

**RISK ASSESSMENT REPORT
OF THE GENETIC MODIFICATION
ADVISORY COMMITTEE (GMAC)
FOR
AN APPLICATION FOR APPROVAL FOR
RELEASE OF PRODUCTS OF
GHB811 COTTON FOR SUPPLY OR
OFFER TO SUPPLY**

**NBB REF NO: JBK(S) 600-2/1/1
APPLICANT: BASF (MALAYSIA) SDN.
BHD.**

DATE: 7 JULY 2020

I - Summary of Assessment Process

On 31 October 2019, the Genetic Modification Advisory Committee (GMAC, please refer to Appendix 1 for details of GMAC) received from the Department of Biosafety an application for the approval for importation for release [sale/placing on the market for direct use as food, feed and for processing (FFP)] of a product of a Living Modified Organism, herbicide tolerant GHB811 cotton. The application was filed by BASF (Malaysia) Sdn. Bhd. (hereafter referred to as “the applicant”). After an initial review, GMAC requested for additional information from the applicant.

A public consultation for this application was conducted from 17 June 2019 to 16 July 2019 via advertisements in the local newspapers, e-mail announcements and social media. Comments were received from Third World Network (TWN) and Malaysian Palm Oil Board (MPOB). GMAC took into considerations comments regarding molecular characterization, safety assessment of the product, and concern regarding allergenicity of the GM cotton plant.

GMAC had five (5) meetings pertaining to this application and prepared the Risk Assessment Report and Risk Assessment Matrix along with its recommended decision, for consideration by the National Biosafety Board.

II - Background of Application

This application is for approval to import and release products of a Living Modified Organism herbicide tolerant GHB811 cotton. The aim of the import and release is to supply or offer to supply for sale/placing on the market for direct use as food, feed and for processing (FFP). According to the applicant, GHB811 cotton has been fully approved in a number of countries for cultivation as well as for food, feed and for processing. GHB811 cotton is approved in Australia, Argentina, Japan, New Zealand, and United States of America. Processed oil and meal of GHB 811 cotton may enter the food and feed chain.

The primary use of cotton is for the textile industry. However, the by-product of cotton ginning find uses in human and animal diet. Cottonseed oil is the main food product while cottonseed meal is the main feed product from GHB811 cotton.

The applicant claims that GHB811 products are substantially equivalent to those of conventional cotton and provide the same nutritional value as cotton products currently being consumed by all age group. There is no difference in the use of products of GHB811 compared to those of conventional cotton already in the market.

Information about GHB811 Cotton

GHB cotton was developed through *Agrobacterium*-mediated transformation using the vector pTSH09 containing *hppdPfW336-1Pa* and *2mepsps* expression cassettes. The double mutant 5-enol pyruvylshikimate-3-phosphate synthase (*2mepsps*) gene encodes for the *2mepsps* protein. The *2mepsps* coding sequence was developed by introducing two-point mutations to the wild-type *epsps* gene cloned from maize (*Zea mays*). Expression of the *2mepsps* protein confers tolerance to glyphosate herbicides. Meanwhile, the *hppdPf W336* gene encodes for the HPPD W336 protein. The *hppdPf W336* coding sequence was developed by introducing a single point mutation to the wild type *hpd* gene derived from *Pseudomonas fluorescens* gene. Expression of the HPPD W336 protein confers tolerance to HPPD inhibitors, such as isoxaflutole herbicides.

Cotton is primarily used worldwide for its lint. Lint is produced on the seed coat and is spun into fine strong threads. Only the United States and a few other countries have developed major commercial uses for the seed. Raw unprocessed cottonseed may be fed to ruminants in the form of cottonseed meal and hulls or the seed can be processed for oil, the primary component consumed by humans. Linters, the short fibers that remain on the hulls after the removal of the lint have both edible and non-edible uses.

Cotton is generally not grown in Malaysia and the genetic background of GHB811 cotton is not suited for the type of environment in Malaysia. GHB811 cotton varieties are grown using the agronomic practices of the region of production outside of Malaysia and the seed is transported, sored and processed using the same processes as cotton currently in commerce, small volumes of which may enter Malaysia.

