



**TOP TEN FACTS ABOUT AGRICULTURAL
BIOTECHNOLOGY AND BIOSAFETY IN
AFRICA BY 2016**

FACT 1

2016 was the 21st year of successful commercialization of biotech crops globally and the 19th in Africa.



1. The first biotech crop to be commercialized was insect resistant (Bt) cotton in South Africa in 1998. Four countries - Burkina Faso, Egypt, South Africa and Sudan - have at some point in the past 19 years placed a GM crop in the market.
2. South Africa and Sudan are the two African countries among the 26 globally that planted biotech crops commercially in 2016.
3. Three biotech crops- cotton, maize and soybean were grown in Africa in 2016.

South Africa and Sudan planted a total of 2.79 million hectares of biotech crops in 2016.

FACT 2

1. The acreage distribution per country for biotech crops grown was: maize (2.16 million hectares), soybean (494,000 hectares), and cotton (9000 hectares) in South Africa, and cotton (120, 600 hectares) in Sudan.
2. Biotech crops' adoption rate was over 90% in both countries (91% in South Africa and 98% in Sudan).
3. South Africa recorded a 16% increase in biotech crops' area, attributed to farmer confidence with the crops despite the El Niño weather pattern that persisted from 2015 through to November 2016, seriously devastating all agricultural sectors. Private sector involvement in seed production contributed to the 600 hectares increase in Bt cotton area in Sudan.



FACT 3



The commercialized biotech traits in Africa in 2016 were insect resistance, herbicide tolerance and stacked traits i.e. Bt/HT cotton and maize, and a combination of various Bt events.

1. In 2016, Sudan planted 120,600 hectares of insect resistant (Bt) cotton, an increase from the 120,000 hectares planted in 2015. Bt maize was grown on 420,000 hectares in South Africa.
2. Herbicide tolerant (HT) maize was planted on 407,000 hectares while HT soybean was planted in 494,000 hectares in South Africa.
3. Stacked traits of insect resistant and herbicide tolerant maize were planted on 1.33 million hectares in South Africa.

Adoption of biotech crops in Africa has delivered substantial economic, environmental, agronomic, health and social benefits to communities and farmers in particular.

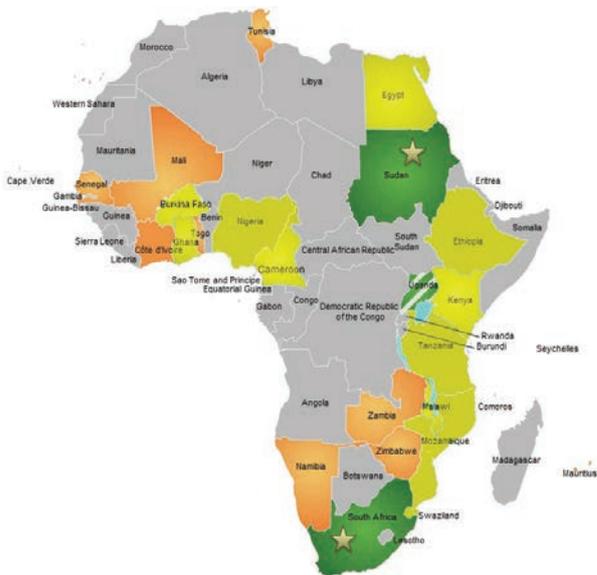
1. South Africa and Sudan enjoyed the increase in income benefits for farmers growing biotech cotton, which was US\$52 billion during the 19-year period 1996 to 2015 and US\$3.4 billion for 2015 alone.
2. South Africa was the only country that benefited from the \$50 billion increase in revenues gained from planting biotech maize between 1996 and 2015.
3. South Africa and Sudan contributed to a better environment globally, where in 2015 alone, 620 million Kg active ingredients of pesticides were saved, thus reducing Environmental Impact Quotient by 19%. Carbon dioxide emissions were reduced by 26.7 % from growing biotech crops, equivalent to taking 12 million cars off the road for one year. Further, 174 million hectares of land was saved thus conserving biodiversity.

