

Title

Summary of the Literature Review for FG72 x A5547-127 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.
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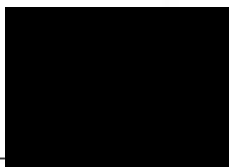
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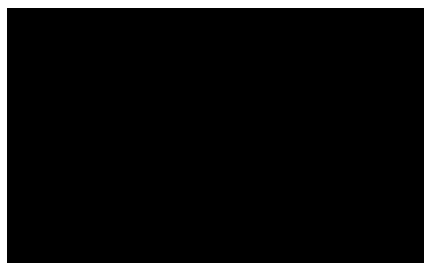
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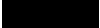



Electronic database search	
Manual search	   
Stage 1 assessment	 
Stage 2 assessment	<u>Food and Feed safety</u>   <u>Molecular characterization</u>   <u>Environmental safety</u>  
Report	 

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SUMMARY

FG72 x A5547-127 is a genetically modified (GM) soybean designed to provide new options for weed control in the crop. FG72 x A5547-127 soybean was obtained by traditional breeding of two parental lines—one derived from FG72 and one derived from A5547-127. FG72 soybean expresses the 5-enolpyruvylshikimate-3-phosphate synthase protein (2mEPSPS) as well as the 4-hydroxyphenylpyruvate dioxygenase protein (HPPD W336), which confer tolerance to glyphosate and HPPD inhibitors such as isoxaflutole herbicides, respectively. A5547-127 soybean expresses the phosphinothricin acetyltransferase (PAT/*pat*) protein, which confers tolerance to glufosinate herbicides. FG72 x A5547-127 expresses all three proteins conferring tolerance to all three herbicides. The OECD identifier is MST-FGØ72-2 x ACS-GMØØ6-4.

A scoping review was performed for FG72 x A5547-127 soybean and its newly expressed proteins, 2mEPSPS, HPPD W336 and PAT/*pat*. The objective was to determine if there were studies about the molecular characterization of FG72 x A5547-127 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 regulatory authorities for food and feed safety, agriculture, and biotechnology 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.

The literature searches identified a total of 90 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of 6 publications were progressed for further assessment. After the detailed review, all 6 publications were determined to be not relevant.

No publications were found that contained new data on the molecular characterization of FG72 x A5547-127 soybean and its newly expressed proteins, 2mEPSPS, HPPD W336 and PAT/*pat*. Similarly, no new publications were found that suggested any potential adverse effects on human health, animal health, or the environment.

In summary, the literature searches and detailed review of the retrieved publications identified no publications that would change the existing safety assessment of FG72 x A5547-127 soybean.

1. INTRODUCTION

FG72 x A5547-127 is a genetically modified (GM) soybean designed to provide new options for weed control in the crop. FG72 x A5547-127 soybean was obtained by traditional breeding of two parental lines—one derived from FG72 and one derived from A5547-127. FG72 soybean expresses the 5-enolpyruvylshikimate-3-phosphate synthase protein (2mEPSPS) as well as the 4-hydroxyphenylpyruvate dioxygenase protein (HPPD W336) which confer tolerance to glyphosate and HPPD inhibitors such as isoxaflutole herbicides, respectively. A5547-127 soybean expresses the phosphinothricin acetyltransferase (PAT/*pat*) protein, which confers tolerance to glufosinate herbicides. FG72 x A5547-127 expresses all three proteins conferring tolerance to all three herbicides. The OECD identifier is MST-FGØ72-2 x ACS-GMØØ6-4.

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 FG72 x A5547-127 soybean, and/or any adverse effects of FG72 x A5547-127 soybean in food, feed or the environment. In that context, broad and inclusive literature searches were performed and the articles retrieved were reviewed in a comprehensive and transparent manner. 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 FG72 x A5547-127 soybean and its newly expressed proteins 2mEPSPS, HPPD W336 and PAT/*pat*. 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 FG72 x A5547-127 soybean and the 2mEPSPS, HPPD W336 and PAT/*pat* proteins, in order to identify any issues related to the molecular characterization of FG72 x A5547-127, food or feed safety, or environmental safety that may require a more detailed examination.

2.2. Review questions

Review questions were formulated to conform to PECO structure (Population, Exposure, Comparators, Outcome) if possible, and to meet data requirements. They were modeled after the review question examples provided in the EFSA 2019 explanatory note¹.

Question 1: Were any studies published during the reporting period that describe adverse effects on human or animal health or the environment of FG72 x A5547-127 soybean and the 2mEPSPS, HPPD W336 and PAT/*pat* proteins?

