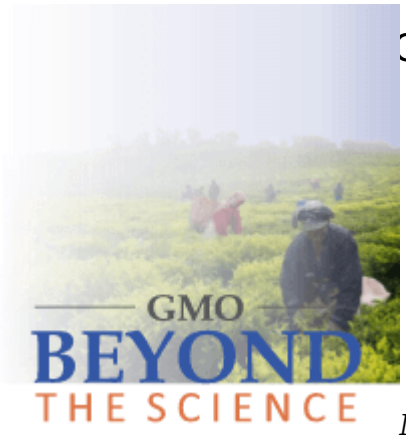
H GOs Block Crop Biotechnology Adoption In Africa



Margaret Karembu, *Director of International Service for the Acquisition of Agri-biotech Applications, Africa regional office (ISAAA) AfriCenter based in Nairobi* | *February 23, 2017*

HIGHLIGHTS:

- European politicians and anti-biotech groups lobby to prevent Africa from adopting or trading GE crops
- Africa remains laggard in food security and faces growth, population and climate change pressures
- African farmers fared poorly using family agro-ecology techniques
- 'Smart' farming fueled by technology can attract youth back into farming
- Farmer experiences with handful of approved GE crops overwhelmingly positive
- Mozambique planted its first confined GMO field trial for drought resistant corn in February 2016

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I grew up in rural Africa, in Central Kenya, in a small village deep down the slopes of Mt Kenya called Gaikundo. For most parts of the year, it was a struggle putting food on the table for our family of 12 and those in the neighborhood. I now know we practiced subsistence farming or what European "greens" have ***ro-ecology family farming***'. This is the type of farming in which farmers focus on gr selves and their families within their localized ecosystem. The output is mostly for loc surplus to take to the market.

For many of the villagers, we hardly produced adequately to last to the next

harvest. Seeds were exchanged freely or barter-traded. It was worse for vegetatively-propagated staple crops—bananas, sweet potato and cassava where, exchanging planting material also meant transferring diseases and pests of mother plants from one neighboring farm to another. Seed systems and hybrid seeds were only slowly being introduced. The majority of farmers were locked up in unsustainable food production modes that further perpetuated the poverty cycle.

That was 50 years ago. Now, farmer practices are beginning to modernize—but we are facing political opposition, mostly from other countries, who seem determined to prevent Africa from joining in a global agricultural revolution.

It was disheartening to learn in June 2016 that the European Parliament adopted a report on the New Alliance for Food Security and Nutrition (NAFSN) stating that any support to African agriculture should be confined to the "agro-ecology family farming level"—the very practices that modern-focused farmers are trying to move away from. Adopted by a large majority of parliamentarians—577 to 24—the report attacked ongoing efforts to introduce advanced technology into African agriculture.

The parliamentarians sharply criticized the bloc of industrialized democracies known as the 'Group of Seven G7's (G7) resolve on intensification of agriculture to address food insecurity. "We have already made the mistake of intensive agriculture in Europe. We should not replicate it in Africa because this model destroys family farming and reduces biodiversity," said Maria Heubuch, a German Green MEP and rapporteur on what has been dubbed "The Heubuch Report".

The New Alliance for Food Security and Nutrition (NAFSN) in Africa is a public-private partnership (PPP), launched in 2012 under the auspices of the G7 to leverage private sector investment in agriculture, with an overall goal of improving food security and nutrition in sub-Saharan Africa. Critics, mainly from the EU Green parties, argue that NAFSN would marginalize small-scale farmers by replicating in Africa the model of the 1960s/1970s Asian 'Green Revolution', based on monoculture, mechanization, biotechnology, dependence on fertilizers, long distribution channels and the production of export crops that may compromise the environment. This is far from the truth. Small scale farming dominates the majority of Asian agriculture. Moreover, African governments are seeking to change the "tired narrative" about poverty and hunger-stricken Africa by adopting proactive proven approaches, research, and modern farming practices with increased private sector participation.

