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## **Korea - Republic of**

### **AGRICULTURAL BIOTECHNOLOGY ANNUAL**

### **AGRICULTURAL BIOTECHNOLOGY ANNUAL**

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**Report Highlights:**

This is to provide Korea's policies and the development of agricultural biotechnology and consumers' acceptance on biotech food. Korea ratified the Cartagena Protocol on Biosafety (CPB) in October 2007 and implemented the LMO Act, Korea's legislation to implement CPB on January 1, 2008. To date, 57 biotech crops have obtained food safety approval and environmental risk assessments for 48 biotech crops have been completed. Korea proposed to expand the current biotech labeling requirements in response to strong demand from NGOs in October 2008. If mandatory labeling is expanded, cooking oil, syrups, and products containing them, which are currently exempt from labeling, may be required to be labeled.

**Section I. Executive Summary:**

Korea ratified the Cartagena Protocol on Biosafety (CPB) on October 2, 2007 and on January 1, 2008, implemented the LMO Act, Korea's implementing legislation for the CPB. To date, there have been no trade disruptions, due in large part to the flexible interpretation by the Korean government of their own regulations on the issue of documentation. However, the Korean government has acknowledged that the LMO Act needs to be modified to reflect actual practices and to be consistent with the CPB. Additionally, many aspects of the consultation process, such as part of the risk assessments for food, feed, and processing (hereinafter referred to as LMO FFPs) are redundant, unprecedented and

without scientific justification. Unnecessary delays as a result of these consultations are already leading to delays in reviews of new products which could lead to potential trade disruptions.

Korea has a fairly extensive regulatory system for biotechnology products. The Ministry for Food, Agriculture, Forestry, and Fisheries (MIFAFF) regulates labeling for unprocessed biotech products and conducts an environmental risk assessment (ERA) of biotech crops. The Korea Food & Drug Administration (KFDA) regulates food safety approval of biotech crops and labeling of processed food products containing biotech components. The Ministry of Knowledge Economy (MKE) is the national competent authority for implementation of the CPB. MKE loosely coordinates the overall efforts of the seven ministries that have been drafting regulations and guidelines to implement the CPB.

In 2009, the Korean government will increase its budget in the biotechnology sector by roughly 18 percent to 1.1 trillion won (approximately \$846 million dollars). No specific details on how this budget will be used are available yet but a substantial amount of money is likely to be invested in research and development of non-agricultural biotechnology such as biomedicine.

Korea has not commercialized any crops produced using biotechnology. Thus, the approval process has always been applied to imported products. In 2008, a biotech grass (used for landscaping) was developed by a local university. An ERA for planting the grass was submitted to the Rural Development Administration (RDA) and field testing was conducted. However, the submission was withdrawn at the request of RDA. No environmental risk assessment for a domestically developed biotech crop has been submitted for review yet (the grass is not considered to be a crop).

Korea has two separate approval systems for biotechnology crops: approval for human consumption (a food safety approval) and an ERA (a feed approval). Both approvals are mandatory. As of July 2009, 57 biotech “events” (i.e., unique genetic lines produced by genetic engineering) have obtained food safety approval. Forty-eight biotech events have completed ERAs.

Unprocessed biotech crops, such as grains that are intended for human consumption and have been approved by KFDA are required to carry GM labels. Three percent adventitious presence of biotech components is allowed. A “GM Food” label is not required as long as identity preserved (IP) documentation or a government issued certificate is submitted to verify that the product is non-biotech.

For processed products and consumer-ready products, biotech labeling is required for 28 food categories of soybeans, corn, cotton, canola, or sugar beets based products if either of the following two situations applies:

- Biotech soybeans, corn, cotton, canola, and sugar beets are one or more of the top five ingredients in the final product.
- Foreign protein or DNA inserted into the product using biotechnology is still present in the final product.

Although Korean regulations allow for the sale of biotech foods, it is impossible to find products with a GM Food label in the marketplace. Korean food processors respond to consumer concerns by not using ingredients produced through biotechnology to avoid having to label them as a GM Food. Retailers explain that they do not want to be singled out for criticism by non-governmental organizations (NGOs) such as consumer groups and environmental groups for selling biotech products.

In October 2008, KFDA proposed to expand the current biotech labeling requirements in response to strong demand from NGOs for greater transparency. If mandatory labeling is expanded, cooking oils, corn syrup products, and products containing them (which are currently exempt from biotech labeling) may be required to be labeled.

The print media used to be negative to biotech agricultural products. Due to the unfavorable international grain market situation these days, however, some newspapers including economic newspapers have started to write positive articles about biotechnology and Korea’s need to import biotech grains. However, the major TV stations are still negative about biotech food and repeat stories such as the rat study by Dr. Pusztai and the monarch butterfly study by Cornell University.

## **Section II. Biotechnology Trade and Production:**

### **A. Commercial Production of Biotechnology Crops**

Korea has yet to commercially produce any biotech crops despite a substantial investment in the development of such crops.

### **B. Biotechnology Crops under Development**

The development of biotechnology crops is being led by various government agencies, universities and private entities. In 2009, MIFAFF's Rural Development Administration (RDA) has given contained field trial permits to 55 scientists to date. RDA, including the National Institute of Agricultural Biotechnology (NIAB), is developing around 80 separate biotech traits among 18 crops. Biotechnology crops under development by RDA include herbicide tolerant rice, pepper, perilla seed, insecticide resistant rice and virus resistant potatoes. Of them, seven are currently undergoing internal safety evaluation.

