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Role of Genetically Modified Crops in Africa - Dr. Daniel Mataruka

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Dr. Daniel Mataruka

Dr. Daniel Mataruka of the **African Agricultural Technology Foundation (AATF)** has written an original article for the CBI blog on the role of ag biotech in Africa. Dr. Mataruka writes:

> "During the past decade, Africa's population increased from 760 to 970 million, pushing farmers to encroach on fragile ecosystems. Climate change is increasingly manifest through erratic rainfall patterns, prolonged drought spells, and unprecedented floods, making rain-fed agriculture even more risky, thus aggravating food insecurity among resource-poor smallholder farmers. Compounding this scenario are post-harvest pests that devour their meager harvests. Indeed, the challenges are great, sometimes disillusioning, but certainly not insurmountable. Under these circumstances, GM technologies have a role in addressing challenges that were previously elusive to classical breeding on its own."

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Genetically modified (GM) crops conjure up varying emotions worldwide. Nevertheless, their acreage is increasing, reaching 125 million hectares in 2008 (James, 2008). Ground breaking work by Mendel in 1860's took advantage of natural genetic recombination within species, resulting into superior harvests for successive generations. The discovery of *Agrobacterium tumefaciens* in 1907 offered a unique tool to transfer genes into plants, ushering in a new era of gene transfer across species.

Recently, use of GM technology to produce medicines has risen steeply. Between 2001 and 2006, 60 to 70% of drug approvals in the US and European Union, involved GM technology (Clearant, 2006; EMEA, 2006). Paarlberg (2008), noted that about 25% of new drugs going into the global market are produced using GM technology, while in agriculture, 80% of all cultivated hybrid maize in the US is GM (Cox *et al.* 2008). In his book *Starved for Science: how biotechnology is being kept out of Africa*, Paarlberg (2008) further articulates that, unfortunately most African countries have adopted an anti-GM stance, that appears to be influenced by European colonial linkages. Yet, it's the application of science to agriculture that enabled Europe to produce surplus food. Consequently, while Europe may not require GM technologies to bolster their agriculture, they however, readily embrace them for improved healthcare.

But, where exactly is the role of GM crops in Africa? During the past decade, Africa's population increased from 760 to 970 million, pushing farmers to encroach on fragile ecosystems. Climate change is increasingly manifest through erratic rainfall patterns, prolonged drought spells, and unprecedented floods, making rain-fed agriculture even more risky, thus aggravating food insecurity among resource-poor smallholder farmers. Compounding this scenario are post-harvest pests that devour their meager harvests. Indeed, the challenges are great, sometimes disillusioning, but certainly not insurmountable. Under these circumstances, GM technologies have a role in

addressing challenges that were previously elusive to classical breeding on its own.

In Africa, benefits from GM technologies have already been demonstrated; in South Africa, under rain-fed conditions, Bt maize increased yield by 11% that translated into US$ 35/ha more revenue (James, 2008). In Burkina Faso, field trials on Bt cotton resulted in a two-thirds reduction in insecticide usage and a 15% higher yield, (Vitale *et al.*, 2008), thus promoting farmers' and environmental health while promoting prosperity. More recently, the African Agricultural Technology Foundation initiated several public-private partnerships to enhance agricultural productivity in Africa, including the development of:

- Bt cowpea for protection against the *Maruca*-pod borer with potential to increase yield from 0.3 to 2.5 kg/ha.
- Water Efficient Maize for Africa that is expected to provide about 30% more yield under moderate drought.
- Nitrogen-Use Efficient Rice for better performance under lower soil N.
- Bananas resistant to bacterial wilt in the Great Lakes region of East Africa, where the disease is causing upto 100% crop loss.

There is a *romantic* notion that African farmers ought to continue using seed they inherited from their ancestors, and not improved seed from conventional breeding or biotechnology. There appears to be safety concerns around the adoption of GM seeds. However, despite over 12 years of increasing adoption of GM crops worldwide, there have been no adverse effects to humans and the environment (EFSA, 2006; James, 2008). Yet, the un-improved seed is the same seed that succumbs to a range of biotic and abiotic challenges, resulting in low productivity and even crop failure. It is the same seed that has ensured that African farmers remain trapped in poverty and reliant on food relief. Although this un-improved seed is a *gem*, it need not be grown on African farmers' fields in that form, but ought to be improved and/or be archived in gene-banks for conservation of biodiversity.

From the foregoing, the important role of GM technology on modern medicines, attainment of food security and improvement of farm profitability cannot be overstated. Clearly, this technology is complimentary to other classical approaches and not a panacea.

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