FACT 4



FACT 5

Significant milestones in the biotechnology research and biosafety policy landscape in Africa were achieved.



	GM Commercialized Crops	2
	CFTs and Biosafety Laws	13
	CFTs without Biosafety Laws	1
	Biosafety Laws without CFTs	8
	No Biosafety Laws or CFTs	31

© 2016 African Biosafety Network of Expertise (ABNE)

1. Kenya, Malawi and Nigeria transitioned from conducting experimental research or confined field trials to granting approvals for environmental release for maize (Kenya) and cotton for the three countries. This could lead to commercial planting in the next one or two years after varietal and national performance trials are completed. Supportive policies are essential to make this happen.
2. Six countries conducted multi-location trials in preparation for general release approvals. They include: Burkina Faso and Ghana (cowpea), Ethiopia and Swaziland (cotton), Nigeria (cowpea and sorghum), and Uganda (banana and maize).
3. Two countries (Tanzania and Mozambique) recorded first time approach and new crop trials under the Water Efficient Maize for Africa project. Tanzania planted its first ever confined field trial of drought tolerant maize while Mozambique granted approval for a trial of a stacked trait, insect resistant and drought tolerant maize. In Kenya, a GM banana trial resistant to banana bacterial-Xanthomonas wilt (BXW) disease was planted. Two trials, one of 'bunchy-top' virus resistant banana and another for insect (Maruca) resistant Bt cowpea were initiated in Malawi. Nigeria granted approval for a stacked trait insect resistance/herbicide tolerance maize for the first time in the country.

Africa progressed with trials on 5 new biotech crops that could contribute to expanding the global food basket in the future.

FACT 6

1. The new biotech crops in Africa modified for various biotech traits include: banana, cassava, cowpea, potato, rice, sorghum and sweet potato.
2. Six countries: including Burkina Faso, Ghana, Kenya, Malawi, Nigeria and Uganda are at various stages of conducting trials on the new biotech crops that constitute the staple diets for most families in Sub-Saharan populations.
3. Insect and disease resistance, nutritional enhancement and nitrogen use efficiency are the biotech traits that have been incorporated in the new biotech food crops under experimentation in six African countries. One ornamental plant, Gypsophila, a cut flower, which has been modified to express pink colour petals is under review for environmental release in Kenya.



FACT 7



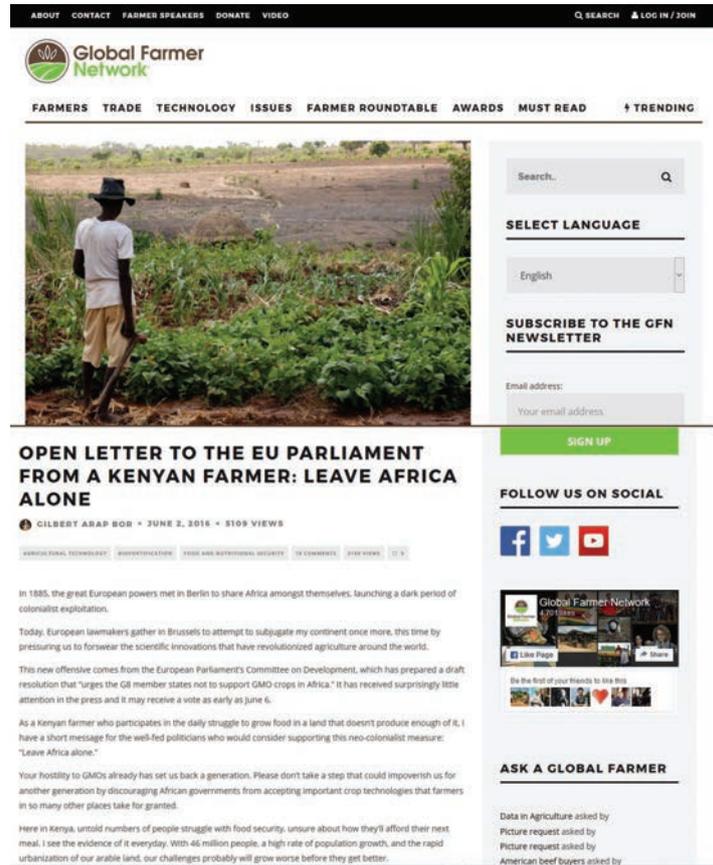
In 2016, Africa recorded a number of milestones in biosafety regulatory landscape.

