Title

Summary of the Literature Review for CV127 soybean
October 1, 2020 – September 30, 2021

Final Report

Data or guideline requirement

Explanatory note on literature searching
conducted in the context of GMO applications for (renewed) market authorization
and annual post-market environmental monitoring reports on GMOs authorised in the EU market.
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STUDY PERSONNEL

Electronic database search	[redacted]
Agency website search	GRM
Manual search **(reference list from review articles)**	[redacted]
Stage 1 assessment	[redacted]
Stage 2 assessment	Food and Feed safety [redacted] Molecular characterization [redacted] Environmental safety [redacted]
Report	[redacted]

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SUMMARY

CV127 soybean plants were produced by introduction of the imidazolinone-tolerant acetohydroxyacid synthase large subunit (*ahasl*) gene *csr1-2* with its native promoter from *Arabidopsis thaliana* into the soybean plant genome via biolistics transformation technology. The *csr1-2* gene from *A. thaliana* encodes an acetohydroxyacid synthase (AHAS, also known as acetolactate synthase (ALS)) large subunit enzyme that is tolerant to imidazolinone herbicides due to a point mutation that results in a single amino acid substitution in which the serine residue at position 653 is replaced by asparagine (S653N). The OECD unique identifier is BPS-CV127-9.

A scoping review was performed for CV127 and its newly expressed protein, AHAS. The objective of this scoping review was to determine if there were studies about the molecular characterization of CV127 soybean, its effect on food and feed safety or environmental safety, that might require an in-depth examination. A set of broad literature searches was performed using several bibliographic databases covering the scientific literature from October 1, 2020 to September 30, 2021. Additional sources of information, such as web pages of food safety, agriculture, and biotechnology-related authorities were searched for the same time window, along with the bibliographies of relevant reviews. The references identified were evaluated for potential relevance to the scoping review questions according to pre-defined criteria.

These literature searches identified a total of 517 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of eight publications were progressed for detailed assessment.

Two of the eight publications were determined to be relevant after detailed review. The relevant articles did not constitute new data on molecular characterization of CV127 soybean, or the AHAS protein, nor did it suggest any potential adverse effects on human and animal health or on the environment. No evidence was identified that would warrant conducting a systematic review.

In summary, these literature searches and review of the retrieved articles identified two relevant publications that support the existing safety assessment of CV127 soybean.

1. INTRODUCTION

CV127 soybean plants were produced by introduction of the imidazolinone-tolerant acetohydroxyacid synthase large subunit (*ahasl*) gene *csr1-2* with its native promoter from *Arabidopsis thaliana* into the soybean plant genome via biolistics transformation technology. The *csr1-2* gene from *A. thaliana* encodes an acetohydroxyacid synthase (AHAS, also known as acetolactate synthase (ALS)) large subunit enzyme that is tolerant to imidazolinone herbicides due to a point mutation that results in a single amino acid substitution in which the serine residue at position 653 is replaced by asparagine (S653N). The OECD unique identifier is BPS-CV127-9.

The objective of the literature searches described here was to determine if there were studies published between October 1, 2020 and September 30, 2021 that mention the molecular characterization of CV127 soybean, and/or any adverse effect of CV127 soybean in food, feed or the environment. In that context, a broad and inclusive literature search was performed, and the articles retrieved were reviewed in a comprehensive and transparent manner. This was intended as a scoping review. The literature review was performed as recommended in the European Food Safety Authority (EFSA) explanatory note on literature searching conducted in the context of Genetically Modified Organisms (GMO)[1] applications and post-market environmental monitoring activities (2019).

The literature searches were performed for CV127 soybean and its newly expressed protein, AHAS. The search terms also included relevant synonyms, trade name and intended trait, plant species and general GMO terms.

2. OVERALL METHODS

2.1. Objective of the scoping review

The objective of the scoping review was to survey the evidence base for CV127 soybean and its newly expressed protein, AHAS, in order to identify any specific issues related to food or feed safety, molecular characterization or environmental safety that might require an in-depth examination.

2.2. Review questions

Review questions were formulated to conform to PE(I)CO structure (Population, Exposure (Intervention), Comparators, Outcome) if possible, and to address data requirements. They were modeled after the review question examples provided in the EFSA 2019 explanatory note[1].

Question 1: Were any studies published during the reporting period that describe adverse effects on human or animal health or the environment of CV127 soybean and its newly expressed protein AHAS?

Key elements:

Population: Human health; animal health; environmental safety

Exposure: CV127 soybean, derived food/feed products, newly expressed protein in CV127 soybean

Comparators: When applicable, comparable populations or subjects exposed to appropriate controls (e.g., vehicle only, innocuous control protein, non-GM comparator) or conventional counterpart used for comparative analysis of plant material

Outcome: Adverse effects

Question 2: Were any studies published during the reporting period that focus on molecular characterization of CV127 soybean and its newly expressed protein AHAS in soybean?

Key elements:

Population: CV127 soybean and newly expressed protein in CV127 soybean
Outcome: Molecular characterization (which would indicate the information/data requirement for molecular characteristics)

2.3. Criteria for relevance

Criteria for establishing the relevance of retrieved publications were defined prior to conduct of the search. These criteria were modeled after those given in the EFSA 2019 explanatory note[1] and are described in Table 1.

Table 1: Eligibility/inclusion criteria to establish the relevance of retrieved publications

Concepts	Criteria	Comment
Key elements of review questions with PECO structure		
Population	The publication addresses human and animal health, and/or the environment (including biodiversity, ecosystem services, service providing units, and endangered species) as general protection goals	From the publications that address the GMO under consideration, those that address protection goals relevant to the risk assessment of the GMO are eligible
Exposure (Intervention)	The publication addresses the GMO, derived food/feed products, and/or the intended trait(s) (e.g., newly expressed proteins(s)) that are identical or like those under regulatory review	This enables the selection of publications that address the GMO, derived food/feed products, and/or the intended trait(s) under consideration
Comparator	If the publication reports a comparative study that uses plant material as test material, eligible publications must report a non-GM variety as comparator	In those cases where the publication addresses the GMO under consideration, reports a comparative analysis study and uses plant material as test material, eligible publications also need to include an appropriate non-GM line as comparator
Outcome	The publication addresses effects/impacts on human and animal health, and/or the environment	Publications that address the GMO under consideration also need to address effects/impacts on entities of concern, and potential determinants of exposure that place these entities at risk, in order to be relevant to the risk assessment of the GMO

