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Assessment of genetically modified sugar beet H7-1 for renewal of authorisation under Regulation (EC) No 1829/2003 (application EFSA-GMO-RX-006)

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Abstract

Following the submission of application EFSA-GMO-RX-006 under Regulation (EC) No 1829/2003 from KWS SAAT SE and Monsanto Company, the Panel on Genetically Modified Organisms of the European Food Safety Authority (GMO Panel) was asked to deliver a scientific risk assessment on the data submitted in the context of the renewal of authorisation application for the herbicide-tolerant genetically modified sugar beet H7-1. The data received in the context of this renewal application contained a systematic search and evaluation of literature, updated bioinformatics analyses and additional documents or studies performed by or on behalf of the applicant. The GMO Panel assessed these data for possible new hazards, modified exposure or new scientific uncertainties identified during the authorisation period and not previously assessed in the context of the original application. Under the assumption that the DNA sequence of the event in sugar beet H7-1 considered for renewal is identical to the originally assessed event, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on sugar beet H7-1.

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Summary

Following the submission of application EFSA-GMO-RX-006 under Regulation (EC) No 1829/2003¹ from KWS SAAT SE and Monsanto Company (referred to hereafter as 'the applicant'), the Panel on Genetically Modified Organisms of the European Food Safety Authority (GMO Panel) was asked to deliver a scientific risk assessment on the data submitted in the context of the renewal of authorisation application for the herbicide-tolerant genetically modified (GM) sugar beet H7-1. The scope of the renewal application EFSA-GMO-RX-006 is for food and feed produced from or food containing ingredients produced from sugar beet H7-1 for import and processing, excluding cultivation within the European Union (EU).

In delivering its scientific opinion, the GMO Panel took into account application EFSA-GMO-RX-006, additional information provided by the applicant, scientific comments submitted by the Member States and relevant scientific publications. The data received in the context of the renewal application EFSA-GMO-RX-006 contained: an evaluation of the literature retrieved by a systematic search, updated bioinformatics analyses, and additional documents or studies performed by or on behalf of the applicant. The GMO Panel assessed these data for possible new hazards, modified exposure or new scientific uncertainties identified during the authorisation period and not previously assessed in the context of the original application.

In conclusion, under the assumption that the DNA sequence of the event in sugar beet H7-1 considered for renewal is identical to the sequence of the originally assessed event, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on sugar beet H7-1 (EFSA, 2006).

¹ Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed. OJ L 268, 18.10.2003, p. 1–23.

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1. Introduction

1.1. Background

On 22 December 2016, the European Food Safety Authority (EFSA) received from the European Commission (DG SANTE) application EFSA-GMO-RX-006 by KWS SAAT SE and Monsanto Company (referred to hereafter as 'the applicant') for the renewal of authorisation of genetically modified (GM) sugar beet H7-1 for food and feed produced from or food containing ingredients produced from this GM sugar beet for import and processing submitted within the framework of Regulation (EC) No 1829/2003. Before sending the application to EFSA, the European Commission confirmed whether the data submitted in the context of this renewal application were in line with the legal requirements laid down in Articles 11 and 23 of Regulation (EC) No 1829/2003.

After receiving application EFSA-GMO-RX-006, and in accordance with Articles 5(2)(b) and 17(2)(b) of Regulation (EC) No 1829/2003, EFSA informed Member States and made the summary of the application available to the public on the EFSA website.²

On 18 April 2017, EFSA declared the application valid in accordance with Articles 6(1) and 18(1) of Regulation (EC) No 1829/2003. EFSA made the valid application available to Member States and the European Commission, and consulted nominated risk assessment bodies of Member States, including national Competent Authorities within the meaning of Directive 2001/18/EC following the requirements of Articles 6(4) and 18(4) of Regulation (EC) No 1829/2003, to request their scientific opinion. Member States had three months after the opening of the Member State commenting period (until 1 August 2017) to make their opinion known.

Following the submission of application EFSA-GMO-UK-2004-08 and the publication of the EFSA scientific opinion (EFSA, 2006), the placing on the market of sugar beet H7-1 for food and feed produced from or food containing ingredients produced from this GM sugar beet for import and processing, excluding cultivation in the EU, was authorised by Commission Decision 2007/692/EC³. Since the scope of the application (EFSA-GMO-UK-2004-08) is limited to food produced from or containing ingredients produced from sugar beet H7-1 and feed produced from sugar beet H7-1, it only includes products produced from sugar beet H7-1 which do not contain viable plant parts. Therefore, there were no requirements for scientific information on environmental risks associated with the adventitious release or cultivation of sugar beet H7-1. At the time of the authorisation, no post-market monitoring requirements were requested. A copy of this authorisation was provided by the applicant.⁴

EFSA requested additional information on 11 May 2017 and 29 June 2017, and the applicant submitted their reply on 15 May 2017 and 30 August 2017, respectively.