RDA expects that commercial production of the first domestically developed biotech crops in Korea would be realized in 5 years at the earliest. No official statistics on the development of biotechnology crops by private entities are available. Based upon a recent survey of local scientific journals, 380 papers pertinent to biotech crops (54 crops) were published in Korea between 1990 and 2007. Of the 380 papers, 99 papers were about tobacco, 45 about rice, and 29 about potatoes. Rough industry estimates indicate that approximately 60 varieties are currently under development although most of them are still at the laboratory stage. One exception could be a virus resistant pepper, which is likely to be submitted for safety assessment before the end of this year.

Research is mainly focused on environmental stress resistance and disease resistance biotech crops, transformation techniques, and gene expression. The prevailing wisdom seems to indicate that research on 2nd and 3rd generation traits have been increasing.

### **C. Imports of Biotechnology Crops/Products**

Korea imports biotechnology crops and products for food and feed, and not for propagation. Foods for human consumption containing biotech events must undergo a complete safety assessment conducted by the KFDA. Biotechnology crops/products that contain unapproved events are not allowed to be imported or sold on the Korean market. This means that Korea applies a zero tolerance for unapproved events for human consumption. To date, 57 events have completed KFDA's assessments. (See Appendix A for a complete list of approved events.) The most important biotech crops imported from the United States are corn and soybeans, which are used for further processing and animal feed in Korea. Biotech crops and products destined for human consumption and animal feed must carry a biotechnology label. Non-GMO grains must have IP documentation or official government certification of the non-biotech status of the shipment.

In MY 2007/2008 (October 2007 through September 2008) the United States supplied 8,336,000 metric tons of corn, accounting for 89.5 percent of Korea's total bulk corn imports. Of that, 7,259,000 metric tons was used for animal

feed, and the rest was used for processing purposes. All U.S. origin corn for feed is bulk corn that contains biotech events. In MY 2007/2008, Korea purchased biotech corn for processing purpose for the first time since KFDA began to require mandatory labeling for corn based products due to the unavailability of non-biotech corn in the international market and increasingly high premiums for non-biotech corn. In 2009, Korea is still importing biotech corn and usage of such corn seems to be limited to industrial use.

In MY 2007/2008, the United States supplied 435,251 metric tons of soybeans, accounting for 36 percent of Korea's total soybean imports. Soybeans imported from the United States consisted of 374,940 metric tons of soybeans used for crushing and 60,311 MT for food processing. Since vegetable oil is exempted from labeling, soybean imports from the United States for crushing purposes are generally bulk soybeans that contain biotech events. All soybeans imported for food processing such as soybeans for tofu, bean paste, bean sprouts, etc. are IP-handled, non-biotech products.

**Table 1: Statistics on soybeans and corn import**

(Calendar year basis / Unit: 1,000 MT / U.S.\$1,000)

Classification			2005		2006		2007		2008	
			Vol	Val	Vol	Val	Vol	Val	Vol	Val
Soybean	Food	GMO	1,019	295,853	886	239,104	1,030	354,000	932	525,500
		Non-GMO	312	98,995	244	82,224	276	114,000	281	215,800
		Total	1,331	394,848	1,130	321,328	1,306	468,000	1,213	741,300
Corn	Food	GMO	-	-	0.012	5	0.1	60	792	260,500
		Non-GMO	1,959	449,564	1,854	286,465	1,952	553,732	688	265,400
		Total	1,959	449,564	1,854	286,470	1,952	553,792	1,480	526,000
	Feed	GMO	2,346	336,753	5,378	777,492	4,369	846,481	7,047	N/A
		Non-GMO	4,247	433,184	1,495	212,632	2,277	433,434	422	N/A
Total		6,593	769,937	6,873	990,124	6,646	1,279,915	7,469	2,278,500	

Source: Korea Biosafety Clearing House, KFDA and MIFAFF

**Table 2: Average Price Difference of U.S. Origin Non-LMO and LMO for Food Use in 2008**

(Unit: Price for One Metric Ton / US dollars)

Crops	LMO	Non-LMO	Difference
Corn	329	386	57 (17.3%)
Soybean	564	768	204 (36.2%)

Source: KFDA

#### D. Food Aid

South Korea is not a food aid recipient and is not likely to become a food aid recipient in the future. South Korea provides intermittent food aid to North Korea.

#### E. Production of Biotechnology Crops That Were Developed Outside of the United States

At present, Korea does not commercially produce biotechnology crops from any origin.

## **Section III. New Technologies:**

### **Animal Biotechnology**

#### **A. Development and Use**

Korea is actively using genetic engineering for the development of animals. The research being led by various government agencies and private entities is mainly related to the development of biomedicines and bio-organs from animals. MIFAFF's Rural Development Administration (RDA) is developing eight traits in two animals, chickens and swine. Of eight traits, 6 traits are to produce biomedicine. These are swine producing material that can treat anemia, hemophilia, thrombus and chickens producing eggs with lactoferrin and antioxidant substances. In 2009, the Korean government finalized its overall plan for future growth engines for the economic development for Korea. Korea has selected 13 areas and biomedicine is one of the areas where Korea is investing resources.

Private entities are also developing genetically-engineered animals. One veterinary drug company in Korea is developing genetically engineered chickens that can produce high value protein pharmaceuticals. Others are producing transgenic cattle that can produce insulin, a fluorescent dog for human disease research, chickens that purportedly produce substances to cure leukemia and mini-pigs for production of bio organs.

