to cover the costs of production.

Costs of production apart from seed include 4,335 CFA per litre of pesticide (6 are needed per ha), 18,000 CFA for 4 bags of fertiliser (needed for 1 hectare). Cotton was paid at 165 CFA, the same as the previous year. They use some paid labour at 300 CFA per day during harvest, and usually 8 days per worker are needed, depending on the production. The total pickers employed will vary according to expected yield.
“Many farmers have abandoned cotton due to this situation. If the price will rise, I will grow more.”

Soils are also poor. The fertiliser they get is not sufficient for cotton and does not help with maize and other rotation crops.

“Late payments are also a problem. This needs solving to secure future of cotton.”

Cotton provides the income for schooling, expenses and household goods. One farmer has children not old enough for school yet, the other has no children here as he is a migrant into the area. He has been here 10 years.

7.9.4. Yoro village

Three producers were interviewed in this village. Bassindia Pachelo (born in 1965) is married with 7 children and grows up to 1ha of conventional cotton. TIANABA D jimadi is 32 years old and married with 2 children and grows up to 2 ha of conventional cotton. YIRGAO Moumouni is 31, married with one child, and grows around 2 ha of conventional cotton.

These producers grow many other crops (millet, yam, groundnut, maize). The groundnut is specifically done by the women. All the three producers have been growing cotton between 3 and 10 years. The seeds are supplied by SOFITEX, helped by UNPCB who also play a part in seed multiplication. Seeds are supplied in a timely manner and they have a choice of the type of production and seed. The cost of seed is 3,000 FCFA per 50 kg bag.

The main difficulties faced by farmers are the high cost of GM cottonseed, the low price of seed cotton, high debt levels which force farmers to sell their equipment, and the difficulties of growing cotton. For example, the only female cotton group in the village gave up cotton growing 3 years ago because the job is so hard.

TIANADA said that, in reality, they don’t get more money in cotton production. They continue only because they use some of the inputs supplied by SOFITEX on other crops. If they had another possibility, they would leave cotton production. He says that three years ago he gave up growing cotton, but came back as he needed “to do something”.

The farmers’ recommendations include that “those responsible for the international market have to increase the price of cotton and diminish the cost of seed”. They also would like help with investment in growing inputs such as animals.
7.9.5. Yale

This group is a family whose chief is Sawadogo Moussa, a 34 year old man. His family is composed of 23 people. He has 2 wives and 5 children who went to secondary school. He has been growing cotton for 10 years, as well as millet and maize.

SOFITEX supplies cotton inputs and seed. Inputs usually arrive on time but not always.

Moussa says that he has the choice of seed. He grows conventional cotton (2.5 ha) and Bt cotton (2 ha). The two fields are separated by around 120 metres. This is his first experience with GM cotton and he says the seed supplied in 2005 was better than the seed they have today\(^\text{14}\). The seed has germination problems and conventional seed yields more than the GM seed. He estimates that conventional yields 1 tonne/ha and GM 8 to 900 kg/ha. For him, the difficulty is the lower yield and higher cost of GM cotton, the poor quality of the seed and the price of cotton, which is not encouraging producers to continue with cotton. He is not sure he completely knows the right technical path for GM cotton. Moussa said that he uses cotton income to invest in oxen, ploughs, children’s schooling, and building his house. For him, to improve the cotton yield, we need to “encourage producers by correcting the seed quality, decreasing the seed price and increasing the price of cotton”.

7.9.6. Bobo Dioulasso

Alexandre and Mamadou are two farmers who were part of a group (around 6-7 were present) visiting town during a festival. They are both cotton farmers while others in the group had been in the past. Cotton is important but many factors are affecting their involvement. Soil fertility, the rising cost of fertilisers, poisonings from pesticides, and the high cost of GM seed will affect their future in cotton. One of the farmers had already moved to Ivory Coast to farm coffee, and another had given up cotton altogether, to focus on coffee and sorghum. All farmed several crops.

Regarding GMOs, they expressed concerns not only over the cost but also whether it was safe, as some oil seed is used locally as oil and animal feed. They also queried whether bollworm resistance was the right approach; their problems are “poor soils and drought/rainfall, this is what determines a good crop, but if anything happens, the high cost of GM seed we will lose a lot of money”. GM

\(^{14}\) This may indicate a problem with GM or a problem with the overall seed breeding and quality management system.
seed costs 27,000 CFA/bag. Only two of the farmers in the group were full-time farmers. Most had to do other activities such as carving to make a living. Food security was another big topic, and they thought this was an area needing more investment, especially as cotton is much less profitable now.

7.9.7. M. Francois Traore

“Mediocrity does not pay”

François Traoré has been a cotton farmer since 1979. He farms over 200 hectares (on two units), and has been involved in the UNPCB. He grows between 15 and 40 hectares of cotton each year. The rest is maize, sesame, millet, sorghum, and some livestock. Mr Traore is in the SOFITEX zone, is 58 years old with 10 dependents, and has experience of conventional and GM personally and of organic and Fairtrade via UNPCB.

Cotton is supported by UNPCB, cotton companies and INERA. The state is involved through laws and regulations and as a shareholder in SOFITEX. The situation is changing with cotton companies forced to recapitalise following the 2005-6 crisis. UNPCBs share has diminished as has that of Dagris, which along with UNPCB did not participate in the recapitalisation of the cotton companies.

Stakeholders in seed supply for planting prioritise adapting and developing seed, which is given to cotton companies for multiplication on their registered farms. The system works in the sense that production in Burkina reached a high of 700,000 tonnes. Research is funded by AICB. Producers get a choice of seed and are involved via UNPCB, including in the scientific research council. There are some 60 varieties available to researchers.

There are gaps such as in traceability and monitoring. Production is not always followed up as it should be. Germination is not always good, although there are disputes as to why. Still, “seeds do not always go”. Technical staff say the problem is linked to poor fertilisation, but bolls were larger in the 1980s. Compared with Brazil and India, “cotton in Burkina Faso grows poorly and is no longer as good as before”. There needs to be more effort on quality and boll formation and size.

Three GM varieties have been developed: “one was no good, one gives lower fibre and one maintained yields”. Mr Traore plants FK 190. The cotton companies distribute seed following multiplication and germination is checked in laboratories. The germination rate should be 90% but this is not always the case.

The research sector is underfunded, and only employs one staff person to oversee seed. More staff and resources are needed and new developments in seed are also needed.
Farmers are involved in meetings with organisations and the scientific committee. Farmers also make up 50% of the board of the AICB through UNPCB.

Seeds come with technical packages, and monitoring is needed, as well as training and inputs. The root causes of problems need to be identified and institutions need to accept that problems exist. In India, for example, seed is checked by universities and certified. All cotton is delinted. Planting distance is greater, as GM cotton should not be planted too densely, which is what is done in Burkina. Seed costs 27,000 CFA per hectare for Bt cotton. This is very expensive, especially when prices for cotton are low; the current high prices need to be maintained to compensate for this.

The producer’s involvement is positive. Still, problems of seed quality and implementation of rules are necessary: “For example, despite the government asking for replacement seed to be distributed free, in several zones this was invoiced to farmers”.

There is no competition in seed production. The protocol that governs the sector is in more or less constant revision. It is however hard to evaluate changes under reforms as the crisis of 2005/6 is still having after-effects.

The recommendations for the sector are to improve financing (e.g. of seed development and quality control), and capacity building for the sector. Donors could support the sector by making sure price rises are passed to producers – “the producer needs to earn to live”.

7.10. Assessment of Burkina Faso

The cotton sector in Burkina Faso continues to suffer the after-effects of the financial crisis it suffered in 2005-6. Bt cotton is now grown on a commercial scale but it is too early to assess its impacts. There are potential strengths in the sector but also concerns, for example over the role and size of SOFITEX (while theoretically the stakeholder approach has a lot to offer, field research shows that SOFITEX acts as a gatekeeper and is deferred to by all parties including UNPCB), the lack of funding for research, the mechanisms for setting research goals, and ongoing problems with costs of production, poor soil fertility and the price of seed cotton.
The research sector needs to be better funded, and funding made available for researchers to be able to do their jobs and have access to transport and finance for long term, basic research.

