



Six Years of Successful Bt Cotton Cultivation in Burkina Faso



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Introduction

Burkina Faso is a landlocked country in West Africa, with an area of 274,200 square kilometres (160,000 sq mi) and an estimated population of slightly over 17.8 million (index mundi, 2013). A former colony of the French, the country acquired its independence in 1960. Formerly called the Republic of Upper Volta, it was renamed Burkina Faso by its fifth president, President Thomas Sankara. Burkina Faso means “The land of honest people” in Mooré and Dioula, the main native languages of the country. The country is bordered by Mali to the north, Niger to the east, Benin to the southeast, Togo and Ghana to the south and Ivory Coast (Cote d’Ivoire) to the southwest. The geography of Burkina Faso is mostly flat savannah with access to three principal rivers: The Black, Red and White Voltas.

Burkina Faso is one of the world’s poorest countries: According to the United Nations Development Programme’s 2012 Human Development Index the country was ranked 183 out of 187. The country has one of the lowest GDP per capita in the world, estimated at \$1,400: In 2012 about 45 % of the population lived on less than \$1.25 per day.

Agriculture

Agriculture contributes 33 % to the country’s GDP of \$10.4 billion, corresponding to \$3.4 billion and employs 90 % of the working population. The total arable land is 5.7 million hectares. Majority of the people are engaged in rearing livestock although in the south and southwest regions, crops such as sorghum, pearl millet, maize, peanuts, sesame grain, cowpea, rice and cotton are grown. This sector is hampered by harsh climatic conditions, frequent droughts and poor soil conditions.

Cotton, mainly grown in the Southwest region (Figure 1), is Burkina Faso’s principal cash crop generating over \$300 million in annual revenues. It has traditionally been a major foreign exchange earner constituting 52 % of the total country’s exports over the period 1995-2000 (Maninski, 2007). More than 3.5 million people depend on cotton for subsistence. The country has recently made considerable technological and financial advances in the cotton sub-sector, including investments in research on Bt cotton, which has increased the quantity of cotton produced. With a production of cotton seed exceeding 600,000 kgs, per year, Burkina Faso is now classified as one of the largest cotton producers in the West African region.

Fig 1. Geographical map of Burkina Faso with major cotton growing regions



*Main cotton growing regions in Burkina Faso: (1) N'dorola, Kenedougou, (2) Banfora, Comoe, (3) Bobo-Dioulasso, Houet, (4) Diebougou, Bougouriba, (5) Hounde, Tuy, (6) Dedougou, Mouhoun, (7) Koudougou, Boulkiemde.

Source: Compiled by ISAAA, 2009

The Cotton Sub-sector

The cotton industry in Burkina Faso has shown impressive growth over the last ten years. This is mainly due to various policy reforms including successful privatization efforts. In 2004 the cotton industry underwent changes aimed at streamlining the sector to safeguard interest of all players and increase production. Previously, the industry was monopolized by a parastatal, SOFITEX (Textile Fibres Company of Burkina). In 2004, two new private cotton companies, SOCOMA (Gourma Cotton Company) and FASO COTON were granted authority to operate in two exclusive geographic zones. SOFITEX withdrew from those zones and remained in the West, with 20 provinces; SOCOMA in the East, with six provinces and FASO COTON in the central region, with 12 provinces. The responsibility for coordination of the sector was taken up by the Inter-Professional Cotton Association of Burkina (AICB) comprised of the national farmers' and ginners' associations. (ICAC 2013, Cotton Sector Reform in CFA Zones).

In order to defend their common interests and harness their efforts, the three companies created the Professional Association of Burkina Cotton Companies (APROCOB) in 2006. In the same breath, the cotton farmers joined forces with the National Union of Burkina Cotton Farmers (UNPCB) in order to enhance their farming activities.

Cotton producers have administrative roles in the three companies (SOFITEX, SOCOMA and FASO COTTON). They hold capital shares in each of the three companies and participate as shareholders on AICB's Board of Directors, thereby having a better understanding of the difficulties faced by the cotton sub-sector. Farmers' shares in the three companies are as follows: 30 % of SOFITEX, 13 % of SOCOMA, and 13 % of FASO COTTON. (ICAC 2013, Cotton Sector Reform in CFA Zones). The government of Burkina Faso oversees the functioning of the sector through the Permanent Secretariat for Monitoring of Cotton Sector Liberalized (SP-SFCL), under the Ministry of Industry, Commerce and Handicrafts.