Concepts	Criteria	Comment
Additional concepts		
Information/data requirements	The publication reports information pertaining to one or more information/data requirement(s) outlined in Appendix A for the GMO and derived food/feed products under consideration, including the intended trait(s)	Publications that potentially contribute to the knowledge informing the risk assessment of the GMO under consideration, and thus the risk hypotheses addressed, taking account of both hazard and exposure, can be considered relevant according to this eligibility/inclusion criterion. Publications addressing other issues such as benefits, socio-economics, ethics, crop protection, detection methods, efficacy, public perception and risk communication can be excluded, as they are not necessarily relevant to the risk assessment of GMOs
Plant species	The publication addresses the same plant species as the GMO under consideration	This eligibility/inclusion criterion permits the exclusion of publications on GMOs that contain the same intended trait(s) as the GMO under consideration, but which are introduced in another plant species
Scope of GMO application	The publication addresses pathways and levels of exposure to the GMO, derived food/feed products, and the intended trait(s) that are relevant for the intended uses of the GMO and derived food/feed products under regulatory review	From the publications that address the GMO under consideration, those that consider pathways and levels of exposure relevant to the scope of the GMO application (i.e., import and processing for food/feed uses, cultivation) are eligible
Target pests/organisms	The publication addresses target pests/organisms that are established in the EU	This permits the exclusion of publications that address interactions between the GMO and target pests/organisms that do not occur in the EU

Concepts	Criteria	Comment
Stacked events obtained by conventional crosses/ subcombinations	The publication addresses the higher stacked event and/or a subcombination or subcombinations of the single events of the higher stacked event, independently of its/their origin	This permits the selection of publications on the higher stacked event and/or subcombinations of the single events of the higher stacked event that are in the scope of the GMO application(s), independently of their origin. This permits the exclusion of publications on the single events of the higher stacked event, because the risk assessment of GMO applications for stacked events covers only the products in the scope of the GMO application – i.e., the higher stacked event and subcombinations of the singles involved, independently of their origin
Molecular stacks	The publication addresses: the molecular stack; all newly expressed proteins in the molecular stack; and/or one or several of the newly expressed proteins in the molecular stack that has/have not been previously risk assessed by EFSA and/or its GMO Panel and for which no safe use has been determined yet by EFSA and/or its GMO Panel	This permits the exclusion of publications that address one or several (not all) of the newly expressed proteins in the molecular stack that has/have been previously risk assessed by EFSA and/or its GMO Panel and for which the safe use has been determined by EFSA and/or its GMO Panel
Previously risk assessed publications	The publication has not been previously risk assessed by EFSA and/or its GMO Panel and is not cited/referenced in an EFSA/GMO Panel output	This permits the exclusion of publications that have been previously risk assessed by EFSA and/or its GMO Panel and cited/referenced in an EFSA/GMO Panel output
Access	Full-text document is accessible	If potentially relevant full-text documents cannot be obtained, they should be listed in a table with a description of the (unsuccessful) methods that have been used to try to obtain a copy

Concepts	Criteria	Comment
Reporting format	The publication presents original/primary data, or it is a risk assessment from a relevant key organisation (such as regulatory agencies and risk assessment bodies involved in the risk assessment of GMOs)	This permits the exclusion of publications that do not present original/primary data (e.g., editorials, position papers), and the inclusion of relevant risk assessments performed and reported by relevant key organisations. Reviews should only be included if they present data that are not available from a primary research study
Reporting format	A study in a publication should only be presented once, but if it is presented in more than one publication, all publications should be listed and grouped	Duplicate publications should be excluded at the screening stage. Only one copy of a study is required even if it is reported in different publications, and identified in more than one database

Table adapted from EFSA, 2019: Explanatory note on literature searching conducted in the context of GMO applications for (renewed) market authorisation and annual post-market environmental monitoring reports on GMOs authorised in the EU market.

2.4. Reference publication

One publication that is relevant for CV127 soybean was previously identified and was used to test and validate the search strategy:

- Papadopoulou N; Ramon M. (2018). Risk assessment of new sequencing information for genetically modified soybean BPS-CV127-9. EFSA Journal (2018), Volume 16, Number 9, e05425 p.

This article was selected as reference publication because it mentions the event name (CV127), the introduced gene (crs1-2), the newly expressed protein (AHAS) and the crop (soybean). Since this article was published outside the search period of this report, the search profile was tested without applying the time filters used in the final profile (UP>=20201001 and UP<=20210930).

3. SEARCH METHODS AND OUTCOMES

The search strategies used here followed the 2019 EFSA explanatory note on literature searching conducted in the context of GMO applications and post-market environmental monitoring activities[1]. The search strategies were designed to be broad and sensitive enough to capture any relevant publications, if available.

An information specialist with background in plant biotechnology selected the databases, identified relevant search terms, developed search profiles, designed search strategies, and conducted the searches.

3.1. Time window and date of the literature search

The database searches were performed on October 8, 2021. Only documents updated between October 1, 2020 and September 30, 2021, were considered in the search. The dates of most recent database updates are provided in Table 3.

3.2. Databases used in the literature search

All searches were performed in the host STN (Scientific and Technical Information Network), an online database service operated jointly by CAS and FIZ Karlsruhe. STN provides access to a broad range of databases from the most renowned database producers worldwide.

The searches described here were performed in five databases: three multidisciplinary/large databases (Biosis, Medline and CA-Plus) and two subject-specific databases focused on agriculture-related topics (Agricola and CABA).

See Appendix 1 for detailed database descriptions.

3.3. Search strategy

The search profiles were designed to cover event name, newly expressed protein and intended traits. The reference publication (Section 2.4) was identified by the search profiles confirming the validity of the applied search strategy. Since the 'newly expressed protein' profiles and the 'intended trait' profiles produced too many results when used on their own, they were combined with additonal profiles: the 'newly expressed protein' profiles were combined with a 'plant species' profile while the 'intended trait' profiles were combined with a 'general GMO' profile as well as with the 'plant species' profile. See Table 2 for a detailed search profile.

Table 2: Search profile for database search

Set	Search string	Concepts
1	CV(w)soy or CVsoy or BPS(w)CV127(w)9 or BPSCV127(w)9 or CV127?	Event name
2	cultivance or cultivancetm or cultivancertm	Trade name
3	CSR1(w)2 or CSR(w)12 or CRS(w)1(w)2 or ((acetohydroxy acid synthase) or (aceto(w)hydroxy acid synthase) or (acetohydroxy acid synthetase) or (aceto(w)hydroxy acid synthetase) or (acetohydroxyacid synthase) or (aceto(w)hydroxyacid synthase) or (acetolactate pyruvate(w)lyase)) or ((acetolactate synthase) or (acetolactate synthetase) or (aceto(w)lactate synthase) or (aceto(w)lactate synthetase) or (acetolactic synthetase) or (aceto(w)lactic synthetase) or (alpha(w)acetohydroxy acid synthetase)) or ((alpha(w)acetohydroxyacid synthase) or (alpha(w)acetolactate synthase) or (alpha(w)acetolactate synthetase) or (alpha(w)ALS) or (GST(w)mALS) or (GST(w)wALS) or (synthase, acetolactate) or AHAS or ALS or AtAHAS or AHASL or (EC(w)2216) or (EC(w)2(w)2(w)1(w)6)) or ((pyruvate(w)pyruvate acetaldehydetransferase) or (pyruvate(w)pyruvate acetaldehyde(w)transferase))	Newly expressed protein
4	(herbicid? or IMI or Imidazoline or Imidazolinone or imidazolone or Imazaquin or imazamethabenz(w)methyl or imazapyr or imazapic or imazethapyr or imazamox or 9027-45-6/BI)(5a)(resist? OR protect?) OR toleran?	Intended trait