III - Risk Assessment and Risk Management Plan

GMAC evaluated the application with reference to the following documents:

- (i) CODEX Guideline for the Conduct of Food Safety Assessment of Foods Derived from Recombinant-DNA Plants.
- (ii) Roadmap for Risk Assessment of Living Modified Organisms, (according to Annex III of the Cartagena Protocol on Biosafety produced by the *Ad Hoc* Technical Expert Group (AHTEG) on Risk Assessment and Risk Management of the Convention on Biological Diversity).
- (iii) The risk assessment and risk management plan submitted by the applicant.

GMAC also referred to the following recommendations within the AHTEG guidelines:

- (i) That the risk assessment exercise be specific to the details of this particular application
- (ii) That the risk assessment exercise be specific to the receiving environment in question, and
- (iii) That any risk identified be compared against that posed by the unmodified organism.

In conducting the risk assessment, GMAC identified potential hazards, and then added a value/rank for the likelihood of each hazard as well as its consequences. The likelihood of each hazard occurring was evaluated qualitatively on a scale of 1 to 4, with 1 for 'highly unlikely', and 4 for 'highly likely'. The consequences of each hazard, if it were to occur, were then evaluated on a scale of 1 to 4, with 1 for 'marginal' and 4 to denote a 'major consequence'. A value was finally assigned for the overall risk from the identified potential hazard. The general formula: Overall Risk = Likelihood x Consequence was employed. GMAC also proposed risk management strategies for potential hazards, where appropriate. This methodology of assessment follows the procedure of Risk Assessment in Annex III of the Cartagena Protocol on Biosafety.

The potential hazards were identified in three main areas:

(i) **Effects on human health**

Relevant scientific publications on the genetic modifications were reviewed for potential human health risks and issues pertaining to acute toxicity of novel protein/ altering/interference of metabolic pathways, potential allergenicity of the novel protein, reproductive toxicity, potential transfer of antibiotic resistance genes in digestive tract, pathogenic potential of donor microorganisms and nutritional equivalence.

(ii) **Effects on animal health**

Relevant scientific publications on the genetic modifications were reviewed for potential animal health risks and issues pertaining to allergenicity, toxicity, anti-nutritional, survivability and animal product contamination.

(iii) **Effects on the environment**

Relevant scientific publications on the genetic modifications were reviewed for issues pertaining to accidental release of seeds, unintentional release and planting, potential of transgenes being transferred to bacteria (soil bacteria, bacterial flora of animal gut), increased fitness, weediness and invasiveness, accumulation of the protein in the environment via feces from animals fed with the GM plant/grain, cross pollination leading to transfer of transgenes and toxic effect on non-target organisms were examined.

Based on the above, a final list of 21 potential hazards was identified. All of these hazards were rated as having an Overall Risk of 1 or "negligible".

GMAC also took caution and discussed a few of the hazards that required further evaluation and data acquisition. Some of these risks are expected to be managed effectively with the risk management strategies proposed (please refer to section IV of this document).

Some of the potential hazards are highlighted below along with the appropriate management strategies:

a) Accidental release of viable seeds

Seeds may be accidentally released during transportation. These seeds can germinate and grow along transportation routes and in areas surrounding storage and processing facilities. Cotton is not grown as an economic crop in Malaysia, thus, there is no issue of outcrossing.

b) Planting of seeds

Plants may be grown by uninformed farmers and perpetuated through small scale cultivations. There should also be clear labeling of the product to state that it is only for the purpose of food, feed and processing, and is not to be used as planting material.

c) Compromised Nutritional Content

Compositional analyses of the seed and forage showed no significant difference in nutritional composition between GHB811 cotton and conventional cotton.

However, applicant is required to update the National Biosafety Board immediately if additional tests indicates potential adverse effects or the possible presence of toxin or allergenic proteins.

d) Effects of isoxaflutole herbicide residues on human and animal health

Residual effects of the isoxaflutole in human and animals have not been established. Raw unprocessed cottonseed may be fed to ruminants in the form of cottonseed meal. As a precautionary measure GMAC recommends that all GHB811 cotton import should be tested for isoxaflutole residues.