Colleges are integrating livestock science with biotechnology in order to develop technologies that can yield high values. They are expanding research in genetically engineered animals and the development of new bio materials. Chungnam National University built the "Transgenic Swine Research Center" in 2002 to produce swine for the development of new pharmaceuticals.

Despite active research by Korean scientists, Korea has yet to commercially produce any genetically-engineered animals. It is too early to estimate how close Korea is to commercial production. As for food use, Korean scientists are unwilling to engage in research as they are concerned with consumer's acceptance of meat from genetically-engineered animals. Currently RDA does not have any plan to develop genetically-engineered animals for food use.

#### **B. Regulation**

The LMO Act and its implementing regulations apply to development and import of genetically engineered animals. In addition to the LMO Act, pharmaceuticals produced from genetically-engineered animals are governed by the Pharmaceuticals Affairs Act. If a genetically-engineered animal is used for human consumption, it must be approved by KFDA's GMO safety evaluation guidelines. No specific regulation has been established for the management of genetically engineered animals.

MIFAFF is responsible for the labeling and approval of genetically-engineered animals, but has not yet established any regulations. KFDA is responsible for the safety evaluation of genetically-engineered animals for human consumption.

#### **C. Stakeholder/Public Opinions**

Many Koreans believe that biotechnology is an important frontier for the economic development of Korea in the 21<sup>st</sup> century. Proponents have had some success in making the case that biotechnology could be an engine for growth and could solve public health and environmental problems. Korea continues to expand investment on biotechnology research and development for biomaterial, biomedicine and organs, gene therapy, etc. Despite the Korean government's support for biotechnology research, the Korean public has a negative perception of crops and foods produced through biotechnology. For meat or food from genetically-engineered animals, it is expected that the public will have even more serious concerns. Consequently, the majority of government funding for biotechnology research is directed toward non-agricultural projects such as biomedicine, stem cell research, cloning, and gene therapy. Koreans in general maintain a positive view towards non-agricultural biotechnology and believe biotechnology will play an important role in the country's economic development.

#### **D. International Organizations**

Not specifically related to genetically-engineered animals, but Korea is actively participating in meetings such as CODEX, IPPC, OIE, APEC and others. Korea is trying to loosely follow CODEX regulations in their safety assessment guidelines.

### **E. Outreach, Needs and Strategies**

No U.S. government-funded outreach activity related to genetic engineering of agriculturally-relevant animals has been carried out in Korea.

## **Section IV. Biotechnology Policy:**

### **PLANT BIOTECHNOLOGY POLICY**

#### **A. Regulatory Framework for Agricultural Biotechnology**

The Act on Transboundary Movement of Living Modified Organisms (LMO Act) and its Presidential Decree and Ministerial Ordinance (Korea's LMO legislation and primary regulations to implement the CPB) were drafted by the Ministry of Knowledge Economy (MKE) and finalized and announced on March 28, 2001, September 30, 2005, and March 10, 2006, respectively. The legislation and regulations went into effect on January 1, 2008, which is 90 days after Korea's ratification of the CPB on October 2, 2007. With this LMO Act and its implementing regulations, Korea is requiring mandatory environmental risk assessments and import approval of biotechnology crops.

For approval of biotechnology crops for human consumption, the Korea Food & Drug Administration (KFDA) conducts safety assessments in accordance with the Food Sanitation Act. KFDA requires mandatory biotech labeling for processed food products in accordance with the Food Sanitation Act.

For labeling of bulk biotechnology crops, the Ministry for Food, Agriculture, Forestry and Fisheries (MIFAFF) requires mandatory labeling in accordance with The Agricultural Product Quality Control Act.

#### **Responsible Government Ministries and Their Role**

Ministry of Knowledge Economy (MKE): National competent authority for the CPB, responsible for the LMO Act and issues related to the development, production, import, export, sales, transportation, and storage (hereafter referred to as trade) of LMOs for industrial use.

Ministry of Foreign Affairs & Trade (MOFAT): National focal point for the CPB

Ministry for Food, Agriculture, Forestry, and Fisheries (MIFAFF): Responsible for ERAs for biotechnology crops and fisheries including LMOs for food, feed, and processing, labeling of unprocessed biotechnology crops, and issues related to the trade of agriculture, forestry, livestock, and fishery LMOs.

Rural Development Administration (RDA) (overseen by MIFAFF): Responsible for ERAs for biotechnology crops and leading developer of biotechnology crops in Korea.

National Plant Quarantine Service (NPQS) (overseen by MIFAFF): Responsible for import inspection of LMOs for

agricultural use at the port of entry.

National Agriculture Product Quality Service (NAQS) (overseen by MIFAFF): Responsible for import approval of LMOs for feed use.

Ministry for Health, Welfare, and Family Affairs (MHWF): Responsible for monitoring and/or enforcing regulations pertinent to the Food Sanitation Act and issues related to trade of LMOs used for health and pharmaceutical purposes including human risk assessments of such LMOs.

Korea Center for Disease Control and Prevention (KCDC) (overseen by MHWF): Responsible for human risk consultation for LMOs.

Korea Food & Drug Administration (KFDA) (overseen by MHWF): Responsible for the issuance of food safety approvals of biotechnology crops and the enforcement of labeling requirements for processed food products containing biotech ingredients.

Ministry of Environment (MOEN): Responsible for issues related to the trade of LMOs that are used for the purpose of environmental purification or release into the natural environment including risk assessments for such LMOs (this does not include agricultural LMOs for planting).

National Institute of Environmental Research (NIER), (overseen by MOEN: Responsible for import approval of LMOs under jurisdiction of MOEN and environmental risk consultation for LMOs.