5	soy or soya or soja or soybean# or soyabean# or sojabean# or glycine(w)max or g(w)max	Plant species
6	GMO OR GMOs OR LMO OR LMOs OR GM OR GE OR transgen? OR (genetic?(3a)(modif? OR transform? OR manipulat? OR improv? OR engineer?))	GMO general
7	3 and 5	Newly expressed protein AND Plant species
8	4 and 5 and 6	Intended trait AND Plant species AND GMO general
9	1 or 2 or 7 or 8	Event name OR (Trade name AND plant species) OR (Newly expressed protein AND Plant species) OR (Intended trait AND Plant species AND GMO general)

All searches were performed in the Basic Index (BI) field, which includes the following subject headings/field names:

- **Agricola**: title (TI), controlled term (CT), supplementary term (ST), abstract (AB), named person (NA), corporate name (CO), note (NTE), geographic term, CABA and other fields (GT)

- **Biosis**: title (TI), abstract (AB), biosystematic codes (BC), chemical name (CN), controlled term (CT), gene name (GEN), geographic term (GT), organism (ORGN) and supplementary term (ST); as well as CAS Registry Numbers (RN)

- **CA-Plus**: title (TI), supplementary term (ST), index term (IT) and abstract (AB); as well as CAS Registry Numbers

- **CABA**: title (TI), controlled term (CT), supplementary term (ST), broader term (BT), abstract (AB), organism name (ORGN) and geographic term (GT); as well as CAS Registry Numbers

- **Medline**: title (TI), chemical name (CN), gene name (GEN), controlled term (excluding MeSH numbers) (CT), supplementary term (ST), named person (NA), other source (OS), and abstract (AB), as well as CAS Registry Numbers and GenBank Numbers

Relevant controlled terms (Table 3) were not searched separately because they are included in the Basic Index and were captured by the free-text searches.

Table 3: Relevant controlled terms (CT) and index terms (IT) in each database

Database	Event	New proteins	Intended traits	Plant species	GM plants
Agricola	None	None	"HERBICIDE RESISTANCE"	"GLYCINE MAX"	"TRANSGENIC PLANTS"
Biosis	None	None	No terms for herbicide resistance	none	None
CABA	None	None	"HERBICIDE RESISTANCE"	SOYABEANS	"TRANSGENIC PLANTS"
CAS	None	None	"HERBICIDE RESISTANCE"	"GLYCINE MAX"	"GENETICALLY MODIFIED PLANTS"
Medline	None	None	"HERBICIDE RESISTANCE"	SOYABEANS/CT	"PLANTS, GENETICALLY MODIFIED"

The search results were limited to documents updated between October 1, 2020 and September 30, 2021 (UP>=20201001 and UP<=20210930), and to non-patent documents (not P/DT). To ensure that documents with indexing errors where two document types (DTs) (one eligible and one ineligible) were attached to a single record were not missed, documents with both 'journal' and 'patent' as document type were also kept. These putative documents would be identified with (P/DT AND J/DT) in CABA and CAPlus.

Table 4 summarizes the number of results obtained from each of the databases searched.

See Appendix 2 for a complete search history.

Table 4: Overview of the selected databases and summary of search results from each database

Database	AGRICOLA	BIOSIS	CAB Abstracts	CAPLUS	MEDLINE
Database Provider	STN International	STN International	STN International	STN International	STN International
Coverage	1970-present	1926-present	1973-present	1907-present	1946-present
Date of search	8 Oct 2021	8 Oct 2021	8 Oct 2021	8 Oct 2021	8 Oct 2021
Datespan of the search	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021
Latest database update	14 Sept 2021	6 Oct 2021	7 Oct 2021	6 Oct 2021	7 Oct 2021

Database	AGRICOLA	BIOSIS	CAB Abstracts	CAPLUS	MEDLINE
Number of records retrieved	74	127	134	170	170
Number of records after duplicate removal	69	101	80	97	170
Number of *relevant* records after rapid assessment	2	0	3	0	3

4. INTERNET and MANUAL SEARCHES

4.1. Internet Searches of food safety, agriculture, and biotechnology-related authority webpages

A search of the web pages of food safety, agriculture, and biotechnology-related authorities was conducted. Search results were manually examined for relevant records that were either published during the time period under consideration (date span of search: October 1, 2020 to September 30, 2021) or refer to relevant records published during this time frame. Relevance of results were determined based on the criteria listed in Table 1 and they were summarized in Table 5. All web pages searched were justified by their recommendation in the EFSA 2019 explanatory note[1]. Of the 13 key organisations cited in the EFSA 2019 explanatory note[1], Environment and Climate Change Canada and Intersecretarial Commission on Biosafety of GMOs (CIBIOGEM) were excluded, since they are not involved in the risk assessment of GM plants. The US-EPA website was excluded, since CV127 soybean does not contain an insect-resistant trait. The GEAC website was excluded, since this agency has only regulated GM cotton products. Therefore, the internet search was limited to nine key organisations relevant for CV127 soybean. Search terms consisted of CV127 or cultivance or BPS-CV127-9, AtAHASL or ALS or modified acetohydroxyacid synthase or acetolactate synthetase (all searched singly, with no search limits applied).

Table 5: Results of search of food safety, agriculture, and biotechnology-related authority websites

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
US Department of Agriculture (USDA)	https://www.usda.gov/	Oct. 22, 2021	Oct. 22, 2021	0
US Food and Drug Administration (FDA)	https://www.fda.gov/	Oct. 22, 2021	Oct. 22, 2021	0
Health Canada	https://www.canada.ca/en/health-canada.html	Sept. 2021	Oct. 21, 2021	0

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
Canadian Food Inspection Agency (CFIA)	https://www.canada.ca/en/food-inspection-agency.html	Sept. 2021	Oct. 21, 2021	0
Food Standards Australia New Zealand (FSANZ)	http://www.foodstandards.gov.au/Pages/default.aspx	Oct. 10, 2021	Oct. 10, 2021	0
Office of the Gene Technology Regulator (OGTR) Australia	http://www.ogtr.gov.au/	Oct. 10, 2021	Oct. 10, 2021	0
National Technical Commission on Biosafety (CTNBio) Brazil	http://ctnbio.mcti.gov.br/en	Oct. 2021	Oct. 13-15, 2021	0
National Advisory Commission on Agricultural Biotechnology (CONABIA) Argentina	https://www.argentina.gob.ar/agroindustria/bioeconomia/biotecnologia	Oct. 1, 2021	Oct. 18, 2021	0
Ministry of Agriculture, Forestry and Fisheries (MAFF) Japan	http://www.maff.go.jp/	Oct. 14, 2021	Oct. 14, 2021	0

4.2. Manual searches of reference lists of recent review articles

Recent review articles as sources of reference lists to search for potentially relevant studies were identified via searches of PubMed.gov for general terms such as “GMO” or “GM crops” in the titles and abstracts. The search of PubMed.gov was also restricted to recent reviews published between October 1, 2020 and September 30, 2021. The resulting number of relevant studies found within the bibliographies of these review articles is given in Table 6.