One paragraph in the Heubuch Report argued that introduction and spread of certified seeds in Africa increases smallholder dependence, makes indebtedness more probable and erodes seed diversity. G7 member states were urged not to support genetically engineered crops in Africa.

I have kept in touch with my village roots and can authoritatively challenge this colonial mindset about Africa. The African farming narrative has completely changed in recent decades. We are not an agricultural backwater as European politicians seem to believe but potentially the World's future food basket. More and more farmers appreciate the value of using certified seeds, which greatly out yield farm-saved seeds. Within the eastern Africa region for example, the average adoption rate of improved hybrid maize seed is 44 percent (Marechera, G.,et al 2016), and increasing fast. This has not in any way prevented those farmers who want to use farm-saved seed from doing so or undermined seed diversity.

While the right of those farmers who wish to multiply, use, exchange and sell their own seeds should be protected, this should be reciprocal for farmers who wish to use modern technologies. The guiding principle should be respect

for choice and opinions. Farmers need and want choices, not European-imposed restrictions. Without that, how will those transitioning from subsistence to farming-as-a business meet the ever stringent market access requirements in regulations, private standards and consumer demands?

Ironically, Europe has some of the utmost stringent commodity import standards. Most small-scale suppliers from Africa have long since been pushed out of the EU market in favor of large farms. Small African farmers can't compete with this model, which is heavily stacked to shield Europe's market but retard Africa's. A European or global standard is inherently inflexible, and this is most problematic for suppliers that operate under circumstances advocated for in the Heubuch report.

Why would Europe incite the G7 members against funding genetically engineered (GE) crops in Africa? One would be forgiven to think biotechnology is an anathema to Europe. Not so. Europe has approved at least 86 GM crop products (Aldemita et al 2015). In 2014 for example, the EU imported more than 30 million tons of GM soya bean for use as animal feed, making Europe one of the largest regional importers of GMOs in the world. At least 87 recombinant (GE) drugs have been approved by Europe as of 2008 (Paarlberg, 2008).

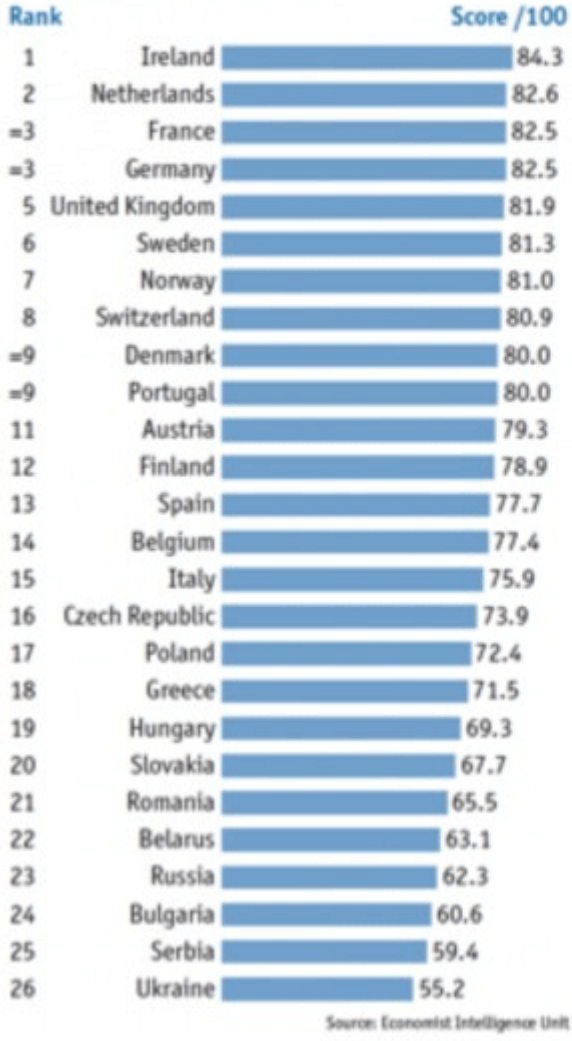
If Europe is reaping rewards from the biotech trade, why should Africa be prohibited from growing the most technologically advanced and sustainable crops?

