Title

Summary of the Literature Review for CV127 Soybean
October 1, 2018 – September 30, 2019

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.
EFSA supporting publications 2019:EN-1614

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[redacted]

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Report	[redacted]

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SUMMARY

CV127 soybean plants were produced by introduction of the imidazolinone-tolerant acetohydroxyacid synthase large subunit 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 large subunit enzyme (AtAHASL) 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 the CV127 soybean and its newly expressed protein, AtAHASL. 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 on environmental safety, that might require in-depth examination. A set of broad literature searches was performed using several bibliographic databases covering scientific literature from October 1, 2018 to September 30, 2019. 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 352 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of 3 publications were progressed for detailed assessment. Two publications were determined to be not relevant after detailed review. The publication found to be relevant did not have any negative impact on the safety assessment of CV127 soybean. The insert and flanking regions of the event CV127 were re-sequenced. The new sequening results showed two nucleotide difference compared to the originally submitted sequence. None of the changes were located in the coding region of the transgenic *csr1-2* gene and therefore do not cause any amino acid change to the AtAHASL protein. Bioinformatics analysis confirmed there were no safety issues. The original risk assessment of the GM soybean CV127 remains valid.

No new publications were found that suggested any potential adverse effects of the CV127 soybean on human health, animal health, or the environment.

In summary, these literature searches and review of the retrieved publications identified only one relevant publication that supports the existing safety assessment of the CV127 soybean.

1. INTRODUCTION

CV127 soybean plants were produced by introduction of the imidazolinone-tolerant acetohydroxyacid synthase large subunit 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 large subunit enzyme (AtAHASL) 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 publications published between October 1, 2018 and September 30, 2019 that mention the molecular characterization of the 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 the CV127 soybean and its newly expressed protein AtAHASL. The search terms also included relevant synonyms, 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 the CV127 soybean and its newly expressed protein AtAHASL, in order to identify any specific issues related to food or feed safety, molecular characterization or environmental safety that might require in-depth examination.

2.2. Review questions

Review questions were formulated to conform to PECO structure (Population, Exposure, 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 the CV127 soybean and its newly expressed protein AtAHASL?

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 the of CV127 soybean and its newly expressed protein AtAHASL in CV127 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		
Intervention/exposure	The publication addresses the GMO, derived food/feed products, and/or the intended trait(s) (e.g., newly expressed protein(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
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
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
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

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(e), 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.	This permits the exclusion of publications that do not present original/primary data (e.g., editorials, position papers). 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 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.

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 21, 2019. Only documents updated between October 1, 2018 and September 30, 2019, 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, trade name, newly expressed protein and intended trait. Since the 'newly expressed protein' profile and 'intended trait' profile produced too many results when used on their own, they were combined with additonal profiles: the 'newly expressed protein' profile was combined with a 'plant species' profile, while the 'intended trait' profile was combined with a 'general GMO' profile as well as with the 'plant species' profile. See Table 2 for a detailed search profile.

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

The search results were limited to documents updated between October 1, 2018 and September 30, 2019 (UP>=20181001 and UP<=20190930), and to non-patent documents (not P/DT). To ensure that documents with indexing errors where two 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 3 summarizes the number of results obtained from each of the databases searched.

See Appendix 2 for a complete search history.

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)

Table 3: 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	21 Oct 2019	21 Oct 2019	21 Oct 2019	21 Oct 2019	21 Oct 2019
Datespan of the search	1 Oct 2018 – 30 Sept 2019	1 Oct 2018 – 30 Sept 2019	1 Oct 2018 – 30 Sept 2019	1 Oct 2018 – 30 Sept 2019	1 Oct 2018 – 30 Sept 2019
Latest database update	4 Oct 2019	16 Oct 2019	16 Oct 2019	20 Oct 2019	20 Oct 2019
Number of records retrieved	66	115	101	110	123
Number of records after duplicate removal	39	85	55	50	123
Number of *relevant* records after rapid assessment	1	1	1	0	0

4. MANUAL SEARCHES

4.1. Manual searches of web pages 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, 2018 to September 30, 2019) 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 4. All web pages searched were justified by their recommendation in the EFSA 2019 explanatory note[1]. Search terms consisted of CV127 or cultivance or BPS-CV127-9, AtAHASL or ALS or modified acetohydroxyacid synthase or acetolactate synthetase in CV127 soybean. (All searched singly, with no search limits applied).