Table 6: Documents for which reference lists were scanned for relevant studies

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
1	Golnar AJ, Ruell E, Lloyd AL, Pepin KM. 2021	Embracing Dynamic Models for Gene Drive Management.	Trends Biotechnol. 2021 Mar;39(3):211-214. doi: 10.1016/j.tibtech.2020.08.011. Epub 2020 Sep 30. PMID: 33010965.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
2	Gupta S, Kumar A, Patel R, Kumar V. 2021	Genetically modified crop regulations: scope and opportunity using the CRISPR-Cas9 genome editing approach.	Mol Biol Rep. 2021 May;48(5):4851-4863. doi: 10.1007/s11033-021-06477-9. Epub 2021 Jun 10. PMID: 34114124.	0
3	Hadrup N, Frederiksen M, Wedebye EB, Nikolov NG, Carøe TK, Sørli JB, Frydendall KB, Liguori B, Sejbaek CS, Wolkoff P, Flachs EM, Schlünssen V, Meyer HW, Clausen PA, Hougaard KS. 2021	Asthma-inducing potential of 28 substances in spray cleaning products-Assessed by quantitative structure activity relationship (QSAR) testing and literature review.	J Appl Toxicol. 2021 Jul 11. doi:10.1002/jat.4215. Epub ahead of print. PMID: 34247391.	0
4	Kumar V, Guleria P. 2020	Application of DNA-Nanosensor for Environmental Monitoring: Recent Advances and Perspectives.	Curr Pollut Rep. 2020 Dec 12:1-21. doi: 10.1007/s40726-020-00165-1. Epub ahead of print. PMID: 33344145; PMCID: PMC7732738.	0
5	Hameed A, Mehmood MA, Shahid M, Fatma S, Khan A, Ali S. 2020	Prospects for potato genome editing to engineer resistance against viruses and cold-induced sweetening.	GM Crops Food. 2020 Oct 1;11(4):185-205. doi: 10.1080/21645698.2019.1631115. Epub 2019 Jul 6. PMID: 31280681; PMCID: PMC7518746.	0
6	Leska A, Nowak A, Nowak I, Górczyńska A. 2021	Effects of Insecticides and Microbiological Contaminants on *Apis mellifera*.	Health. Molecules. 2021 Aug 22;26(16):5080. doi: 10.3390/molecules26165080. PMID: 34443668; PMCID: PMC8398688	0
7	Madzak C. 2021	*Yarrowia lipolytica* Strains and Their Biotechnological Applications: How Natural Biodiversity and Metabolic Engineering Could Contribute to Cell Factories Improvement.	J Fungi (Basel). 2021 Jul 10;7(7):548. doi: 10.3390/jof7070548. PMID: 34356927; PMCID: PMC8307478.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
8	Menz J, Modrzejewski D, Hartung F, Wilhelm R, Sprink T. 2020	Genome Edited Crops Touch the Market: A View on the Global Development and Regulatory Environment.	Front Plant Sci. 2020 Oct 9;11:586027. doi: 10.3389/fpls.2020.586027. PMID:33163013; PMCID: PMC7581933.	0
9	Mushtaq M, Ahmad Dar A, Skalicky M, Tyagi A, Bhagat N, Basu U, Bhat BA, Zaid A, Ali S, Dar TU, Rai GK, Wani SH, Habib-Ur-Rahman M, Hejnak V, Vachova P, Brestic M, Çığ A, Çığ F, Erman M, El Sabagh A. 2021	CRISPR-Based Genome Editing Tools: Insights into Technological Breakthroughs and Future Challenges.	Genes (Basel). 2021 May 24;12(6):797. doi: 10.3390/genes12060797. PMID: 34073848; PMCID: PMC8225059.	0
10	Okoli AS, Blix T, Myhr AI, Xu W, Xu X. 2021	Sustainable use of CRISPR/Cas in fish aquaculture: the biosafety perspective.	Transgenic Res. 2021 Jul 25. doi:10.1007/s11248-021-00274-7. Epub ahead of print. PMID: 34304349.	0
11	Teferra TF. 2021	Should we still worry about the safety of GMO foods? Why and why not? A review.	Food Sci Nutr. 2021 Jul 27;9(9):5324-5331. doi: 10.1002/fsn3.2499. PMID: 34532037; PMCID: PMC8441473.	0
12	Turnbull C, Lillemo M, Hvoslef-Eide TAK. 2021	Global Regulation of Genetically Modified Crops Amid the Gene Edited Crop Boom - A Review. .	Front Plant Sci. 2021 Feb 24;12:630396. doi: 10.3389/fpls.2021.630396. PMID: 33719302; PMCID: PMC7943453	0
13	Woźniak E, Tyczewska A, Twardowski T. 2021	A Shift Towards Biotechnology: Social Opinion in the EU.	Trends Biotechnol. 2021 Mar;39(3):214-218. doi: 10.1016/j.tibtech.2020.08.001. Epub 2020 Sep 4. PMID: 32896439.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
14	Zhang Y, Restall J, Crisp P, Godwin I, Liu G. 2021	Current status and prospects of plant genome editing in Australia.	In Vitro Cell Dev Biol Plant. 2021 May 24:1-10. doi: 10.1007/s11627-021-10188-y. Epub ahead of print. PMID: 34054265; PMCID: PMC8143062.	0

5. RESULTS OF THE STUDY IDENTIFICATION AND SELECTION PROCESS

The database searches (Section 3) identified a total of 675 references, which were reduced to 517 after removal of duplicates (Table 4). No additional studies were identified in the manual searches (Section 4).

5.1. Screening of titles and abstracts to exclude obviously irrelevant references (Stage 1)

All references identified in the database searches described in Section 3 were assessed for relevance based on information in their title and abstract by two reviewers independently. If opinions of relevance differed, the discrepancies were discussed between the reviewers and if a disagreement had persisted, the publication in question was transferred to Stage 2 for a detailed evaluation by the experts. In this search, both evaluators were in 100 % agreement.

