FACT SHEET

APPLICATION FOR APPROVAL FOR RELEASE OF PRODUCTS OF MON 88302 CANOLA FOR SUPPLY OR OFFER TO SUPPLY FOR SALE OR PLACING IN THE MARKET

NBB REF NO: JBK(S) 600-2/1/22

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 Bayer Co. (Malaysia) Sdn. Bhd.

1. What is the application for?

This application is to import and release MON 88302 canola and its products. MON 88302 is also known by its trade name TruFlex RoundupReady Canola.

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 88302 canola. MON 88302 canola may enter Malaysia as oil, feedmeal, or food ingredients for processing or packaging or as finished products ready for distribution. The MON 88302 canola is not intended for cultivation in Malaysia.

3. How has MON 88302 canola been modified?

Genetically modified MON 88302 canola was produced by insertion of the *cp4 epsps* gene from *Agrobacterium* sp. strain CP4 into the genome of conventional canola using *Agrobacterium*-mediated transformation method. MON 88302 canola produces the 5-enolpyruvylshikimate-3-phosphate synthase (CP4 EPSPS) protein which confers tolerance to the herbicide glyphosate.

4. Characteristics of MON 88302 canola

a. Details of the parent organism

The parental plant is *Brassica napus* L., also known as canola and the variety of canola used was Ebony.

Brassica napus (*B. napus*) or oilseed rape is thought to have originated in the Mediterranean and was cultivated by ancient civilizations in Asia and the Mediterranean and its oil was used for lighting. In the 1960s, through intensive breeding programmes, Canadian scientists made two important genetic modifications to oilseed rape which led to the first double-low (low-erucic acid and low glucosinolate) variety. In 1978, to distinguish this new edible variety of *B. napus* oil from industrial *B. napus* oil, the Canola Council of Canada chose the word “canola” (Canadian oil, low acid) to become the registered trademark for edible *B. napus* oil with less than 2% erucic acid in the oil (Brown *et al*, 2009; CCC, 2020[1]; Codex Alimentarius, 2005).

[1] https://www.canolacouncil.org/canola-encyclopedia/history-of-canola-seed-development/

b. Donor organism

Characteristics of *Agrobacterium* sp.

Agrobacterium sp. is a gram-negative, motile, soil-dwelling plant pathogen. *Agrobacterium* sp. strain CP4 is the source of the *cp4 epsps* gene. *Agrobacterium* species are not known for human or animal pathogenicity (FAO-WHO, 2001).

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

MON 88302 canola has been genetically modified to contain a *cp4 epsps* gene derived from *Agrobacterium* sp. strain CP4 that expresses CP4 EPSPS protein which confers tolerance to glyphosate herbicide.

d. Safety of the expressed protein

Information and data from studies demonstrate that the CP4 EPSPS protein is unlikely to be an allergen or toxin. This is based on the assessment of the donor organism, *Agrobacterium* sp. strain CP4, which is not a known human or animal pathogen and there are no reports of allergies derived from the organism (FAO-WHO, 2001). The CP4 EPSPS and native plant EPSPS enzymes are functionally equivalent except for their tolerance to glyphosate. Bioinformatics was used to compare the CP4 EPSPS amino acid sequence against known allergens, toxins and biologically active proteins and the results showed a lack of significant structural similarity between the CP4 EPSPS protein and known allergens or toxins or biologically active proteins (Kang and Silvanovich, 2013). In addition, studies using the CP4 EPSPS protein have demonstrated that the protein was digested rapidly in simulated digestive fluid (Leach et al., 2002), and ingestion of the protein did not cause acute toxicity in mice (Harrison et al., 1996; Naylor, 1993). These data support the safety for CP4 EPSPS protein.

e. Utilization of canola

Today, canola is grown principally for its oil which is extracted from the seed, and has both food and industrial applications. Canola oil is high quality oil that is used in a variety of foods including frying and baking oils, salad oils, margarines and shortenings, and is the most valuable component of canola seed. It is the world's third largest source of vegetable oil with 14% of world vegetable oil consumption after soybean oil at 28% and palm oil at 36% (ASA, 2019; USDA-FAS, 2019).

MON 88302 canola may enter Malaysia as oil, feedmeal, or food ingredients for processing or packaging or as finished products ready for distribution.

5. Assessment of risks to human health

a. Nutritional data

The compositional analyses of MON 88302 canola seeds showed that for 51 components statistically evaluated, statistically significant differences were observed for nine analytes in comparison to the control. Where values were different, the means were within the 99% tolerance interval developed from the commercial reference varieties and were within the published literature ranges (with the exception of total dietary fiber which does not have published reference data)(Lundry et al., 2011). Hence, these differences are unlikely to be biologically meaningful. From these results, it is concluded that seeds produced by MON 88302 canola is comparable to seeds of conventional canola.

b. Toxicological information

There are no known health hazards associated with the product. Studies conducted using the CP4 EPSPS protein have shown no toxicity toward mammals (Kang and Silvanovich, 2013; Harrison et al., 1996; Leach et al., 2002; Naylor, 1993). Additionally, there are no amino acid sequences similarities of the CP4 EPSPS protein to known toxins or other biologically active proteins.

c. Pathogenicity

Agrobacterium sp. strain CP4 is ubiquitous in the environment and not known to be associated with any allergies derived from the organism (FAO-WHO, 2001).

