



**Frequently Asked
Questions on Bt Cotton
in Kenya**



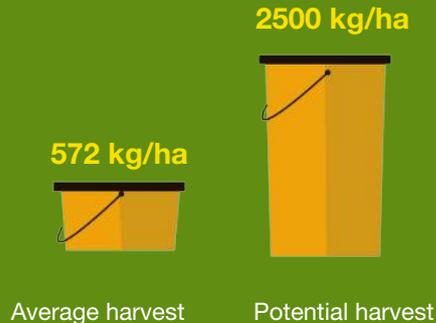
Frequently Asked Questions on Bt Cotton

The Kenyan government has identified cotton as a key driver towards expansion of the manufacturing sector, one of the Big Four Action Plan. Cotton is a multi-purpose crop with lint and seeds being the principal products. However, cotton yields remain low, with the annual production recorded at 25,000 bales (as of 2017) against a potential of 700,000. The main challenge is pest infestation which has reduced the average harvest of cotton lint and seed to 211 kg/ha and 572 kg/ha respectively, compared to a potential of about 925 kg/ha cotton lint and 2500 kg/ha cotton seed. Pest control takes on average 45% of all production costs, presenting a major constraint that largely contributed to the collapse of the cotton sub-sector. Modern biotechnology, specifically Bt cotton, offers a viable contribution to address this challenge. This booklet provides basic information on Bt cotton and addresses some of the frequently asked questions on the genetically modified cotton.

COTTON LINT



COTTON SEED



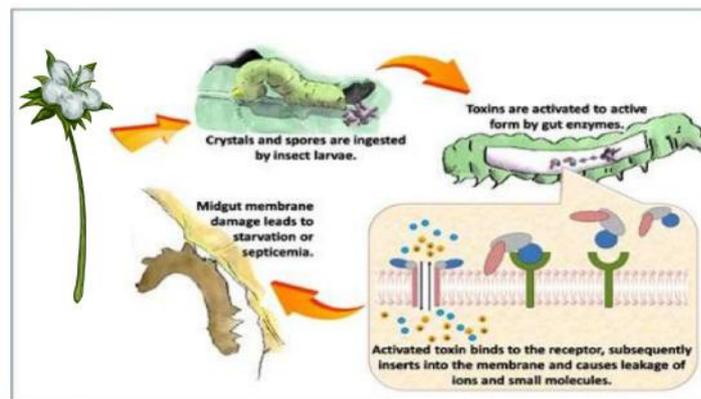
Pest control takes
45%
of all production costs

1. What is Bt cotton?

Bt cotton is a cotton variety that has an in-built mechanism to protect itself from caterpillar pests, also commonly known as the bollworm. This protection comes from a scientific process known as genetic modification (GM). The in-built mechanism is from a common soil bacterium also known as Bt, which stands for *Bacillus thuringiensis*.

2. How does Bt work?

Bt produces a protein that is harmful to the digestive system of a caterpillar pest. When the caterpillar feeds on the Bt cotton plant, its digestive system is weakened, making it unable to feed and it eventually dies. The mode of action works the same way in maize, cowpea and other crops. Bt is very specific and not harmful to humans and other animals. It has been used in organic farming as a spray for over 50 years to control insect pests.



3. Why is Bt cotton needed in Kenya?

The Kenyan government, through its Big Four Action Plan, is banking on Bt cotton to create 50,000 jobs and generate Sh20 billion in apparel export earnings per year. Cotton production has remained very low due to numerous challenges in the country, key among them pests and low quality seed. Introduction of Bt cotton will address some of these challenges.

4. What are the advantages of Bt cotton over conventional cotton?

Bt cotton protects itself from damage by the African bollworm.

This reduces the number of sprays needed from 12 per season, to about 3-4 per season.

This reduction in number of sprays is beneficial to human health and the environment.

The reduced costs associated with bollworm control will also increase farmers' returns, improving their well-being.

In addition, Bt cotton varieties can reach their maximum yield potential because the initial bolls, which are the greatest contributor to overall yield, are protected from insect damage.