1. The Association of National Biosafety Agencies in Africa (ANBAA) was formed under the African Biosafety Network of Expertise (ABNE).
2. ANBAA aims at reducing hurdles in sharing data and information between biosafety agencies across the continent.
3. Ghana Biosafety Authority issued guidelines for general release of Genetically Modified Organisms in readiness to handle applications and review of GMOs either for experimentation, environmental release, placing on the market, import/export, and for transit.

Africa's progress towards adoption of biotech crops has been slow due to several challenges.

1. Regulatory hurdles such as the ban on importation of GM foods in Kenya, the slow progress in passage of biosafety bill in Uganda and restrictive or non-existence of biosafety laws in some countries remain some of the key hindrances to adoption of biotech crops in Africa.
2. Unpredictable policy environment coupled with interference by international players such as the European Parliament has majorly contributed to the delay in adoption of biotech crops to address Africa's unique food security challenges.
3. Heightened activism that breeds fear and misinformation on GMOs remains a major obstacle in adoption of agricultural biotechnology as one of the interventions to the myriad of challenges facing farmers across Africa.

FACT 8



The screenshot shows the Global Farmer Network website. At the top, there is a navigation bar with links for ABOUT, CONTACT, FARMER SPEAKERS, DONATE, VIDEO, a search bar, and a login/signup option. Below the navigation bar is the Global Farmer Network logo and a secondary menu with links for FARMERS, TRADE, TECHNOLOGY, ISSUES, FARMER ROUNDTABLE, AWARDS, MUST READ, and TRENDING. The main content area features a large image of a farmer in a field, followed by the article title "OPEN LETTER TO THE EU PARLIAMENT FROM A KENYAN FARMER: LEAVE AFRICA ALONE" and the author "CILBERT ARAP BOB" dated "JUNE 2, 2016" with "1109 VIEWS". The article text discusses the historical context of colonialist exploitation and the current European Parliament's stance on GMOs in Africa. On the right side of the page, there is a search bar, a language selection dropdown set to "English", a newsletter subscription form, social media icons for Facebook, Twitter, and YouTube, and a section titled "ASK A GLOBAL FARMER" with a list of recent questions.

FACT 9



In 2016, different stakeholders intensified pressure on African governments to create conducive environments that enable access to biotech products.

1. Kenyan farmers called on the government to lift the four year old ban on GMO foods importation and deliver modern biotechnology to them, citing high cost of inputs, drudgery and the surge in rural to urban migration as reasons why technologies that make agriculture competitive and attractive to youth should be expedited. Ugandan farmer leaders formed a grassroots forum – National Farmers’ Forum on Agricultural Biotechnology – to enhance their voices in demanding the technology. The forum has been instrumental in petitioning Parliament to fast-track passage of the Biosafety Bill. In Nigeria, Farmers Association of Nigeria (AFAN), reaffirmed its support for all introduction of agricultural biotechnology to reduce poverty.
2. Commodity groups such as the Cowpea Association of Nigeria challenged the EU Parliament to stop undue influence in African agriculture and allow farmers to make their own choices on what tools to use in agriculture. This was in reference to the 2016 Heubuch report on the New Alliance for Food Security and Nutrition, urging G7 members not to support GMO crops in Africa.
3. Students from various universities across the region petitioned their governments to provide enabling environment for agricultural biotechnology. Similarly, Nigeria Academy of Sciences (NAS) endorsed genetically-modified foods as safe for consumption.

New partnerships and diversification of technology providers in Africa are emerging.