Ministry of Education, Science & Technology (MEST): Responsible for issues related to the trade of LMOs that are used for testing and research including risk assessments for such LMOs.

Ministry of Land, Transport, and Maritime Affairs (MLTM): Responsible for issues related to the trade of maritime LMOs including risk assessments for such LMOs.

National Fisheries Research & Development Institute (NFRDI), (overseen by MIFAFF): Responsible for import approval of fisheries and consultations for LMOs for marine environment.

### **Role and Membership of the Biosafety Committee and Its Political Implications**

In accordance with Article 31 of the LMO Act, a Biosafety Committee should be established under the Prime Minister to review the following factors relevant to the import and export of LMOs:

- Factors relevant to the implementation of the protocol
- Establishment and implementation of the safety management plan for LMOs
- Notification of a list of LMOs that pose no harm in accordance with the provisions of Article 15
- Re-examination in accordance with the provisions of Article 18 of appeals by an applicant who fails to get import approval, etc.
- Factors relevant to legislation and notification pertinent to the safety management, import, and export, etc. of LMOs

- Factors relevant to the prevention of damage caused by LMOs and measures taken to mitigate damage caused by LMOs
- Factors requested for review by the Chair of the Committee or the head of competent national authority.

The Committee (including the Chair) is composed of 15 or more members but not to exceed 20 members. The Prime Minister is the Chair. Committee members include ministers from eight ministries (the seven relevant ministries noted above plus the Ministry of Strategy and Finance (MOSF)). Private sector specialists can also be members of the Committee. The Committee may have subcommittees and technical committees. The Presidential Decree designates the necessary factors relevant to the formation, function, and operation of the Committee, subcommittees, and technical committees. The Committee was formed for the first time in 2008 to discuss the safety management plan for LMOs.

The most important role of the Committee is to reconcile different positions among the relevant ministries. As each relevant ministry holds authority and responsibility in its respective areas, it may not be easy to reach consensus on some issues. In such cases, the Prime Minister as the Chair of the Committee can be called upon to resolve matters lacking consensus.

### **Political Influence**

Regulatory decisions related to agricultural biotechnology are influenced by political factors, mostly from NGOs. Vocal anti-biotech NGOs are appointed as members of the government's food safety and biotechnology risk review committees. NGOs are pressuring the government to make more stringent biotech regulations and the government is responding to such pressure. One example is KFDA's proposed expanded biotech labeling requirements.

### **B. Approval of Biotechnology Crops**

As of July 2009, food safety approvals have been given to 57 events (out of 67 submissions) and 48 events (out of 66 submissions) have completed ERAs. The sixty six submissions to RDA include four carnation events. As for food safety approval, KFDA has three categories of approval; full approval and two types of conditional approval. Full approval is given to biotech crops that are commercially produced and imported for human consumption. Conditional approval applies to discontinued crops such as potatoes and crops not commercially produced for human consumption such as Bt 10. Crops granted conditional approval require a full safety evaluation if they are intended for commercial production for human consumption. In 2008, the biotech grass for landscaping, the first application to RDA for environmental risk assessments, was submitted to RDA. However, the submission was withdrawn at the request of RDA. To date, no product has been approved for commercial production. (Please refer to Appendix A for the status of approval of biotechnology crops in Korea.)

### **C. Field Trials**

In 2009, RDA has granted field trial permits to 55 scientists. RDA renews the field trial permits every year. No details on types of crops/traits are available.

Concerning in-country field testing requirements for imported LMOs, the implementing guidelines to the LMO Act (referred to as the Consolidated Notice) include a provision for agricultural biotechnology crops to be subject to in-

country field tests. The Consolidated Notice states that RDA will require in-country field tests for LMOs used for seed. As for LMOs to be used for food, feed, and processing (FFPs), RDA will review the information resulting from field tests conducted in the exporting country. However, if necessary, RDA may require in-country field tests for LMO FFPs.

For biotechnology crops being developed by RDA, field trials must follow the “Guidelines for Research and Handling of Recombinant Organisms Related to Agricultural Research.” Voluntary guidelines entitled “Guidelines for Research of Recombinant Organisms” issued by the Ministry of Health & Welfare exist for biotechnology crops under development by private entities including universities. The Consolidated Notice also includes guidelines for local biotech developers and laboratories to comply with during their research and development.

#### **D. Stacked Events**

KFDA does not require additional approval for stacked events if they meet the following criteria:

- Traits that are being combined were already approved individually.
- There is no difference in the given traits, intake amount, edible part and processing method in the stacked event and the conventional non-biotech counterpart.
- There is no crossbreeding among subspecies.

The Consolidated Notice announced on December 2007 includes provision for ERAs for stacked events. The following documents need to be submitted to RDA:

1. Information to verify whether there is interaction of traits in nucleic acid inserted in the parental line
2. Available information pertinent to characteristics of the stacked event
3. Evaluation of 1 and 2 above
4. Confirmation from the developer who received approval for the parental event used in the stacked event and agreement for review of already submitted information for the parental event

RDA reviews the submitted documents and if there is interaction between traits in the inserted nucleic acid of the parental line or other differences are noticed, then RDA will require an ERA. Otherwise, no additional approval is required.

For multi-trait stacked events, Korea has not yet determined its policy. It is known that the Korean government is considering several options to review multi-trait stacked events and one of options is to require crop-based information rather than information for individual intermediate events.

#### **E. Registration Requirement**

For biotechnology crops for food or feed or for processing, no additional registration is required other than approval. For LMOs for propagation, however, it should complete the process to be approved as a seed.