Africa And Food Insecurity

Historical and global experiences indicate technology (in all forms) has provided a bridge between food insecurity and food abundance. According to the Food Security Index 2016, developed western countries hold the highest levels of food security while sub-Saharan African countries are at the bottom of the rankings.

Overall food security rankings in Europe

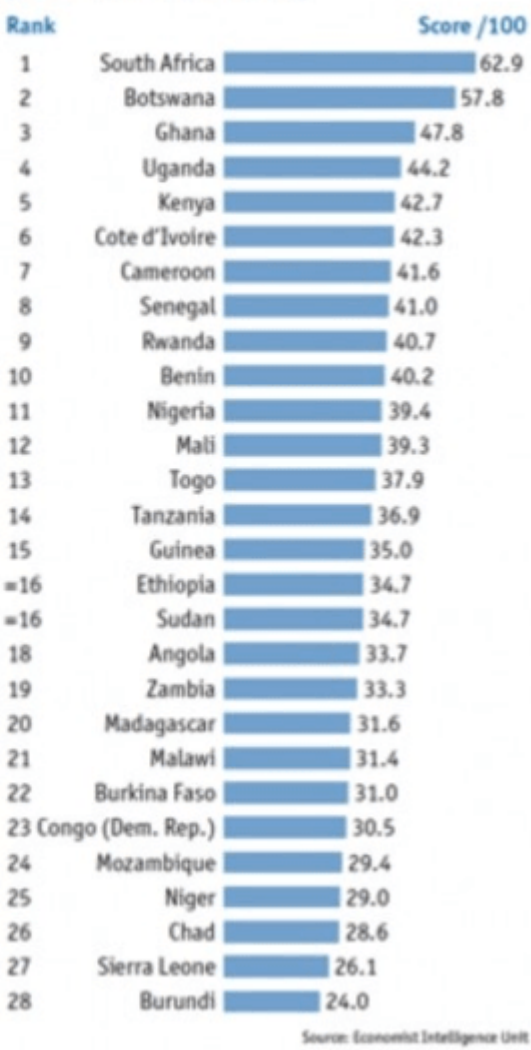
Weighted total of all category scores
(0-100 where 100=most favourable)



Source: Economist Intelligence Unit

Overall food security rankings in Sub-Saharan Africa

Weighted total of all category scores
(0-100 where 100=most favourable)



Source: Economist Intelligence Unit

The Economist Intelligence Unit — Global food security index 2016 An annual measure of the state of global food security

2016 GFSI overall rankings table

Weighted total of all category scores (0-100 where 100=most favourable)