5. Is Bt cotton safe for humans and animals?

Bt cotton has a history of safe use, having been in the market for over two decades. The crop's safety evaluation will be done according to international scientific standards. These standards are accepted by credible bodies such as World Health Organization (WHO) and Food and Agricultural Organization (FAO). The National Biosafety Authority (NBA), as mandated by the Biosafety Act No.2 of 2009, having reviewed and verified the results, gave a limited approval for open field cultivation of Bt cotton.

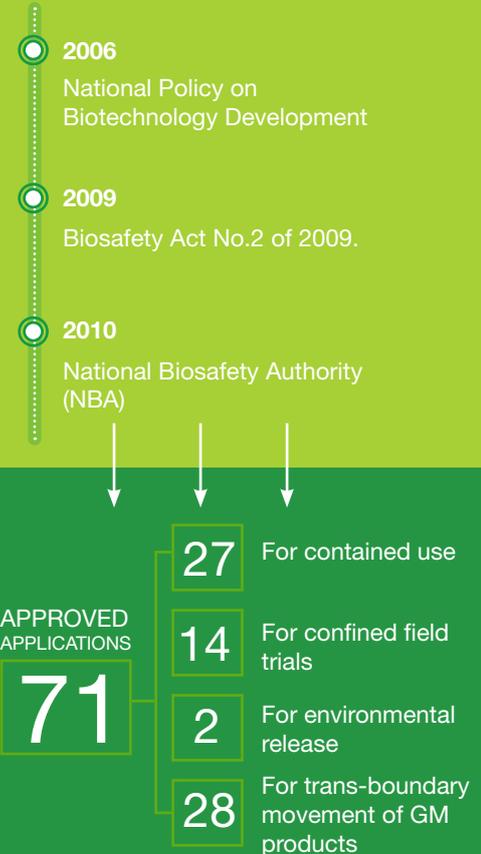
6. Is Bt cotton safe for the environment?

In Bt cotton, the protein harmful to caterpillars is very specific and does not affect non-target organisms. The Bt traits are also evaluated to ensure that they do not negatively affect the ecosystem. Moreover, reduced pesticide application associated with planting Bt cotton is beneficial to the environment. Overall, there are no known negative impacts of Bt cotton on the environment relative to conventional cotton.

7. Does Kenya have the capacity to regulate Bt cotton?

Kenya has the requisite framework for regulating GM crops in general. The country has a National Policy on Biotechnology Development, 2006. The policy charts a vision towards the development and safe application of the technology. In 2009, the country enacted its biosafety legislation - Biosafety Act No.2 of 2009. The Act lays down legal and institutional frameworks for governing modern biotechnology. It paved way for establishment of the National Biosafety Authority (NBA) which was officially inaugurated in 2010. The Authority is mandated to conduct overall supervision and monitoring of GM crops under research, cultivation and in the market. The Authority works closely with eight (8) other regulatory agencies. As of March 2018, the Authority had reviewed and approved a total of 71 applications: 27 for contained use, 14 for confined field trials, 2 for environmental release and 28 for trans-boundary movement of GM products for humanitarian assistance and relief supplies.

Bt cotton regulation



95%
of cotton is
self-pollinated

8. What will happen to conventional cotton varieties after introduction of Bt cotton?

Cotton is 95% self-pollinated, greatly reducing the chances of Bt cotton crossing with conventional cotton varieties. To conserve conventional varieties, the county has a national gene bank, a repository where biological material is collected, stored, catalogued and made available for redistribution. The main role of this gene bank is to preserve crop genetic diversity, in the form of seeds or cuttings in the case of plants reproduced vegetatively. This material, together with associated information can be made available for future use in research and plant breeding. Therefore, conventional cotton varieties can be regenerated whenever necessary.

9. How will Bt cotton benefit Kenyan farmers?



The new insect-protected cotton varieties will provide better seed choices to farmers and help them produce improved yields by reducing losses incurred by pest damage.



Bt cotton will also reduce labour and farm input costs by helping farmers who have no access to pesticides to control the African bollworm and protect their yields.



Bt cotton will reduce pesticide use, which will be beneficial to both the environment and human health.