In giving its scientific opinion to the European Commission, the Member States and the applicant, and in accordance with Articles 6(1) and 18(1) of Regulation (EC) No 1829/2003, EFSA has endeavoured to respect a time limit of 6 months from the acknowledgement of the valid application. As additional information was requested by the EFSA Panel on Genetically Modified Organisms (GMO Panel), the time limit of 6 months was extended accordingly, in line with Articles 6(1), 6(2), 18(1) and 18(2) of Regulation (EC) No 1829/2003.

According to Regulation (EC) No 1829/2003, this scientific opinion is to be seen as the report requested under Articles 6(6) and 18(6) of that Regulation and thus will be part of the EFSA overall opinion in accordance with Articles 6(5) and 18(5).

1.2. Terms of Reference as provided by the requestor

The GMO Panel was requested to carry out a scientific risk assessment on the data submitted in the context of a renewal of authorisation application for sugar beet H7-1 for food and feed produced from or food containing ingredients produced from this GM sugar beet for import and processing in accordance with Articles 11 and 23 of Regulation (EC) No 1829/2003.

Where applicable, any conditions or restrictions which should be imposed on the placing on the market and/or specific conditions or restrictions for use and handling, including post-market monitoring requirements based on the outcome of the risk assessment and, in the case of GMOs or food/feed

² Available online: <http://registerofquestions.efsa.europa.eu/roqFrontend/questionDocumentsLoader?question=EFSA-Q-2017-00026>

³ COMMISSION DECISION of 24 October 2007 authorising the placing on the market of food and feed produced from genetically modified sugar beet H7-1 (KM-ØØØH71-4) pursuant to Regulation (EC) No 1829/2003 of the European Parliament and of the Council. Official Journal of the European Union L 283/69, 27.10.2007.

⁴ Dossier: H7-1 renewal – Annex 1.

containing or consisting of GMOs, conditions for the protection of particular ecosystems/environment and/or geographical areas should be indicated in accordance with Articles 6(5)(e) and 18(5)(e) of Regulation (EC) No 1829/2003.

The GMO Panel was not requested to give an opinion on information required under Annex II to the Cartagena Protocol. Furthermore, the GMO Panel did not consider proposals for labelling and methods of detection (including sampling and the identification of the specific transformation event in the food/feed and/or food/feed produced from it), which are matters related to risk management.

2. Data and methodologies

2.1. Data

The data for application EFSA-GMO-RX-006 provided by the applicant at the time of submission, or in reply to requests for additional information, are specified below.

In the context of this renewal application, no new sequencing study was submitted among the additional documents or studies performed by or on behalf of the applicant. In accordance with the GMO Panel guidelines for renewal of applications of GM food and feed authorised under Regulation (EC) No 1829/2003 (EFSA GMO Panel, 2015), the GMO Panel evaluated the data provided in the context of this sugar beet H7-1 renewal application under the assumption that the event sequence is identical to the original sequence of the event.

2.1.1. Post-market monitoring reports⁵

A post-market monitoring (PMM) plan and post-market environmental monitoring (PMEM) plan were not required by the authorisation decision; therefore no reports were submitted in the frame of this application.

2.1.2. Systematic search and evaluation of literature⁶

The applicant performed a systematic literature search covering the period from 2007 to March 2017, relevant for the food and feed and environmental safety assessment of sugar beet event H7-1 and the CP4 5-enol-pyruvyl-shikimate-3-phosphate-synthase (CP4 EPSPS) protein. The retrieved publications were evaluated for their potential relevance for food/feed safety, molecular characterisation, and environmental safety.

The applicant searched two general databases to identify relevant publications. Using these two databases, 292 and 233 publications were retrieved. After applying the eligibility/inclusion criteria defined *a priori* by the applicant, the applicant reported that no relevant publications were identified.

2.1.3. Updated bioinformatic data⁷

At the time of validation of the renewal dossier, the applicant provided an overview on the bioinformatics package for sugar beet H7-1 and one full study report. On 11 May 2017, EFSA requested the full study reports for four more bioinformatics studies. On 15 May 2017, the applicant provided the requested studies, which included an analysis of the potential similarity to allergens or toxins of the newly expressed proteins and of all possible open reading frames (ORFs) within the insert and spanning the junction sites and an analysis of possible horizontal gene transfer (HGT). The bioinformatics data was obtained using the original event sequence. The outcome of the updated bioinformatics is presented in Section 3.3.