There also needs to be support and recognition of the place of organic, Fairtrade, and CMIA programmes.

Effort needs to go into supporting further strengthening of UNPCB and its ability to be independent and impartial, and to be a more potent advocate for all farmers and less a ‘partner’ of cotton companies or an input provider. There are existing or potential conflicts of interest, for example in UNPCB being an input supplier, and these functions need to be separate from the running of the organisation as a farmers’ association.

Farmers are concerned about issues like costs and prices, germination and seed quality.

Donors are not really involved in supporting seed research and quality control and this should be a higher priority in all programmes.

For the future, the cotton sector needs:

- A neutral policy on approved variety promotion
- Protections for small farmers against the high price/risk of GM seed and to ensure insurance against crop loss due to factors such as climate, rainfall, unexpected pest attack
- To support opportunities for vulnerable farmers to enter into sustainable production programmes with lower risks, and with good seed supply (IPM, Organic, FT, CMIA, BCI...).
- To support strong and independent cotton research and cottonseed development
- To support UNPCB’s continued development and capacity building
- To strengthen governance and oversight of emerging problems by (1) supporting INERAs socio-economic research, (2) increasing the capacity of governing bodies to address these issues, and (3) adding socio-economic analysis of the sector and farmer needs to the role of the permanent secretariat of the Government of Burkina Faso, which should perhaps take a more active role in looking into the functioning of the sector.

8. Case study 2: Uganda

The key stakeholders in cotton in Uganda include the farmers, who are smallholder farmers. Farmers depend on the Cotton Development Organisation (CDO), whose role is to promote and regulate the production and marketing of cotton in Uganda. As an autonomous agency, its role is to represent the cotton industry in all aspects. The CDO is responsible for:
• Setting standards for seed cotton and lint against international standards
• Classifying the lint
• Procuring, processing and distributing cottonseed for planting
• Announcing and monitoring indicative farmgate, ginnery buying and export prices
• Announcing the commencement and closure of the cotton marketing season
• Collecting, maintaining and disseminating statistical information in respect of all aspects of the cotton industry
• Advising the Government on policies concerning the cotton subsector

CDO is funded by the government of Uganda as well as by the World Bank, International Development Association (IDA), and International Fund for Agricultural Development (IFAD). Funds also come from a levy on ginners (20%) and fees for registration.

Ginners and exporters are responsible for buying seed cotton from farmers, ginning and trading but also retaining seed for CDO. Most ginners are foreign or foreign-owned, including Dunavant, Great Lakes/Plexus, and others.

The National Agricultural Research Organisation (NARO) is the main national research body, and the National Semi-Arid Resources Research Institute (NaSARRI) is the research station under NARO, responsible for breeding cotton for the whole of Uganda.

Uganda's cotton sector has 150,000 farmers planting 0.5 to 2 hectares each. There are 15,000 organic cotton farmers among them. The number of certified organic cotton farmers has reduced drastically this year with the government stopping purchase of organic cotton (there have been various disputes over organic cotton between the CDO and some ginners for some time now). This does not mean, however, that all farmers are conventional now. Many organic farmers are still practising organic methods, although they can’t market their cotton as organic.

The country has a total of 45 gins and 3 vertically-integrated textiles mills, with 25 SMEs in the textiles and apparel sector.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cotton Lint Production (Bales @ 185 Kg)</th>
<th>Ave. FOT price ($/Kg of lint)</th>
<th>Value ($ million)</th>
<th>Indicative price announced by CDO(Sh./Kg) of seed cotton</th>
<th>Ave. Farmgate Price received by farmers (Sh/Kg)</th>
<th>Value (Shs Billion)</th>
<th>% World market price received by farmers</th>
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* Estimates

Source: http://cdouga.org/index.php?option=com_content&view=article&id=18&Itemid=9

“In Uganda, the major reasons for the fall [in production] have been the break of the zoning system previously in place and, therefore, no proper seed distribution to the farmers.” (Nath, 2009).

Liberalisation of the cotton sector in Uganda led to a proliferation of private actors in cotton ginning and trading, but the sector is now once again quite concentrated. The state remains involved in coordination and regulation via CDO as well as through the national research organisation. The farmer cooperative sector is much reduced but several remain such as the Lango Cooperative Union and the system is often mentioned by actors and farmers. There used to be a strong zoning system in Uganda, which according to our study and recent visits still seems to operate at least unofficially, although it remains very much the preserve and discretion of CDO. Collaboration between CDO and
the ginners is supposed to ensure input supply. Competition has now been limited in the different zones to try and ensure better input provision. USAID and ginners are co-funders of the input supply.


Cotton is one of Uganda’s major crop exports. It ranks fourth after coffee, tea and tobacco. Cotton was introduced in Uganda as a cash crop in 1903 and it became Uganda’s major cash crop until the 1950s when it was surpassed by coffee. Cotton production in Uganda is rain-fed. The major cotton producing areas are the Eastern, Northern and West Nile parts of Uganda.

Uganda’s peak cotton production has been recorded as 465,000 bales of lint in 1969/70, while the lowest was 11,000 bales in 1987/88. This drastic decline was attributed to lack of credit and farming inputs, low cottonseed germination percentage, lack of extension services, a poor marketing system and inefficient ginning system. The lint cotton production was 65,000 bales of in 2007, 120,000 in 2008 and 60,000 bales of lint for 2009.

Before 1993, cotton marketing was handled by the Cooperative Movement, which was in charge of internal marketing and processing, while the Lint Marketing Board, a government-owned parastatal then, was in charge of marketing lint externally and seed for planting. Research on cotton was under the Ministry of Agriculture. When the liberalisation policy was introduced in 1993, the marketing and processing aspects were liberalised. This meant that the private sector was allowed to participate and compete with the Cooperative Unions in marketing, processing and export of cotton.
The regulatory functions of overseeing all activities in the cotton industry (e.g., marketing, registration, quality control, seed distribution) were vested in a Statutory Body which is now the Cotton Development Organisation (CDO), which was established in October, 1994.

8.3. Cotton Breeding and Seed Multiplication

From the mid-1960s, two varieties of cotton were grown in Uganda. In order to counteract the degeneration of seed quality which occurred during the period 1971 to 1986, the Ugandan Government initiated a three-year programme funded by IFAD known as the Smallholders Cotton Rehabilitation Project (SCRP) in 1993. The objectives of this program were to re-establish an effective national cotton research programme, reintroduce an effective seed multiplication system and develop an animal traction system.

As a result, Ugandan farmers now grow only BPA cotton stocks, but earlier lines are being maintained purely for research. NaSSARI still holds the mandate to produce breeders and foundation seed. After production of the seed, the breeder passes on the foundation seeds to CDO, which in turn distributes it to segregated areas, where it is grown by farmers as certified planting seed.

Breeding of new cotton varieties, better adapted to Ugandan conditions is in the hands of the National Agricultural Research Organisation (NARO). Seed multiplication takes place in Research Stations and designated segregated areas. The specific research organisation handling cotton is the National Semi-Arid Resources Research Institute (NaSARRI) located in Serere, Eastern Uganda.
Traditional multiplications areas are Kasese and Masindi (western Uganda), and Serere and Soroti District (eastern Uganda). Multiplication centres were also opened up in the districts of Apac, Tororo and Kamuli in an effort to reduce transport costs.