#### **F. Coexistence (Zero Tolerance for GMOs in Organic Products)**

Although many Korean consumers have negative sentiments about biotech crops and products, Korean regulation provides for the production, import, use and consumption of biotech crops and products. Similarly, regulations exist in Korea that provide for organic agricultural production. At present, however, Korean regulations for organic processed products are mainly focused on the components of the final product rather than on the production process. Accordingly, KFDA maintains a zero-tolerance policy for the inadvertent presence of biotech content in processed organic products. In accordance with the Food Industry Promotion Act, MIFAFF introduced the organic certification program for processed food products on June 28, 2008. This new program will be enforced from January 1, 2010.

## **G. Labeling**

Both unprocessed biotech crops for human consumption and processed food products containing biotech ingredients must carry GM Food labels. The purpose of biotech labeling in Korea is for the consumer's right to know. However, it is not easy to find products with GM Food label in the market.

The Agricultural Product Quality Control Act is the legal basis for MIFAFF's labeling requirements for unprocessed biotech crops. Until June 2007, MIFAFF required mandatory biotech labeling for soybeans, corn, bean sprouts, and potatoes for human food use. With the revision to the biotechnology labeling guidelines for unprocessed crops, MIFAFF extended biotech labeling to all biotech crops that have been approved by KFDA for human consumption effective from June 29, 2007. In 2007, MIFAFF also revised its Feed Manual and required that retailed packaged animal feed containing biotechnology products be labeled like food products. This new labeling requirement for animal feed went into effect on October 11, 2007.

Labeling guidelines for processed food products containing biotech soybeans and corn as ingredients were finalized on August 30, 2000 and enforced from July 13, 2001. KFDA regulations for processed products, including consumer-ready products, require biotech labeling for 27 categories of foods if biotech soybeans or corn are one or more of the top five ingredients in the finished product or if a foreign protein or foreign DNA is present in the finished product. Effective May 14, 2008, KFDA added three more biotech crops to the current product list requiring mandatory GMO labeling. The three crops are cotton, canola, and sugar beets. If these crops are among the top five ingredients in the designated 28 food categories, and a foreign protein or foreign DNA is present in the final product, the processed food product would be subject to GMO labeling. Foods containing refined ingredients derived from these crops, such as cotton and canola oils, and raw sugar are currently exempt from the labeling requirement since a foreign protein or foreign DNA is not present in the finished products.

KFDA proposed a draft revision to the biotech labeling requirements for processed food products in October 2008 in response to strong demand from NGO groups. Since the first import of biotech corn for human consumption in May 2008, vocal NGO groups have been pressuring KFDA to expand its mandatory labeling to food products manufactured with ingredients derived from biotechnology regardless of the presence of foreign protein or foreign DNA in a final product. The proposed revision to the current biotech labeling guidelines is to 1) expand biotech labeling to 1<sup>st</sup> step final processed food products such as cooking oil or corn syrup and 2) expand biotech labeling to any processed food product containing ingredients derived from biotechnology such as a soft drink containing corn syrup. KFDA planned to finalize this labeling proposal by April 2009 but due to strong resistance from the local food industry and concern related to food security, the announcement of the final labeling guidelines has been delayed. The local food industry is

concerned that expanded GMO labeling would mislead consumers who may believe that these products are not safe despite the fact that they have been approved by the Korean government. They are also concerned that this will increase production costs and limit consumers' choices.

It is expected that Korea would become a non-GM market for food products if the current mandatory biotech labeling is expanded as proposed. Food manufacturers will not be willing to take the risk of developing a GM food. Supermarkets will not want to carry GM labeled products when they are unsure of the consumer's reaction. In addition many stores that do carry GM labeled products are likely to be targeted by local consumer groups. This will force consumers to buy non-biotech products at a higher cost. In 2008, due to NGO's constant pressure to boycott products from a company using biotech ingredients, 21 larger size food manufacturers companies declared that they would not use ingredients derived from biotech corn in their products.

In April 2007, MIFAFF introduced GMO labeling requirements for animal feed. Retail packaged animal feed products are required to carry a GMO label on a retail package if the biotech ingredients with a three percent threshold are used in making the animal feed like food products. This new requirement has been implemented since October 11, 2007. However, it seems that mandatory labeling has had no impact on the trade of biotech feed grains as almost all animal feed products are subject to mandatory GMO labeling.

### **GM Labeling Guidelines**

Shipments that consist of 100 percent unprocessed biotech crops for human consumption should carry labels stating "GM 'commodity'" (e.g. "GM soybeans"). Shipments that contain some biotech-enhanced crops should carry labels stating that the product "contains GM 'commodity'" (e.g. "contains GM soybeans"). Shipments that may contain biotech-enhanced crops should carry labels stating that the product "may contain GM 'commodity'" (e.g. "may contain GM soybeans").

Processed products containing biotech ingredients should be labeled as follows:

- 'products that contain biotech corn or soybeans composing less than 100 percent of the product ingredients should be labeled as "GM food" or "food containing GM corn or soybeans."
- 'corn or soybean products that are 100 percent biotech products should be labeled "GM" or "GM corn or soybeans."
- 'products that may contain biotech corn or soybeans should be labeled "May contain GM corn or soybeans."