Clearly irrelevant records were tagged as “Not Relevant”. These included:

- Duplicated entries
- Secondary literature (reviews), other than assessments from regulatory agencies
- Articles on non-relevant topics like detection methods, socio-economic implications of GM crops, GM policy, agronomical performance, other herbicide resistant GM crops, other insect resistant GM crops, unrelated topics, etc.

Publications which appeared to be relevant and those of unclear relevance were tagged as “Relevant” and progressed to Stage 2 (detailed assessment; see Section 5.2).

The number of publications excluded after rapid assessment for relevance is presented in Table 7 documenting the selection process.

5.2. Detailed assessment of eligible references (Stage 2)

Publications tagged as “Relevant” in Stage 1 were assessed in detail independently by two scientific experts in each of three corresponding areas (i.e., Molecular Biology, Food and Feed Safety, Environmental Safety), based on the full text of the publications. If opinions of relevance differed between the experts within each area, the discrepancy are discussed as necessary and additional reviewers were consulted to resolve the discrepancy, if needed.

Table 7 gives an overview of the reference selection process and results of the detailed assessment.

Table 7: Results of the publication selection process

Total number of publications retrieved after all searches of the scientific literature (excluding duplicates)	517
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	509
Total number of full-text documents assessed in detail	8
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	6
Total number of unobtainable/unclear publications	0
Total number of relevant publications	2

Table 8 lists the publications determined to be relevant along with their potential impact on the safety assessment based on detailed evaluation. Publications that were clearly not relevant after a detailed assessment are listed in Table 9. Table 10 lists the publications for which full-text documents were unobtainable for detailed assessment or for which relevance was unclear after detailed assessment.

Table 8: Report of all relevant publications retrieved after detailed assessment of full-text documents for relevance: ordered by category of information/data requirement(s)

Main category of information/data requirement	Study (Author(s) and year)	Title	Source
Environmental Safety Assessment	Biazoto, F. S. Albrecht, L. P. Albrecht, A. J. P. Silva, A. F. M. Pereira, V. G. C. Mundt, T. T. Baccin, L. C. Mattiuzzi, M. D. Pertuzati, A. 2020	Agronomic performance and chlorophyll indices of transgenic soybean (with csr1 -2 gene), under imazapic/imazapyr post application.	Pakistan Journal of Agricultural Sciences (2020), Volume 57, Number 5, pp. 1223-1229, 37 refs. ISSN: 0552-9034. Published by: University of Agriculture, Faisalabad.
Environmental Safety Assessment	Pereira, V. G. C. Albrecht, L. P. Albrecht, A. J. P. Biazoto, F. dos S. Kosinski, R. Bottcher, A. A. Mattiuzzi, M. D. Krenchinski, H. 2021	Effect of post-emergence applications of imazapyr and imazapic on the growth and grain yield of AHAS -transgene soybean plants.	Australian Journal of Crop Science (2021), Volume 15, Number 1, pp. 164-171, 29 refs. ISSN: 1835-2693; 1835-2707. Published by: Southern Cross Publishing Group, Brisbane

Table 9: Report of publications excluded from the risk assessment after detailed assessment of full-text documents

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Fast Brandon J Shan Guomin Herman Rod A Gampala Satyalinga Srinivas 2020	Transgene expression in sprayed and non-sprayed herbicide-tolerant genetically engineered crops is equivalent.	Regulatory toxicology and pharmacology : RTP, (2020 Mar) Vol. 111, pp. 104572. Electronic Publication Date: 26 Dec 2019 Journal code: 8214983. E-ISSN: 1096-0295. L-ISSN: 0273-2300.	CV127soybean was not included in the study.
Sahin, Olcay Karlik, Elif Meric, Sinan Ari, Sule Gozukirmizi, Nermin 2020	Genome organization changes in GM and non-GM soybean [Glycine max (L.) Merr.] under salinity stress by retro-transposition events	Genetic resources and crop evolution (Aug 2020), Volume 67, Number 6, pp. 1551-1566, 16 p. ISSN: 0925-9864 Source Note: 202008, v. 67, no. 6.	CV127soybean was not included in the study.
Sieradzki, Zbigniew Mazur, Malgorzata Krol, Beata Kwiatek, Krzysztof 2021	Prevalence of genetically modified soybean in animal feedingstuffs in Poland	Journal of Veterinary Research (29 Jan 2021), Volume 65, Number 1, pp. 93-99, 7 p. ISSN: 2450-8608; 2450-8608 Source Note: 20210129, v. 65, no. 1	The publication is not relevant to the risk assessment of GMOs.
Fraga, D. S. Agostinetto, D. Ruchel, Q. Langaro, A. C. Oliveira, C. 2020	Changes in the metabolism of soybean plants submitted to herbicide application in different weed management systems.	Planta Daninha (2020), Volume 38, Number e020215525, 25 refs. ISSN: 0100-8358; 1806-9681 Published by: Sociedade Brasileira da Ciencia das Plantas Daninhas, Vicosa.	The publication is not relevant to the risk assessment of GMOs.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Schulz Ralf Bub Sascha Petschick Lara L Stehle Sebastian Wolfram Jakob 2021	Applied pesticide toxicity shifts toward plants and invertebrates, even in GM crops.	Science (New York, N.Y.), (20210402) Vol. 372, No. 6537, pp. 81-84. Journal code: 0404511. E-ISSN: 1095-9203. L-ISSN: 0036-8075.	CV127soybean was not included in the study.
Soga Keisuke Kimata Shinya Narushima Jumpei Akiyama Hiroshi Kondo Kazunari Nakamura Kosuke Sato Sakiko Sato Emi Kawakami Hiroshi Mano Junichi Takabatake Reona Kitta Kazumi 2020	Development and Testing of an Individual Kernel Detection System for Genetically Modified Soybean Events in Non-identity-preserved Soybean Samples.	Biological + pharmaceutical bulletin, (2020) Vol. 43, No. 8, pp. 1259-1266. Journal code: 9311984. E-ISSN: 1347-5215. L-ISSN: 0918-6158.	CV127soybean was not included in the study.

Table 10: Report of unobtainable/unclear publications

Study (Author(s) and year)	Title	Source	Description of (unsuccessful) methods used to try and obtain a copy of the publication
No publications in this category.			

6. NARRATIVE SYNTHESIS/SUMMARY OF RELEVANT STUDIES

A total of eight publications were selected during Stage 1 evaluation (rapid assessment based on title and abstract). After Stage 2 evaluation (detailed review based on full text), it was determined that two publications were relevant for the safety assessment of CV127 soybean and its newly expressed protein AHAS.