Rank		Score /100
1	United States	86.6
2	Ireland	84.3
3	Singapore	83.9
=4	Australia	82.6
=4	Netherlands	82.6
=6	France	82.5
=6	Germany	82.5
=8	Canada	81.9
=8	United Kingdom	81.9
10	Sweden	81.3
11	New Zealand	81.1
12	Norway	81.0
13	Switzerland	80.9
=14	Denmark	80.0
=14	Portugal	80.0
16	Austria	79.3
=17	Finland	78.9
=17	Israel	78.9
19	Spain	77.7
20	Qatar	77.5
21	Belgium	77.4
=22	Italy	75.9
=22	Japan	75.9
24	Chile	74.4
25	Czech Republic	73.9
26	Oman	73.6
27	Kuwait	73.5
28	South Korea	73.3
29	Poland	72.4
30	United Arab Emirates	71.8
31	Greece	71.5
32	Saudi Arabia	71.1
33	Bahrain	70.1
34	Hungary	69.3
35	Malaysia	69.0
36	Uruguay	68.4
=37	Argentina	68.3
=37	Costa Rica	68.3
39	Mexico	68.1
40	Slovakia	67.7
41	Brazil	67.6
=42	China	65.5
=42	Romania	65.5
44	Panama	64.4
45	Turkey	63.6
46	Belarus	63.1
47	South Africa	62.9
48	Russia	62.3
49	Colombia	61.0
50	Bulgaria	60.6
51	Thailand	59.5
52	Serbia	59.4
53	Tunisia	57.9
54	Botswana	57.8
55	Peru	57.7
56	Ecuador	57.5
=57	Azerbaijan	57.1
=57	Egypt	57.1
=57	Vietnam	57.1
=60	Jordan	56.9
=60	Venezuela	56.9
62	Morocco	55.5
63	Ukraine	55.2
64	Dominican Republic	55.1
65	Sri Lanka	54.8
66	Algeria	54.3
67	Paraguay	54.2
68	Kazakhstan	53.7
69	El Salvador	53.3
70	Bolivia	51.6
71	Indonesia	50.6
72	Uzbekistan	49.8
73	Guatemala	49.6
74	Philippines	49.5
=75	India	49.4
=75	Nicaragua	49.4
77	Honduras	48.2
=78	Ghana	47.8
=78	Pakistan	47.8
80	Myanmar	46.5
81	Uganda	44.2
82	Nepal	42.9
83	Kenya	42.7
84	Cote d'Ivoire	42.3
85	Cameroon	41.6
86	Senegal	41.0
87	Rwanda	40.7
88	Benin	40.2
89	Cambodia	39.8
90	Nigeria	39.4
91	Mali	39.3
92	Tajikistan	38.6
93	Togo	37.9
94	Tanzania	36.9
95	Bangladesh	36.8
96	Syria	36.3
97	Guinea	35.0
=98	Ethiopia	34.7
=98	Sudan	34.7
100	Yemen	34.0
101	Angola	33.7
102	Zambia	33.3
103	Laos	32.7
104	Madagascar	31.6
105	Malawi	31.4
106	Burkina Faso	31.0
107	Congo (Dem. Rep.)	30.5
=108	Haiti	29.4
=108	Mozambique	29.4
110	Niger	29.0
111	Chad	28.6
112	Sierra Leone	26.1
113	Burundi	24.0

Germany and France—which have opted out of cultivating GMO crops—both ranked 6/113; in contrast, Kenya ranked 83 and Mozambique 108. Modernization of the agricultural sector in the 1940s spurred productivity in Europe and ended food dependency in the United States. The Green Revolution, which harnessed the use of advanced genetics and used synthetic fertilizers and pesticides, helped Asia close to filling the gap with the

industrialized countries. Africa was left behind.

It is critical that African countries that face immense food security challenges due to rapid population increase, low agricultural productivity and climate change are given an opportunity to make their own decisions about the choice of agricultural tools without undue interference from food secure countries. The global population is expected to grow to 9.7 billion in 2050 and 11.2 billion in 2100, according to the United Nations, with roughly half of the growth taking place in Africa. The UN predicts that by 2050 the human race will require 60 percent more food—100 percent more in the developing world. There is no safety or environmental reason for Africa to be blocked from charting its own course on GE crops.

African Crop Biotech Adoption

Corroborating other findings from credible institutions including the European Food Safety Authority, the US National Academies of Sciences, Engineering, and Medicine found no difference in risks to human health between currently commercialized GM crops and conventionally (including organic) bred crops. These reports have documented that GE crops have allowed farmers to reduce chemical pesticide, translating into more money for farmers who are better able to support their families and lower food prices for consumers.

The accumulated hectarage of biotech/GM crops planting between 1998 and 2015 in Africa stood at 3.5 million with an estimated economic benefit of ~ USD $2 billion (Brookes and Barfoot, 2016). Three countries maintained the lead in adoption: South Africa at 2.3 million hectares, Burkina Faso with 350,000 hectares and Sudan at 120,000 hectares.