### **Unintentional Presence of GM**

MIFAFF allows for up to a three percent unintentional presence of biotech components in unprocessed non-biotech products. MIFAFF's threshold is the default threshold for processed food products that are subject to biotech labeling requirements. KFDA also allows for a three percent unintentional presence of biotech components in raw materials such as soybeans and corn destined for human consumption. Intentional mixture of biotech ingredients triggers the labeling requirement even if the final level of biotech presence is within the three percent threshold. Grains and processed food products within the three percent threshold are required to submit a full IP documentation or a government issued documentation to get exempt from biotech labeling requirement.

**Table 3: Unintentional GM Presence and GM Label**

	<b>Threshold</b>	<b>Label</b>
<b>Non-GM Bulk grains Containing Unintentional GM Presence</b>		
with IP or government certificate	3%	GMO label is exempted.
without IP or government certificate	0%	GMO label shall be affixed.
<b>Processed Products Containing Unintentional GM Presence</b>		
with IP or government certificate	3%	GMO label is exempted.
without IP or government certificate	0%	GMO label shall be affixed.
<b>Processed Products Containing Intentional GM Presence (in top five ingredients)</b>		
with IP or government certificate	3%	GMO label is exempted
without IP or government certificate	0%	GMO label shall be affixed.
<b>Processed Products Containing Intentional or Unintentional GM Presence (beyond top five ingredients)</b>		
GMO label is exempted without any further documentation requirements.		
<b>Processed Product Containing No Foreign DNA, such as syrups, oils, alcohols and processing aids</b>		
GMO label is exempted without any further documentation requirements.		

#### **Use of Labels Such as Biotech-Free, Non-Biotech, GMO-Free, or Non-GMO**

Concerning unprocessed biotech crops for human consumption, MIFAFF allows a voluntary non-GMO label if the product is composed of 100-percent non-biotech enhanced material. For products with non-GMO labels, the maximum GMO threshold allowance is zero. Unprocessed bulk crops in which there is an unintentional presence of biotech components are not permitted to carry a non-GMO label. Importers must keep the relevant documents that support their non-GMO claim. Such documents can include a testing certificate stating that there is no presence of GMO components. With regard to processed food products, however, KFDA does not encourage non-GMO or GMO-free labeling to prevent the misuse of such labels. (See Attaché Reports [KS1004](#) and [KS1046](#) for more details on GM labels.)

#### **H. Biosafety Protocol**

Korea ratified the Cartagena Protocol on Biosafety (CPB) on October 2, 2007 and implemented the LMO Act, Korea's legislation that implements the CPB on January 1, 2008. To date, there have been no trade disruptions due, in large part to the flexible interpretation by the Korean government in interpreting of their regulations on the issue of documentation. For documentation requirements, the LMO Act is interpreted to require exporters to state which biotech events are contained in the shipment; however, MIFAFF has decided to allow exporters to simply provide a list of all biotech events approved for use in Korea. The LMO Act requires a "does contain" principle, but in actual practice, Korea is allowing a "may contain" principle. Although trade has continued without any disruption, Korean regulations including the LMO Act need to be modified to reflect the actual practice and to be consistent with the CPB.

Concerns over the risk assessment process for LMOs for food, feed, and processing (LMO FFP) are growing. Specifically, consultations as part of risk assessments for LMO FFPs are redundant, unprecedented and without scientific justification. Unnecessary delays as a result of these consultations are already leading to delays in reviews of new products which could lead to potential trade disruptions.

#### **I. Other International Fora**

Korea is actively participating in meetings such as CODEX, IPPC, OIE, APEC and others. Korea tends to loosely follow CODEX regulations in their safety assessment guidelines.

#### **J. Biotechnology-Related Trade Barriers**

In 2005, KFDA revised its labeling guidelines in order to formalize its policy regarding the zero tolerance for biotech components in organic products. Exporters from any country where biotech crops are produced could face difficulty in exporting organic products such as soybean powder and soy protein to Korea because of Korea's zero-tolerance policy. From January 1, 2010, MIFAFF will implement the new organic certification program for processed food products. It is likely that MIFAFF may maintain KFDA's zero tolerance policy.

The Korean government requires shipments of U.S. rice to be tested multiple times to confirm the absence of LLRice since the discovery of trace amounts of LLRice 601 in the U.S. rice supply in August 2006. MIFAFF requires two separate tests prior to loading, while the KFDA requires a third test upon arrival. Once rice is released into the market, the National Agricultural Product Quality Service under MIFAFF conducts the fourth test to verify the absence of LLRice in the marketed rice.

In March 2008, Korea eliminated mandatory requirements for a StarLink free certificate for U.S. origin corn and corn-based products and Bt 10 free certificate for U.S. origin bulk corn shipments.

#### **K. Intellectual Property Rights**

As noted in paragraph B above, biotechnology crops are not commercially planted in Korea. However, intellectual property rights are protected by existing domestic regulations.

### **Section V. Marketing: PLANT BIOTECHNOLOGY MARKETING ISSUES**

#### **A. Market Acceptance**

Contradictory views about biotechnology characterize the Korean marketplace. Koreans hold positive views about the use of biotechnology in human and animal research, bio-medicine, and in the treatment of disease. On the other hand, Koreans feel negatively about the use of plant biotechnology to produce food. Polls seem to indicate that Koreans are willing to pay more for non-biotech food products.

Non-governmental organizations (NGOs) and the media have reinforced negative consumer perceptions surrounding the use of biotechnology to produce food. Concerns about negative reactions from NGOs, media, and individual consumers severely limit retailers' willingness to stock products with a GM Food label. Retailers explain that they do not want to be singled out for criticism by NGOs for selling biotech products. In 2008, 21 large scale food manufacturers declared themselves to be GMO free, which was used as a marketing tool. Nonetheless, Korea imports substantial amounts of

biotech food ingredients for further processing into vegetable oil, corn syrup, and other products that are currently exempt from the GM Food labeling requirements.