Table 4: 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 Environmental Protection Agency (EPA)	https://www.epa.gov/	Oct 9, 2019	Oct 9, 2019	0
US Department of Agriculture (USDA)	https://www.usda.gov/	Oct 8, 2019	Oct 9, 2019	0
US Food and Drug Administration (FDA)	https://www.fda.gov/	Oct 8, 2019	Oct 10, 2019	0
Health Canada	https://www.canada.ca/en/health-canada.html	Oct 7, 2019	Oct 10, 2019	0
Canadian Food Inspection Agency	https://www.canada.ca/en/food-inspection-agency.html	Aug 21, 2019	Oct 10, 2019	0
Environment and Climate Change Canada	https://www.canada.ca/en/services/environment/weather/climatechange.html	Jul 26, 2019	Oct 10, 2019	0
Food Standards Australia New Zealand (FSANZ)	http://www.foodstandards.gov.au/Pages/default.aspx	Oct 10, 2019	Oct 10, 2019	0
Office of the Gene Technology Regulator (OGTR)	http://www.ogtr.gov.au/	Oct 8, 2019	Oct 10, 2019	0
National Technical Commission on Biosafety (CTNBio)	http://ctnbio.mcti.gov.br/en	September 2019	Oct 7-21, 2019	0
National Advisory Commission on Agricultural Biotechnology (CONABIA)	https://www.argentina.gob.ar/agroindustria/bioeconomia/biotecnologia	Oct 1, 2019	Oct 2, 2019	0
National Food Safety and Quality Service (SENASA)	https://www.argentina.gob.ar/senasa	Oct 2, 2019	Oct 2, 2019	0
Ministry of Environment, Forest, and Climate change. Government of India	http://moef.gov.in/	Sept 30, 2019	Oct 10, 2019	0

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
Ministry of Agriculture, Forestry and Fisheries (MAFF)	http://www.maff.go.jp/	Oct 30, 2019	Oct 30, 2019	0
Ministry of Health, Labour and Welfare (MHLW)	http://www.mhlw.go.jp/	Oct 30, 2019	Oct 30, 2019	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, 2018 and September 30, 2019. The resulting number of relevant studies found within the bibliographies of these review articles is given in Table 5.