Key elements:

Population: Human health; animal health; environmental safety

Exposure: FG72 x A5547-127 soybean, derived food/feed products, newly expressed proteins in FG72 x A5547-127 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 the molecular characterization of FG72 x A5547-127 soybean and the 2mEPSPS, HPPD W336 and PAT/pat proteins?

Key elements:

Population: FG72 x A5547-127 soybean and newly expressed proteins in FG72 x A5547-127 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 note¹ 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
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
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(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

No publications for FG72 x A5547-127 soybean were known before starting the search, therefore, a related publication referring to one element of the stack, FG72, was used as reference publication:

- Dreesen R; Capt A; Oberdoerfer R; Coats I; Pallett KE (2018). Characterization and safety evaluation of HPPD W336, a modified 4-hydroxyphenylpyruvate dioxygenase protein, and the impact of its expression on plant metabolism in herbicide-tolerant MST-FGO72-2 soybean. Regulatory toxicology and pharmacology 97:170-185

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 activities¹. 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 November 25, 2019. Only documents updated between October 1, 2018 and September 30, 2019, were considered in the search.

3.2. Search strategy

The search profiles were designed to capture the stack, and they covered event name, trade name, newly expressed proteins and intended traits. Since the 'intended traits' profile produced too many results when used on their own, it was combined with additional profiles: a 'plant species' profile and a 'general GMO' profile. See [Table 2](#) for the 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 1](#) for a complete search history.

Table 2: Search profile for database search

Set	Search string	Concepts
1	FG72 or MST(w)FG072 or MST(w)FG072 or MST(w)FG072 or MST(w)FG072x or MST(w)FG072x or MST(w)FG072x	Event FG72
2	LL55 or A5547(w)127 or A(w)5547(w)127 or ACS-GM006-4 or ACS-GM006-4 or ACS-GM006-4 or ACSGM006(w)4 or ACSGM006(w)4 or ACSGM006(w)4 or xA5547(w)127 or xA(w)5547(w)127 or xACS-GM006-4 or xACS-GM006-4 or xACS-GM006-4 or xACSGM006(w)4 or xACSGM006(w)4 or xACSGM006(w)4	Event A5547-127
3	FG72? or ?FG72 or LL55? or ?LL55 or FG72.time#.LL55 or MST(w)FG072-3xA5547(w)12 or MSTFG072-3xA5547(w)12 or MST(w)FG072-3xA(w)5547(w)12 or MSTFG072-3xA(w)5547(w)12	Event FG72 x A5547-127
4	(1 and 2) or 3	Event all
5	GT27 or GT27TM	Trade name FG72
6	libertylink? or liberty(w)link or liberty(w)linktm or liberty(w)linkrtm or LL or LLTM or LLRTM	Trade name A5547-127
7	5 and 6	Trade name all
8	((2MEPSPS or 2(w)MEPSPS or 2M(w)EPSPS or 2(w)M(w)EPSPS) or (EPSPS OR EPSP(W)SYNTHASE OR	Newly expressed proteins FG72

Set	Search string	Concepts
	(ENOL(W) PYRUVYL SHIKIMATE OR ENOL(W) PYRUVYL(W) SHIKIMATE OR ENOLPYRUVYL SHIKIMATE OR ENOLPYRUVYL SHIKIMATE OR ENOYLPYRUVYL SHIKIMATE OR ENOLPYRUVYL SHIKIMIC) (4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE) or (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIMKIMATE OR PHOSPHOSHIMKIMIC or ENOLPYRUVYL SHIKIMATE PHOSPHATE) (2W) (SYNTHASE OR SYNTHETASE) or (ENOL(W) PYRUVYL SHIKIMATE OR ENOLPYRUVYL SHIKIMATE OR ENOLPYRUVYL SHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W) SHIKIMATE) (3W) PHOSPHATE (W) (SYNTHASE OR SYNTHETASE) or (PHOSPHOSHIMKIMATE (2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIMKIMATE (2W) CARBOXYVINYL (W) TRANSFERASE OR ENOLPYRUVOYL (W) SHIKIMIC (3W) PHOSPHOSYNTHASE) (s) ((DOUBL# or DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)) or (HPPDW336 or HPPD(w)W336 or HPPD(w)W(w)336 or HPPDW(w)336 or ((hydroxyphenylpyruvate or hydroxy(w)phenylpyruvate or hydroxyphenyl(w)pyruvate or hydroxy(w)phenyl(w)pyruvate) (w) (dehydrogenase# or dioxygenase#) or hppd) (s) (modif? or MUTANT# OR MUTAT?))	
9	((bar or pat) (2a) (gene# or protein# or enzyme#)) or ppt (2w) acetyltransferase or ppt (2w) acetyl(w) transferase or pt (w) n (2w) acetyltransferase or pt (w) n (2w) acetyl(w) transferase or phosphinothricin (w) n (w) acetyltransferase or phosphinothricin (2w) acetyltransferase or phosphinothricin (2w) acetyl(w) transferase or phosphinothricin acetyl(w) transferase	Newly expressed protein A5547-127
10	8 and 9	Newly expressed proteins all
11	(herbicid? or HPPD(w) inhibitor# or isoxaflutole# or diketonitrile# or pyrazolone# or triketone# or GL!PHOSATE# or GL!FOSATE# OR G360 or g(w)360 or roundup? or round(w)up?) (5a) (resist? or toleran? or protect?)	Intended trait FG72
12	(herbicid? or bialaphos or basta or glufosinate or phosphinothricin or liberty?) (5a) (resist? or toleran? or protect?)	Intended trait A5547-127
13	11 and 12	Intended trait all
14	soy or soya or soja or soybean# or soyabean# or sojabean# or glycine(w)max or g(w)max	Plant species
15	GMO OR GMOs OR LMO OR LMOs OR GM OR GE OR transgen? OR (genetic?(3w) (modif? OR transform? OR manipulat? OR improv? OR engineer?)) or (stacked(w) (gene# or trait# or event#))	GMO general
16	13 and 14 and 15	Intended trait AND Plant species AND GMO general

