

Renewal of the authorisation for import and processing of genetically modified soybean 305423

COGEM advice CGM/241017-01

- The present application (GMFF-2024-23560; RX046) concerns the renewal of the authorisation for import and processing for use in feed and food of genetically modified (GM) soybean (*Glycine max*) 305423 (DP-305423-1);
- GM soybean 305423 was previously authorised for import and processing in 2015;
- COGEM advised positively on the import and processing of soybean 305423 in 2007;
- GM soybean 305423 expresses a *fad2-1* gene fragment, resulting in a high oleic phenotype. Furthermore, the *gm-hra* gene is expressed, which confers slight tolerance to acetolactate synthase (ALS)-inhibiting herbicides and was used as a selectable marker;
- In the Netherlands, feral soybean populations do not occur;
- Hybridisation of soybean with other species is not possible in the Netherlands, as there are no wild relatives of soybean;
- The molecular characterisation of GM soybean 305423 has been updated and meets the criteria of COGEM;
- The updated bioinformatics analyses, literature review and the post-market environmental monitoring reports do not indicate a potential environmental risk;
- COGEM is of the opinion that the import and processing of GM soybean 305423 poses a negligible risk to the environment in the Netherlands;
- As other organisations carry out a food/feed assessment, COGEM abstains from giving advice on the potential risks of incidental consumption.

1. Introduction

The present application (GMFF-2024-23560; RX046)), filed by Corteva Agriscience Belgium BV on behalf of Corteva Agriscience LLC, concerns the renewal of the authorisation for import and processing for use in feed and food of genetically modified (GM) soybean (*Glycine max*) 305423. This authorisation was granted in 2015.¹ As import and processing authorisations remain valid for a period of 10 years, the applicant has filed an application for the renewal of the authorisation granted in 2015. The application includes monitoring reports, updated bioinformatics analyses, and a systematic literature search.

GM soybean 305423 expresses a gene fragment of the *fad2-1* gene, which – through RNA interference – silences the expression of the endogenous soybean omega-6 desaturase gene 1 (*FAD2-1*) and in turn leads to a decreased level of the omega-6 fatty acid desaturase and a high-oleic acid phenotype. Furthermore, 305423 expresses the *gm-hra* gene, which confers slight tolerance to acetolactate synthase

(ALS)-inhibiting herbicides. Expression of the *gm-hra* gene does not confer high enough tolerance for ALS-inhibiting herbicides in the field, but is high enough to have been used as a selection marker during development of the 305423 event.

2. Previous COGEM advice

COGEM advised on the import and processing of GM soybean 305423 in 2007, and concluded that it poses a negligible risk to the environment.² In addition, COGEM has also advised positively on two different stacked events that contain 305423, in 2008, and 2018.^{3,4}

3. Environmental risk assessment

The objective of an environmental risk assessment (ERA) is to identify and evaluate potential adverse effects of the genetically modified organism (GMO), direct or indirect, immediate, or delayed, on human health and the environment. This ERA involves the import and processing of GM soybean. Any concerns relating to cultivation, management or harvesting practices are beyond the scope of this advice. When assessing the environmental risk of incidental spillage of GM soybean COGEM first considers the likelihood that the event could establish itself in the Netherlands or could hybridise with related species. Other so-called ‘areas of concern’ (e.g., effects on non-target organisms) are addressed only if there is a chance that the event could establish itself or if gene flow to other species might occur.

3.1 Characteristics of the crop

Soybean (*Glycine max*) belongs to the Leguminosae (Fabaceae) family and is cultivated from equatorial to temperate zones. The optimum temperature for soybean growth is between 25 °C and 30 °C. Soybean is sensitive to frost and therefore does not survive freezing conditions.^{5,6,7} The soybean plant is not weedy in character.^{6,7} To reduce yield losses during harvest, soybean plants with minimal seed scattering have been selected for breeding. Soybean seeds rarely display dormancy, survive poorly in the soil, and do not form a persistent soil seed bank.^{6,8} Soybean volunteers are rarely observed throughout the world and do not compete effectively with other cultivated plants or primary colonisers.^{6,7} In addition, volunteers are easily controlled mechanically or chemically.⁷

Soybean is a predominantly self-pollinating species. The anthers mature in the bud and directly pollinate the stigma of the same flower.^{6,7} Pollinators such as honeybees (*Apis mellifera* L.) may improve the pollen distribution on the stigmatic surface, which is known to increase seed set in many crops, and may also facilitate the transfer of soybean pollen and enable cross-pollination.^{9,10,11,12} The cross-pollination rate of soybean is low and on average between 1 and 3%.^{6,7,13,14,15,16,17} Soybean pollen usually only disperse over short distances.

3.2 Receiving environment

As mentioned above, soybean is sensitive to frost. Temperatures below 0 °C are common in the Netherlands, with an average of 51 frost days per year between 1991 and 2020.¹⁸ Although the Dutch climate is not optimal, soybean is cultivated on a small scale (442 hectares in 2023).¹⁹ Soybean volunteers are very uncommon in the Netherlands and have never led to the establishment of wild

populations.^{20,21} To the best of COGEM’s knowledge, there are no reports of feral soybean populations in Europe. Additionally, hybridisation with other species is not possible in Europe, as there are no wild relatives of soybean.^{6,7}

Conclusion: In the Netherlands feral soybean populations do not occur and hybridization of soybean with other species is not possible.