In a recent initiative to curb the devastation caused by the cotton bollworm which can cause crop losses of up to 40%, the government of Uganda approved confined field trials of genetically modified (GM) cotton, the second GM crop to be tried in the country, after bananas. The National Semi-Arid Resources Research Institute (NaSARRI), under the National Agricultural Research Organisation began the Bt cotton trials in Uganda's Kasese district in July 2009. The two-type GM cotton varieties—Herbicide Tolerant (Ht) Cotton and Bacillus thuringiensis (Bt) Cotton are being tested by scientists and they are showing early indicators of pest-resistance and herbicide-tolerance. Ht cotton and Bt cotton has been planted by NaSSARI and the scientists have reported that they have observed herbicide tolerance on Ht cotton and bollworm resistance on Bt cotton.

The Ministry of Agriculture approves the breeding goals and activities on request of CDO. The current breeding goal is to introduce fusarium wilt resistance from foreign varieties. Regulations allow only one cotton variety to be registered for commercial production (except during transition phases from an old to a new variety).

As well as CDO and the MoA, other institutions involved include the Uganda Bureau of Standards, Ministry of Trade and Uganda Investment Authority. The President of Uganda is reported to take a direct interest in the cotton sector. CDO is governed (policy direction is given) by a board of directors consisting of representatives of the ministries of agriculture, trade and finance, NARO (represented by the director of NASARRI, Tom Areke), the oil miller association, the textile miller association, the ginneries and lint exporters (both from UGCEF) and two farmer representatives (nominated by the Ministry of Agriculture), plus the CEO (Jolly Sabune). A new variety is due for release in 2011.
8.3.1. Seed breeding in Uganda

The agronomy department in the CDO headed by Damalie Lubwama organises the distribution of inputs and seeds and the seed treatment in a CDO-owned dressing station. Below her are six field based officers in the six main production areas, aided by some assistants, who organise the seed distribution. Local stores are managed by temporary staff (farmers) who collect data on the amount of planting seed required in each region and hand out the seed to the farmers.

NaSARRI breeds cotton varieties. The senior breeder is also the director of the institute and a board member in the CDO. Research needs are reportedly derived from surveys by the NaSARRI agronomist, but such a survey was last carried out in 1994.

Research needs are now said to be derived by CDO staff through interactions in daily activities. They report these to NaSARRI, through the board. The current breeding goal is to introduce fusarium wilt resistance from foreign varieties (which does not seem to be a farmers' breeding goal).

For commercial production, only one variety is allowed, because in earlier years there had been problems in marketing the cotton because different qualities were mixed up. For breeding, NaSARRI keeps a germplasm collection of around 70 introductions from East and West Africa, India and the USA. There are no measures to maintain genetic purity, as seed is selected out of the harvested cotton. However, most varieties have been grown for 4 years in a row before being replaced by a new release, so such measures are maybe not needed. Only the BPA 2002 variety is still grown because the development of the new fusarium resistant one took longer than usual.

(Summary provided by Louis Bolk Institute, Uganda)

8.4. Seed Distribution

By law, cottonseeds belong to Cotton Development Organisation (CDO), which is responsible for seed procurement and dressing. Although done by ginners, this exercise is supervised by CDO. Seed distribution is handled by CDO officers located in different cotton growing regions of Uganda. Seed distribution in early planting areas ends in July. Distribution to lake planting areas mainly the Kazinga Channel ends in mid-September.

According to CDO\textsuperscript{15}, cottonseed for planting has never been free of cost to the farmer. The cost of seed, processing, packaging and distribution is built into the farmgate price announced by the

\textsuperscript{15} [http://www.foodnet.cgiar.org/scrip/docs&databases/ifpriStudies]
government. The farmers however are not aware of this, so they always claim cottonseed is free and is provided by government.

CDO is the only legal seed supplier, and has “specifically gazetted seed production areas”. Gins in these areas have to keep fixed amounts of the best seed as inspected by CDO for CDO to buy. All seed is delinted and treated against bacterial blight. CDO is “held responsible for the amount of seed crop planted and seed treated, produced and delivered to the Ministry of Agriculture”. CDO is hampered by staff shortages, e.g. only has 7 main field staff.

Low crops are sometimes blamed on lack of seed. Lack of seed is blamed on different factors, among which we find accusations that ginners hoard seed for oil processing, lack of storage, insufficient production and quality control (see for example (Habati, 2009)). But some interviewees blamed CDO staff for the same thing. Cotton in Uganda is very political, and this situation often becomes extreme in the organic cotton sub-sector with CDO interventions preventing buyers from purchasing organic fibre.

One farmer group in the Lira district expressed confusion over the direction of CDO, who are also said to have directed payments for organic and conventional should be the same. The farmers estimate the sector is destabilised by the excessive power of CDO. There is “weak protection of the sector”, farmers say.

Seed distribution begins with farmers registering their needs with CDO who verify information. Seed arrives in the store nearest to farmers' registration point. Farmers in Lira report insufficient seed for the most recent season¹⁷, which was reported by others in the same district in 2008. Some farmers bought seed (which is supposed to be distributed free). Farmers assess previous years as being alright. CDO makes the decisions on seed in the end but farmers believe CDO reduces the number of bags from the request. Each bag has 6kg of seed. “Seed is distributed as late as July” even though it is supposed to arrive in May or June. Thus farmers do tend to save seed. The germination rate reported this year is 75%, and poor yields occurred in 2008 because of poor germination. Seed is

¹⁶ Group discussion LIRA 24-11-2010
¹⁷ Group interview 24-11-2010
commonly recycled, or re-used (i.e. it goes straight back to farmers from ginning rather than fresh seed being bred and put into the system from the separate seed breeding cycle) rather than bred from new foundation seed, which is essential to maintain quality in hybrid seeds: “Seed is recycled unless there is a research”. Each bag contains 3kg of cottonseed and the recommendation is 3 to 5kg per acre.

Prices are volatile and CDO sets base prices according to the world market. Prices vary from 1100, 1200, to 1300 shillings, but some buyers are reported to be paying 1400.

The Lango Cooperative Union at Neaffa ginnery supply delinted seed ready packaged to CDO for distribution. According to LCU there is “always shortage”. CDO is responsible for actual distribution back to farmers.

The Aromo focus group also report late seed supply and that farmers thus save some in case for the next year. Groups are registered with CDO. Seed per hectare is estimated at 30kg per hectare with yields between 600 to 1300 kg. Seed germinated well according to this group. The farmers here would prefer not to buy the seed from CDO. Improvements are needed in distribution and quantity as well as crop finance. Research needs to work on adapted varieties.

One group interviewed (25-11-2010) bring in seed from Zimbabwe (BPA 2002) after farmers pressured CDO. Seed is the government’s mandate. Insufficient seed supply is blamed on a lack of transport. The West Aschow Cooperative Union did their own distribution. They report germination at 75% due to poor storage, and their first planting failed so farmers had to sow again. Poor boll formation is also reported. One farmer reported that he “planted but few seeds germinated so I had to replant” (Opo Martin). Another, Johnson Aboka, said he planted “three seeds per hole as only one will germinate”.

Some farmers report that germination is better than previous years but would prefer to save seed rather than buy again each year. There is a contradiction between farmers reporting payment for seed and officials saying seed is distributed without cost. Farmers recommend the government support a full technical package including equipment, inputs and better seed storage.

Farmers in Uganda currently do not pay cash for cottonseed under the formal process of seed acquisition. Those who buy, do so from the ‘wise’ farmers who get cottonseed, but do not wish to
plant cotton that season. The reason for the informal buying of cottonseed is that some farmers do not get enough seed for the areas they would wish to plant with cotton. Usually one bag of 3kg is given per farmer. The suggestion by some farmers to pay cash for the cottonseed is to give those who wish to get more the opportunity to acquire more.

Ginners sell cottonseed back to CDO. CDO then treat and classify the seed, and multiply to meet the numbers on registrations returned. This should in principle ensure farmers get enough seed. Lead farmers monitor the distribution. Germination should be above 90%, but is often not. Causes again can be reported differently according to sources, with some blaming poor storage of seed by farmers. Problems with seed storage are mentioned by many farmers and respondents as cause of poor germination, while variety is deemed alright. Late arrival and insufficient quantities are also frequently mentioned problems.