## **B. Korean Market Survey on Biotechnology Products**

### **Consumer Group Survey**

In July 2008, the Korea Consumer Union conducted a survey of the members of the National Assembly to identify awareness of lawmakers on biotechnology. The survey showed contrasting results between the ruling conservative Grand National Party and the opposition Democratic Party and a rather negative perception on biotechnology. Twenty eight percent of the respondents from the ruling party thought that there is a safety problem with GMOs while over 61 percent of the respondents from the opposition party thought the same. Only 6.5 percent of the respondents from the ruling party thought that Korea should stop development of biotech crops but 23.7 percent of the respondents from the opposition party thought Korea should stop it. Over sixty percent of the law makers responded that they knew that Korea conducts safety evaluation of biotech crops. Over 75 percent of the lawmakers thought that biotech labeling should be required for cooking oil. Over 50 percent of the lawmakers felt uneasy eating biotech food.

### **Korea Biosafety Clearing House Survey**

In November 2008, the Korea Biosafety Clearing House conducted a survey of 1,000 consumers nationwide to identify consumer perceptions on biosafety and LMOs following a similar survey in 2007. The survey showed 0.2 percent and 3.4 percent of the respondents knew about LMO “very well” and “well” respectively while 49.7 percent and 46.7 percent of the respondents knew about LMO “just heard of it” and “a little bit” respectively. Over 90 percent of the respondents thought that stringent control over importation of LMOs is necessary and that LMOs should be labeled. Over 50 percent of the respondents thought that LMOs would have harmful impact on environment and human health. As for LMOs, 93.4 percent of the respondents thought that strict measures are needed for handling, storage, and distribution of LMOs. Sixty-three point eight percent of the respondents thought that more stringent control over importation of LMOs is necessary. The survey showed that only 28.4 percent of the respondents thought that LMO would be well accepted by Korean society and 21.4 percent of the respondents would purchase food products made of LMOs. Demographic survey analysis showed that females with a high educational background and high income households refused to purchase LMOs as they believed the risks outweighed the benefits. Compared to a similar survey in 2007, negative public perceptions on plant biotechnology appear to be getting more negative. The survey reaffirmed that there is still strong negative perception on the social acceptance of LMOs in Korea.

In November 2008, the Korea Biosafety Clearing House conducted a survey of 1,082 researchers nationwide (not limited to biotech-related researchers) to determine researcher’s perceptions of LMOs. The survey showed that around 44 percent of the respondents knew about LMOs well. Over 69 percent of the respondents thought that GMO is the most familiar term that refers to LMO. Eighty-five percent of the respondents thought that LMOs would contribute to the development of human life. Concerning sources of information, the internet was ranked as the top source followed by seminars and scientific papers. This survey also revealed that researchers were more positive about LMOs used for pharmaceutical purposes than food use.

## **Section VI. Capacity Building and Outreach:**

### **PLANT BIOTECHNOLOGY CAPACITY BUILDING AND OUTREACH**

#### **A. U.S. Government or USDA Funded Outreach Activities**

A number of activities have been organized and funded to provide biotechnology outreach in Korea:

1. Inclusion of biotech briefings for participants in the State Department’s International Visitors Program since 1999
2. Biotech press mission to the United States consisting of six reporters in 2000 sponsored by the USDA
3. Cochran Fellowship Program for three Korean biotechnology regulators in 2002
4. Video conference sponsored by the USDA for professors and media in 2002

5. Speakers from the USDA, the State Department, and other agencies/organizations for various local symposiums organized by Korean government agencies including KFDA, RDA, the Korea Research Institute for Bioscience and Biotechnology, etc.
6. U.S. Grains Council's annual biotech program for media, NGOs, scientists, and high school science teachers, etc.
7. Dr. Benson's speech and press outreach in June 2006
8. Presentation by an expert from North American Export Grain Association to Korean industry pertinent to the Cartagena Protocol on Biodiversity in December 2007
9. Presentation by U.S. Grain Council's invited speakers for science high school students, graduate students and professors at the university, the Korea Society of Food Science and Korean NGOs in May 2009
10. Presentations to universities by FAS/Seoul staff in 2007-2009
11. Discussions with Busan broadcast network by FAS/Seoul staff to promote a more positive view of biotechnology in their up coming program in June 2009

## Section VII. Author Defined:

### REFERENCE MATERIAL

### APPENDIX A. TABLE OF APPROVED BIOTECHNOLOGY PRODUCTS AS OF JULY 2009

\* FA: Food approval

\* ERA: Environmental Risk Assessments (not for planting)

Crop	Event	Applicant	Trait	Approval	Approval Date
Soybean	GTS40-3-2	Monsanto	Herbicide Tolerance (HT)	Food & Feed	2002 & 2004
Soybean	Mon89788	Monsanto	HT	Food & Feed	2009
Soybean	A2704-12	Bayer	HT	Food & Feed	2009
Corn	Mon810	Monsanto	Insect Resistance (IR)	Food & Feed	2002 & 2004
Corn	TC1507	Dupont	HT, IR	Food & Feed	2002 & 2004
Corn	GA21	Monsanto	HT	Food & Feed	2002 & 2005
Corn	NK603	Monsanto	HT	Food & Feed	2002 & 2004
Corn	Bt 11	Syngenta	HT, IR	Food & Feed	2003 & 2006
Corn	T25	Aventis / Bayer	HT	Food & Feed	2003 & 2004
Corn	MON863	Monsanto	IR	Food & Feed	2003 & 2004
Corn	Bt176	Syngenta	HT, IR	Food & Feed	2003 & 2006
Corn <sup>1)</sup>	DLL25	Monsanto	HT	Food	2004
Corn <sup>1)</sup>	DBT418	Monsanto	HT, IR	Food	2004
Corn	MON863 X NK603	Monsanto	HT, IR	Food & Feed	2004 &