Table 5: Documents for which reference lists were scanned for relevant studies

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
1	Agapito-Tenfen SZ, Okoli AS, Bernstein MJ, Wikmark OG, Myhr AI. 2018	Revisiting Risk Governance of GM Plants: The Need to Consider New and Emerging Gene-Editing Techniques.	Front Plant Sci. 2018 Dec 21;9:1874. doi: 10.3389/fpls.2018.01874.	0
2	Alarcon CM, Shan G, Layton DT, Bell TA, Whipkey S, Shillito RD. 2019	Application of DNA- and Protein-Based Detection Methods in Agricultural Biotechnology.	J Agric Food Chem. 2019 Jan 30;67(4):1019-1028. doi: 10.1021/acs.jafc.8b05157.	0
3	Bogner A, Torgersen H. 2018	Precaution, Responsible Innovation and Beyond - In Search of a Sustainable Agricultural Biotechnology Policy.	Front Plant Sci. 2018 Dec 18;9:1884. doi: 10.3389/fpls.2018.01884.	0
4	Boonchaisri S, Rochfort S, Stevenson T, Dias DA. 2019	Recent developments in metabolomics-based research in understanding transgenic grass metabolism.	Metabolomics. 2019 Mar 15;15(4):47. doi: 10.1007/s11306-019-1507-4.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
5	Collins C, Lorenzen N, Collet B. 2019	DNA vaccination for finfish aquaculture.	Fish Shellfish Immunol. 2019 Feb;85:106-125. doi: 10.1016/j.fsi.2018.07.012.	0
6	Gaffar FY, Koch A. 2019	Catch Me If You Can! RNA Silencing-Based Improvement of Antiviral Plant Immunity.	Viruses. 2019 Jul 23;11(7). pii: E673. doi: 10.3390/v11070673.	0
7	Ghosh S, Ghosh S, Sil PC. 2019	Role of nanostructures in improvising oral medicine.	Toxicol Rep. 2019 Apr 15;6:358-368. doi: 10.1016/j.toxrep.2019.04.004.	0
8	Halford NG. 2019	Legislation governing genetically modified and genome-edited crops in Europe: the need for change.	J Sci Food Agric. 2019 Jan 15;99(1):8-12. doi: 10.1002/jsfa.9227.	0
9	Hamburger DJS. 2018	Normative Criteria and Their Inclusion in a Regulatory Framework for New Plant Varieties Derived From Genome Editing.	Front Bioeng Biotechnol. 2018 Dec 19;6:176. doi: 10.3389/fbioe.2018.00176.	0
10	Hundleby PAC, Harwood WA. 2019	Impacts of the EU GMO regulatory framework for plant genome editing.	Food Energy Secur. 2019 May;8(2):e00161. doi: 10.1002/fes3.161.	0
11	Ichim MC. 2019	The Romanian experience and perspective on the commercial cultivation of genetically modified crops in Europe.	Transgenic Res. 2019 Feb;28(1):1-7. doi: 10.1007/s11248-018-0095-9.	0
12	Ishaq N, Bilal M, Iqbal HMN. 2019	Medicinal Potentialities of Plant Defensins: A Review with Applied Perspectives.	Medicines (Basel). 2019 Feb 19;6(1). pii: E29. doi: 10.3390/medicines6010029.	0
13	Jyoti A, Kaushik S, Srivastava VK, Datta M, Kumar S, Yugandhar P, Kothari SL, Rai V, Jain A. 2019	The potential application of genome editing by using CRISPR/Cas9, and its engineered and ortholog variants for studying the transcription factors involved in the maintenance of phosphate homeostasis in model plants.	Semin Cell Dev Biol. 2019 Apr 6. pii: S1084-9521(18)30112-5. doi: 10.1016/j.semcdb.2019.03.010.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
14	Kauffmann F, Van Damme P, Leroux-Roels G, Vandermeulen C, Berthels N, Beuneu C, Mali S. 2019	Clinical trials with GMO-containing vaccines in Europe: Status and regulatory framework.	Vaccine. 2019 Sep 30;37(42):6144-6153. doi: 10.1016/j.vaccine.2019.08.018.	0
15	Looi FY, Baker ML, Townson T, Richard M, Novak B, Doran TJ, Short KR. 2018	Creating Disease Resistant Chickens: A Viable Solution to Avian Influenza?	Viruses. 2018 Oct 15;10(10). pii: E561. doi: 10.3390/v10100561.	0
16	Mat Jalaluddin NS, Othman RY, Harikrishna JA. 2019	Global trends in research and commercialization of exogenous and endogenous RNAi technologies for crops.	Crit Rev Biotechnol. 2019 Feb;39(1):67-78. doi: 10.1080/07388551.2018.1496064.	0
17	Napier JA, Haslam RP, Tsalavouta M, Sayanova O. 2019	The challenges of delivering genetically modified crops with nutritional enhancement traits.	Nat Plants. 2019 Jun;5(6):563-567. doi: 10.1038/s41477-019-0430-z.	0
18	Rostoks N, GrantiÅ†a-IeviÅ†a L, IeviÅ†a B, Evelone V, ValciÅ†a O, Aleksejeva I. 2019	Genetically modified seeds and plant propagating material in Europe: potential routes of entrance and current status.	Heliyon. 2019 Feb 15;5(2):e01242. doi: 10.1016/j.heliyon.2019.e01242.	0
19	Tyczewska A, WoÅºniak E, Gracz J, KuczyÅ„ski J, Twardowski T. 2018	Towards Food Security: Current State and Future Prospects of Agrobiotechnology.	Trends Biotechnol. 2018 Dec;36(12):1219-1229. doi: 10.1016/j.tibtech.2018.07.008.	0
20	Wolt JD, Wolf C. 2018	Policy and Governance Perspectives for Regulation of Genome Edited Crops in the United States.	Front Plant Sci. 2018 Nov 8;9:1606. doi: 10.3389/fpls.2018.01606.	0
21	Wu Y, Li J, Li X, Zhai S, Gao H, Li	Development and strategy of reference materials for the DNA-based detection of	Anal Bioanal Chem. 2019 Mar;411(9):1729-1744. doi:	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
	Y, Zhang X, Wu G. 2019	genetically modified organisms.	10.1007/s00216-019-01576-w.	
22	Zimny T, Sowa S, Tyczewska A, Twardowski T. 2019	Certain new plant breeding techniques and their marketability in the context of EU GMO legislation - recent developments.	N Biotechnol. 2019 Jul 25;51:49-56. doi: 10.1016/j.nbt.2019.02.003.	0

5. RESULTS OF THE STUDY IDENTIFICATION AND SELECTION PROCESS

The database searches (Section 3) identified a total of 515 references, which were reduced to 352 after removal of duplicates (Table 3). 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 persisted, the publication under the discussion was transferred to Stage 2 for detailed evaluation by the experts.

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, unrelated topics, etc.