One farmer groups say, “the cost of production against the price of seed cotton has reduced cotton farmers from 90% of people in the 1960s to 10-15% now”.

One person even comments, “promoting cotton is promoting poverty” (notes, Nebbi district local staff) when it is not done in the context of ensuring food security.

8.4.1. Stakeholder views: NGOs and service providers

On behalf of TECHNO SERVE, the Programme Director of the cotton program, Mr. Herbert Kirunda, was one of the respondents for this research.

The Government, through CDO, which is the mother body that governs the cotton sector in Uganda, does the seed distribution as stipulated in the Cotton Development Act free of charge to the farmers. This year, variety BPA 2002 was distributed to the farmers. The quality of the seed was not good because this variety has been replanted and distributed to the farmers for the past 2 to 3 years meaning it is the same old seed. Farmers do save seed from the previous stock because of the unpunctuality of the seed distribution.

Challenges include the farmers’ lack of knowledge of how to handle the seed, especially after harvesting. Some of the farmers put salt in the cotton after harvesting to increase the weight of the cotton, this affects the quality of the seed. Also, ginners have selfish interests, for instance the current cotton has got between 30 to 33% ginning outcome. CDO lack seed multiplication sites, which is affecting the volume of seed required for the farmers. Poor quality of seed distributed, for instance this last seed, had a poor resistance to pests and drought. There is poor management of
seed right from the farmer to the delinting stage. Transportation of seed from the ginners to the farmers is difficult and the farmers cannot afford it. For Mr Kirunda,

- There is need for research on seed that is geared to development of more seed varieties, for instance Zimbabwe has got over 10 varieties, Egypt has 8 varieties which means a farmer has the choice to plant seed he/she feels grows best in her areas.

- Distribution of cottonseed should be privatised to address issues of amount distributed and volumes. CDO gets 4 billion Ugandan shillings from the National budget for seed every year. If this money is given to an investor, good seed varieties can be developed instead of having the same poor variety all year round.

- There is need to increase awareness of the farmers on integrating cotton and other rotation crops to increase income diversification and to address food insecurity.

- There is need to build capacity of the farmers in areas of transportation and storage of cotton after harvesting.

The Conservation Cotton initiative (CCI) is an organisation that promotes the farming of organic, conservation-friendly cotton around high biodiversity areas in Uganda, Zambia, and Madagascar. In Uganda, CCI operates in one of the cotton growing areas – Gulu.

The director Mr. Claude Auberson made the following recommendations:

- There is need to breed new varieties of seed that meet the fibre requirements of the textile industries to the benefit of the farmers. Countries like Zimbabwe have good varieties with appropriate fibre length.

- Rogueing\(^{18}\) to remove cotton plants with undesired characteristics

For interviewees in the Louis Bolk Institute, the sector, from an organic perspective, is a cause for concern. Weed management is a big issue, but “seed provision is political”. There is an expectation that Bt will be approved, but amidst continual problems of “consistently late supply of bad germinating seed”. The organic sector would like to manage seed supply itself.

“Often farmers get no or not enough seed because either there was not enough delivered or other farmers collect seed in order to sell it to the others (for around 1000 USH per bag). This misuse is another reason for CDO staff to supply less seed than requested; they assume the requests are exaggerated.”

The CDO does have farmers on its board, but whether they are representative of most farmers is questionable according to some reports. There are different activities to train farmers and guidelines

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18 To rogue – is a technical agriculture term which means pulling out by hand and discarding, unwanted plants (usually the heavily diseased or infested with pests or those which do not look like the desirable crops)
on planting and seed density, but “farmers do not follow those prescriptions because they find the germination too low”\(^{19}\). Problems reported include:

> Especially the insufficient quantities of seed can cause conflicts among farmers to the extent of stealing from neighbouring villages and physical fighting. Farmers do not save seed themselves because they are not allowed to gin themselves and because they want to plant delinted seed (basically easier sowing).”

8.4.2. Stakeholder views: farmers and farm groups

However, Uganda has more problems in cotton than just seed:

> Soil fertility management is a challenge in Uganda – farmers are not used to doing this, the presumption is still that soils are naturally fertile although this is no longer true.”\(^{20}\)

Soil fertility management is a major issue for many respondents in Uganda. Farmers have been used to the idea that soil fertility is good, and so little management is needed. Most interventions are perceived as time consuming and not offering sufficient returns. At best, farmers will practice green manure in the rotation, as long as it is also a food or cash crop.

There has also been a lot of chopping and changing in policy in the cotton sector as well as cotton companies withdrawing often for reasons linked to the global sector and economy. One village leader in 2009 reported that they were virtually abandoned when the ginner supporting them withdrew. They were at that point not even sure any seed would arrive\(^{21}\). This group reported similar problems to those interviewed in 2010 for the present study: late rains, water-logging, low prices, poor seed germination and lack of buyer competition as ginners have area monopolies.

In May 2009, at the Dunavant training centre in Lakwa Parish, Pader district, Patong sub-county, a group of farmers in the Dunavant cotton programme from one of the local primary societies including Justin Adonga, Chairman of the Apoa group, Niero Kalo, Camilo Kiniera (site Coordinator), Alex Ayot (Dunavant office staff), John Langavelis, Janna, Charles Niero (Chairman Pulbaix group), Tao Watts, Pompidus Okidi, Guy Kallos, and Simon Onono, were interviewed.

These farmers are fairly typical of farmers in Lira, but were receiving strong extension support and were satisfied with yields of 975 kilos on 1.25 acres (0.5 hectares) for the best farmers and prices of

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19 LB pc
20 According to Auberson and Tembo interviewed in 2009,
21 Julio Okecha, Kalalo village, ex lead farmer and field officer of the CopCot programme, May 16 2009
800 Shillings per kilo. Dunavant ensure seed distribution of the seed received from CDO, provision of free botanical pesticides, some ox ploughs and a limited mechanical ploughing service. They farmed conventionally before, used pesticides occasionally if distributed by CDO or the local Cooperative Union (LCU). However, almost no chemicals came into the region after 2002, when insecurity drove people into camps. Other crops grown by farmers are: soya, sesame, ground nuts, millet, upland rice, sorghum, maize, cassava, beans, pigeon peas, mangoes, eggplant (aubergine), honey, pineapple, sunflower, citrus, sunflower, cassava and ginger. Livestock levels are low.

Most farmers plant up to 2 acres of cotton, some as much as 4 if they have access to tractor ploughing or oxen. Family labour is most commonly used for work, and group work by the community may take place for bigger tasks like weeding and sowing. Those with more cash income might pay labour. There are women farmers registered.

The cotton sector in Uganda is constrained by different factors according to stakeholders. These constraints include low levels of mechanisation coupled with continued use of the hand hoe for land opening, land fragmentation, high rates of seed wastage during planting, inadequate cotton targeted extension services, and low soil fertility, especially in Eastern Uganda. There is also over dependence on rain-fed production, high production costs without accessible and affordable credit for rural farmers, low capacity of Domestic Value Addition resulting in over dependence on volatile world market prices which determine farmgate prices (95% of Ugandan cotton production is exported), high utility tariffs for cotton processors, dependence of ginners on pre-financing by merchants, which is costly and results in reduced prices to farmers.

8.4.3. Stakeholder views: CDO

The Managing Director and the Board Secretary for CDO (Ms. Jolly Sabune and Mr. Hilary Magunda) contributed that “cottonseed for planting is distributed free of charge to all the cotton farmers in the right quantities as per the information that is registered by our extension staff on the ground. So the seed distributed is per acreage of the farmer and this is done before the planting season to ensure early planting for cotton”.

Cotton prices are set by CDO according to international prices and adjusted according to the qualities and variables within Uganda. The price quoted is a minimum price and may go higher. The price is agreed by the CDO board on which there is a representative from the farmers.

