FACT SHEET

APPLICATION FOR APPROVAL FOR RELEASE OF PRODUCTS OF MON 15985 COTTON FOR SUPPLY OR OFFER TO SUPPLY FOR SALE OR PLACING IN THE MARKET

NBB REF NO: JBK(S) 600-2/1/15

The objective of the Biosafety Act 2007 is to protect human, plant and animal health, the environment and biological diversity. Under the Biosafety Act 2007, the National Biosafety Board (NBB) is currently assessing an application for approval submitted by Monsanto (Malaysia) Sdn. Bhd.

1. What is the application for?

This application is to import and release MON 15985 cotton and its products.

2. What is the purpose of the import and release?

The purpose of the import and release is to supply or offer for sale/ placing on the market-for direct use as food, feed and for processing (FFP) of MON 15985 cotton. This means that MON 15985 cotton may enter Malaysia as cottonseed, food ingredients for processing or packaging or as finished products ready for distribution, or as feed meal for animals. The MON 15985 cotton is not intended for cultivation in Malaysia.

3. How has MON 15985 cotton been modified?

Genetically modified MON 15985 cotton was produced by re-transformation of Bollgard® cotton event MON 531, which produces the Cry1Ac protein and the NPTII selectable marker protein. MON 15985 was developed by using particle acceleration plant transformation prosedures to insert *cry2Ab2* gene and *uidA* scorable marker gene to the plant genome of MON 531 to produce Cry2Ab2 and GUS proteins. In addition, *aad* gene encodes AAD protein, which facilitates selection process is under the control of its own bacterial promoter, and therefore the encoded protein AAD is not expressed in the cotton plants. In summary, MON 15985 cotton produces Cry1Ac, Cry2Ab2, NPTII and GUS proteins. The Cry1Ac and Cry2Ab2 proteins produced in MON 15985 provide protection from feeding damage caused by targeted lepidopteran pests . The GUS and NPTII proteins presented in MON 15985 as selectable marker to facilitate transformation selection process, served no other purpose and have no known pesticidal properties.

4. Characteristics of MON 15985 cotton

a. Details of the parent organism

The recipient or parental plant is *Gossypium hirsutum* L.*,* also known as cotton. Cotton is a perennial plant that is harvested and planted annually. Cotton is grown worldwide and is grown primarily for the value of the fiber with cottonseed being a by-product. Cotton is the leading plant fiber crop produced in the world. Cotton is primarily a self-pollinated species and is propagated by seed. Outcrossing levels in cotton are low and there are no identified non-cotton plants that are sexually compatible with cultivated cotton.

b. Donor organism

Characteristics of *Bacillus thuringiensis* subsp*. kurstaki*

Bacillus thuringiensis (*B.t.*) subsp*. kurstaki* , a common soil bacteria, is the source of the *cry1Ac* and *cry2Ab2* genes*.* Applications of sporulated *B.t.* have a long history of safe use for pest control in agriculture, especially in organic farming. Microbial pesticides containing *B.t.* Cry proteins have been subjected to extensive toxicity testing showing no adverse effects to human health. There are no confirmed cases of allergic reactions to Cry proteins in microbial-derived *B.t.* products during more than 50 years of use*.*

Characteristics of *Escherichia coli* (*E. coli*)

The *nptII*, *uidA* and *aad* genes were derived from a non-virulent strain of *Escherichia coli* (*E. coli*), a bacterium that is ubiquitous in the environment and found in the digestive tracts of vertebrate species, including humans. There are no known reports of allergies to *E. coli* or to the proteins produced by *E. coli*.

c. Description of the trait(s) and characteristics which have been introduced or modified

MON 15985 cotton contains *cry1Ac* and *cry2Ab2* genes derived from *Bacillus thuringiensis* subsp*. kurstaki* that expresses Cry1Ac protein and Cry2Ab2 protein, respectively. The Cry1Ac and Cry2Ab2 proteins provide protection from feeding damage caused by targeted lepidopteran pests.

MON 15985 cotton also contains *nptII* and *uidA* genes derived from *Escherichia coli* that encodes NPTII protein and GUS protein, respectively to serve as selectable marker to facilitate transformation selection process, have no other purpose or pesticidal properties.

d. Safety of the expressed proteins

Information and data from studies demonstrate that the Cry1Ac, Cry2Ab2, NPTII and GUS proteins are unlikely to be an allergen or toxin. This is based on the assessment of the donor organisms, *Bacillus thuringiensis* and *Escherichia coli,* which are not a known human or animal pathogen and have lack of reports of allergies derived from the organism. Additionally, there are no confirmed cases of allergic reactions to Cry proteins in microbial-derived *B. thuringiensis* products during more than 50 years of use. Bioinformatics was used to compare the Cry1Ac, Cry2Ab2, NPTII and GUS amino acid sequences against known allergens and pharmacologically active proteins and the results showed a lack of significant structural similarity between the Cry1Ac, Cry2Ab2, NPTII and GUS proteins and known allergens or pharmacologically active proteins. In addition, studies using the Cry1Ac, Cry2Ab2, NPTII and GUS proteins have demonstrated that the proteins were digested rapidly in simulated digestive fluids, and ingestion of the proteins did not cause acute toxicity in mice. These data support the safety for Cry1Ac, Cry2Ab2, NPTII and GUS proteins.