In the publications identified as relevant, Biazoto *et al*. (2020) aimed to evaluate the chlorophyll indices and agronomic performance of CV127 soybean cultivated in Brazil (Cultivance® soybean - variety BRS-397 CV) under rates of imazapic/imazapyr at the V1, V2, and V3 stages. Imazapic/imazapyr (formulated premix) application up to the rate 157.5/52.5 g a.e. ha^{-1} did not affect chlorophyll indices and agronomic performance of Cultivance® soybean (cultivar BRS-397 CV) at the phonological stages V1, V2 and V3. Thus, the selectivity of imazapic/imazapyr applied in post-emergence was observed for Cultivance® soybean. In the other relevant publication, Pereira *et al*. (2021) evaluated the tolerance of imidazolinone-resistant plants (AHAS-transgene soybean = CV127 = Cultivance - BRS 397 variety) to post-emergence application of different rates of Soyvance® (525 g/kg imazapyr, and 175 g/kg imazapic) on the growth and grain yield of plants cultivated in Brazil. They concluded that the use of rates of the commercial product higher than that recommended by the manufacturer (100 g/ha) may affect the agronomic performance of AHAS-transgene soybean plants.The data and knowledge generated from both these studies do not impact the safety assessment of CV127 soybean.

Table 11 lists the relevant publications along with a summary of any adverse effects reported and the reliability of the publications.

Table 11: Summary report for all relevant publications retrieved after detailed assessment of full-text documents for relevance and report of the reliability and implications for the risk assessment: ordered by category of information/data requirement(s)

Main category of information/data requirement	Study (Author(s) and year)	Intervention/ test materials used	Adverse effects reported	Which adverse effect reported	Summary of reliability appraisal	Implications for risk assessment
Environmental safety assessment	Biazoto, F. S. Albrecht, L. P. Albrecht, A. J. P. Silva, A. F. M. Pereira, V. G. C. Mundt, T. T. Baccin, L. C. Mattiuzzi, M. D. Pertuzati, A. 2020	CV127	None	Not applicable	High	None, because no new hazards, modified exposure, or scientific uncertainties are reported.
Environmental safety assessment	Pereira, V. G. C. Albrecht, L. P. Albrecht, A. J. P. Biazoto, F. dos S. Kosinski, R. Bottcher, A. A. Mattiuzzi, M. D. Krenchinski, H. 2021	CV127	None	Not applicable	High	None, because no new hazards, modified exposure, or scientific uncertainties are reported.

7. CONCLUSION

The literature searches performed for CV127 soybean and its newly expressed protein, AHAS, for the period from October 1, 2020 to September 30, 2021, identified a total of 517 unique publications (after duplicate removal). A total of eight publications were progressed for detailed assessment after excluding 509 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The eight publications that progressed to Stage 2 were evaluated in detail, based on full text, for potential relevance, following the pre-established criteria listed in Table 1. Two relevant references with bearing on environmental safety were identified. The data and knowledge generated from these studies do not impact the safety assessment of CV127 soybean. No issues or topics were identified that would trigger or warrant more specific question formulation.

8. REFERENCES

No.	Author(s), title, source, edition, year, pages
1.	Devos Y, Guajardo IM, Alvarez F and Glanville J. Explanatory note on literature searching conducted in the context of GMO applications for (renewed) market authorisation and annual post-market environmental monitoring reports on GMOs authorised in the EU market. EFSA supporting publications 2019:EN-1614. 62 pages. doi:10.2903/sp.efsa.2019.EN-1614.

9. APPENDICES

Appendix 1 Database descriptions

Host	File	Description
STN	AGRICOLA	Agriculture Online Access is a bibliographic database containing selected worldwide literature of agriculture and related fields. AGRICOLA is the locator and bibliographic access and control system of the National Agricultural Library (NAL) collections and also includes records from other cooperating institutions. Coverage of the database includes agricultural economics and rural sociology, agricultural production, animal sciences, chemistry, entomology, food and human nutrition, forestry, natural resources, pesticides, plant science, soils and fertilizers, and water resources. Also covered are related areas such as biology and biotechnology, botany, ecology, and natural history. The database draws on bibliographies, serial articles, book chapters, monographs, computer files, serials, maps, audiovisuals, and reports. Bibliographic information, abstracts, geographic terms, controlled terms, and supplementary terms are searchable.
STN	BIOSIS	BIOSIS Previews® is the largest and most comprehensive life science database in the world. Amongst others subject coverage includes Agriculture, Biochemistry, Biophysics, Botany, Environmental Biology, Physiology, Toxicology. Sources include periodicals, journals, conference proceedings, reviews, reports, patents, and short communications. Nearly 6,000 life source journals, 1,500 international meetings as well as review articles, books, and monographs are reviewed for inclusion. Bibliographic information, indexing terms, abstracts, and CAS Registry Numbers are all searchable.
STN	CABA/CAB	The CAB Abstracts database covers worldwide literature from all areas of agriculture and related sciences including Agriculture, Agricultural chemicals, Animal sciences and production, Crop protection, Crop sciences and production, Environment, Soils and fertilizers. Sources for CABA include journals, books, reports, published theses, conference proceedings, and patents. Bibliographic information, indexing terms, abstracts, and CAS Registry Numbers are searchable.

Host	File	Description
STN	CAS-CA/CAPLUS	The Chemical Abstracts (CA) database covers all areas of Biochemistry, Chemistry and Chemical engineering, and related sciences. Sources include over 8,000 journals, patents from 38 national patent offices and two international patent organizations, technical reports, books, conference proceedings, and dissertations. Electronic only journals and Web preprints are also covered. Bibliographic terms, indexing terms, roles, CAS Registry Numbers, International Patent Classification, and abstracts are searchable.
STN	MEDLINE	MEDLINE contains information on every area of medicine. The MEDLINE database corresponds to Index Medicus, Index to Dental Literature, and International Nursing Index; OLDMEDLINE, with data from NLM's from the Cumulated Index Medicus (1960-1965) and Current List of Medical Literature (1958-1959); and, since August 2001, IN-PROCESS records, the latest documents before they have been completely indexed for inclusion on MEDLINE. Sources include journals and chapters in books or symposia. Bibliographic information, indexing terms, abstracts, chemical names, and CAS Registry Numbers are all searchable. Online thesauri are available for the Medical Subject Headings (/MN), Controlled Terms (/CT) and Chemical Name (/CN) fields.