A more reliable harvest will give farmers additional confidence to invest in their farms and improve their farming practices, as well as their well-being.



This type of smart farming has been shown to attract young people in countries where Bt cotton has been adopted.

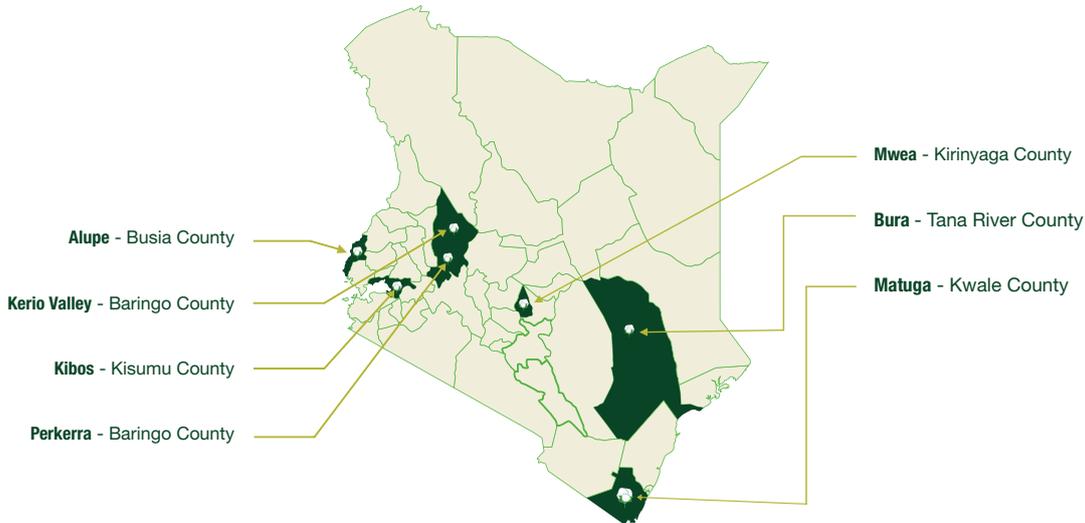
10. When will farmers in Kenya access Bt cotton varieties?

The government has put in place an ambitious plan to commercialize Bt cotton by 2020. In September 2016, NBA granted conditional approval of Bt cotton. The approval is part of a routine regulated research process in line with national policies and laws.

In 2017, a Government-led Bt cotton commercialization taskforce was constituted. The taskforce, which comprises all the regulatory agencies, is mandated with the responsibility of overseeing successful implementation of the Bt cotton program. The initial phase entails planting of Bt cotton National Performance Trials (NPTs), under the supervision of Kenya Plant Health Inspectorate Service (KEPHIS), one of the eight (8) regulatory agencies working with NBA. The trials are designed to test new plant varieties for performance in different agro-ecological zones, compared to varieties currently on the market. Upon successful completion of the NPTs, the NBA will approve placement on the market of Bt cotton varieties. Farmers will be able to access seed through appointed seed companies, the standard practice for all hybrid seeds in the country.

