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Agricultural Biotechnology Annual

2012 Kenya Agricultural Biotechnology Report

Approved By:
Stephen Hammond
Prepared By:
FAS/Nairobi Staff

Report Highlights:
The Government of Kenya's (GOK) has recently taken additional action on the labeling of agriculture biotechnology that has medium and long-term potential to discourage development of and investment in this historically-new technology and to preclude imports of foods containing genetically-enhanced components. On a positive note, the GOK's National Biosafety Authority has evaluated registered U.S. genetically-enhanced commodities/products and deemed them safe for human consumption in Kenya.

Section I. Executive Summary:
The GOK first required the labeling of genetic enhancement (GE) foods, feed, or ingredients in 2010, when the Kenya Bureau of Standards (KEBS) published regulation KS 2225:2010 that required the identification of GE content on product labels. Kenya's National Biosafety Authority (NBA) has used the National Biosafety Law 2009, Part IX Section 51, (f) and KS 2225:2010 to insist that U.S. food aid, approved for import by the NBA (please see table here below), carry labels that identify the GE components, even when the consumers of the food will not likely ever see the label.

In its most recent foray into regulating GE foods, the GOK, through Kenya Gazette Supplement No. 48 of 2012, Legal Notice No. 40, The Biosafety Act, 2009 (No. 2 of 2009), dated May 25, 2012, incorporated additional requirements on GE-containing foods. KEBS officials, in collaboration with the NBA, proposed D (draft) KS 2225:2012 *Genetically Enhanced organisms and derived products- labeling of food and feed* –Second Edition, in advance of the above-referenced Gazette notice. The additional restrictions invoked by the Gazette notice include: 1) a reduction of the adventitious presence from five-to-one percent to trigger mandatory labeling when tested using KS ISO 21570: 2005 (*Foodstuffs- methods of analysis for detection of genetically enhanced organisms and derived products - Quantitative nucleic acid based methods);* 2) permits "GMO-Free" labeling where the GE adventitious presence tests below the one percent threshold; 3) requires that labels present reference to GE content with the same font size used for ingredients, trademarks, etc; and, 4) references the CODEX Standard CAC/GL 76 2011.

The mandatory labels and potential penalties may have already altered trade in corn. Reverting to the Biosafety Act 2009, the GOK imposes a fine not exceeding twenty million Kenya Shillings ($235,300) and/or imprisonment not to exceed ten years should someone be found to violate the abovementioned mandatory labeling provisions (or any other Biosafety Law 2009 provision). Previous to implementation of the National Biosafety Law 2009 and mandatory GE labels, Kenyan traders frequently sourced corn from South Africa (reportedly about 70 percent of South African corn contains GE) in times of Kenyan shortfall but now import from non-GE sources, reportedly, to avoid the new GE restrictions.

Section II. Plant Biotechnology Trade and Production:

The National Biosafety Act 2009 requires that the NBA approve the development and imports of GE commodities/foods. The NBA lists approved confined field trials (CFT), import/transit, and contained use on the following Website: http://ke.biosafetyclearinghouse.net/approvedgmo.shtml. The tables here below present the most recent listings published on the NBA Website noted above.

Name of Applicant	Release Date (est.)	Title of Application	Location/Site of Trial	Introduced Modified Trait(s)	Date Approved	Remarks
Kenya Agricultural Research Institute (KARI)	2018	Application to introduce Transgenic maize with water efficiency event MON 87460 to carry out confined field trials under moisture stress at	KARI, Kiboko sub-station, Makindu District, Machakos County (Eastern province)	Water efficiency/ Drought tolerance	16th August 2010	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.