2.1.4. Additional documents or studies provided by the applicant⁸

In line with the renewal guidance requirements (EFSA GMO Panel, 2015), the applicant provided an overview on the worldwide approvals of sugar beet H7-1 and a list of all studies performed by or on behalf of the applicant over the course of the authorisation period and not previously submitted to the EU. Full study reports were provided (Table 1).

⁵ Dossier: H7-1 renewal – Annex 2.

⁶ Dossier: H7-1 renewal – Annex 3.1

⁷ Dossier: H7-1 renewal – Annex 3.2 and additional information 15/5/2017.

⁸ Dossier: H7-1 renewal and H7-1 renewal – Annex 3.3.

Table 1: List of additional studies performed by KWS SAAT SE or Monsanto Company over the course of the authorisation period (2007–2016) for sugar beet H7-1

Study identification	Title
PLT 6016-6MA	Sequencing of plant genomic DNA flanking the T-DNA insert in Roundup Ready sugar beet event H7-1
MSL0021534	Compositional analysis of leaf and root (brei) from Roundup Ready sugar beet event H7-1 grown in 2008 European field trials
MSL0022232	Assessment of CP4 EPSPS protein levels in Roundup Ready sugar beet event H7-1 leaf and root (brei) tissues produced in 2008 European field trials
MSL0022403	Assessment of CP4 EPSPS protein levels in Roundup Ready sugar beet event H7-1 pollen
RAR-2013-0686	Phenotypic evaluation and environmental interactions of Roundup Ready sugar beet event H7-1 in US field trials and greenhouse assessments

The relevance of the listed studies for molecular characterisation, human and animal safety and the environment was assessed by the applicant.

2.1.5. Overall assessment as provided by the applicant⁹

In line with the requirements listed in the renewal guidance (EFSA GMO Panel, 2015), the applicant provided an overall assessment on whether the collected information in the application for renewal of authorisation of sugar beet H7-1 for food and feed produced from or food containing ingredients produced from this GM sugar beet for import and processing in the EU, challenges the conclusions of the original risk assessment (EFSA, 2006).

2.1.6. Monitoring plan and proposal for improving the conditions of the original authorisation

A PMM and PMEM plan were not required by the authorisation decision.

2.2. Methodologies

The GMO Panel assessed the application for the renewal of the authorisation of sugar beet H7-1 for food and feed produced from or food containing ingredients produced from this GM sugar beet for import and processing in accordance with Articles 11 and 23 of Regulation (EC) No 1829/2003. The GMO Panel took into account the requirements described in its guideline for the risk assessment of renewal applications of GM food and feed authorised under Regulation (EC) No 1829/2003 (EFSA GMO Panel, 2015).

The comments raised by Member States are addressed in Annex E of EFSA's overall opinion¹⁰ and were taken into consideration during the scientific risk assessment.

3. Assessment

3.1. Evaluation of the post-market monitoring reports

No reports were required and submitted in the frame of this application, therefore no evaluation was performed.

3.2. Evaluation of the systematic search and evaluation of literature

After conducting a systematic search covering the authorisation period, the applicant did not retrieve any safety relevant paper for sugar beet event H7-1. The GMO panel accepts the outcome of the systematic literature search. No new information that could give rise to a safety concern for human and animal health and the environment which would change the original risk assessment conclusions on sugar beet H7-1 was reported in the systematic literature search.

⁹ Dossier: H7-1 renewal.

¹⁰ Available online: <http://registerofquestions.efsa.europa.eu/roqFrontend/questionLoader?question=EFSA-Q-2017-00714>

3.3. Evaluation of the updated bioinformatics data

The results of the updated bioinformatics analyses indicated that the insert is located in a region showing similarity to sequences encoding MATE efflux transport proteins. In order to evaluate the impact of this new information, the GMO panel took into account studies provided in the original application. These included a comparison of an inbred line homozygous for the H7-1 insertion with non-GM inbred lines which did not indicate relevant morphological changes. Cultivated sugar beet are commonly hybrids, therefore hemizygous plants for H7-1 event will be used for commercial purposes. These plants contain an intact copy of the locus. The original agronomic, phenotypic and compositional analyses of plants hemizygous for the H7-1 insertion did not indicate biologically relevant differences as compared to the non-GM comparator and a reference variety.¹¹ In addition, other studies performed by or on behalf of the applicant over the course of the authorisation period also confirmed the absence of compositional and phenotypic differences between the GM line and its comparators (Table 1).