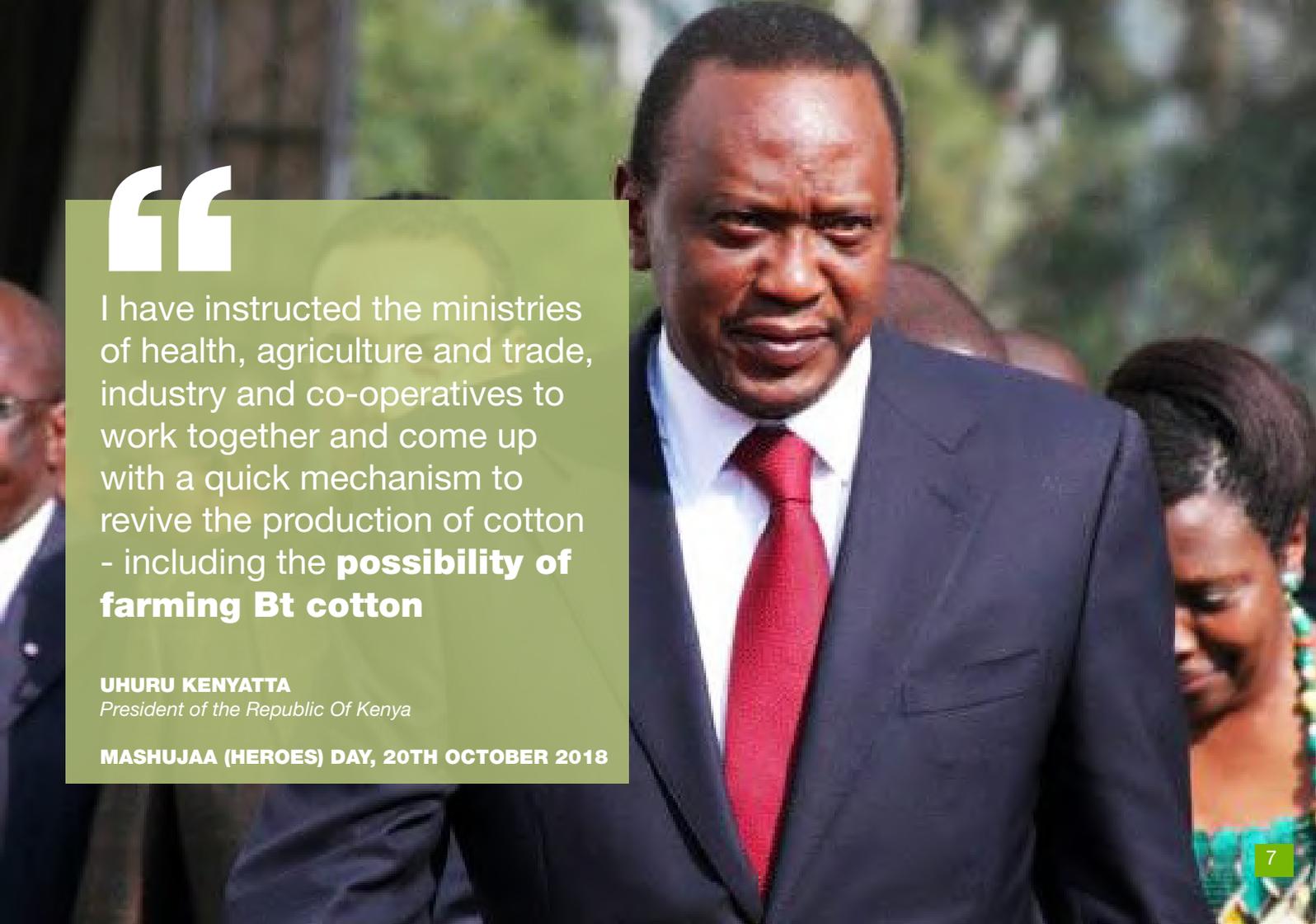


NPT Sites for Bt Cotton



11. How will Bt cotton be availed to farmers?

Bt cotton seeds will be produced locally through local participatory breeding programs. With cost reduction from reduced pesticide use, Bt cotton seeds will be affordable to farmers.



“

I have instructed the ministries of health, agriculture and trade, industry and co-operatives to work together and come up with a quick mechanism to revive the production of cotton - including the **possibility of farming Bt cotton**

UHURU KENYATTA

President of the Republic Of Kenya

MASHUJAA (HEROES) DAY, 20TH OCTOBER 2018

12. Are Bt cotton products already in use?



Bt cotton was first commercialized in 1996 in the United States.

14 countries —
grew biotech cotton in 2016

COUNTRIES GROWING MORE THAN 1 MILLION HECTARES OF BIOTECH COTTON

India
10.8 million

USA
3.7 million

Pakistan
2.9 million

China
2.8 million

3 out of the 4 leading countries are developing countries

(Based on International Service for the Acquisition of Agri-biotech Applications (ISAAA) Global status report on biotech crops)

AREA PLANTED WITH COTTON 2016

Total area

35 million
hectares

Biotech

22.3 million
hectares

64%

of global cotton is genetically modified (GM) cotton.