		Kiboko in Kenya				
KARI	2015/2016	Application to conduct confined field trial of transgenic Cassava expressing siRNA and G5 protein for resistance to cassava Mosaic Disease in Kenya	KARI Alupe Sub-centre, Teso District, Busia County (Western province)	Virus resistance	18th January 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
KARI	2016/2017	Application to introduce transgenic cassava containing Pro-vitamin A (DXS+PSY) genes for confined field trials in Kenya	KARI Alupe Sub-centre, Teso District, Busia County (Western province)	Nutritional change; Vitamin A enhanced cassava	18th January 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
KARI	2020	Application to conduct a CFT of transgenic sorghum containing pro-vitamin A, improved sorghum protein quality, digestibility, enhanced iron and Zinc	KARI, Kiboko sub-station, Makindu District, Machakos County (Eastern province)	Nutritional change; Bio-fortified sorghum	11th August 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.

		availability				
KARI	2015/2016	Application by KARI to conduct confined field trial of transgenic cassava expressing siRNA for resistance to cassava brown streak disease in Kenya	KARI Mtwapa Centre, Kikambala District (Coast province)	Virus resistance	27th April 2012	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
KARI	2015	Application by KARI to carry out confined field trials of transgenic cotton for insect resistance (bollworms)	KARI Mwea Centre	Insect Resistance	2003(approved by the National Biosafety Committee that existed then)	Confined Field Trials completed. Environmental release application to be submitted in 2012

Approved Genetically Modified Products for Imports and Transit

Name of Applicant	**Title of Application**	**Quantity (Metric Tonnes)**	**Introduced Trait (s)**	**Date Approved**	**Remarks**
World Food Programme (WFP)	Application to import genetically modified corn-soya blend into Kenya for humanitarian assistance	1080.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts
WFP	Application to import genetically modified corn-	100.00MT	Insect resistance/ Herbicide	13th September 2011	Approved for human consumption after a food safety risk

	soya blend into Kenya for humanitarian assistance		tolerance		assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts
WFP	Application to import genetically modified maize meal into Kenya for humanitarian assistance	540.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified maize meal into Kenya for humanitarian assistance	2,960.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified maize meal into Kenya for humanitarian assistance	250.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	1,520.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified corn-soya blend through Kenya	480.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption

					and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	490.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	990.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	680.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	530.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	250.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe

					for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	1,310.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified maize/corn meal through Kenya	690.00MT	Insect resistance/ Herbicide tolerance	13th September 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified corn meal into Kenya for humanitarian assistance	249.025MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts
WFP	Application to import genetically modified corn-soya blend into Kenya for humanitarian assistance	3,140.00MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts
WFP	Application to import genetically modified corn meal into Kenya for humanitarian assistance	1,300.00MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially

					equivalent to the non-modified counterpart
WFP	Application to import genetically modified corn meal into Kenya for humanitarian assistance	2,080.00MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified corn meal into Kenya for humanitarian assistance	180.00MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified corn meal into Kenya for humanitarian assistance	8,780.00MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified corn meal into Kenya for humanitarian assistance	390.00MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified corn-soya blend through Kenya for humanitarian assistance	1386.125MT	Insect resistance/ Herbicide tolerance	17th November 2011	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts
WFP	Application to import genetically	2,440.00MT	Insect resistance/	10th February	Approved for human consumption after a

	modified corn meal into Kenya for humanitarian assistance		Herbicide tolerance	2012	food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterpart
WFP	Application to transit genetically modified corn-soya blend through Kenya	50.00MT	Insect resistance/ Herbicide tolerance	10th February 2012	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterparts
WFP	Application to transit genetically modified maize meal through Kenya	620.00MT	Insect resistance/ Herbicide tolerance	10th February 2012	Approved for transit through Kenya after a food safety risk assessment concluded that the product is safe for human consumption and substantially equivalent to the non-modified counterpart
WFP	Application to import genetically modified corn-soya blend into Kenya for humanitarian assistance	290.00MT	Insect resistance/ Herbicide tolerance	11th May 2012	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts
USAID East Africa	Application to import genetically modified corn-soya blend into Kenya for humanitarian assistance	500.00MT	Insect resistance/ Herbicide tolerance	11th May 2012	Approved for human consumption after a food safety risk assessment concluded that the product is safe and substantially equivalent to the non-modified counterparts.