Set	Search string	Concepts
17	4 or 7 or 10 or 16	Event name all OR Trade name all OR Newly expressed proteins all OR (Intended traits all AND Plant species AND GMO general)

3.3. 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).

The dates of the most recent database updates are provided in [Table 3](#).

See [Appendix 2](#) for detailed database descriptions.

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	25 Nov 2019	25 Nov 2019	25 Nov 2019	25 Nov 2019	25 Nov 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	5 Nov 2019	20 Nov 2019	20 Nov 2019	24 Nov 2019	24 Nov 2019
Number of records retrieved	16	28	29	26	26
Number of records after duplicate removal	13	21	16	14	26
Number of relevant records after rapid assessment	1	2	2	1	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 regulatory authorities for food and feed safety, agriculture, and biotechnology was conducted. Search results were manually examined for relevant records that were either published during the time period of : October 1, 2018 to September 30, 2019 or refer to relevant records published during this time frame. Relevance of results was determined based on the criteria listed in [Table 1](#) and are summarized in [Table 4](#). All web pages searched were chosen based on them being recommended as part of the EFSA 2019 explanatory note¹. Search terms consisted of FG72 x A5547-127 or MST-FG072-2 x ACS-GMO06-4 or HPPD W336 or modified-hydroxyphenylpyrovate dioxygenase or 2mEPSPS or double mutant 5-enolpyruvyl shikimate-3-phosphate synthase enzyme or PAT/*pat*, phosphinothricin in FG72 x A5547-127 soybean. (all searched singly, with no search limits applied).

Table 4: Search of websites for regulatory authorities for food and feed safety, agriculture, and biotechnology

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/climate-change.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	Sept. 2019	Oct. 7-21, 2019	0

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
National Advisory Commission on Agricultural Biotechnology (CONABIA)	https://www.argentina.gob.ar/agroindustria/bioeconomia/biotechnologia	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/	Sep. 30, 2019	Oct. 10, 2019	0
Ministry of Agriculture, Forestry and Fisheries (MAFF)	http://www.maff.go.jp/	Oct. 30, 2019	Oct. 30, 2019	0
Ministry of Health, Labor 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 published between October 1, 2018 and September 30, 2019 serves as sources for reference lists to search for potentially relevant studies. The review articles were identified by searching of PubMed.gov for general terms such as “GMO” or “GM crops” in the titles and abstracts. A list of review articles and resulting number of relevant studies found within the bibliographies 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
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

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
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
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

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
18	Rostoks N, Granti A, Levi A, B, Evelone V, Valci A, 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, Woźniak E, Gracz J, Kuczyński 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 Y, Zhang X, Wu G. 2019	Development and strategy of reference materials for the DNA-based detection of genetically modified organisms.	Anal Bioanal Chem. 2019 Mar;411(9):1729-1744. doi: 10.1007/s00216-019-01576-w.	0
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 125 references, which were reduced to 90 after the 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 the 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:

- Duplicate entries
- Secondary literature (reviews), other than assessments from regulatory authorities

- Articles on non-relevant topics like detection methods, socio-economic implications of GM crops, GM policy, agronomical performance, other herbicide resistant GM crops, one element of the stack, 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 (Stage 1) is presented in [Table 6](#).

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 Characterization, 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 as well as the quality and reliability of the study. Categorization of reliability (as described in the EFSA 2019 explanatory note¹ 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)	90
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	84
Total number of full-text documents assessed in detail	6
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	0

[Table 7](#) lists the publications determined to be relevant along with their potential impact on the safety assessment after 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
No publications in this category.			