Heavy reliance on rainfed agriculture makes farming in Africa unpredictable. A devastating drought in South Africa in 2015, for example, contributed to a massive 23 percent decline in intended plantings, demonstrating the vulnerability of the continent to climate change. The drought led to a decrease in the production of biotech crops from an anticipated record of 3.0 million to 2.3 million hectares. An approval of drought tolerance trait in maize under WEMA—the Water Efficient Maize for Africa project in 2015, was a timely development. The public-private sector partnership is being implemented in five countries: Kenya, Mozambique, South Africa, Tanzania and Uganda.

African scientists are conducting GM crop trials on key food security crops, which include: banana, cassava, cowpea, sweet potato, maize, potato and rice—some of which are nearing commercialization. In addition to South Africa, Burkina Faso and Sudan, which have commercialized biotech crops, eight others—Cameroon, Egypt, Ghana, Kenya, Malawi, Nigeria, Uganda and Swaziland—are conducting trials on crops with traits relevant to African agricultural challenges. They include: drought tolerance, pest and disease resistance, nutritional enhancement, nitrogen and water use efficiency and salt tolerance for which the 11 African countries are conducting trials on. Africa could contribute five new biotech crops to the global food security basket in the coming years.

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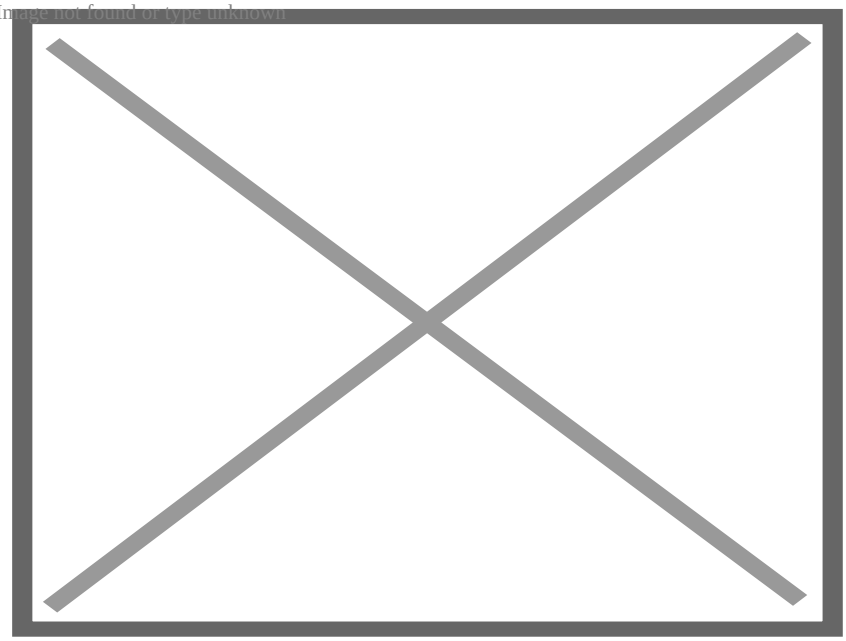

Source africenter.isaaa.org

Many African scientists, farmers and policy makers are eager to see GE crops more widely embraced. I have been tracking African farmers who have started growing GE crops and their testimonies are inspiring. Take the case of Maria Swele, a 35-year-old woman from Limpopo province in South Africa. Maria has won the local award for youth and technology adoption twice in a row, becoming a role model for many young people in her region.

Her story underscores the changing agricultural narrative within Africa's small-scale agricultural scene:

I was inspired into Bt cotton farming 4 years ago by my former employer Mr. Frans Mallela — himself a large-scale farmer .He discouraged me from taking up a clerical office job but instead try out 5 hectares of Bt cotton and that has made all the difference in my life. In 4 years, I have increased area of production tenfold to 50 hectares of Bt cotton. Venturing into Bt cotton enterprise has been rewarding, enabling me to purchase 2 tractors, a car and a house. I have also managed to pay for my younger sister's education. Attending to our crops is so much easier and has drastically reduced labour. We no longer need to carry crude tools to weed and spray as most of this is now done mechanically.