Publications which appear 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 6 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 reviewers within each area, the initial reviewers discussed the discrepancy as necessary and consulted additional reviewers to resolve the discrepancy if needed. All eligible references were assessed in detail. This detailed assessment included evaluation of the scope of the article and the study quality and reliability. Categorization of reliability (as described in the EFSA 2019 explanatory note[1] and reported in Table 11) was dependent upon the following:

- appropriateness of methodology
- whether the description of methodology would allow independent repetition of the study
- extent of characterization of test materials
- reporting of evidence of reproducibility

Table 6 gives an overview of the reference selection process and results of the detailed assessment.

Table 6: Results of the publication selection process

Total number of publications retrieved after all searches of the scientific literature (excluding duplicates)	352
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	349
Total number of full-text documents assessed in detail	3
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	2
Total number of unobtainable/unclear publications	0
Total number of relevant publications	1

Table 7 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 8. Table 9 lists the publications for which full-text documents were unobtainable for detailed assessment or for which relevance was unclear after detailed assessment.

Table 7: 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
Molecular characterization	Papadopoulou, N. Ramon, M.	Risk assessment of new sequencing information for genetically modified soybean BPS -CV127 -9 .	EFSA Journal (2018), Volume 16, Number 9, e05425 p., 3 refs. ISSN: 1831-4732 DOI: 10.2903/j.efsa.2018.5425 Published by: Wiley, Oxford

Table 8: 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
Ricroch, Agnes Akkoyunlu, Serife Martin-Laffon, Jacqueline Kuntz, Marcel 2018	Assessing the Environmental Safety of Transgenic Plants: Honey Bees as a Case Study.	Kuntz, M [Editor]. Adv. Bot. Res., (2018) pp. 111-167. Transgenic Plants and Beyond. Publisher: ACADEMIC PRESS LTD-ELSEVIER SCIENCE LTD, 24-28 OVAL ROAD, LONDON NW1 7DX, UK. Series: Advances in Botanical Research. CODEN: ABTRAJ. ISSN: 0065-2296. ISBN: 978-0-12-809447-1(P).	Review of 64 peer-reviewed papers (from 1994 to 2017) and 18 US EPA studies (from 1993 to 2002) related to the effect of GM crops (protease inhibitors, Cry, Vip, RNAi-producing and HT) such as cotton, soybean and maize on honey bees (feeding with purified insecticidal toxins or GM pollen). No effect was observed. It can be excluded since it does not present original/primary data.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Eriksson, Mattias Lagerkvist, Carl-Johan Hansson, Emma Ghosh, Ranjan Basnet, Shyam	Environmental consequences of introducing genetically modified soy feed in Sweden	Journal of cleaner production (2018), Volume 176, pp. 46-53 ISSN: 0959-6526 Published by: Elsevier Ltd Source Note: 2018 Mar. 01, v. 176	An attributional life cycle assessment (ALCA) of the global soy chain separately for the GM and non-GM imports to Sweden (EU) for animal feed, and a consequential life cycle assessment (CLCA) that includes the market effects for a scenario of shifting from GM to non-GM soy were performed. No relationship with ERA and CV127 soybean.

Table 9: 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 3 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 one publication was relevant for the safety assessment of the CV127 soybean and its newly expressed protein AtAHASL.

The publication found to be relevant did not have any negative impact on the safety assessment of CV127 soybean. The insert and flanking regions of the event CV127 were re-sequenced. The new sequencing results showed two nucleotide difference compared to the originally submitted sequence. None of the changes were located in the coding region of the transgenic *csr1-2* gene and therefore do not cause any amino acid change to the AtAHASL protein. Bioinformatics analysis confirmed there were no safety issues. The original risk assessment of the GM soybean CV127 remains valid.

No new publications were found that suggested any potential adverse effects of the CV127 soybean on human health, animal health, or the environment.

Table 10 and Table 11 list the relevant publication along with a summary of any adverse effects reported and the reliability of the publications.

Table 10: Report of the summary 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)	Intervention/ test materials used	Adverse effects reported	Which adverse effect reported
Molecular characterization	Papadopoulou, N. Ramon, M. 2018	Genetically modified soybean BPS-CV127 - 9 .	No adverse effect reported.	Not applicable

Table 11: Report of the reliability and implications for the risk assessment 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)	Summary of reliability appraisal	Implications for risk assessment
Molecular characterization	Papadopoulou, N. Ramon, M. 2018	The study presented reliable methods and findings.	No negative impact on risk assessment.

7. CONCLUSION

The literature searches performed for the CV127 soybean and its newly expressed protein AtAHASL for the period from October 1, 2018 to September 30, 2019, identified a total of 352 unique publications (after duplicate removal). A total of 3 publications were progressed for detailed assessment after excluding 349 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The 3 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. One relevant reference on molecular characterization was identified. This reference supports the risk assessment of CV127 soybean. No relevant publications with bearings on human and animal safety or environmental safety were identified. 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.
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.