Information is provided to the farmers using radio, and training is also done by extension staff on the ground in areas such as judicious use of pesticides. This involves how to use the chemicals, account for direction of the wind, minimum numbers of sprays, land opening and harvesting.
For CDO, the wish list includes that donors should invest more in the textile industry in Uganda from the spinning stage to garmenting as well as in research on quality of seed. There is need for establishment of more farmer organisations, and investment in production and value addition.

For the CDO representative of the West Nile region, the quality of seed is good with a germination percentage of over 90%. To ensure this high percentage CDO has an in-house testing team which tests the seeds, and viability tests are done with the farmers in the field. The price of cotton is set by ginners based on the world market price and this price is approved by parliamentarians. The CDO board has a farmer’s representative and the director of NaSARRI is also a member of the board. This representative recommends more funding for the cotton sector to allow mechanisation and provide production credit for the farmers.

8.4.4. Stakeholders views: National Semi-Arid Resources Research Institute (NaSARRI)

NaSARRI is one of the Research Institutes under the National Agricultural Research Organisation (NARO). NaSARRI is situated in Serere district, Eastern Uganda, and is mandated to conduct research on crops like cotton, millets, sorghum, groundnuts, Bambara nuts, simsim (sesame), sunflower, cowpeas, pigeon peas and green grams. As a cotton research Institute, NaSARRI breeds cotton for the whole of Uganda. The varieties which are produced as nucleus at Serere are BPA and SATU. The nucleus (foundation) cotton is multiplied to produce foundation seed which is then taken to segregated areas where cotton of a particular variety is produced and ginned. Each of the segregated areas has a ginnery. After ginning by ginners who are contracted by Cotton Development Organisation (CDO), the seeds are treated with synthetic chemicals and distributed to the farmers free of charge at farmers’ cotton stores.

Seed from different segregation areas is not supposed to mix since the cotton grown in that particular segregation area is also ginned there, and seeds are treated and distributed in that particular segregation areas. The researchers recall a particular variety from farmers by collecting and crushing all the seed from all the different segregation areas and introducing a new one from the research centre seed bank. This movement of seed is called the seed wave.

The mixing of different varieties happens when farmers keep seed from the previous season and when buyers buy cotton from different segregation areas.

NaSARRI is conducting research on Bt cotton. Currently Bt Cotton has been planted at the institute in fenced and isolated areas, away from the conventional cotton. Researchers are pro-Bt cotton production because they regard organic practices as costly.
Researchers recommend the following:

1. Currently Bt cotton has not yet been released but the growing of conventional and organic types has not been zoned. Zoning of the country for the production of the different cotton types (organic, conventional and Bt) is necessary to avoid contamination.

2. In past years, all cotton activities were handled in cooperative societies which were in the farmers’ localities. The system was organised as farmers did not have to make long journeys to get seed, sell cotton or receive payment. There is need to restore cooperative societies to allow for proper farmer registration, seed distribution and marketing.

3. The researchers come in contact with the farmers during their monitoring visits to establish the performance of different varieties on-farm, but the farmers do not have the opportunity to select their variety of preference. Farmers could be encouraged to select a variety with different characteristics like early maturing, high yielding, and disease-resistant. Participatory breeding and research was recommended.

4. Researchers should breed and release varieties that meet the needs of customers, for example breeding for cotton of long fibre length that is required by the textile industry.

5. The seed wave has been doing well but there is need to zone production of different cotton types such as organic, conventional and Bt, and for enforcement to regulate the movement of cotton from one segregation area to another to avoid, for example, mixing cotton from Nebbi and Lira which are in different segregation areas.

6. Research on control of the notorious bollworm, which is the major reason for the introduction of Bt cotton. Researchers believe that the Bt cotton will be resistant to bollworm damage.

7. In NaSARRI the same breeders work on the different cotton types. Researchers recommended having different breeders for the different types of cotton namely conventional, organic and Bt to avoid contamination and bias.

8. Ginters should acquire better technologies or skills for delinting the cotton so as to leave the seed bare to avoid wasting that cotton that remains on the seed; to ease seed distribution (weighing, packing) and planting.

9. Cotton price should be improved to motivate the farmers who spend a lot of time and energy in the production process.

8.4.5. Stakeholder views: Farmer Organisations

In this study four farmer organisations from three districts (Lira, Gulu and Nebbi) in northern Uganda participated in the research.

Seed distribution experience with a farmers’ organisation representing 12,000 farmers (Lango Organic Farming Promotion-LOFP)

In district of Lira, cotton is a major cash crop as it contributes about 60% of farmers’ income. For cottonseed distribution, cotton farmers are registered along with the number of acres they plan to plant in the following cotton season. The lists are submitted to CDO who in turn make arrangements for distribution of cottonseeds.
The farmers collect seed from the nearest store, which in this case is 1km away. They receive insufficient seed and the cotton produced is sold in a market 6 to 7 km from their village. The farmers lack proper storage facilities so they store the cotton in grass thatched huts, which could easily catch fire. The farmers in Lira receive 1 bag of seed per acre, yet they feel 2 bags per acre would be better. Each bag contains 3 kg of cottonseed. The viability of the seed is declining over the years in cotton-growing areas. In Lira it is at 70%, while the yield is increasing; previously it was over 85% but the yield was low (the reasons for this were unclear, but could be because more seed is being distributed or the variety has changed). The seed is distributed late and seed distribution is not organised well, so the farmers struggle a lot, leading to abortions in pregnant women. This leads to farmers saving seed. About one-third of the seed is saved for fear of failing to get seed to plant the next season.

Another challenge faced by farmers is the bollworm. The farmers still open their land using hand hoes which is very time consuming, leading to farmers failing to plant on time.

**Gulu (groups under Conservation Cotton Initiative-CCI)**

Cotton is the fourth most important crop in Gulu district, following ground nuts, simsim and beans. In Gulu the farmers receive 1 bag (3kg) of cottonseed per acre, but they feel 4 bags would be better.

One of the reasons given as the cause of the allocated seed not being sufficient is that the seeds stick together and it is not easy for the farmer to separate them. This leads to farmers throwing many seeds in one hole instead of the recommended 5 seeds. When many seeds are planted in one hole, the 3 kg given per acre is not enough.

In Gulu, only one out of every three seeds planted germinates and the cotton growth is mainly vegetative forming a few bolls. Square abortions were rampant and wilting of the cotton plant was observed. The seed for cotton is distributed late.

**Nebbi farmers (groups under West Nile Organic Farmers Organisation)**

The farmers in Nebbi said the seeds are delivered on time and are of good quality. The challenge faced is lack of proper storage facilities, resulting in farmers keeping the cotton in their kitchens and animal houses. The farmers do not save seed; they plant all the seed they receive.
The conventional farmers do not belong to any group. They were individual farmers and they faced challenges similar to the farmers organised in groups.

Cottonseed challenges faced by farmers

The cottonseed that is distributed to the farmers every season is insufficient and this results in farmers:

1. Planting less area than planned
2. Buying from those who received but did not plant their cottonseed
3. Failing to plant the pieces of land that are prepared due to lack of seed
4. Saving seed for fear of not receiving seed the next season thereby disrupting the seed wave in cottonseed production.

Seed is not delivered on time. The best time for planting cotton is May-June, however the seeds are distributed as late as June. Timely planting is a prerequisite for optimum cotton production. Any delay in planting cotton adversely affects cotton yield due to the fact that late planted cotton is always heavily affected by pests.

Seed quality has been declining since 2008. The farmers’ representatives attribute the poor quality to poor storage and harvesting of immature seed. BPA 2002 is the variety that is distributed to the farmers currently.