Appendix 2 Search history

FILE 'MEDLINE' ENTERED AT 15:11:29 ON 08 OCT 2021
L1 7 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR CV127?
L2 2 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L3 18 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L4 481 SEA ((ACETOHYDROXY ACID SYNTHASE) OR (ACETO(W)HYDROXY ACID SYNTHASE) OR (ACETOHYDROXY ACID SYNTHETASE) OR (ACETO(W)HYDROXY ACID SYNTHETASE) OR (ACETOHYDROXYACID SYNTHASE) OR (ACETO(W)HY DROXYACID SYNTHASE) OR (ACETOLACTATE PYRUVATE(W)LYASE))
L5 1089 SEA ((ACETOLACTATE SYNTHASE) OR (ACETOLACTATE SYNTHETASE) OR (ACETO(W)LACTATE SYNTHASE) OR (ACETO(W)LACTATE SYNTHETASE) OR (ACETOLACTIC SYNTHETASE) OR (ACETO(W)LACTIC SYNTHETASE) OR (ALPHA(W)ACETOHYDROXY ACID SYNTHETASE))
L6 52318 SEA ((ALPHA(W)ACETOHYDROXYACID SYNTHASE) OR (ALPHA(W)ACETOLACTA TE SYNTHASE) OR (ALPHA(W)ACETOLACTATE SYNTHETASE) OR (ALPHA(W)A LS) OR (GST(W)MALS) OR (GST(W)WALS) OR (SYNTHASE, ACETOLACTATE) OR AHAS OR ALS OR ATAHAS OR AHASL OR (EC(W)2216) OR (EC(W)2(W) 2(W)1(W)6))
L7 0 SEA ((PYRUVATE(W)PYRUVATE ACETALDEHYDETRANSFERASE) OR (PYRUVATE (W)PYRUVATE ACETALDEHYDE(W)TRANSFERASE))
L8 52551 SEA (L3 OR L4 OR L5 OR L6 OR L7)
L9 359823 SEA (HERBICID? OR IMI OR IMIDAZOLINE OR IMIDAZOLINONE OR IMIDAZOLONE OR IMAZAQUIN OR IMAZAMETHABENZ(W)METHYL OR IMAZAPYR OR IMAZAPIC OR IMAZETHAPYR OR IMAZAMOX OR 9027-45-6/BI)(5A)(RESIST? OR PROTECT?) OR TOLERAN?
L10 67146 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX
L11 3820466 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A)(MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))
L12 77 SEA L8 AND L10
L13 1171 SEA L9 AND L10 AND L11
L14 1232 SEA L1 OR L2 OR L12 OR L13
L15 294 SEA L14 AND PY>=2019
L16 170 SEA L15 AND UP>=20201001 AND UP<=20210930

FILE 'BIOSIS' ENTERED AT 15:12:03 ON 08 OCT 2021
L17 9 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR CV127?
L18 3 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L19 11 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L20 879 SEA ((ACETOHYDROXY ACID SYNTHASE) OR (ACETO(W)HYDROXY ACID SYNTHASE) OR (ACETOHYDROXY ACID SYNTHETASE) OR (ACETO(W)HYDROXY ACID SYNTHETASE) OR (ACETOHYDROXYACID SYNTHASE) OR (ACETO(W)HY DROXYACID SYNTHASE) OR (ACETOLACTATE PYRUVATE(W)LYASE))
L21 1804 SEA ((ACETOLACTATE SYNTHASE) OR (ACETOLACTATE SYNTHETASE) OR (ACETO(W)LACTATE SYNTHASE) OR (ACETO(W)LACTATE SYNTHETASE) OR (ACETOLACTIC SYNTHETASE) OR (ACETO(W)LACTIC SYNTHETASE) OR (ALPHA(W)ACETOHYDROXY ACID SYNTHETASE))
L22 30917 SEA ((ALPHA(W)ACETOHYDROXYACID SYNTHASE) OR (ALPHA(W)ACETOLACTA TE SYNTHASE) OR (ALPHA(W)ACETOLACTATE SYNTHETASE) OR (ALPHA(W)A LS) OR (GST(W)MALS) OR (GST(W)WALS) OR (SYNTHASE, ACETOLACTATE) OR AHAS OR ALS OR ATAHAS OR AHASL OR (EC(W)2216) OR (EC(W)2(W)

2(W)1(W)6))
L23 0 SEA ((PYRUVATE(W)PYRUVATE ACETALDEHYDETRANSFERASE) OR (PYRUVATE (W)PYRUVATE ACETALDEHYDE(W)TRANSFERASE))
L24 31813 SEA (L19 OR L20 OR L21 OR L22 OR L23)
L25 368157 SEA (HERBICID? OR IMI OR IMIDAZOLINE OR IMIDAZOLINONE OR IMIDAZOLONE OR IMAZAQUIN OR IMAZAMETHABENZ(W)METHYL OR IMAZAPYR OR IMAZAPIC OR IMAZETHAPYR OR IMAZAMOX OR 9027-45-6/BI)(5A)(RESIST? OR PROTECT?) OR TOLERAN?
L26 168368 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX
L27 465984 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A)(MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))
L28 222 SEA L24 AND L26
L29 1034 SEA L25 AND L26 AND L27
L30 1233 SEA L17 OR L18 OR L28 OR L29
L31 217 SEA L30 AND PY>=2019
L32 127 SEA L31 AND UP>=20201001 AND UP<=20210930

FILE 'AGRICOLA' ENTERED AT 15:12:33 ON 08 OCT 2021
L33 7 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR CV127?
L34 1 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L35 8 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L36 265 SEA ((ACETOHYDROXY ACID SYNTHASE) OR (ACETO(W)HYDROXY ACID SYNTHASE) OR (ACETOHYDROXY ACID SYNTHETASE) OR (ACETO(W)HYDROXY ACID SYNTHETASE) OR (ACETOHYDROXYACID SYNTHASE) OR (ACETO(W)HY DROXYACID SYNTHASE) OR (ACETOLACTATE PYRUVATE(W)LYASE))
L37 1214 SEA ((ACETOLACTATE SYNTHASE) OR (ACETOLACTATE SYNTHETASE) OR (ACETO(W)LACTATE SYNTHASE) OR (ACETO(W)LACTATE SYNTHETASE) OR (ACETOLACTIC SYNTHETASE) OR (ACETO(W)LACTIC SYNTHETASE) OR (ALPHA(W)ACETOHYDROXY ACID SYNTHETASE))
L38 9334 SEA ((ALPHA(W)ACETOHYDROXYACID SYNTHASE) OR (ALPHA(W)ACETOLACTA TE SYNTHASE) OR (ALPHA(W)ACETOLACTATE SYNTHETASE) OR (ALPHA(W)A LS) OR (GST(W)MALS) OR (GST(W)WALS) OR (SYNTHASE, ACETOLACTATE) OR AHAS OR ALS OR ATAHAS OR AHASL OR (EC(W)2216) OR (EC(W)2(W) 2(W)1(W)6))
L39 0 SEA ((PYRUVATE(W)PYRUVATE ACETALDEHYDETRANSFERASE) OR (PYRUVATE (W)PYRUVATE ACETALDEHYDE(W)TRANSFERASE))
L40 9792 SEA (L35 OR L36 OR L37 OR L38 OR L39)
L41 125779 SEA (HERBICID? OR IMI OR IMIDAZOLINE OR IMIDAZOLINONE OR IMIDAZOLONE OR IMAZAQUIN OR IMAZAMETHABENZ(W)METHYL OR IMAZAPYR OR IMAZAPIC OR IMAZETHAPYR OR IMAZAMOX OR 9027-45-6/BI)(5A)(RESIST? OR PROTECT?) OR TOLERAN?
L42 92386 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX
L43 103176 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A)(MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))
L44 150 SEA L40 AND L42
L45 751 SEA L41 AND L42 AND L43
L46 893 SEA L33 OR L34 OR L44 OR L45
L47 120 SEA L46 AND PY>=2019
L48 74 SEA L47 AND UP>=20201001 AND UP<=20210930