3.3 Description of the introduced genes and traits

A description of the inserted genetic elements is given in the table below. The list is limited to information on the introduced genes, corresponding traits, and regulatory elements (promoters and terminators). A more detailed description can be found in the previous COGEM advice.²

Introduced genes	Encoded proteins	Regulatory elements	Traits
Fragment of the coding region of <i>gm-fad2-1</i>	Does not encode a functional protein ^{2,22}	Seed preferred promoter (1000-fold less active in leaf tissue) and terminator from soybean Kunitz trypsin inhibitor gene 3 (<i>KTi3</i>)	Transcription of the <i>gm-fad2-1</i> fragment silences the endogenous omega-6 desaturase gene 1 (<i>FAD2-1</i>), which – through RNA interference – results in the inhibition of the conversion of oleic acid to linoleic acid, resulting in decreased levels of linoleic acid and increased levels of oleic acid
<i>gm-hra</i>	Modified version of acetolactate synthase (ALS) (GM-HRA) from <i>Glycine max</i> ^{2,23}	S-adenosyl-L-methionine synthetase (SAMS) promoter, and the acetolactate synthase (<i>als</i>) gene terminator from <i>G. max</i>	Slight tolerance to ALS-inhibiting herbicides. Expression does not confer commercial levels of ALS-inhibiting herbicides, and only functioned as a selectable marker during development of the 305423 event.

3.4 Updated bioinformatic analyses

The bioinformatic analysis performed for the previous application regarding 305423 was repeated with updated databases – assembled in 2023 – containing sequences from allergens, toxins, and proteins. According to the applicant there were no biologically relevant amino acid sequence similarities to known allergens, toxins, or other biologically active proteins with adverse effects for human or animal health.

COGEM is of the opinion that the molecular characterisation of GM soybean 305423 has been performed correctly and meets the requirements of COGEM.²⁴

Conclusion: The bioinformatics analyses of GM soybean 305423 been updated and performed adequately. No indications for potential environmental risks were identified.

3.5 Systematic literature search and unpublished studies

The applicant performed a literature search using several bibliographic databases covering a publication period from January 2015 to the spring of 2024. The literature search addressed the question “Does 305423 soybean and derived food/feed products, or the intended traits [including the newly expressed protein and small interfering RNA (siRNAs)], have adverse effects on human and animal health and the environment in the scope of this application?”. The applicant states that they are not in possession of unpublished studies that could influence the risk assessment of GM soybean 305423.

The literature search identified 305 publications in electronic databases, four of which were considered relevant for soybean 305423.^{25,26,27,28} According to the applicant, none of these studies were found to contain new data relevant to the risk assessment. Overall, the applicant’s literature search did not identify any adverse effects on human and animal health, or the environment.

Conclusion: The systematic literature search did not provide any indications that import and processing of GM soybean 305423 poses an environmental risk.

3.6 Annual monitoring reports

The applicant supplied annual reports of the post-market monitoring (PMEM) conducted between July 2015 and December 2023. These reports include information on the monitoring that is conducted by operators involved in the import, handling and processing of viable GM soybean. These operators are members of the European trade associations COCERAL, UNISTOCK or FEDIOL, and have agreed to participate in the PMEM. They are expected to report any occurrence of unanticipated adverse effects arising from soybean 305423, including adventitious populations resisting routine eradication procedures. No adverse health or environmental effects have been reported by the trade associations involved in the monitoring of the import and processing of the 305423 soybean.

Conclusion: The information in the annual monitoring reports gives no indication of adverse effects or incidents resulting from import and/or processing of GM soybean 305423.

4. Food/feed assessment

This application is submitted under Regulation (EC) 1829/2003²⁹, therefore a food/feed assessment is conducted by European Food Safety Authority (EFSA) and national organisations involved in the assessment of food safety. In the Netherlands, Wageningen Food Safety Research (WFSR) conducts a food and/or feed assessment for Regulation (EC) 1829/2003 applications. The outcome of the assessment by other organisations (EFSA, WFSR) was not known when this advice was completed.

5. Post-market environmental monitoring

The applicant did not propose any changes to the existing post-market environmental monitoring (PMEM) plan for soybean 305423. COGEM has published several recommendations for further improvement of the general surveillance (GS) plan^{30,31} – which is part of a PMEM plan – but considers the current GS plan to be adequate for the import and processing of soybean 305423.

Conclusion: The current PMEM plan is sufficient for the import and processing of GM soybean 305423.

6. Overall conclusion

Overall, COGEM is of the opinion that import and processing of GM soybean 305423 poses a negligible risk to the environment in the Netherlands. COGEM abstains from giving advice on the potential risks of incidental consumption since other organisations conduct a food/feed assessment.

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