General challenges faced by farmers are low prices, adverse weather conditions and the high price of pesticides and lack of protective equipment faced by conventional farmers. The farmers’ group representatives made the following recommendations:

- The cottonseed should be delivered early so that farmers can plant on time.
- Acid delinted seeds should be provided to farmers so as to reduce the seed requirement per acre.
- Farmers to be provided with ox-ploughs to hasten the land opening process.
- Need for more ginners to remove monopoly and encourage competition.
- There is need to restore cooperative societies to ease seed distribution and cotton storage and marketing. All these activities were orderly in the former cooperative movements. Cottonseed should be stored properly to improve the viability.
- Farmers need loans to expand their fields.
- Crop financing.
- Research should work with farmers to develop varieties suited to particular regions.
• The government should provide conventional farmers with protective gear to be used while spraying pesticides.

• Farmers should participate in selection of the cotton varieties that are released by researchers and these varieties should be tested in the farmers’ conditions through on-farm research.

• Researchers should breed for varieties resistant to the bollworm.

• To increase the seed supply from 3 to 4 kilos per acre. The 3kg that is recommended is insufficient to plant 1 acre due to poor seed viability.

• To sell the cottonseed at price of 500 (Ugandan shillings) per kilo to encourage farmers to attach value to the seed that they produce and to take care of their cotton to maximise output.

• To put in place a policy on cotton.

• Ginners should be zoned and not allowed free movement to buy cotton from anywhere.

• Support research on organic cotton production. Most of the research has been conducted on conventional cotton production.

• Introduce subsidies for the development of the sector.

8.4.6. Stakeholder views: Ginners

Packwach ginnery and Ngetta ginnery under Lango Cooperative Union

Ginners pass seed to CDO after ginning. The seed is then dressed and packaged by CDO before being distributed to farmers through agents. The bad seed is crushed by the ginners to produce oil.

Challenges faced by Ngetta ginnery include the small cotton supply, irregular power (electricity) supply, and spares for machinery which have to be imported at a high cost. The recommendation is for distribution of seed to be done through primary societies.

8.4.7. Stakeholder views: Government extension services

In the district of Lira, there is no direct working relationship between extension services and the Cotton Development Organisation (CDO). In a new area, CDO register their presence with the district and begin operations but the district extension staff are not involved in the cotton activities. In the study area, there are two CDO officers, one for the West Nile area stationed at Pakwach and one for northern region stationed at Lira.

The district lacked information on cotton production activities as this was in the custody of CDO. The district NAADS Coordinator, Amach, said that farmers are registered by CDO officers and lists submitted to CDO. He said the information he gets from farmers is that seed distributed by CDO is
insufficient, not delivered on time and the farmers are not given any training before or after delivery of the cottonseed.

He said he did not think the farmers could buy the seed if a value was attached to it.

The price of cotton is low and the farmers, who have persisted growing it, know its value as a good rotation crop. Cotton leaves a very good seed bed for finger millet after harvest.

**Nebbi district**

The situation in Nebbi is quite different from the situation in the district of Lira. The seed is of a high quality with a germination percentage of 95-98%. The farmers get enough seed therefore the farmers do not save seed and the seed is delivered on time. The cotton farmers in the district receive trainings on cotton agronomy from lead farmers who are trained by the extension staff. CDO has field officers who conduct trainings and CDO also has a program on Radio Paidha which is a local radio station where activities to do with cotton production are aired.

Cotton production in Nebbi district however, has been going down due to the low profit margin and marketing difficulties experienced by farmers. For example in the 1960s, over 90% of the population was growing cotton, but to date, only an estimated 15-20% of the population still is. The farmers have a marketing problem as the district has only one buyer.

The district lacked data on production volumes and sales as this was in the custody of CDO. According to the district authorities, the farmers experience challenges such as adverse weather conditions (excess rainfall and long drought periods), low cotton prices, poor storage facilities for the lint at the farmer level before marketing and food insecurity among cotton producing farm families.

The recommendations from the extension service staff are:

- To involve district extension workers in cotton activities, for example trainings, especially on agronomic practices and to update districts on cotton production activities.
- There is need to restore cooperative societies to allow for proper farmer registration, seed distribution and marketing.
- To improve the price of cotton to benefit the farmers.
- To avail agronomic and production data to district authorities
8.5. Assessment of cottonseed supply for planting in Uganda

In Uganda, the main actors in cottonseed research, breeding and multiplication are the researchers at the National Semi-Arid Resources Research Institute (NaSARRI). The main actor in cottonseed distribution, regulation and policy is the cotton development organisation (CDO). The cottonseed industry in Uganda is in the hands of the government. The private sector is not involved. There is variation in the quality of seed distributed across the different cotton growing areas; very good in some districts, poor in others. Only conventional seed is distributed to farmers. Farmers do not play an active role in selection of cotton varieties distributed to their areas.

The recommendations to improve the situation of seed supply for planting in Uganda are:

1. Improve communication and sharing of data and information between the CDO and district extension workers, farmers’ organisations and researchers.

2. The country should be zoned for production of the different cotton types (organic, conventional and Bt cotton) so as to avoid contamination and enable co-existence.

3. Cooperative societies should be restored to allow for proper farmer registration, seed distribution and marketing.

4. CDO should increase monitoring to discourage seed recycling by farmers.

5. Delinting methods should be improved to reduce the incidence of seeds sticking together which leads to unnecessary high seed rates.

6. Farmers should be involved in selection of the cotton varieties that are released by researchers and these varieties should be tested in the farmers’ conditions through on-farm research.

Some observers add that that seed supply can work well locally, but fails in other locations. The main impediment is the monopoly by the CDO and lack of accountability. Different interest groups have used negative media campaigns, and pressure through other government bodies to gain the upper hand in disputes which should have been addressed through other means such as multi-stakeholder platforms. Currently, “mismanagement and corruption cannot be avoided”.

Seed supply could be done through private traders and interested farmer organisations, which should be certified and committed to fixed prices by the CDO. Organic farmer organisations should be allowed to omit seed treatment or carry out their own.

A general cotton farmer organisation should be created to represent true farmers in the CDO, react to false media reports, and lobby for a better seed supply. In the meantime, existing farmer organisations should be supported to do lobbying.
In the breeding sector, the variety development has worked well for many years, but now it is financially constrained and dedicated to a breeding goal irrelevant to most farmers (fusarium resistance). Breeding goals should be determined together with farmers or through systematic surveys. Breeders should be allowed to breed more than one variety to give farmers a choice. For example, there could be several varieties all belonging to the BPA type and having the same fibre characteristics (such that there is no export problem), but with different agronomic characteristics. Farmers might even be able to improve seed by themselves.

“It is very unfortunate that the seed system is completely locked up”

9. Summary of main problems facing farmers in seed supply for planting

Regarding the Terms of Reference, the study can make certain conclusions and recommendations.

Farmers in Africa are supplied with seed mostly from domestic research and development, although external supply and technology is now available in South Africa in the shape of GM cotton varieties, and Bt genes from Monsanto have been inserted into Burkina Faso cotton varieties. There is a limited amount of trade in seeds between countries, for example in some countries in Eastern Africa.

The major problems regarding external issues are for African countries to maintain their own capacity in research and seed development while gaining access to new technology. South Africa, for example, has seen its seed market almost entirely taken over by Monsanto/Delta and Pineland. This means that even in the face of pressures to liberalise African governments need to find ways to maintain domestic capacity and competition in seed supply.
Domestically, lack of finance and poor infrastructure are the main problems, leading to low quality seed and a lack of new varieties introduced to cotton sectors. Most farmers have limited choice of seed variety and supplier, although seed remains generally affordable.

The countries studied in depth are fairly representative of the situation in Africa and the types of changes being introduced in most countries.

The major issues are quality, lack of choice, and lack of suppliers and alternative varieties or production systems, rather than cost.

Many reforms are being introduced and many systems seem interesting but most are underfunded with the cotton market itself not able to generate sufficient funds to support the required quality of seed multiplication and distribution or the funding of variety development. Some of the factors causing underfunding are domestic capacity and management, but others are to do with international market prices and volatility. There is simply no long-term stability or security to allow cotton sectors to invest in research, especially long-term research programmes.

The stakeholders in each country should look to ensure sufficient funds are cleared, work together nationally and regionally to develop seed knowledge banks and exchanges and common research structures, and lobby together where possible on international issues.

