

Biotechnology Notification File No. 000172 CFSAN Note to the File

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From: Patrick Cournoyer, PhD

To: Administrative Record, BNF No. 000172

Subject: Soybean with insertion event GMB151 (GMB151 soybean)

Keywords: soybean, *Glycine max*, plant-parasitic nematode resistant, soybean cyst nematode, *cry14Ab-1.b*, Cry14Ab-1, *Bacillus thuringiensis*, tolerance to HPPD-inhibitor herbicides, *hppdPf-4Pa*, 4-Hydroxyphenylpyruvate dioxygenase (HPPD), HPPD-4, *Pseudomonas fluorescens* strain A32, BASF, GMB151, OECD Unique Identifier BCS-GM151-6

Summary

BASF Corporation (BASF) has completed a consultation with the Food and Drug Administration (FDA) on food derived from GMB151 soybean engineered to express Cry14Ab-1 for protection against plant-parasitic nematodes¹ and to express HPPD-4 for tolerance to HPPD-inhibitor herbicides and for use as a selectable marker. This document summarizes BASF's conclusions and supporting data and information that FDA's Center for Food Safety and Applied Nutrition (CFSAN, we) evaluated pertaining to human food uses. FDA's Center for Veterinary Medicine summarizes its evaluation pertaining to animal food in a separate document.

BASF concludes:

- it has not introduced into food a new protein or other substance that would require premarket approval as a food additive
- human food from GMB151 soybean is comparable to and as safe as human food from other soybeans.

CFSAN evaluated data and information supporting these conclusions and considered whether GMB151 soybean raises regulatory issues within FDA's authority under the Federal Food, Drug, and Cosmetic Act (FD&C Act). We have no further questions at this time about the safety, nutrition, and regulatory compliance of human food from GMB151 soybean.

The U.S. Environmental Protection Agency (EPA) evaluates and authorizes the use of plant incorporated protectants (PIPs) under the FD&C Act and the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). A PIP is defined in 40 CFR 174.3 as "a pesticidal substance that is intended to be produced and used in a living plant, or the produce thereof, and the genetic material necessary for the production of such a pesticidal substance," including "any inert

¹ The Cry14Ab-1 protein is intended primarily for resistance to soybean cyst nematode (*Heterodera glycines*).

ingredient contained in the plant, or produce thereof.” In GMB151 soybean, Cry14Ab-1 is a PIP and HPPD-4 is an inert ingredient. EPA granted a permanent exemption from the requirement of a tolerance for Cry14Ab-1 when used as a PIP in soybean (40 CFR 174.540) and for HPPD-4 when used as a PIP inert ingredient in all food commodities (40 CFR 174.537). The safety of Cry14Ab-1 and HPPD-4 in GMB151 soybean is under EPA’s purview and therefore is not addressed in this document.

BASF has submitted a petition (Petition Number 19-317-01p) to the United States Department of Agriculture seeking a determination of nonregulated status under 7 CFR part 340, for soybean event GMB151.

Subject of the Consultation

Crop:	Soybean
Designation:	GMB151
Intended trait:	Protection against plant-parasitic nematodes
Intended trait:	Tolerance to HPPD-inhibitor herbicides
Developer:	BASF Corporation
Submission received:	February 1, 2019
Amendment received:	May 11, 2021
Intended use:	General use in human and animal food
Expression cassette 1:	<i>cry14Ab-1.b</i> encoding Cry14Ab-1 from <i>Bacillus thuringiensis</i> for protection against plant-parasitic nematodes
Expression cassette 2:	<i>hppdPf-4Pa</i> encoding 4-Hydroxyphenylpyruvate dioxygenase (HPPD) from <i>Pseudomonas fluorescens</i> strain A32, with four introduced amino acid changes (HPPD-4) conferring tolerance to HPPD-inhibitor herbicides
Transformation method:	<i>Agrobacterium</i> -mediated transformation

Inheritance and Stability

BASF performed whole genome sequencing and bioinformatics analysis on five breeding generations of GMB151 soybean and found consistent insertion junctions in each generation, confirming stable inheritance of the inserted DNA. BASF analyzed the inheritance of the insertion using polymerase chain reaction-based genotyping and found the expected Mendelian segregation ratio.

Uses in Human Food

Soybean (*Glycine max*) is grown around the world for a variety of human and animal food and industrial uses. Soybean seeds are processed into oil and meal. Soybean oil is rich in

polyunsaturated fatty acids and is commonly used as a salad and cooking oil and in the production of margarine and other human food ingredients. While most soybean meal is used in animal food, some soybean meal is further processed into soy flours and soy protein for a variety of human food uses. Traditional foods prepared from soybeans include tofu, miso, soymilk, tempeh, and soy sauce.

Human Food Nutritional Assessment


The intended traits in GMB151 soybean are not expected to alter levels of key nutrients, anti-nutrients, or toxicants. To ensure the absence of unintended changes in components relevant to safety or nutrition, BASF measured levels of key components in seed of GMB151 soybean, the untransformed parental variety Thorne, and nine commercial reference varieties.² BASF measured levels of proximates (moisture, ash, carbohydrates, crude fat, crude protein, acid detergent fiber, neutral detergent fiber, and total dietary fiber), isoflavones (daidzein, genistein, glycitein, and total isoflavones), anti-nutrients (lectins, phytic acid, raffinose, stachyose, and trypsin inhibitor), fatty acids, amino acids, eight vitamins, and nine minerals.³

Levels of most components in GMB151 soybean were similar to levels in the parental variety. When slight differences between GMB151 soybean and the parental variety were observed, levels in GMB151 soybean were within the range of reference variety means or within ranges reported in the International Life Sciences Institute Crop Composition Database for soybean (2018).⁴ Because levels were within the range of natural variability, BASF concludes that the differences were not relevant to human nutrition and that GMB151 soybean is comparable to other soybean varieties with respect to human nutrition.

Conclusion

Based on the information provided by BASF and other information available to CFSAN, we have no further questions at this time about the safety, nutrition, and regulatory compliance of human food from GMB151 soybean. We consider the consultation with BASF on GMB151 soybean to be complete.

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² Field trials took place at eight sites, with three reference varieties at each site. GMB151 soybean was grown with and without HPPD-inhibitor herbicide treatment. At each site, four replicates per entry were planted in a randomized complete block design.

³ BASF also measured levels of several components in forage, which is used in food for animals.

⁴ On May 1, 2020, the International Life Sciences Institute Crop Composition Database became known as the Agriculture and Food Systems Institute Crop Composition Database.