



This is a provisional English translation of an excerpt from the original full report.

Safety Assessment Report

Sugar Beet tolerant to herbicide glyphosate, glufosinate and dicamba (KWS20-1 line)

(Genetically Modified Food)

Food Safety Commission of Japan (FSCJ)
September 2025

ABSTRACT

The FSCJ conducted a safety assessment of “Sugar beet tolerant to herbicide glyphosate, glufosinate and dicamba (KWS20-1 line).”

This line was developed by introducing the modified *cp4 epsps* transgene derived from *Agrobacterium sp.* CP4 strain, the *pat* transgene derived from *Streptomyces viridochromogenes*, and the modified *dmo* transgene derived from *Stenotrophomonas maltophilia* DI-6 strain into the breeding line 04E05B1DH05 of sugar beet (*Beta vulgaris* L. ssp. *vulgaris* var. *altissima*) belonging to the genus *Beta* in the family *Amaranthaceae*, as a conventional variety. The expression of modified CP4 EPSPS protein, PAT protein, and modified KWS20-1 DMO protein confers tolerance to herbicide glyphosate, glufosinate and dicamba, respectively.

Unlike 5-enolpyruvylshikimate-3-phosphate synthase present in sugar beet, modified CP4 EPSPS protein can utilize its shikimate pathway without competitive inhibition by herbicide glyphosate. Therefore, this genetically modified organism can grow without the influence of herbicide glyphosate.

Since PAT protein acetylates L-glufosinate, the active ingredient of herbicide glufosinate, and produces N-acetyl L-glufosinate having no herbicidal activity, this genetically modified organism can grow without the influence of herbicide glufosinate.

Since modified KWS20-1 DMO protein demethylates herbicide dicamba and inactivates it through catalyzing the reaction of transforming it to 3,6-dichlorosalicylic acid having no herbicidal activity and formaldehyde, this genetically modified organism can grow without the influence of herbicide dicamba.

Referring to the “Guidelines for the Safety Assessment of Genetically Modified Foods (Seed Plants) ¹”, evaluations were conducted on the safety of the donor of the inserted genes, the toxicity and allergenicity of the proteins expressed by the inserted genes, the base sequence analysis of the inserted genes, the stability of the inserted genes in successive generations, the effects on the metabolic pathways of the plant, and the comparative analysis of nutritional and toxic components. These evaluation results

¹ Decision of the FSCJ dated January 29, 2004



indicated no additional factors that could impair safety in this line compared with non-recombinant sugar beet.

Therefore, the FSCJ concluded that “Sugar beet tolerant to herbicide glyphosate, glufosinate and dicamba (KWS20-1 line)” is unlikely to pose a risk to human health.