With reference to the guidance for farmer interviews with which the field interviews were designed.
• Farmers mostly get their seed from cotton companies or state institutions, and in a monopoly situation of one type or another, i.e., a single licensed cotton supplier or a monopoly by a private company or occasionally ginner.

• Seed is often distributed free or cheaply, except in the case of Bt cotton in Burkina Faso, but GM cotton is expensive. Farmers want seed that is affordable, of good quality, with good boll formation and germination rates, and that is adapted to the climate and soils it is planted in.

• Most importantly, farmers want improvements in areas such as access to water and access to means of managing soil fertility and pests more affordably, for example through finance to develop more organic composting across cotton farming regions. Farmers would also like better credit systems. In some cases, farmers are prepared to pay for seed if this might help improve choice and quality.

• Many farmers are not satisfied, and while cost is not necessarily an issue, problems include quality, sufficiency, germination, and lack of choice. Perceptions of decline in quality are common but not universal. Some farmers would like to save seed although many understand that hybrids deteriorate, and would rather have choice over seed supplier or production system. Only in the case of GM seed is subsidy of the cost an issue.

• Regarding messages for consumers of cotton, what farmers would like is more consistent good prices for cotton – more stability.

There are a variety of common problems surfacing across African cotton sectors. In some there are promising results or good premises for reform. It is also clear that there are severe constraints to success and potential improvement, notably over sufficiency of funds generated by the cotton sector to assure long-term investment in research and development. Certainly, there is a need to develop Africa-wide research exchange and investment to attempt to improve the situation. The theoretical basis of the reforms in Benin and Burkina Faso, Tanzania, Kenya and Zambia all suggest potential for delivering results, but the reality is again under-funding and poor delivery in some cases.

The common problems emerging in seed supply to farmers are low investment in seed research and development, the costs of seed to smallholder farmers, low germination rates and poor boll formation, and seeds not always adapting to agronomic conditions, the socio-economic capacity of farmers and climate variability. Farmers are also insufficiently involved in decision making on research directions and policy is also often one-dimensional rather than addressing the different profiles of production in terms of farmers, agro-ecological zones and constraints such as soil, climate and water.

Research sectors in Africa are generally underfunded and driven by short-term agendas rather than long-term research including adaptation to climate, agronomy and farmer needs. The introduction of new external technologies together with neglect and underfunding of domestic and regional research capacity risks increasing dependency on external knowledge and finance, further reducing
African research capacity and leading to a continuing spiral of decline in capacity and performance – with resource-poor farmers the most vulnerable to strategies based only on intensification which are capital and technology intensive. Where technology is introduced, it needs to be in a context where there is sufficient capacity to manage biosafety agendas, educate farmers about the new technology and where other cotton sectors such as organic, Fairtrade, CMiA and others are able to continue to grow and meet the needs of their stakeholders.

Too often, the main issues for farmers (price, costs, climate, soils) are not addressed while the regulatory and governance frameworks are weakened by low funding and capacity.

Stakeholders – both farmers and others agree on the need to introduce and develop new seed varieties that are affordable and adapted to drought, poor soils and still able to raise yields.

10. Critical issues for future of cottonseed development in Africa

There are some very specific issues relating to seed we can point to in Africa, but first, it is also clear that any recommendations and interventions need to take place in a wider strategy that addresses the context of cotton production in Africa and the global challenges faced by the continent.

On a global level, African countries are almost entirely dependent on exports of cotton lint, even as they face ever greater challenges from price volatility, rising costs of production and the impacts of policies in other countries (such as subsidies).

Internally, Africa's cotton sectors have low capitalisation, poor productivity, declining soil fertility and a falling reputation for quality on international markets, thus reducing their ability to try and command premium prices (although some countries are bucking this trend, and other African countries would do well to learn from these).

10.1. The way forward for seed supply for planting

In terms of seed supply for planting, all African countries face challenges from under-funding of research, poor infrastructure, and supply systems with insufficient quality management, leading to low quality seed being delivered to farmers. All too often, policy responses are looking for a quick fix rather than strategic interventions to deal with the wide range of fundamental problems – in some cases, looking for these quick fixes is (sadly)
the only option as there is simply not enough money to spend on addressing the fundamentals.

The major challenge is improving the financing of the cotton sector and of seed research and supply, and maintaining and enhancing national and continental research capacity. This needs to be supported by seed breeding, multiplication and distribution to the highest standards and with top-notch quality control that nevertheless delivers affordable seed for planting to farmers across Africa, many if not most of whom are resource-poor smallholder farmers vulnerable to the tiniest fluctuation in productions costs and market prices.

The returns from the cotton trade are unlikely to be sufficient in the short term even if improvements in the efficiency of the cotton sectors can be achieved. In other words, there is a need for long-term investment in the cotton sectors to address weaknesses as well as in improving seed sectors specifically.

Some important considerations for policy makers concerned must be:

1. To analyse and be critical of Bt and GM cotton claims – there is no such thing as a magic bullet solution and any introductions of new technology need to take place in the context of improving the fundamental performance of seed supply mechanisms. Policy-makers also need to remember that rarely, if ever, do trial results lead to replication of the same results in farmers’ fields.

2. To avoid dependence on external technology and funding. It is critical for cotton sectors to maintain some degree of ability to function independently and not become dependent on external knowledge and suppliers.

3. As well as maintaining national and regional public funding, policy-makers should integrate farmers into planning seed research, and to consult as widely as possible with different categories of farmers as well as other actors such as ginners and traders.

4. Policy makers should also ensure research takes a long-term view including addressing challenges such as water supply, climate variability, soil fertility and even food security impacts of cotton production.

5. For the long term, there needs to be consideration of how to ensure sufficient finance is generated by the cotton trade to support seed research and breeding.

There are some things that are seen to work. A certain amount of central governance and multi-stakeholder oversight along with good research and quality management are pre-requisites, which suggests that reforms, especially reforms with strong liberalisation agendas, need to be introduced with caution. The context of cotton production in Africa is not the same as that in more developed producing regions such as the USA or even Brazil.
10.1.1. Financing seed supply

Many cotton sectors are attempting to use levies on seed cotton or lint to finance their research and development and infrastructure. Clearly, this works well in the United States, where the cotton sector contributes to the funding of the activities of Cotton Inc. in this way.

However, in Africa, it is unlikely that the entire needs of the sector can be financed like this in the short to medium term, and this means that governments and donors are also needed to support the strengthening of the sector. For national governments, ensuring their interests and those of their citizen farmers are met through cotton is essential and worth investing in. It is probably also desirable that regional and continental (i.e., AU, WCA and ESA) trade bodies take a more active interest in the sector, not only with funding but also in encouraging cross-border collaboration and knowledge transfer. Major donors and governments such as the European Union could help finance such initiatives, while international bodies such as the International Cotton Advisory Committee, already involved in supporting the industry could continue to ensure knowledge and technology transfer to Africa is on the global agenda.

Donors should focus on funding African-led research and capacity.

10.1.2. Strategies

Strategy proposals need to be based on a comprehensive analysis of the weaknesses and assets of the cotton sector in different countries, including the seed supply sub-sector, to identify areas for intervention, and then define a priority list for investment addressing issues in a rational and reasoned order – and not just following the latest fashion or big idea. There is no magic bullet solution for chronic problems in the cotton and cottonseed sector. The focus should be on those areas which are in the control of national and regional actors. Those pertaining to the international arena (prices, subsidies) should be addressed separately (and via lobbying as is the case already for some issues such as subsidies).