The union of cotton growers has a membership of 350,000 farmers and is headed by a president. UNPCB members organize themselves into smaller units called GPCs (Groupement de Producteurs de Cotton) at provincial level. The country has a total of 9,000 GPCs. Each GPC negotiates for inputs and credit from the cotton companies.

Ginning is done by the three cotton companies. These companies finance 50 % of the costs of the inputs, distribute seed, provide agronomic advice and at harvest pay the farmer at a price linked to the world price.

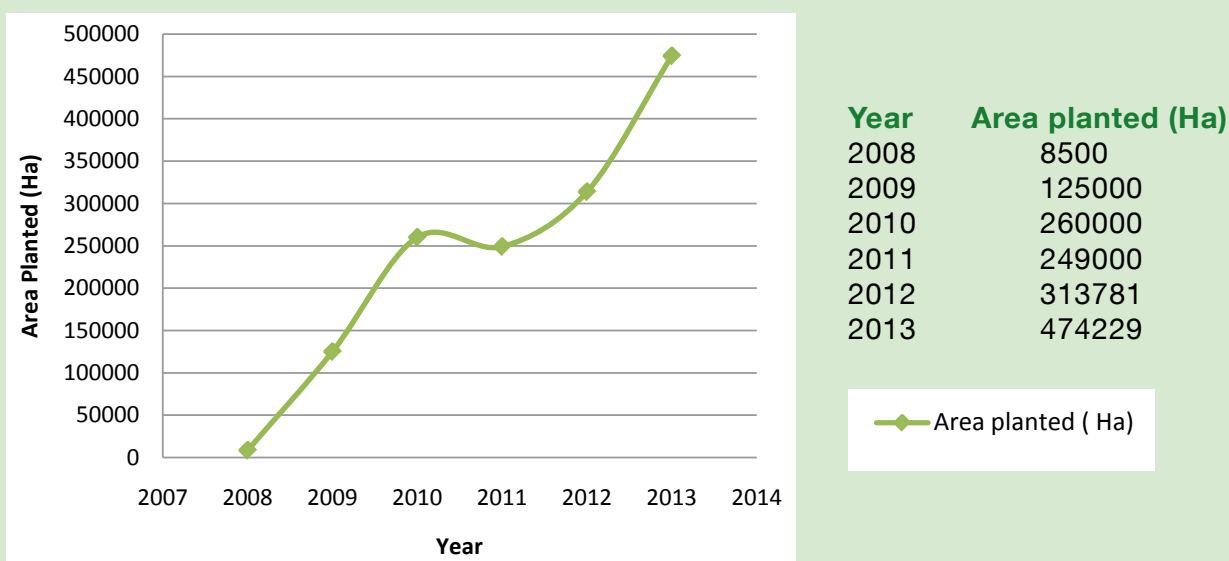
Biotech/GM Cotton Production

The year 2013 was the sixth year of commercialization of Bt cotton in Burkina Faso. Out of a total of 690,971 hectares planted with cotton in the country, 474,229 or 68.6 % were planted to Bt cotton (BGII). This was a hectare increase of 51 % from 313,781 hectares in 2012 (James, 2013). Based on average cotton holding of 3.16 hectares, the number of Burkinabe farmers growing Bt cotton in 2013 was slightly over 150,000.

Biotech cotton/GM cotton was adopted in Burkina Faso after a lengthy quest for a solution to the pests' infestation in the country and the West African region at large. Since 1980, application of binary insecticides containing both pyrethroids and organophosphates had been the best way to control caterpillar damage in West Africa. However, from 1995-1996, such applications were not fully successful in controlling insect pests, particularly the bollworms (Martin et al., 2000). This led to increased insecticides application by cotton growers in the region. The consequences were higher production costs and adverse effects on human health and environment. Several studies were carried out by the Cotton Research Programme from the Institut de l'Environnement et de Recherches Agricoles (INERA) to determine the extent of bollworms resistance to insecticides used in the country. The studies demonstrated the resistance of different strains of bollworms to various insecticides, notably the pyrethroids (Omer et al., 2009).

In 2003, the government started exploring the use of biotechnology as a tool to address this pest resistance problem. Research in laboratories, confined fields and with farmers showed efficacy of the Bt gene against the different strains of bollworms but not for piercing and sucking insects such as aphids, cotton strainers and white flies. This success led to an agreement with Monsanto, to transform one of the local commercial varieties with the Bt gene. Planting at commercial scale started in 2008, where 4,300 farmers planted 8,500 hectares of Bt cotton. From then on, Bt cotton was adopted by an increasing number of farmers and its acreage has increased over the last six years (Figure 2).