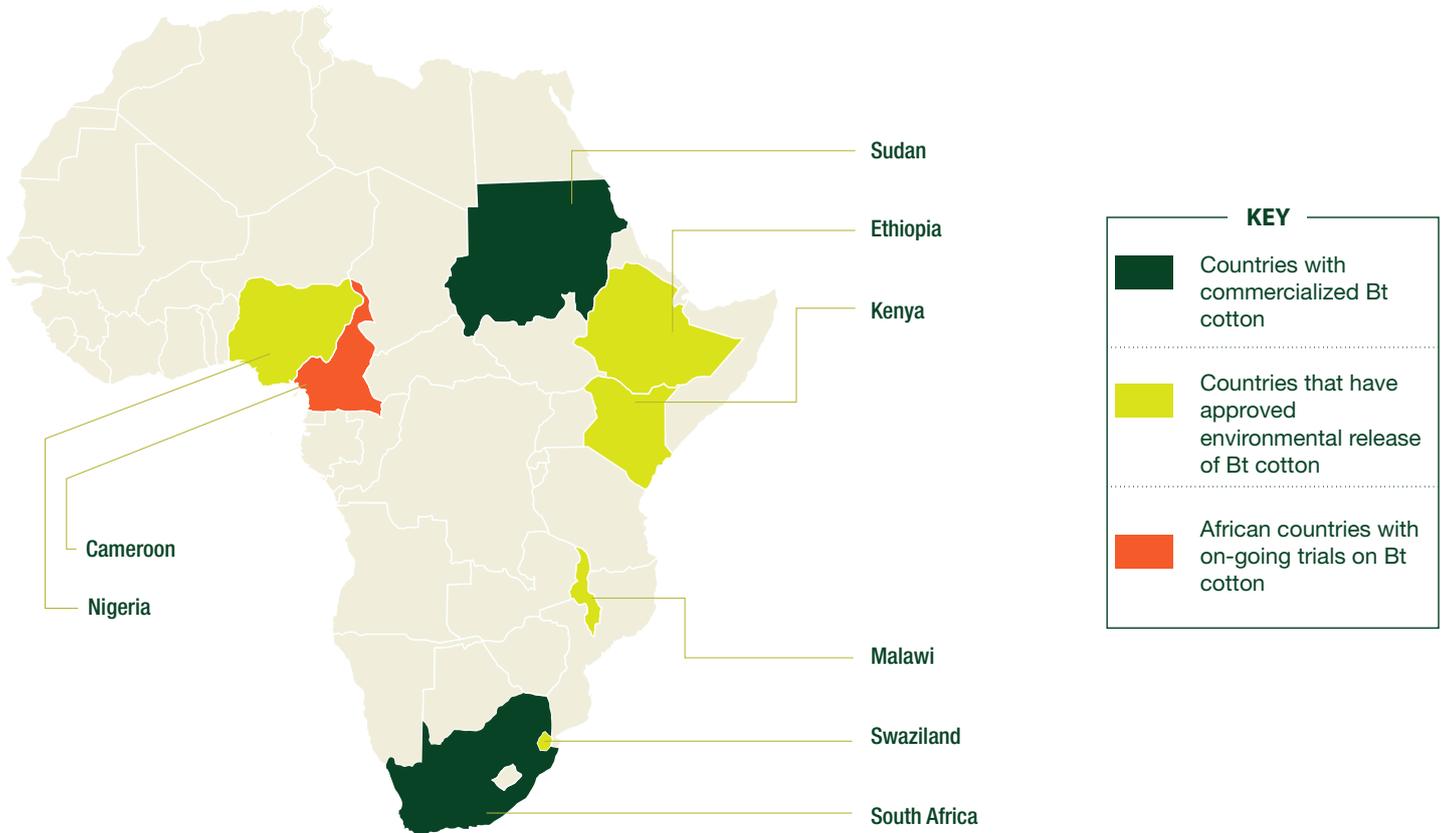
(Based on the latest FAOSTAT data)