Farmers are fighting against rising costs of inputs and increasingly variable climatic conditions, and are highly vulnerable to debt linked to the costs of production – yet new innovations like GM seed tend to cost more up front. The interests determining the direction of seed research and development for planting may not always take into account the reality of production conditions and farmer capacity, especially among smallholders. Farmers may not always get the best possible seed because of structural issues with the seed supply system and its quality control, and this may be a higher priority intervention area in the short term.
It is not always clear that addressing seed supply is the right immediate intervention or that introducing new factors such as GM will address the basic problems of low prices, poor production conditions, poor equipment of farmers and poor soil fertility. Yet seed may also be essential to helping cotton farmers maintain and increase production in the face of future challenges such as climate change. The governance of seed development and multiplication needs to balance the short-term demands of actors with the long-term needs of farmers. These needs include resilient seed adapted to climate and agronomic conditions, seed that is affordable and of good quality, that meets the demands of the market, delivers long-term improvements in productivity, can grow in poor soils and is adapted to drought and variable rainfall.

To help farmers make the most of good seed there is a need to support and improve efforts to rebuild soils and ecosystem services in all countries as well as to develop and improve training programmes such as Farmer Field Schools and all types of Integrated Pest Management, Integrated Crop management, and other systems such as Lutte Étagée Ciblée. Expensive as they are, they are proven strategies.

Investments should also be made in improving the capacity of national research in cotton producing countries as well as developing Pan-African research networks to generate economies of scale in research and facilitate knowledge transfer across countries.

The long-term problems of rising costs and unstable prices in cotton need to be addressed as well. Commodity users and consumers need to be educated as to the negative impacts of downwards pressures on prices in an age of resource constraints. This is another clear role for NGOs and donors.

Donors also need to support representation of a broad cross-section of stakeholders in cotton and seed supply and research, including representation of all types of farmers. Supporting farmer organisations is one option, along with more specific programmes such as supporting the costs of farmer participation in national cotton platforms and international fora. Financing participation should include smaller farmers and other minorities as well as female farmers.

Funding is also needed to support blue sky research looking at addressing long-term challenges: adaptation to climate change, water shortages and poor soils.

Seed funding also needs to work on developing suitable varieties for different production systems including organic and low-input systems, CMiA and Better Cotton, supporting small farmers as well as more intensive production systems.
Donor interventions and programmes are often piecemeal and there could be more coordination and communication to enable synergies to develop.

11. Appendix

11.1. List of individuals and organisations consulted

11.1.1. Burkina Faso

- Mr Georg Felber, Helvetas,
- Benjamin Ouedrago, INERA
- Gaspard Vognan, INERA
- Fafona Tiouri, Second Vice President, UNPCB
- Adama Bakonu, Chef services semences SOFITEX
- Sibiry Sou, Adjoint Directeur de production, SOFITEX
- Yalda Ataloz, Chef de service agro-economie, SOFITEX
- Leonce Sanou UNPCB, coordinateur
- Marc Leynaert, Faso Coton
- Francois Traore, farmer

11.1.2. Uganda

- Mrs Jolly Sabune (Managing Director) Cotton Development Organisation
- Mr Hilary Magunda (Board Secretary) Cotton Development Organisation
- Damali, (Agronomist), Cotton Development Organisation
- Robert Anyima, Ngetta Ginnery, Lango Cooperative Union
- Nebbi District Extension office (5 staff)
- Mr Julius, Coordinator, Nebbi District, NAADS
- Dinesh Patel, Ajay Cotton Ltd, Pakwach cotton ginnery
- Herbert Kirunda, Technoserve Ltd
- Claude Auberson, Cotton Conservation Initiative
- Lango Organic Farming Promotion
- National Semi-Arid crops resources research Institute
• Phenix logistics
• Lira District extension workers
• Mr Bo van Elzakker, Louis Bolk Institute
• Sara Preissel, Louis Bolk Institute

11.1.3. Other
• Silvere Tovignan, Textile Exchange, Benin
• Sulemana Stevenson, CAPSARD, Ghana
• Rafiq Chaudry, ICAC
• Christoph Kaut, Aid by Trade Foundation
• Edward Wambugu, Traidcraft Kenya
• Hein Schroder, Cotton South Africa
• Mark Bennett, Tanzania Cotton Board
• Willy Douma, Hivos, The Netherlands

11.2. Guidance questionnaire for study

11.2.1. Part 1. Respondent profile

| Name |
| Job title and role |
| Organisation name |
| Organisation roles/activities |
| Organisation type: State, parastatal, private company, NGO, farmer organisation, |
| Is cotton the main business of the organisation? Can you give any information on turnover, cotton turnover, staff, etc.? |
### 11.2.2. Part 2. Legal and institutional framework of seed sector (policy, regulation, laws, governing bodies)

1. What are main laws and regulations covering the supply of cottonseed to farmers? What do they say and how do they work?

2. What are the laws and regulations covering research and breeding of appropriate seed varieties for planting?

3. Which government or other bodies are responsible for policy and law in these areas? What is your relationship to these bodies? How do you influence these decisions? Does government or its institutions take an active role in breeding, research and distribution of planting seed? How does the policy and decision making process work?

4. Which are the bodies that approve varieties, and what criteria are used to approve varieties? What decision making processes exist?

### 11.2.3. Part 3. Functioning and operation of the seed sector

#### A. Organisations in the sector

1. Which are the main organisations in the farm cottonseed supply sector, and what are their roles? (including public and private sector as well as local and international businesses)?

#### B. Research and breeding

- Who is responsible for seed research and variety development? Who determines research and research parameters of seed for farming?
- Is there enough variety of seed choice and genetic base for future breeding and supply? Who maintains genetic purity of an approved variety? Does the breeder remain involved?
- Is there competition among researchers, breeders and suppliers?

#### C. Seed Multiplication

i. Who is responsible for cottonseed multiplication of planting seed? Can you describe the process?

ii. What treatments are given to seed for planting? For example, how is it delinted, is it treated with fungicides or insecticides? Are there cost implications to this or implications for farmers growing in certified production systems?

iii. How much seed is certified and registered? How much is from the gin and how much from breeding? What implications does this have for farmers wanting to grow cotton? Is the decision making process ensuring sufficient seed for all the farmers? Is there a reserve against problems...
iv. Who monitors the quality, timeliness and good functioning of cottonseed supply for planting? Who is responsible for monitoring, visiting fields, checking storage and monitoring seed there and at the gin? Who checks packing and sale of seed to farmers?

E. Distribution and trade

- Who is responsible for ensuring seed gets to farmers? Is this a public or private activity?
- Is there a multiple choice of seeds and seed suppliers for farmers?

F. Finance

- How is the cotton supply sector financed?

11.2.4. Part 4. Seed supply and farmers

- How are farmers and their organisations and representatives involved in the sector, such as through consultation or representation on decision making bodies?
- Do farmer organisations participate in distribution?
- What varieties of cottonseed are available for farmers to choose from? What are the characteristics? Do farmers get a choice on what seed to plant? For example, do they get a choice of seed adapted to their farming technique (e.g., organic, Fairtrade, GM, etc.)?
- Are farmers obliged to accept a technical package and/or loan package with the seed?
- Do farmers receive technical support, advice, planting and sowing instructions?
- In your experience, are farmers generally satisfied with the seed they receive and the delivery system? For example is seed delivered on time? Does it germinate well and give a good yield given all other factors are also in order? Can farmers save seed? Are there any other factors to take into account or problems that farmers face?

7. Are seeds for farmers generally affordable? Do farmers receive any help to meet cost of seeds (e.g., loans or subsidies)?

11.2.5. Part 5. Assessment of strengths and weaknesses

- Is seed supply working? Can you give examples of good practice and/or examples of how the current seed supply system works and delivers good results for all participants in the sector including farmers?
- Are there restrictive trade practices or policies in entering the seed market? e.g., favouring one type of production system or seed variety or technology?
• Is any one company or group holding a monopoly or other strong-hold over the market?
• How long has system been in place, and what was it like before?
• What measures exist for remedies and correction in case of any sector failures?
• What are the main strengths and weaknesses of seed supply to farmers? What works well and where are there challenges? What are the main issues impeding or enhancing seed supply to farmers? What are your recommendations or wishes for the future?

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