IV - Proposed Terms and Conditions for Certificate of Approval

Based on the 21 potential hazards identified and assessed, GMAC has drawn up the following terms and conditions to be included in the certificate of approval for the release of this product:

- a) There shall be clear documentation by the exporter describing the product which shall be declared to the Royal Malaysian Customs.
- b) There shall be clear labeling of the product from importation to all levels of marketing stating that it is only for the purpose of food, feed and processing and is not to be used as planting material.
- c) Should the approved person receives any credible and/or scientifically proven information that indicates any adverse effect of GHB811 cotton, the National Biosafety Board shall be informed immediately.
- d) Any spillage (during loading/unloading/transportation) shall be collected and cleaned up immediately.

- e) Transportation of the consignment from the port of entry to any destination within the country shall be in secured and closed conditions.
- f) Importers are required to provide certificate of analysis for isoxaflutole residues to show that GHB811 cotton in the consignments are below the maximum residual level established prior to shipment.

V - Other Regulatory Considerations

- a) Administrative regulatory procedures shall be arranged between the Department of Biosafety, Royal Malaysian Customs Department and relevant agencies to ensure accurate declaration of product information and clear labeling of the product is implemented.
- b) Administrative regulatory procedures shall be arranged between the Department of Biosafety and the Malaysian Quarantine and Inspection Services (MAQIS) to impose post entry requirements for accidental spillage involving the GM product.
- c) Administrative regulatory procedures shall be arranged between the Department of Biosafety and the Malaysian Quarantine and Inspection Services (MAQIS) and other competent agencies to impose post entry requirements for food safety compliance.
- d) Administrative regulatory arrangements shall be carried out between the Department of Biosafety and the Department of Veterinary Services (DVS) so that any unanticipated adverse effects in animals caused by any consumption of the GM products shall be reported immediately.
- e) Administrative regulatory arrangements shall be carried out by Food Safety and Quality of Ministry of Health to monitor compliance to the Food Act 1983 and Food Regulations 1985; and GM food labelling guidelines.
- f) Administrative regulatory procedures shall be arranged between Department of Biosafety and Ministry of Health to ensure that herbicide residues in cotton consignments are below the maximum residual level established. It is recommended that importers are required to provide certificate of analysis for herbicide residues prior to shipment.

VI - Identification of issues to be addressed for release and long term use of this product

- a) Continuous monitoring is required from the approved person and any unanticipated adverse effect caused by the GHB811 cotton shall be reported to the National Biosafety Board.

VII –Conclusion and Recommendation

GMAC has conducted a thorough evaluation of the application for approval for importation for release [sale/placing on the market for direct use as food, feed and for processing (FFP)] of a

product of a Living Modified Organism, herbicide tolerant GHB811 cotton , and has determined that the release of this product does not endanger biological diversity or human, animal and plant health. GMAC recommends that the proposed application for release be **APPROVED WITH TERMS AND CONDITIONS** as listed in section IV - Proposed Terms and Conditions for Certificate of Approval.

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GENETIC MODIFICATION ADVISORY COMMITTEE (GMAC) MEMBERS INVOLVED IN SPECIFIC RISK ASSESSMENT AREAS FOR THE APPROVAL FOR RELEASE OF PRODUCTS OF GHB811 COTTON FOR SUPPLY OR OFFER TO SUPPLY

Genetic Modification Advisory Committee (GMAC) members divided the task of looking up more information for the Risk Assessment matrix based on three broad categories which were environment, human health and animal health. Each sub-committee had a nominated leader to coordinate the work and report back to the main GMAC. The GMAC members involved in the risk assessment are as below:

- **Prof. Dr. Mohd. Faiz Foong bin Abdullah (Universiti Teknologi MARA) (GMAC Chairman)**
- **Dr. Kodi Isparan Kandasamy (Industry Representative) (Environment sub-committee Leader)**
- **Madam T.S. Saraswathy (Institute of Medical Research - retired) (Human Health sub-committee Leader)**
- **Prof. Dr Jothi Malar Panandam (Universiti Putra Malaysia - retired) (Animal Health sub-committee Leader)**
- **Dr. Rahizan Issa (Institute of Medical Research - retired) (Notification Assessment sub-committee Leader)**
- Dato' Dr. Sim Soon Liang (Academy of Sciences Malaysia)
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