2 African countries

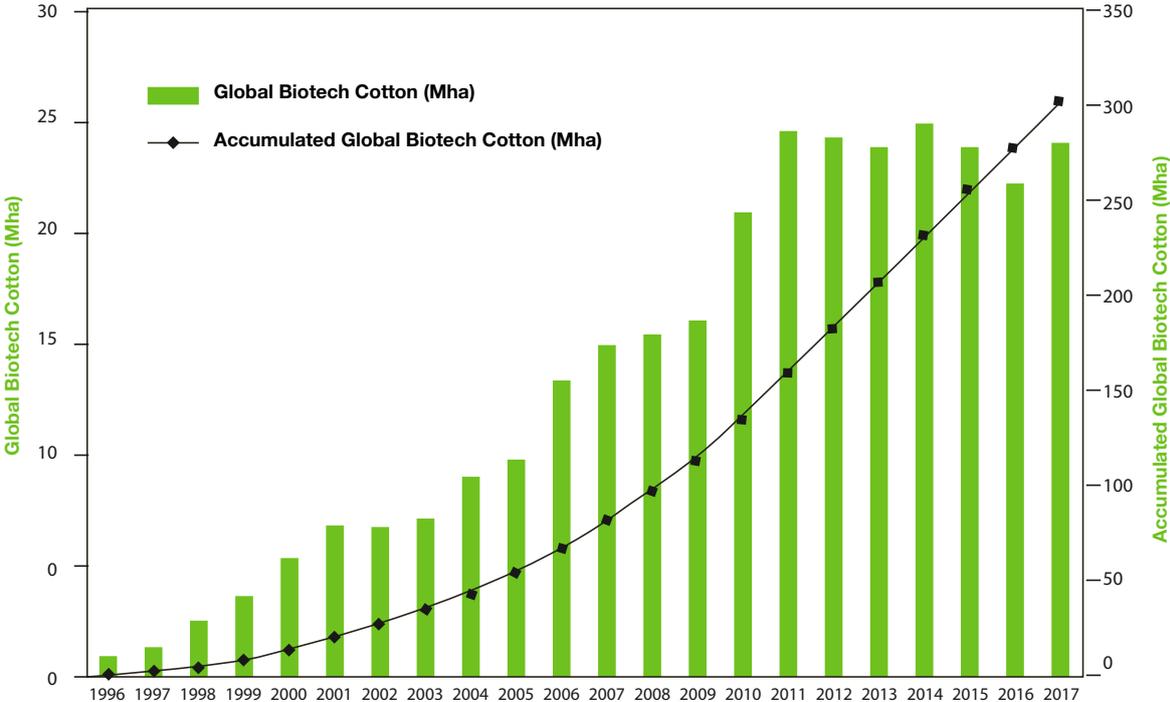
South Africa and Sudan grew biotech cotton on approximately

0.3 million acres

Africa Biotech Cotton Research and Commercialization Status



Global Adoption of Biotech Cotton in Hectares and Accumulated Hectares, 1996 to 2017



Source: ISAAA, 2017

13. Is there a market for Bt cotton produce?

With the sink in the cotton industry, only 5 out of 22 ginneries are operational in Kenya as of 2017, producing an average 25,000 bales against an annual demand of 200,000 bales. The deficit is covered through imports. Thus, the demand for quality locally produced cotton is insatiable.

Further, Kenya-made textile and apparel products can enter most of the world's richer economies free of any customs duties and with limited restrictions. Some of the trade agreements the country has signed up for preferential market access include:

- African Growth and Opportunity Act (AGOA) with the US
- Economic Partnership Agreement (EPA) with EU
- Common Market for Eastern and Southern Africa (COMESA)
- East African Community (EAC)

Africa is currently exporting less than 2 percent (approx. USD 1 billion) of the potential AGOA market, meaning there is a huge market for Kenya's Bt-cotton produce.

14. Can farmers save their Bt cotton seeds for replanting?

It is good agronomic practice to plant new seeds each year to ensure consistently good harvests, especially where the seed is a hybrid. Since Bt cotton seeds will be available as hybrids, farmers are advised to apply same management practices as for other hybrid seeds.

ONLY
5 out of **22**
ginneries are operational
in Kenya (2017)



Africa is currently
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15. Does growing Bt cotton prevent exports to other countries?