Figure 2. Bt cotton adoption in Burkina Faso 2008 to 2013



Social / Economic Benefits of Bt Cotton

The onset of commercial cultivation of Bt cotton in Burkina Faso in 2008 marked a significant turning point in the country's cotton sub-sector. Cotton production in the country had gone down to almost 50 % before Bt cotton was commercialized (Index Mundi, 2013). According to a 2014 report by the International Monetary Fund, the development and use of Bt cotton in the country has significantly improved productivity by more than 18.2 % compared to conventional varieties.

The benefits of Bt cotton are hinged on the efficacy of the gene to fight cotton pests—chiefly the bollworms. The significant reduction of sprays from a minimum of six sprays within the three to four months of the growing phase of conventional cotton, to two sprays applied at the end of the growth phase has proved to be the main incentive for adoption by many cotton growers. It is estimated that Bt cotton has the potential to generate an economic benefit of up to \$70 million per year for Burkina Faso. The 2012 data on benefits from Bt cotton in 2012 includes an average yield increase of almost 20 %, labor and insecticide savings, which resulted in a net gain of about \$95 per hectare compared with conventional cotton. Benefits were consistent across farm types and geographical zones. Bt cotton farmers captured 53 % of the total benefits in 2009, 66 % in 2010 and 67 % in 2011. As reported by Burkina National Cotton Producers Union (UNPCB), cotton production in the country increased by 57.5 % in 2012, and the country obtained more than \$1 billion from the sale of the crop in 2012. The government reported 630,000 tons of seed cotton from the 2012/2013 planting, a 52 % increase from 2011/2012 (James, 2013).

The Biosafety Regulatory Framework

Development and application of biotechnology in a safe and sustainable manner remains a subject of considerable debate worldwide. Burkina Faso ratified the Cartagena Protocol on Biodiversity on April 25, 2003. The Protocol seeks to protect biodiversity from the potential risks that may be derived from living modified organisms (LMOs) resulting from modern biotechnology.

Research on Bt cotton in Burkina Faso begun in 2003—under a presidential decree—as a signatory to the protocol. The country put in place its own regulatory framework. It developed a policy on biotechnology and biosafety that enabled development of regulations and guidelines on GM crops, which were adopted in June 2004. The Biosafety law was passed in 2006. A National Biosafety Authority was established after the passing of the biosafety law as the competent authority which determines the terms and conditions for use of GMO and their products except pharmaceuticals. The Authority operates within the Ministry of Environment and works with two advisory boards: The National Biosafety Scientific Committee and the National Biosafety Observatory.

Other on-going Research on Crop Biotechnology

Institut de l'Environnement et de Recherches Agricoles (INERA) is undertaking biotechnology research activities to improve sorghum and cowpea. The research on cowpea is aimed at developing pod-borer resistant varieties that will yield 20 % more than the conventional cowpea. The GM varieties are in the fourth confined field trial stage and are showing promising successful results. The cowpea project is a public-private partnership coordinated by the African Agricultural Technology Foundation (AATF) and INERA with the goal of enhancing food security to an estimated eight million farmers and their families in the region.

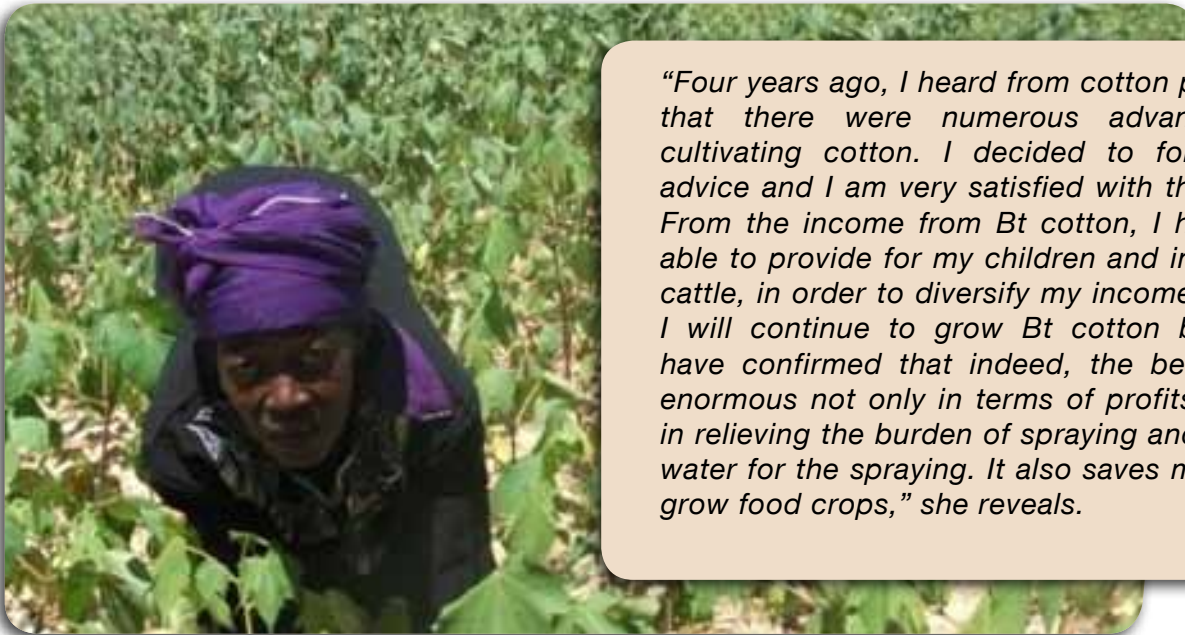
The Bio-fortified sorghum is a biotech crop that will contain essential nutrients, especially lysine, vitamin A, iron and zinc is another public-private partnership project at INERA. The project is being coordinated by the Africa Harvest Biotechnology Foundation International.