Elameen Alzain, 45 years old, is a cotton farmer from Sudan who uses seeds engineered with the natural bacteria Bt (Bacillus thuringiensis), which fights bollworms (and is used in spray form by organic farmers):

"When you plant Bt cotton, you are assured of high quality and quantity. There is no guarantee with the old varieties. I saw an opportunity to improve my lifestyle. The yields were very high and with no bollworm damage, I realized I could make big savings."

In Burkina Faso, 38 year-old Sibiri Antoine Nikiéma, a farmer in Lado (Saponé), began growing insect-resistant cotton. With the increased proceeds, he has acquired a bicycle, a motorbike and built a family house, and now comfortably pays school fees for his children:

"I am very satisfied with Bt cotton due to its many advantages, especially in terms of monetary returns. Bt cotton has improved the quality of our lives and the labour is not as tedious as before since we don't spray that much now – from 8 sprays to just 2. My colleagues and I are relieved from harmful chemicals sprayed to Bollworm."

If we could replicate these scenarios and extend it to 60 percent of the African population that is now directly engaged in the agricultural sector, Africa could make a quantum jump in productivity and draw back many young people who are shunning farming in favor of elusive "smart" technology-driven enterprises in big cities. Every farmer in Africa and indeed farmers everywhere are looking for better tools, competitive yields and socioeconomic empowerment, not the reverse!

Biotech Politics

The biosafety regulatory landscape has improved significantly, but challenges remain. In 1998, South Africa was the only country with a biosafety law. By 2016, 19 African countries had developed biosafety legislation, and even Zambia, long a center of hostility toward GM crops, has responded to the ongoing drought crisis by indicated it is favorably inclined to allow imports of GM food. . Nigeria, Africa's most populous country, enacted its law in 2015, and four crops–insecticide resistant Bt cotton; Bt cowpea (a legume); iron, zinc, protein and Vitamin A fortified and nitrogen efficient sorghum; and salt tolerant and water efficient rice–are undergoing confined field tests. The same year, Kenya's National Biosafety Authority received for the first time two applications for open field cultivation of genetically modified maize and cotton. Initiatives to operationalize biosafety laws in other countries as well as regional biosafety harmonization efforts have continued.

Despite these gains, counter-productive debates and political misgivings continue to slow down progress with the technology—mostly perpetrated by non-African based groups, and often from Europe. NGOs such as Greenpeace, Friends of the Earth, GeneWatch UK, ActionAid and GM Freeze and their affiliates in Africa claim GM crops would mortgage the agricultural sector to large multinational corporations, harm biodiversity, undermine small

farmers and expose their populations to the potential health hazards of consuming GM food.

According to Greenpeace, “GMOs should not be released … since there is not an adequate scientific understanding of their impact on the environment and human health.” Zakiyya Ismail, a campaigner for the African Center for Biodiversity, has said, “There is no consensus around the safety of GMOs and there should be long term studies into them before they are released into the food supplies.” Jason Tutu, the communication leader of Food Sovereignty Ghana claimed, “GMO products carry known health risks such as organ damage, sterility, infant mortality, birth defects, low sperm quality and increase risk of cancer.”

No health or science agency in the world has documented links between GM foods and any health hazard, let alone cancer.

Three Cases Deserve Mention

? In November 2012, Kenya declared a ban on genetically modified grain imports. The decision emanated from a publication of a paper by French researcher Gilles-Éric Séralini, which featured grotesque pictures of rats with bodies twisted by cancerous tumors supposedly caused by GMO feed and glyphosate, a herbicide paired with some GE crops. The author’s conclusions and experimental design were heavily criticized, and the paper was retracted and then republished in “free for all” non-peer reviewed online journals, and again greeted with harsh criticism from scientists. But the damage was done with the original publication, and it had a ripple effect across Africa. Kenya banned GMO imports and cultivation, and it remains in place today (2016). As a result, young people are discouraged from venturing into biotechnology-related courses and there has been a drastic reduction in number of applications for processing of GMO-related requests, denying the government revenue.