FACT 10

1. South-South collaboration has resulted in diversification of technology providers where a number of Asian companies are partnering with several African research organizations to share technology and expertise.
2. The diversity of public-private-partnerships is expected to boost confidence in decision-making and adoption of the technology in Africa.
3. Similarities in geographic and socio-economic conditions of Asian and African countries and farmers have accelerated the commencement of insect resistant cotton trials in Ethiopia and Swaziland as well as research and release of new insect resistant cotton hybrids in Sudan.



Status of Confined Field Trials by December 2016				
Country	Crop	Trait	Institutions involved	Status
Burkina Faso	Cowpea (<i>Vigna unguiculata</i>)	Insect resistance	INERA, AATF	Multi-location trials planted in 3 sites
Nigeria	Cowpea	Insect resistant to Maruca pest	AATF, Institute of Agricultural Research	Back crossed, 2nd season Multi-locational trials in 3 sites managed by farmers
	Sorghum (ABS)	Biofortification	Africa Harvest, Pioneer Hi-Bred, a company of DuPont business, IAR and NABDA	4th CFT and back crossing with preferred Nigerian varieties, still on going
	Rice	Nitrogen use, Water efficient and salt tolerant (NUWEST) Rice	National Cereals Research Institute, Badeggi	Permit granted trial is on going
	Maize (<i>Zea mays</i>)	Insect resistance Bt + Herbicide tolerant Ht corn	Monsanto Agriculture Nigeria Ltd	CFT permit granted (yet to commence)
	Cotton (commercial release)	Insect resistance	Monsanto Agriculture Nigeria Ltd	Approved for commercial release: Bt Cotton (On 4 multi-location NPTs)
Sudan	Cotton (<i>Gossypium hirsutum</i> L.)	Insect resistance 2 Indian Bt hybrids 1 Chinese Bt cotton variety SCRC37	Biotechnology and Biosafety Research Center; China-aid Agricultural Technology Demonstration Center, Elfaw	Multi-location trials completed for 3 additional Bt hybrid varieties; Approved for commercial planting
Ethiopia	Cotton	Insect resistance	Ethiopia Institute of Agricultural Research (EIAR), JK Agri Genetics-India	Multi location trials in 6 sites
Ghana	NUWEST rice	Nitrogen Use Efficiency/Water Use Efficiency and Salt Tolerance	Crop Research Institute, AATF, IITA	3rd CFT relocated to a more drier area (uplands)
	Cowpea	Insect resistance	AATF, Savannah Agricultural Research Institute	Multi-location trials planted in 3 sites

Country	Crop	Trait	Institutions involved	Status
Kenya	Maize (<i>Zea mays</i> L.)	Drought tolerance (WEMA)	AATF, CIMMYT, KALRO	CFT - 6th Season completed
		WEMA Insect resistance (Bt maize MON810)	AATF, CIMMYT, KALRO	Conditional Approval for Environmental release; to conduct National Performance Trials (NPTs)
		Stack maize event for Bt (MON810) and Drought (MON87460)	AATF, CIMMYT, KALRO	1st season CFT completed
	Cotton (<i>Gossypium hirsutum</i> L.)	Insect resistance	KALRO, Monsanto	Conditional Approval for Environmental release; to conduct National Performance Trials (NPTs)
	Gypsophila (<i>Gypsophila paniculata</i>)	Pink Colouration of Petals	Danziger - "Dan" Flower Farm, Israel	Review for Environmental release
	Cassava (<i>Manihot esculenta</i> Crantz.)	Cassava Brown Streak Disease Introgression into CMD tolerant background materials	KALRO, Danforth Plant Science Center (DDPSC)	1st season CFT completed, Regulatory trial ongoing - 1st season
		Cassava Brown streak virus (CBSV) and African Cassava Mosaic Virus (ACMV)	Masinde Muliro University of Science and Technology (MMUST)	CFT - 1st season completed
	Sweet potato (<i>Ipomoea batatas</i>)	siRNA resistance to Sweet potato virus disease	KALRO-Kakamega, Danforth Plant Science Center (DDPSC)	1st season CFT completed
	Banana	Banana bacterial - Xanthomonas Wilt (BXW) resistance	KALRO, IITA	1st season CFT ongoing
Sorghum (ABS), (<i>Sorghum bicolor</i> Moench.)	Enhanced pro-Vit. A levels, Bio-available Zinc and Iron	Africa Harvest, Pioneer Hi-Bred, a DuPont business and KALRO	CFT - 7th Season completed	