Farmers' Testimonies

Farmer testimonies offer the best and most honest assessment of the benefits of agricultural innovations like Bt cotton. Mrs. Azeta Kinda and Mr. Coulibaly Tankelé, the two Burkinabe farmers featured in this brief, offer insights into why many farmers have opted to grow Bt cotton in Burkina Faso. Table 2 summarizes these and other documented benefits from Bt cotton farming.

Mrs. Azèta Kinda, Farmer from Binsboubou town, Bazèga Province, Central Burkina Faso.

Mrs. Azèta Kinda owns a one-hectare farm on which she cultivates Bt cotton. The year 2013 marked her fourth successive year cultivating Bt cotton. For this mother of five, Bt cotton cultivation has profoundly increased her income and opened up new opportunities for her to diversify her agriculture to include cattle rearing and growing food crops.

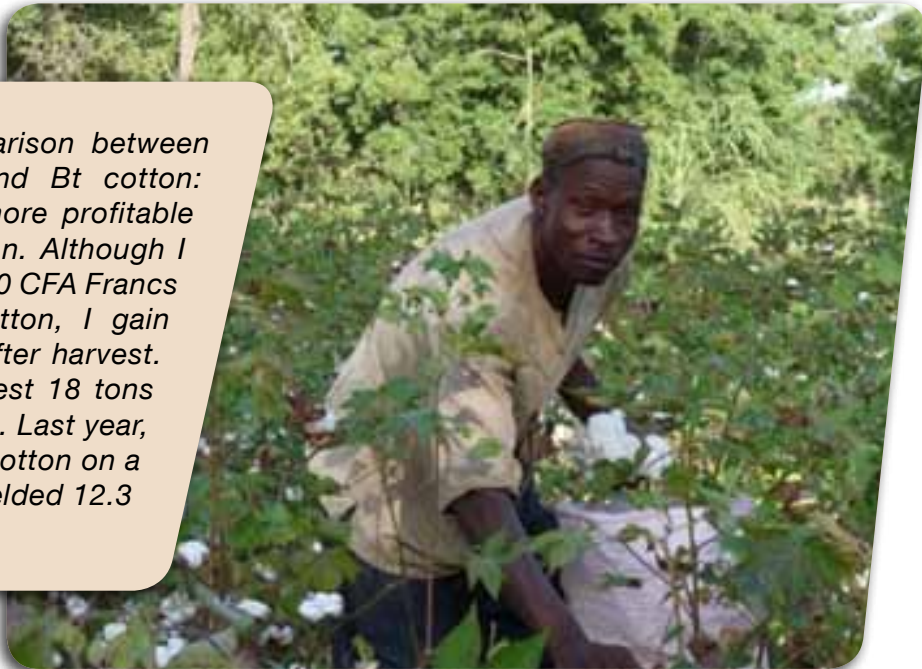


“Four years ago, I heard from cotton promoters that there were numerous advantages in cultivating cotton. I decided to follow their advice and I am very satisfied with the results. From the income from Bt cotton, I have been able to provide for my children and invested in cattle, in order to diversify my income sources. I will continue to grow Bt cotton because I have confirmed that indeed, the benefits are enormous not only in terms of profits but also in relieving the burden of spraying and fetching water for the spraying. It also saves me time to grow food crops,” she reveals.