Approved Contained Use Research Activities of Genetically Modified Organisms

Name of Applicant	Title of Application	Location/Site of Facility	Desired Trait	Date Approved	Remarks

International Livestock Research Institute (ILRI)	Application to carry out genetic modification of banana for disease resistance under laboratory and greenhouse conditions in Kenya	ILRI facility-Nairobi	Bacterial wilt disease resistance	11th March 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application to carry out genetic transformation of pigeon pea for insect resistance under laboratory and greenhouse condition in Kenya	ILRI facility-Nairobi	Insect resistance	11th March 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application to carry out genetic transformation of cassava for stress tolerance under laboratory and greenhouse conditions in Kenya	ILRI facility-Nairobi	Stress tolerance	11th March 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application to carry out genetic modification of Yam (Dioscorea spp) for nematode resistance in laboratory and greenhouse conditions in Kenya	ILRI facility-Nairobi	Nematode resistance	11th March 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application to carry out genetic modification work of cassava for resistance to cassava brown streak disease under Laboratory and greenhouse conditions	ILRI facility-Nairobi	Virus resistance	11th August 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found

	in Kenya				acceptable.
ILRI	Application for contained use of Knockout Mice of C57BL/6 mouse strain and A/J mouse strain from Korea,for laboratory studies of gene function.	ILRI facility-Nairobi	Trypanosome resistance model studies on mice	1st December 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application for Proof of Concept: Test of transgene in cattle (Bos taurus) under containment to study basic mechanisms underlying trypanosome resistance.	ILRI facility-Nairobi	Trypanosome resistance in cow	1st December 2011	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application to carry out genetic modification of banana for development of doubled haploid plants under laboratory and greenhouse conditions in Kenya.	ILRI facility-Nairobi	Double haploidy to speed up the breeding process	11th May 2012	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.
ILRI	Application for accelerating the development of improved vaccines against livestock infections caused by members of the Mycoplasma mycoides cluster through the application of targeted mutagenesis	ILRI facility-Nairobi	Vaccine development	11th May 2012	Approval was given after a thorough risk assessment and the risk management measures put in place were found acceptable.

Section III. Plant Biotechnology Policy:

The NBA continues building its human capacity and administrative procedures. The NBA Board of Directors, comprised of representatives on the agencies listed here below, has chosen the NBA's CEO and Technical and Financial Directors. They, in turn, have hired staff to support their administration. The following regulatory agencies provide Members to the NBA Board of Directors. The Websites indicated for each agency here below take the reader to the respective agency's agriculture-biotechnology statements.

- Kenya Plant Health Inspectorate Service, Ministry of Agriculture, which oversees the introduction, testing and use of biotechnology plants and seeds;
- Department of Public Health, Ministry of Public Health which safeguards consumers health through food safety and quality control, surveillance, prevention and control of food borne diseases;
- Kenya Bureau of Standards, Ministry of Industrialization, which develops food standards, quality assurance, and testing;
- National Environmental Management Authority, Ministry of Environment and Natural Resources, which oversees environmental questions and conducts environmental impact assessments;
- Pest Control Products Board which regulates pesticide use;
- Kenya Wildlife Service, Ministry of Environment and Natural Resources, which handles biodiversity and biotechnology related matters in wildlife and forestry;
- Kenya Industrial Property Institute, Ministry of Industrialization which handles intellectual property issues; and,
- Department of Veterinary Services—no known Website available.

Section IV. Plant Biotechnology Marketing Issues:

Various surveys and/or studies on agricultural biotechnology conducted in Kenya reveal that although many respondents have heard about biotechnology most of them do not have adequate knowledge about the science. The studies referenced here below indicate that most Kenyans wish to learn more about agricultural biotechnology, regardless of the perceived food and environmental safety risks.