Analyses of the amino acid sequence of the newly expressed CP4 EPSPS protein revealed no significant similarities to toxins or allergens. In addition, bioinformatics analyses of the newly created ORFs within the insert or spanning the junctions with genomic DNA revealed no significant similarities to toxins and allergens.

The sequence identity analysis of the regions of bacterial origin in sugar beet H7-1 identified a single element with sufficient length and identity to facilitate homologous recombination (HR) with the *Agrobacterium tumefaciens* octopine plasmid (EFSA, 2015). However considering the function of the genetic elements of the insert, this does not raise safety concern. There is no new information that would change the previous conclusion of the GMO Panel, therefore the unlikely, but theoretically possible, horizontal transfer of recombinant genes from sugar beet H7-1 to bacteria does not raise any environmental safety concern.

3.4. Evaluation of the additional documents or studies provided by the applicant

The GMO Panel evaluated the full study reports of the additional studies provided. This new information did not raise any concern for human and animal health and the environment, which would change the original risk assessment conclusions on sugar beet H7-1.

3.5. Evaluation of the monitoring plan and proposal for improving the conditions of the original authorisation

As a PMM and PMEM plan were not required by the authorisation decision, the applicant did not indicate any new proposal for monitoring. The GMO panel is of the opinion that a PMM and PMEM plan is still not needed.

4. Conclusions

Under the assumption that the DNA sequence of the event in sugar beet H7-1 considered for renewal is identical to the originally assessed event, the GMO Panel concludes that there is no evidence in the context of this renewal application for new hazards, modified exposure or scientific uncertainties that would change the conclusions of the original risk assessment on sugar beet H7-1 (EFSA, 2006).

Documentation provided to EFSA

- 1) Letter from the European Commission to EFSA received on 22 December 2016 for the continued marketing of genetically modified sugar beet H7-1 in accordance with articles 11 and 23 of Regulation (EC) No 1829/2003 by KWS SAAT SE and Monsanto Europe S.A./N.V. (EFSA-GMO-RX-006).
- 2) Acknowledgement letter dated 11 January 2017 from EFSA to European Commission.
- 3) Letter from EFSA to applicant dated 20 February 2017 requesting additional information under completeness check.

¹¹ Application EFSA-GMO-UK-2004-08.

- 4) Letter from applicant to EFSA received on 23 March 2017 providing additional information under completeness check.
- 5) Letter from EFSA to applicant dated 18 April 2017 delivering the 'Statement of Validity' for application EFSA-GMO-RX-006.
- 6) Letter from EFSA to applicant dated 11 May 2017 requesting additional information and stopping the clock.
- 7) Letter from applicant to EFSA received on 15 May 2017 providing additional information.
- 8) Email from EFSA to applicant dated 16 May 2017 re-starting the clock on 15 May 2017.
- 9) Letter from EFSA to applicant dated 29 June 2017 requesting additional information and stopping the clock.
- 10) Letter from applicant to EFSA received on 30 August 2017 providing additional information.
- 11) Email from EFSA to applicant dated 31 August 2017 re-starting the clock on 30 August 2017.

References

- EFSA (European Food Safety Authority), 2006. Opinion of the Scientific Panel on Genetically Modified Organisms on an application (reference EFSA-GMO-UK-2004-08) for the placing on the market of products produced from glyphosate-tolerant genetically modified sugar beet H7-1, for food and feed uses, under Regulation (EC) No 1829/2003 from KWS SAAT and Monsanto. EFSA Journal 2006;4(12):431, 18 pp. <https://doi.org/10.2903/j.efsa.2006.431>
- EFSA (European Food Safety Authority), 2015. Explanatory note on DNA sequence similarity searches in the context of the assessment of horizontal gene transfer from plants to microorganisms. EFSA Supporting Publication 2015:12(12);EN-916, 10 pp. <https://doi.org/10.2903/sp.efsa.2015.en-916>
- EFSA GMO Panel (EFSA Panel on Genetically Modified Organisms), 2015. Guidance for renewal applications of genetically modified food and feed authorised under Regulation (EC) No 1829/2003. EFSA Journal 2015; 13(6):4129, 8 pp. <https://doi.org/10.2903/j.efsa.2015.4129>

Abbreviations

CP4 EPSPS	CP4 5-enol-pyruvyl-shikimate-3-phosphate-synthase
GM	genetically modified
GMO Panel	EFSA Panel on Genetically Modified Organisms
HGT	horizontal gene transfer
HR	homologous recombination
ORF	open reading frame
PMEM	post-market environmental monitoring
PMM	post-market monitoring