e. Utilization of cotton

The primary product of cotton production is lint for textile use. However, cottonseed has a number of industrially important uses including livestock feed in the form of whole or crushed cottonseed and cottonseed meal, as well as human food use in the form of oil and linters. The presence of the anti-nutrients gossypol and cyclopropenoid fatty acids in cottonseed has limited the human and animal consumption of cottonseed. Cottonseed is processed into four major by-products: oil, meal, hulls, and linters. The primary human foods from cottonseed are the highly processed refined, bleached, and deodorized (RBD) oil and linters. Cottonseed oil is used in a variety of food uses, including frying, salad, and cooking oil, mayonnaise, salad dressing, shortening, margarine, and packing oil. Linters, which are nearly pure cellulose, are used as a fiber supplement, casings for processed meats, binder for solids in the pharmaceutical industry, and to improve viscosity in products such as toothpaste, ice cream, and salad dressing.

Cottonseed meal is primarily sold as feed for livestock, of which the major value is as a protein concentrate. Due to the presence of gossypol and cyclopropenoid fatty acids in cottonseed, most monogastric farm animals are not fed cottonseed meal to any appreciable level, while ruminants are able to incorporate only limited amounts of cottonseed into their diets as a protein supplement.

Hulls are used as feed for livestock and can be an economical roughage that provides fiber as well as a good carrier for cottonseed meal.

Gin by-products, the dried plant material cleaned from the fiber during ginning (process of removing the seeds and debris from cotton), is also used as a source of roughage for livestock feeds.

MON 15985 cotton may enter Malaysia as cottonseed, food ingredients for processing or packaging or as finished products ready for distribution, or as feed meal for animals.

5. Assessment of Risks to Human Health

a. Nutritional Data

Data obtained from compositional analyses conducted on the cottonseed of MON 15985 showed that there were no statistically significant differences in 42 of the 48 comparisons made between MON 15985 and parental control as well as other commercial cotton varieties. Of the 6 statistically significant differences, all test mean values fell within the 95% confidence interval and within the commercial cotton reference ranges. Therefore, these statistically significant differences are not considered biologically relevant. This data supports the statement that MON 15985 cottonseed is compositionally equivalent to conventional cotton.

b. Toxicological Information

There are no known health hazards associated with the product. Studies conducted using the Cry1Ac, Cry2Ab2, NPTII and GUS proteins produced in MON 15985 have shown no toxicity

toward mammals. Additionally, there are no amino acid sequences similarities of MON 15985 cottonseed to known toxins.

c. Pathogenicity

Bacillus thuringiensis and *Escherichia coli,* are not a known human or animal pathogen and have lack of reports of allergies derived from the organism.

6. Assessment of Risks to the Environment

The application does not cover an environmental release. The application is intended only to cover the import of MON 15985 cotton products from countries where cotton is already approved and commercially grown, and that may enter Malaysia as foodstuffs or as feed or cottonseed for further processing.

7. What is the Emergency Response Plan?

MON 15985 cotton and food and feed products derived from it have been assessed as being as safe as its conventional non-genetically modified counterparts and there are no reports of adverse effects since its commercialization. Should adverse effects be reported and verified, appropriate follow up action would be taken to investigate these, and if verified, appropriate actions taken.

a. First Aid Measures

No special first aid measures are required in response for exposure to this product.

b. Accidental Release Measure

No special measures are required in response to an accidental release. Spilled seed should be swept, scooped or vacuumed in a manner that avoids dust generation and dust-related hazards.

c. Handling and Storage

No special handling procedures are required for this product. MON 15985 cotton and its products may be handled and stored as any conventional cotton product.

d. Disposal Consideration

The same measures for waste disposal and treatment as for conventional cotton are valid for MON 15985 cotton.

8. How can I comment on this application?

Any member of the public may submit their comments or queries on publicly notified information about the application. Before submission of comments or queries, the person should review the information provided. Your comments or queries on any possible impacts/risks to the health and safety of the people and the environment that may be posed by the proposed release are appreciated. The submission of the comments or queries should be prepared carefully as it will be given the same scrutiny as the application by the NBB. The submission of comments and

clarifications of queries should contribute to the NBB's assessment. Even if the submission is not science-based, and focuses on cultural or other values, it should still be developed in the form of a well-founded argument.

Please note that the consultation period closes on 25 December 2020 and written submissions are required before/by that date. Submissions must be addressed to:

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Please include your full name, address and contact details in your submission.