According to United Kingdom's Department for International Development (DFID)-funded study entitled "***Agro-Dealers and the Political Economy of Agricultural Biotechnology in Kenya***" and written by Hannington Odame and Elijah Muange, December 2011, over 60 percent (please see the table here below) of Kenyan farmers and agro-dealers interviewed in a high and a low-rainfall areas of Uasin Gishu and Machakos, respectively, said that they would buy GE seeds but wanted more information.

Agriculture Input Dealers Interviewed	**Agree**			**Don't Know**		
	(% of respondents)			**(% of respondents)**		
GE Seeds	**Uasin Gishu**	**Machakos**	**Total**	**Uasin Gishu**	**Machakos**	**Total**
Alleviate food shortage	78	81.5	**79.4**	12.2	11.1	**11.8**
More Nutritious	12.2	38.5	**22.4**	34.1	34.6	**34.3**
More Yield	63.4	77.8	**69.**	19.5	18.5	**19.**

			1			**1**
Tolerate drought better	43.9	70.4	**54.4**	34.1	22.2	**29.4**
Resist pest better	42.5	63	**50.7**	27.2	29.6	**28.4**
Resist herbicide better	19.5	48.1	**30.9**	39	40.7	**39.7**
Contaminate local varieties	51.2	42.3	**47.8**	17.1	30.8	**22.4**
Dangerous to human health	50	40.7	**46.3**	30	29.6	**29.9**
Injurious to non-target organisms	42.5	36	**40**	40	32	**36.9**
More expensive	53.7	75	**61.5**	17.1	20.8	**18.5**
Require more expertise to trade	63.2	58.3	**61.3**	21.1	12.5	**17.7**
Would trade in GM seeds	48.8	75.0	**57.4**	26.8	25.0	**26.2**

Source: Agro-dealer Survey 2010

Details of the study can be found at:
http://www.dfid.gov.uk/r4d/PDF/Outputs/Futureagriculture/FAC_Working_Paper_033.pdf

In another study, entitled [**Kenyan**] **Consumers' Willingness to Pay for Genetically Modified foods in Kenya,** conducted by *Simon Chege Kimenju(University of Nairobi) and Hugo De Groote (CIMMYT),* indicated that about 70 percent of Nairobi consumers would pay the same price for either traditional or GE corn meal. The full report can be found at the following address:
http://ageconsearch.umn.edu/bitstream/24504/1/pp05ki01.pdf

Section V. Plant Biotechnology Capacity Building and Outreach:

The U.S. Government has provided/provides funds to the GOK to further agriculture biotechnology awareness, understanding and appreciation within Kenya. As examples, the U.S. Government has supported the GOK's National Biotechnology Awareness Strategy (Bio-AWARE-Kenya); agriculture biotechnology regulatory development; the Kenya Agriculture Research Institute's (KARI) biotechnology program; university outreach and awareness programs; visiting speakers programs; and, individual training through the Borlaug Fellowship Program.

Section VI. Animal Biotechnology:

The National Biosafety Law 2009 endows the NBA with "Biosafety" regulatory responsibilities. As a result, the NBA regulates animal research and applications that might have "biosafety" concerns in Kenya. The International Livestock Research Institute (ILRI) conducts animal research in Kenya and has applied to the NBA as follows:

Title of Application	Location /Site of Facility	Desired Trait	Date Approved
Application for contained use of Knockout Mice of C57BL/6 mouse strain and A/J mouse strain from Korea,for laboratory studies of gene function.	ILRI facility-Nairobi	Trypanosome resistance model studies on mice	1st December 2011
Application for Proof of Concept: Test of transgene in cattle (Bos taurus) under containment to study basic mechanisms underlying trypanosome resistance.	ILRI facility-Nairobi	Trypanosome resistance in cow	1st December 2011
Application for accelerating the development of improved vaccines against livestock infections caused by members of the Mycoplasma mycoides cluster through the application of targeted mutagenesis	ILRI facility-Nairobi	Vaccine development	11th May 2012

Source: NBA