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 88302 canola products from countries where canola is already approved and commercially grown, and that may enter Malaysia as oil, feedmeal, or food ingredients for processing or packaging or as finished products ready for distribution. Thus, the potential exposure to the environment is limited to rare spillage events. On environmental risk assessment of genetically engineered (GE) plants under low-exposure conditions, the loss of imported canola are most likely to occur near ports or along roads from ports to manufacturing sites (Roberts et al., 2014). Most of the spilled grains are unlikely to survive for long outside intentional cultivation by the following limiting factors:

i) seeds not encountering conditions favorable for germination as optimum temperature for growth of canola is about 20^{o}C (OECD, 1997);

ii) the plants germinated in the areas which are often managed (e.g. mowing, cleaning);

iii) poor competitive ability with native vegetation, canola is not an indigenous species (OECD, 2000), and is not a major economic crop in Malaysia. Therefore, MON 88302 canola is unlikely to germinate and establish upon accidental spillage in Malaysia.

7. What is the emergency response plan?

There have been no reports of adverse effects of MON 88302 canola since its commercialization. Should adverse effects be reported and verified, appropriate follow up action would be taken to investigate these, and if verified, appropriate action taken.

a. First aid measures

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

b. Accidental release measures

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

c. Handling and storage

No special handling and storage procedures are required for this product. MON88302 canola and its products may be handled and stored as any conventional canola products.

d. Disposal considerations

The same measures for waste disposal and treatment as for conventional canola are valid for MON 88302 canola.

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 and 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 to 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 2 November 2021 and written submissions are required by that date. Submissions must be addressed to:

Director General,
Department of Biosafety
Ministry of Environment and Water

Level 4, Block F11, Complex F
Lebuh Perdana Timur, Precinct 1
62000 Putrajaya, MALAYSIA.
E-mail: dob@biosafety.gov.my
Please include your full name, address and contact details in your submission.

References

ASA. 2019. 2019 SoyStats: A reference guide to soybean facts and figures. American Soybean Association, St. Louis, Missouri.

Brown, J., J.B. Davis, M. Lauver and D. Wysocki. 2009. United States Canola Association: Canola growers manual. University of Idaho, Oregon State University, Boise, Idaho.

Codex Alimentarius. 2005. Codex standard for named vegetable oils. Pages 1-13 in Codex-STAN 210. Codex Alimentarius Commission, Joint FAO/WHO Food Standards Programme, Food and Agriculture Organization of the United Nations, Rome, Italy.

FAO-WHO. 2001. Evaluation of allergenicity of genetically modified foods. Report of a joint FAO/WHO expert consultation on allergenicity of foods derived from biotechnology. Food and Agriculture Organization of the United Nations, Rome, Italy.

Harrison, L.A., M.R. Bailey, M.W. Naylor, J.E. Ream, B.G. Hammond, D.L. Nida, B.L. Burnette, T.E. Nickson, T.A. Mitsky, M.L. Taylor, R.L. Fuchs and S.R. Padgette. 1996. The expressed protein in glyphosate-tolerant soybean, 5-enolypyruvylshikimate-3-phosphate synthase from *Agrobacterium* sp. strain CP4, is rapidly digested in vitro and is not toxic to acutely gavaged mice. Journal of Nutrition 126:728-740.

Kang, H.T. and A. Silvanovich. 2013. Updated Bioinformatics Evaluation of the CP4 EPSPS Protein Utilizing the AD_2013, TOX_2013 and PRT_2013 Databases. Monsanto Technical Report MSL0024715. St. Louis, Missouri.

Leach, J.N., R.E. Hileman, J.J. Thorp, C. George and J.D. Astwood. 2002. Assessment of the in vitro Digestibility of Purified E. coli-produced CP4 EPSPS Protein in Simulated Gastric Fluid. Monsanto Technical Report MSL17566. St. Louis, Missouri.

Lundry, D.R., S.G. Riordan, B.L. Potts, and R. Sorbet . 2011. Amended Report for MSL0022807: Compositional Analyses of Canola Seed Collected from Glyphosate Treated MON 88302 Grown in the United States and Canada during the 2009 Growing Season. Monsanto Technical Report MSL0023615. St. Louis, Missouri.

Naylor, M.W. 1993. Acute Oral Toxicity Study of CP4 EPSPS Protein in Albino Mice. Monsanto Technical Report MSL-13077. St. Louis, Missouri.

OECD. 1997. Consensus document on the biology of Brassica napus L. (oilseed rape). OCDE/GD(97)63. Series on Harmonization of Regulatory Oversight in Biotechnology No. 7. Organisation for Economic Co-operation and Development, Paris, France.

OECD. 2000. Report of the task force for the safety of novel foods and feeds. C(2000)86/ADD1. Organisation of Economic Co-operation and Development, Paris, France.

Roberts, A., Y. Devos, A. Raybould, P. Bigelow and A. Gray. 2014. Environmental risk assessment of GE plants under low-exposure conditions. Transgenic Research 23:971-983.

USDA-FAS. 2019. Oilseeds: World markets and trade. U.S. Department of Agriculture, Foreign Agricultural Service, Washington, D.C.