Growing Bt cotton does not stop a country from exporting the crop to another country, as long as the trait is approved in that country. In India, Bt cotton transformed the country from being a net importer to a net exporter of cotton. Countries growing Bt cotton continue to export other agricultural produce.

16. Will Bt cotton give Kenya a competitive stance in the world market?

Bt cotton is expected to increase productivity while reducing input costs. This, coupled with Government efforts to address various challenges along the value-chain, including the operating environment, will give the country a competitive stance in the global market.

17. What other global benefits are expected from adoption of Bt cotton?

For every 1 kg of fibre, the cotton plant produces on average 1.7 kg of cottonseed – a rich source of oil and high quality protein. In India for example, Bt cotton seed has been used in form of edible oils and de-oiled cake as animal feed. The de-oiled cake contributes one-third of the country's total demand for animal feed, whereas approximately 14% of the total edible oil produced for human consumption is from cotton oil. Cotton oil offsets more than half of the import bill of edible oil valued at USD 6.5 billion annually. For Kenya, de-oiled cake would make a significant contribution to the livestock sector by reducing competition for maize as animal feed, while the edible oil will save the country some foreign exchange from imports.

INDIAN EXPERIENCE

93%

BT COTTON
ADOPTION



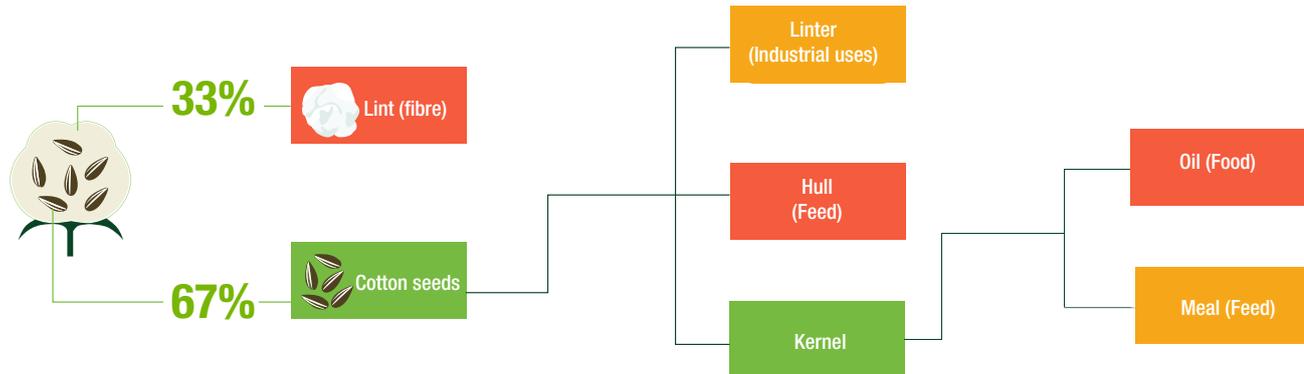
14%
of India's total edible oil is from cotton oil;

This offsets more than half of import bill for edible oil valued at **USD 6.5 billion (Sh650m) annually**

Utilization of cotton seeds generates **Rs. 47,000 (Sh68,700)** per ton to farmers and processors



Bt cotton is a multi-purpose crop with lint and seeds being the principal products



18. Does Bt have negative effects on the plant's functions

The current Bt cotton varieties available on the market do not show any adverse effects and are the same as the conventional hybrids. As a biosafety regulatory compliance, various studies are done between a GM and its non GM counterpart, to negate any concerns related to impact on the plant's function.

19. Can the insect pests become resistant over time?

Kenya has an Insect Resistant Management (IRM) and stewardship plan, a mandatory requirement before approval of Bt cotton. Such a plan is necessary because resistance, including to insecticides, is a common response among insects in nature. The IRM and stewardship plan will minimize and delay resistance development as the technology keeps evolving.