FILE 'CABA' ENTERED AT 15:12:59 ON 08 OCT 2021

L49 17 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR CV127?
L50 8 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L51 14 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L52 1039 SEA ((ACETOHYDROXY ACID SYNTHASE) OR (ACETO(W)HYDROXY ACID SYNTHASE) OR (ACETOHYDROXY ACID SYNTHETASE) OR (ACETO(W)HYDROXY ACID SYNTHETASE) OR (ACETOHYDROXYACID SYNTHASE) OR (ACETO(W)HY DROXYACID SYNTHASE) OR (ACETOLACTATE PYRUVATE(W)LYASE))
L53 1811 SEA ((ACETOLACTATE SYNTHASE) OR (ACETOLACTATE SYNTHETASE) OR (ACETO(W)LACTATE SYNTHASE) OR (ACETO(W)LACTATE SYNTHETASE) OR (ACETOLACTIC SYNTHETASE) OR (ACETO(W)LACTIC SYNTHETASE) OR (ALPHA(W)ACETOHYDROXY ACID SYNTHETASE))
L54 12621 SEA ((ALPHA(W)ACETOHYDROXYACID SYNTHASE) OR (ALPHA(W)ACETOLACTA TE SYNTHASE) OR (ALPHA(W)ACETOLACTATE SYNTHETASE) OR (ALPHA(W)A LS) OR (GST(W)MALS) OR (GST(W)WALS) OR (SYNTHASE, ACETOLACTATE) OR AHAS OR ALS OR ATAHAS OR AHASL OR (EC(W)2216) OR (EC(W)2(W) 2(W)1(W)6))
L55 0 SEA ((PYRUVATE(W)PYRUVATE ACETALDEHYDETRANSFERASE) OR (PYRUVATE (W)PYRUVATE ACETALDEHYDE(W)TRANSFERASE))
L56 13135 SEA (L51 OR L52 OR L53 OR L54 OR L55)
L57 260959 SEA (HERBICID? OR IMI OR IMIDAZOLINE OR IMIDAZOLINONE OR IMIDAZOLONE OR IMAZAQUIN OR IMAZAMETHABENZ(W)METHYL OR IMAZAPYR OR IMAZAPIC OR IMAZETHAPYR OR IMAZAMOX OR 9027-45-6/BI)(5A)(RESIST? OR PROTECT?) OR TOLERAN?
L58 194201 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX
L59 184643 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A)(MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))
L60 344 SEA L56 AND L58
L61 1510 SEA L57 AND L58 AND L59
L62 1839 SEA L49 OR L50 OR L60 OR L61
L63 270 SEA L62 AND PY>=2019
L64 134 SEA L63 AND UP>=20201001 AND UP<=20210930
L65 134 SEA L64 NOT P/DT
L66 0 SEA L64 AND (P/DT AND J/DT)
L67 134 SEA L65 OR L66

FILE 'HCAPLUS' ENTERED AT 15:13:33 ON 08 OCT 2021
L68 23 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR CV127?
L69 3 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L70 16 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L71 1272 SEA ((ACETOHYDROXY ACID SYNTHASE) OR (ACETO(W)HYDROXY ACID SYNTHASE) OR (ACETOHYDROXY ACID SYNTHETASE) OR (ACETO(W)HYDROXY ACID SYNTHETASE) OR (ACETOHYDROXYACID SYNTHASE) OR (ACETO(W)HY DROXYACID SYNTHASE) OR (ACETOLACTATE PYRUVATE(W)LYASE))
L72 3925 SEA ((ACETOLACTATE SYNTHASE) OR (ACETOLACTATE SYNTHETASE) OR (ACETO(W)LACTATE SYNTHASE) OR (ACETO(W)LACTATE SYNTHETASE) OR (ACETOLACTIC SYNTHETASE) OR (ACETO(W)LACTIC SYNTHETASE) OR (ALPHA(W)ACETOHYDROXY ACID SYNTHETASE))
L73 24064 SEA ((ALPHA(W)ACETOHYDROXYACID SYNTHASE) OR (ALPHA(W)ACETOLACTA TE SYNTHASE) OR (ALPHA(W)ACETOLACTATE SYNTHETASE) OR (ALPHA(W)A LS) OR (GST(W)MALS) OR (GST(W)WALS) OR (SYNTHASE, ACETOLACTATE)

OR AHAS OR ALS OR ATAHAS OR AHASL OR (EC(W)2216) OR (EC(W)2(W)2(W)1(W)6))
L74 0 SEA ((PYRUVATE(W)PYRUVATE ACETALDEHYDETRANSFERASE) OR (PYRUVATE(W)PYRUVATE ACETALDEHYDE(W)TRANSFERASE))
L75 26981 SEA (L70 OR L71 OR L72 OR L73 OR L74)
L76 402526 SEA (HERBICID? OR IMI OR IMIDAZOLINE OR IMIDAZOLINONE OR IMIDAZOLONE OR IMAZAQUIN OR IMAZAMETHABENZ(W)METHYL OR IMAZAPYR OR IMAZAPIC OR IMAZETHAPYR OR IMAZAMOX OR 9027-45-6/BI)(5A)(RESIST? OR PROTECT?) OR TOLERAN?
L77 411147 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX
L78 692486 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A)(MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))
L79 1047 SEA L75 AND L77
L80 7678 SEA L76 AND L77 AND L78
L81 8130 SEA L68 OR L69 OR L79 OR L80
L82 2178 SEA L81 AND PY>=2019
L83 690 SEA L82 AND UP>=20201001 AND UP<=20210930
L84 170 SEA L83 NOT P/DT
L85 0 SEA L83 AND (P/DT AND J/DT)
L86 170 SEA L84 OR L85

FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 15:14:11 ON 08 OCT 2021
L87 517 DUP REM L16 L32 L48 L67 L86 (158 DUPLICATES REMOVED)
ANSWERS '1-170' FROM FILE MEDLINE
ANSWERS '171-271' FROM FILE BIOSIS
ANSWERS '272-340' FROM FILE AGRICOLA
ANSWERS '341-420' FROM FILE CABA
ANSWERS '421-517' FROM FILE HCAPLUS