Country	Crop	Trait	Institutions involved	Status
Cameroon	Cotton	Insect resistance and herbicide tolerance	Bayer Crop Science	Application for Environmental release in process
Uganda	Maize (<i>Zea mays</i> L.)	Drought tolerance and Insect resistance stacked events	NARO, AATF, Monsanto, CIMMYT	Multi-location Trial planted in July 2016
	Banana, <i>Musa</i> spp.	Banana bacterial - Xanthomonas Wilt (BXW) resistance	NARO, IITA	On multi-location trial
		Banana parasitic nematode resistance	NARO, University of Leeds	2nd season CFT-planted in March 2016
		Nutrition enhancement (Fe and Provitamin A)	NARO, QUT (Queensland University of Technology)	In staggered planting systeming. Latest staggered planting on-going
	Cassava (<i>Manihot esculenta</i> Crantz)	Cassava brown streak virus (CBSV) resistance	NARO, DDPSC	CFTs-1st Trial crossing block planted
	NEWEST Rice	Nitrogen Use Efficiency/Water Use Efficiency	NARO, AATF, Arcadia Biosciences	3rd season CFT-harvested in August, construction of a rain out shelter ongoing
	Potato	Disease resistance	NARO, CIP	CFT-4th Trial Planted in October, 2016
Tanzania	Maize	Drought tolerance	AATF, Commission of Science and Technology (COSTECH)	1st season CFT planted in October

Country	Crop	Trait	Institutions involved	Status
Malawi	Cotton, (<i>Gossypium hirsutum</i>)	Insect resistance	LUANAR, DARS, Monsanto, Quton	General Release approved Variety registration trials underway to be planted in 9 sites
	Cowpea (<i>Vigna unguiculata</i>)	Insect resistance	LUANAR, DARS, AATF	2nd season CFT planted
	Banana	Bunchytop virus resistance	DARS, Queensland University of Technology	CFT – 1st season trial planted in July 2016
Mozambique	Maize	Stack - Drought tolerance and Insect resistance	AATF, Instituto de Investigaçã Agrária de Moçambique (IIAM)	CFT approval granted
Swaziland	Cotton	Insect resistance	Swaziland Cotton Board, JK Agri- Genetics	CFTs approval granted
South Africa	Cotton	Insect resistance and Herbicide tolerance	Bayer Crop Science	Trial permit granted
	Maize	Drought tolerance and insect resistance	AATF, IAR	Trials on-going
		Insect resistance	AATF, IAR	Trials on-going



ISAAA AfriCenter
ILRI Campus, Old Naivasha Road,
P.O.Box 70-00605,
Uthiru, Nairobi, Kenya.
Tel: +254 20 4223618,
Fax: +254 20 4223634
Email: africenter@isaaa.org
Website: www.africenter.isaaa.org



OPEN FORUM ON AGRICULTURAL
BIOTECHNOLOGY IN AFRICA

AATF
ILRI Campus, Old Naivasha Road,
P.O.Box 30709-00100,
Nairobi, Kenya.
Tel: +254 20 422 3700,
Fax: + 254 20 422 3701
Email: ofab@aatf-africa.org
Website: www.aatf-africa.org

*Karembu M., F.Nguthi and P.Chege (2017) Top Ten Facts about Agri-biotech and Biosafety in Africa by 2016.
International Service for the Acquisition of Agri-biotech Applications (ISAAA AfriCenter), Nairobi Kenya.*