ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 15 No. 4
September 2015
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Commentary

GMO Commentary: A Healthy Debate Continues in Kenya

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Maize is the most important cereal crop in sub- Saharan Africa and a widely grown staple consumed either as grain or flour. Food production in Africa faces many challenges: climate change, population burst, shrinking crop land sizes, lack of finances, post-harvest losses and underexploited market opportunities. Therefore, safeguarding maize production is safeguarding food security.

Insect pressure further threatens food production in Africa. One such pest is the maize stalk borer. Two species *Busseola fusca* and *Chilo partellus* are endemic in Kenya's maize producing areas in varying populations[1]. Maize stalk borer infestation causes broken stems, fungal (mycotoxin) infection and nutrient blockage in affected plants. This results in 13-18% yield loss, equivalent to USD 80 million and affecting 4.1 million people annually in Kenya[2].

Maize stalk borer is managed using Integrated Pest Management (IPM) that combines biological, cultural and chemical practices, but there are other approaches in Biotechnology that have proven more effective. In order to minimize farm losses to stalk

borer infestation and also insecticide costs, genetic engineering has been employed to develop a maize plant that is resistant to stalk borer damage.

Bt maize is a plant that expresses one or more proteins from *Bacillus thuringiensis*, soil dwelling bacteria. The gene (protein) when put in maize, is expressed throughout the vegetative parts of the plant. When stalk borer larvae (caterpillars) feed on the plant, the gene is activated in the alkaline environment of the larvae gut, causing holes in the gut wall. The larvae stop feeding and die quickly.

In Kenya, *Bt* maize is limited to Confined Field Trials (CFTs) in KARI Kiboko Research Center, awaiting approval for open field cultivation. The Kenya Agricultural and Livestock Research Organization (KALRO) and the African Agricultural Technology Foundation (AATF) applied to the National Biosafety Authority (NBA) for permission to release the variety for open cultivation. The NBA put out an advertisement for the public to give comments (July 23- August 23, 2015) on the application for first release of transgenic, genetically modified (GM) maize in Kenya. In the 30 days, the public was given the opportunity to say whether they support (and need) transgenic crop cultivation, giving credible reasons and/or otherwise.

Anti-GM activists in Kenya argue that GM foods are unsafe for human and animal consumption. They also express concern on transfer of genetic materials to non-*Bt* maize varieties and that GM technology will place a financial burden to already poor African farmers because they will need to buy seeds every season.

Extensive research has shown that *Bt* maize is safe food for consumption as it has undergone rigorous testing to meet health and environment safety standards [3, 4, 5]. *Bt* Cry proteins are highly specific to moth species; therefore they would pose no harm to non-target beneficial insects. The protein is also biodegradable. Gene flow can be reduced through spatial isolation and besides, the large size of maize pollen restricts its transfer. However, stewardship and training will be important in order to get maximum benefits of *Bt* technology. On the cost issue, *Bt* technology was given to Africa (through AATF) by Monsanto royalty-free and the seeds will be sold at market rate by local seed companies. Therefore, there are no 'patent royalties' paid back to Monsanto. Also, farmers are not being forced to buy GM seeds, but rather, they are being given more options. Genetically engineered seeds give consistently higher yields, which equals more economic gain for farmers.

GM technology is regulated in Kenya by National Biosafety Authority (NBA), Kenya Plant Health Inspectorate Service (KEPHIS), National Environment Management Authority (NEMA), and the Biosafety Law (2009).

For the gains Kenya has made in information and communication technology (ICT) development and adoption, the country still lags behind in adopting agricultural

technology of GM crops. GM technology is used in 28 countries worldwide, benefitting only 18 million farmers for the last 20 years. In Africa, only 3 countries have adopted open cultivation of GM crops- South Africa (*Bt* maize, *Bt* cotton and *Bt* soy bean), Burkina Faso and Sudan (*Bt* cotton). There is an opportunity for Kenya to lead in agricultural production in the region, outside of South Africa.

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