					2008
Corn	MON863 X MON810	Monsanto	IR	Food & Feed	2004 & 2008
Corn	MON810 X GA21	Monsanto	HT, IR	Food	2004
Corn	MON810 X NK603	Monsanto	HT, IR	Food & Feed	2004 & 2008
Corn	MON810 X MON863 X NK603	Monsanto	HT, IR	Food & Feed	2004 & 2008
Corn	TC1507 X NK603	Dupont	HT, IR	Food & Feed	2004 & 2008
Corn	Das-59122-7	Dupont	HT, IR	Food & Feed	2005
Corn	Mon88017	Monsanto	HT, IR	Food & Feed	2006
Corn	Das-59122-7 X TC1507 X NK603	Dupont	HT, IR	Food & Feed	2006 & 2008
Corn	TC1507 X Das-59122-7	Dupont	HT, IR	Food & Feed	2006 & 2008
Corn	Das-59122-7 X NK603	Dupont	HT, IR	Food & Feed	2006 & 2008
Corn	Bt11 X GA21	Syngenta	HT, IR	Food & Feed	2006 & 2008
Corn	MON88017 X MON810	Monsanto	HT, IR	Food & Feed	2006 & 2008
Corn <sup>2)</sup>	Bt10	Syngenta	HT, IR	Food	2007
Corn	MIR604	Syngenta	IR	Food & Feed	2007 & 2008
Corn	MIR604 X GA21	Syngenta	HT, IR	Food & Feed	2008
Corn	Bt11 X MIR604	Syngenta	HT, IR	Food & Feed	2007 & 2008
Corn	Bt11 X MIR604 X GA21	Syngenta	HT, IR	Food & Feed	2008
Corn	Mon89034	Monsanto	IR	Food & Feed	2009
Cotton	Mon531	Monsanto	IR	Food & Feed	2003 & 2004
Cotton	757	Monsanto	IR	Food & Feed	2003 & 2004
Cotton	Mon1445	Monsanto	HT	Food & Feed	2003 & 2004
Cotton	15985	Monsanto	IR	Food & Feed	2003 & 2004
Cotton	15985 X 1445	Monsanto	HT, IR	Food & Feed	2004 & 2008
Cotton	531 X 1445	Monsanto	HT, IR	Food & Feed	2004 & 2008
Cotton	281/3006	Dow Agro Science	HT, IR	Food & Feed	2005 & 2008
Cotton	Mon88913	Monsanto	HT	Food & Feed	2006
Cotton	LLCotton 25	Bayer	HT	Food & Feed	2005
Cotton	Mon88913 X Mon15985	Monsanto	HT, IR	Food & Feed	2006 & 2008
Cotton	Mon15985 X	Bayer	HT, IR	Food & Feed	2006 &

	LLCotton 25				2008
Cotton	281/3006 X Mon88913	Dow Agro Science	HT, IR	Food	2006
Cotton	281/3006 X Mon1445	Dow Agro Science	HT, IR	Food	2006
Canola	RT73 (GT73)	Monsanto	HT	Food & Feed	2003 & 2005
Canola	Ms8/Rf3	Bayer	HT	Food & Feed	2005
Canola	T45	Bayer	HT	Food & Feed	2005
Canola <sup>1)</sup>	MS1/RF1	Bayer	HT	Food & Feed	2005 & 2008
Canola <sup>1)</sup>	MS1/RF2	Bayer	HT	Food & Feed	2005 & 2008
Canola <sup>1)</sup>	Topas19/2	Bayer	HT	Food & Feed	2005 & 2008
Potato <sup>1)</sup>	SPBT02-05	Monsanto	IR	Food	2004
Potato <sup>1)</sup>	RBMT06	Monsanto	IR	Food	2004
Potato <sup>1)</sup>	RBMT15-101	Monsanto	IR, Virus Resistance (VR)	Food	2004
Potato <sup>1)</sup>	RBMT15-02	Monsanto	IR, VR	Food	2004
Potato <sup>1)</sup>	RBMT15-15	Monsanto	IR, VR	Food	2004
Potato <sup>1)</sup>	RBMT21-129	Monsanto	IR, VR	Food	2004
Potato <sup>1)</sup>	RBMT21-350	Monsanto	IR, VR	Food	2004
Potato <sup>1)</sup>	RBMT22-82	Monsanto	IR, VR	Food	2004
Sugar beet	H7-1	Monsanto	HT	Food	2006
Alfalfa	J101	Monsanto	HT	Food & Feed	2007 & 2008
Alfalfa	J163	Monsanto	HT	Food & Feed	2007 & 2008
Alfalfa	J101 X J163 <sup>3)</sup>	Monsanto	HT	Food & Feed	2007 & 2008

**Total Food Approval: 57**

**Total Feed Approval: 48**

<sup>1)</sup> Conditional approval for discontinued items

<sup>2)</sup> Conditional approval for items that are not intended for commercialization

<sup>3)</sup> Conditional approval as other category and adventitious presence is accepted.