Mrs. Kinda in her farm

Mr. Coulibaly Tankelé, from Dissankuy village in Solenzo, Western Burkina Faso

Ever since he Tankelé started cultivating Bt cotton in 2011, Tankele’s income from cotton farming has nearly doubled and the living standards of his family consequently improved significantly. The father of five notes that income from Bt cotton has enabled him to pay his children’s school fee as well as cater for seven others from his extended family.



“I have made a comparison between conventional cotton and Bt cotton: For me, Bt cotton is more profitable than conventional cotton. Although I spend an additional 5000 CFA Francs per hectare for Bt cotton, I gain much more than that after harvest. I am expecting to harvest 18 tons from my 14 hectare plot. Last year, I planted conventional cotton on a 15 ha plot and it only yielded 12.3 tons,” he said.

Mr Coulibaly Tankelé in his farm

Table 1. Summary of benefits from growing biotech cotton in Burkina Faso

Attributes	Description
Improved health	<ul style="list-style-type: none"> The reduced number of sprays (from 6 to 2) ensures that farmers have reduced incidences of discomfort including body odor, itchiness, painful eyes, colds, abdominal bloating and skin lesions due to exposure to the chemicals.
Increased yields	<ul style="list-style-type: none"> Bt cotton carries more capsules of cotton and therefore gives an increased yield
Quality of cotton	<ul style="list-style-type: none"> The cotton fiber is more elastic, strong and impeccably white
Increased incomes	<ul style="list-style-type: none"> The increased income from Bt cotton enables farmers and their families to afford better healthcare, education, farm equipment, better housing as well as be able to diversify their sources of income by venturing to other agricultural endeavors like cattle rearing
Time gain	<ul style="list-style-type: none"> The time gained from reduced spraying has been invested in the production of more crops and other family social engagements.
Reduced labor	<ul style="list-style-type: none"> Farmers were relieved from walking 60-90km/ha while spraying with a heavy container full of pesticides on the back. Women and children were relieved from walking miles to go fetch water for the spray.
Impact on the environment	<ul style="list-style-type: none"> Reduced volumes of insecticides applied to land Reduction of water volumes used Reduction of environmental pollution (surface water, groundwater etc.) Reduced risk towards beneficial insects and non-target organisms

Experiences and Future Perspectives

International market prices- This is one of the major challenges facing cotton farmers globally. The decision to or not to plant cotton by farmers in Burkina Faso usually depends on the price they will get after harvest. This usually has consequences on how many farmers plant cotton (both conventional and genetically modified) each year. However, the interests of the farmer and other stakeholders in the cotton industry in the country are well-looked-after by the local Inter-Professional Cotton Association of Burkina (AICB). The Association manages the Inter-professional agreement to ensure its enforcement, including the setting of the purchase price; quality standards for seed cotton; determining conditions for the transfer of agricultural inputs to farmers and overseeing common management functions such as research and the classification of fibre (ICAC 2013, Cotton Sector Reform in CFA Zones).

Stewardship and extension – Maintaining Bt cotton's resistance to the bollworm is emerging as a challenge in countries that have grown the crop for many years. In Burkina Faso, the three cotton companies are charged with the responsibility of ensuring farmers maintain good stewardship in the management of the crop. This includes following the recommended husbandry practices such as weeding and ensuring the mandatory pesticides spraying regimes towards the end of the growing season are adhered to. In addition to maintaining 20 % of cotton area on conventional varieties, research is looking into other alternative refugia crops.

IPR issues- The perceptions peddled by biotech opponents that multinationals are dominating African agriculture and taking all the benefits could be a hindrance to continued adoption of Bt cotton by Burkina Faso farmers. To prevent the perpetuation of this perception, there is an existing arrangement on how the benefits are shared among cotton companies and farmers. This is done by dividing the value of increased yield plus savings in insecticide sprays (considered as gross income) into three parts: Two-thirds remain with the farmer with the remaining one-third shared between the technology owner and the company that provides the planting seeds. Thus most of the gain goes to the farmers.

Cotton remains a powerful tool for development in Burkina Faso. The sector has experienced tremendous improvement due to the reforms in the cotton sector, and most especially, with the introduction of Bt cotton, which has placed the country among the leading cotton producers on the continent. The country serves as an example to its neighbouring countries in terms of developing and implementing a workable biosafety framework that is facilitating adoption of biotech crops. Various initiatives in the ECOWAS/WAEMU regions are on-going to look into possibilities of harmonizing their biosafety regimes into affordable, workable frameworks.

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