? In 2014, the Head of the European Union delegation in Kenya, on live TV, made a highly discriminatory ‘warning’ to Kenyan farmers that Kenya risked losing the Europe export market if it adopted biotech crops. “We have had a huge discussion on GMOs in the EU and have made it crystal clear to farmers in South Africa and here in Kenya that we are not in favor of GMOs. Farmers who grow GM crops will have difficulty exporting their produce to the EU,” he said. While the statement was later retracted, with the office of the head of delegation acknowledging its inaccuracy, these sentiments demonstrate the level of foreign interference, which helps explain the slow progress with the sector.

? In March 2015, ActionAid-Uganda admitted as misguided and inappropriate its campaign on genetically modified foods in which it suggested a link between GMOs and health problems, including cancer and infertility. Action Aid’s UK headquarters apologized to the Uganda government, saying, “ActionAid and ActionAid Uganda remain sorry for any past suggestion we have made of a link between GM food and health concerns.” But the damage had been done. The country and many others in Africa have seen an upsurge of activism against the technology even as scientists work hard to apply biotech tools to address the many pest challenges facing key staple crops such as banana bacterial wilt, banana biofortification, cassava mosaic and brown streak viral diseases, sweet potato weevil and potato late blight among several others. In each case, there are biotech tools that could offer comparative advantages against other conventional breeding methods. A Biotechnology and Biosafety Bill to regulate responsible use of the technology remains locked in parliamentary debate.

A few private European food importing companies have consistently misrepresented the official EU position on biotechnology. These misrepresentations have been perpetuated by insufficient knowledge about the magnitude of

GE trade in EU on the part of African export traders and the deliberate misinformation spread by some foreign-funded anti- biotech interest groups about the official status of the technology in the EU.

To a large extent, these misconceptions have created confusion and complicated policy choices for African countries as vested anti-biotechnology and anti-business ideologies find their way into government offices and influence decision makers. In some instances, African fresh produce exporters to the EU are pressured to declare their goods are GMO-free even when there are no GE versions of their products.

Maize is the major staple of 300 million Africans. In the period, 1996-2015, biotech maize was successfully grown globally in about 15 countries by millions of farmers on 600 million hectares, who benefited from $50 billion in increased revenues. Ironically, farmers in African countries (except South Africa), where the need for improved maize is greatest, suffered a big opportunity cost because they were denied the choice to adopt biotech crops. Lack of, and/or unpredictable regulatory environment, weak political support and misinformation are the greatest contributors to this loss.

This affirms the need for continuous exploration of new crop improvement opportunities to provide sustainable solutions to food and nutrition security. Priority for application of modern biotechnology in Africa should, and must focus on improving food security and environmental sustainability.

Moreover, African agriculture is currently characterized by ageing farmers, as the youth shun farming to look for white collar jobs. The young, who are flexible and willing to adopt technology, are no longer enthusiastic about old farming methods as they are tedious and lead to low rewards. However, with the narrative changing in South Africa, Sudan and Burkina Faso, where young farmers are now willing to take up farming because of the access to high yielding seeds and labour-saving technologies, African policy makers should rebuff EU ideologies that want to take the continent back to the dark ages.

To entirely exploit and benefit from modern biotechnology, Africa needs to focus on three strategic areas:

? Accelerate adoption of those proven biotechnologies that are appropriate in addressing Africa's unique challenges.

? Encourage collaboration and partnerships that will increase the probability of delivering approved biotech crop products to farmers within a reasonable time frame.

? Reposition Africa towards being a global player in development and ownership of emerging technologies such can be applied within existing policy infrastructure.

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The Genetic Literacy Project is a 501(c)(3) non profit dedicated to helping the public, journalists, policy makers and scientists better communicate the advances and ethical and technological challenges ushered in by the biotechnology and genetics revolution, addressing both human genetics and food and farming. We are one of two websites overseen by the Science Literacy Project; our sister site, the Epigenetics Literacy Project , addresses the challenges surrounding emerging data-rich technologies.

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