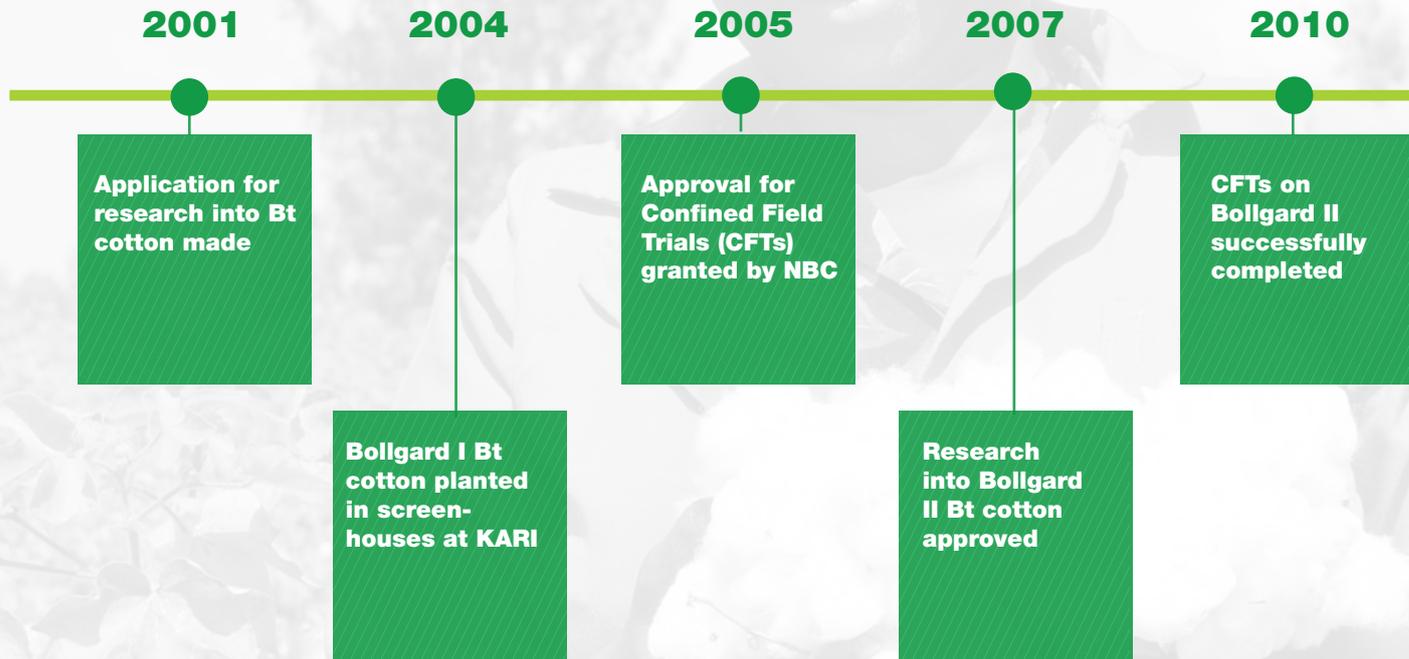
20. What concerns have been associated with growing Bt cotton?

General concerns around GM crops can be grouped into four main categories: Human and animal health; Impact on the environment; Regulatory capacity; and Socio-economic impacts. All these concerns have been addressed in this FAQ. Concerns related to lint quality have recently come up, due to an observed short-staple length challenge in Burkina Faso, Africa's second Bt cotton adopter nation. However, the short-staple length issue is a breeding challenge related to the variety, and is in no way linked to Bt technology. The government is working closely with scientists and other key stakeholders to address this issue. It is important for the Kenyan government to invest in research and breeding programs for cotton to ensure sustainability of the program, given the crop's potential to contribute towards the Big Four Action Plan.





Process Map: Bt Cotton Research and Development in Kenya



Acronyms:

KARI – Kenya Agricultural Research Institute

NBA – National Biosafety Authority

NEMA – National Environment Management Authority

NBC – National Biosafety Committee

2011

Application for National Performance Trials (NPTs) made

2016

NBA grants conditional approval for environmental release

2017

Bt cotton commercialization Taskforce formed

2018

NEMA gives clearance for Bt cotton NPTs

Bt cotton NPTs commence

2019

2nd season of NPTs planted

COPIES OF THIS FAQ CAN BE OBTAINED FROM:

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Program for Biosafety Systems