Host	File	Description
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

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     FILE 'MEDLINE' ENTERED AT 14:35:18 ON 21 OCT 2019
L1             5 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            13 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L4           451 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           981 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         47965 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         48173 SEA (L3 OR L4 OR L5 OR L6 OR L7)
L9        320222 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        60220 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
                 OR GLYCINE(W)MAX OR G(W)MAX
L11      3442146 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           72 SEA L8 AND L10
L13          929 SEA L9 AND L10 AND L11
L14          986 SEA L1 OR L2 OR L12 OR L13
L15          231 SEA L14 AND PY>=2017
L16          123 SEA L15 AND UP>=20181001 AND UP<=20190930

     FILE 'BIOSIS' ENTERED AT 14:35:48 ON 21 OCT 2019
L17            8 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            8 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L20          834 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         1642 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        26772 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        27637 SEA (L19 OR L20 OR L21 OR L22 OR L23)
L25       332419 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?
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L26      156566 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
                OR GLYCINE(W)MAX OR G(W)MAX
L27      428965 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         199 SEA L24 AND L26
L29         890 SEA L25 AND L26 AND L27
L30        1066 SEA L17 OR L18 OR L28 OR L29
L31         218 SEA L30 AND PY>=2017
L32         115 SEA L31 AND UP>=20181001 AND UP<=20190930

     FILE 'AGRICOLA' ENTERED AT 14:36:10 ON 21 OCT 2019
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         239 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        1092 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        8697 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        9128 SEA (L35 OR L36 OR L37 OR L38 OR L39)
L41      103960 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       81953 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
                OR GLYCINE(W)MAX OR G(W)MAX
L43       90274 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         132 SEA L40 AND L42
L45         627 SEA L41 AND L42 AND L43
L46         753 SEA L33 OR L34 OR L44 OR L45
L47         112 SEA L46 AND PY>=2017
L48          66 SEA L47 AND UP>=20181001 AND UP<=20190930

     FILE 'CABA' ENTERED AT 14:37:54 ON 21 OCT 2019
L49          14 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR
                CV127?
L50           4 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L51          13 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L52         912 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        1590 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       11809 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)
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                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       12283 SEA (L51 OR L52 OR L53 OR L54 OR L55)
L57      227351 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      177598 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
                OR GLYCINE(W)MAX OR G(W)MAX
L59      166048 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         310 SEA L56 AND L58
L61        1295 SEA L57 AND L58 AND L59
L62        1589 SEA L49 OR L50 OR L60 OR L61
L63         239 SEA L62 AND PY>=2017
L64         101 SEA L63 AND UP>=20181001 AND UP<=20190930
L65         101 SEA L64 NOT P/DT
L66           0 SEA L64 AND (P/DT AND J/DT)
L67         101 SEA L65 OR L66

     FILE 'HCAPLUS' ENTERED AT 14:38:26 ON 21 OCT 2019
L68          17 SEA CV(W)SOY OR CVSOY OR BPS(W)CV127(W)9 OR BPSCV127(W)9 OR
                CV127?
L69           2 SEA CULTIVANCE OR CULTIVANCETM OR CULTIVANCERTM
L70          15 SEA CSR1(W)2 OR CSR(W)12 OR CRS(W)1(W)2
L71        1209 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        3171 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       20458 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       22778 SEA (L70 OR L71 OR L72 OR L73 OR L74)
L76      351383 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      371169 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
                OR GLYCINE(W)MAX OR G(W)MAX
L78      636243 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         722 SEA L75 AND L77
L80        6603 SEA L76 AND L77 AND L78
L81        6970 SEA L68 OR L69 OR L79 OR L80
L82        1954 SEA L81 AND PY>=2017
L83         501 SEA L82 AND UP>=20181001 AND UP<=20190930
L84         110 SEA L83 NOT P/DT
L85           0 SEA L83 AND (P/DT AND J/DT)
L86         110 SEA L84 OR L85

     FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 14:38:54 ON 21
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     OCT 2019
L87         352 DUP REM L16 L32 L48 L67 L86 (163 DUPLICATES REMOVED)
                    ANSWERS '1-123' FROM FILE MEDLINE
                    ANSWERS '124-208' FROM FILE BIOSIS
                    ANSWERS '209-247' FROM FILE AGRICOLA
                    ANSWERS '248-302' FROM FILE CABA
                    ANSWERS '303-352' FROM FILE HCAPLUS
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