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
Papineni, Sabitha Fletcher, Dale W. Cromwell, Gary L. Ekmay, Ricardo D. 2017	Comparative performance of broilers fed diets containing DAS-44406-6 and non-transgenic soybean meal.	Poultry Science, (MAY 2017) Vol. 96, No. 5, pp. 1244-1249.	FG72 x A5547-127 soybean is not the subject of this study.
Papineni, Sabitha Christina M Dunville Ekmay Ricardo Jennifer A Murray Johnson Thomas Radha Krishna Sura 2017	Evaluation of the safety of a genetically modified DAS-44406-6 soybean meal and hulls in a 90-day dietary toxicity study in rats	Food and chemical toxicology (2017), pp. 245-252 ISSN: 0278-6915 Published by: Elsevier Ltd Source Note: 2017 Nov., v. 109	FG72 x A5547-127 soybean is not the subject of this study.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Papineni, S. Passage, J. K. Ekmay, R. D. Thomas, J. 2018	Evaluation of 30% DAS-444O6-6 soybean meal in a subchronic rat toxicity study.	Regulatory Toxicology and Pharmacology (2018), Volume 94, pp. 57-69 ISSN: 0273-2300 DOI: 10.1016/j.yrtph.2018.01.005 Published by: Elsevier, New York	FG72 x A5547-127 soybean is not the subject of this study.
Herman, R. A. Ekmay, R. D. Schafer, B. W. Song Ping Fast, B. J. Papineni, S. Shan GuoMin Juberg, D. R. Song, P. Shan, G. M. 2018	Food and feed safety of DAS-444O6-6 herbicide-tolerant soybean .	Regulatory Toxicology and Pharmacology (2018), Volume 94, pp. 70-74 ISSN: 0273-2300 DOI: 10.1016/j.yrtph.2018.01.016 Published by: Elsevier, New York	FG72 x A5547-127 soybean is not the subject of this study.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
EFSA Panel on Genetically Modified Organisms Naegeli, Hanspeter Birch, Andrew Nicholas Casacuberta, Josep De Schrijver, Adinda Gralak, Mikolaj Antoni Jones, Huw Manachini, Barbara Messean, Antoine Nielsen, Elsa Ebbesen Nogue, Fabien Robaglia, Christophe Rostoks, Nils Sweet, Jeremy Tebbe, Christoph Visioli, Francesco Wal, Jean-Michel Alvarez, Fernando Ardizzone, Michele Liu, Yi Neri, Franco Maria Ramon, Matthew 2017	Scientific opinion on an application by Dow AgroSciences LLC (EFSA-GMO -NL-2012-106) for the placing on the market of genetically modified herbicide - tolerant soybean DAS-44406-6 for food and feed uses, import and processing under Regulation (EC) No 1829/2003	EFSA Journal (2017), 15(3), n/a CODEN: EJFOA6; ISSN: 1831-4732	FG72 x A5547-127 soybean is not the subject of this document.

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).	FG72 x A5547-127 soybean is not the subject of this study.

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 AND SUMMARY OF RELEVANT STUDIES

A total of 6 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 there were none of the 6 publications were relevant for the safety assessment of FG72 x A5547-127 soybean and the newly expressed proteins 2mEPSPS, HPPD W336 and PAT/*pat*.

[Table 10](#) and [Table 11](#) list the relevant publications along with a summary of any adverse effects reported and the reliability of the publications.

Table 10: Summary of all relevant publications retrieved after detailed assessment of full-text documents for relevance (Stage 2): 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
No publications in this category.				

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 (Stage 2): 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
No publications in this category.			

7. CONCLUSION

The literature searches performed for FG72 x A5547-127 soybean and the 2mEPSPS, HPPD W336 and PAT/*pat* proteins for the period from October 1, 2018 to September 30, 2019, identified a total of 90 unique publications (after removal of duplicates). A total of 6 publications were progressed for detailed assessment after excluding 84 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

These 6 publications were evaluated in detail, based on their full text, for potential relevance, following the pre-established criteria. No relevant references with bearing on human and animal safety, molecular characterization or environmental safety were identified. No issues or topics were identified that would trigger or warrant a 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 Search history

```
(FILE 'HOME' ENTERED AT 09:27:25 ON 25 NOV 2019)

FILE 'MEDLINE' ENTERED AT 09:27:43 ON 25 NOV 2019
L1      5 SEA FG72 OR MST(W)FG072 OR MST(W)FG072 OR MST(W)FG072 OR
MST(W)FG072X OR MST(W)FG072X OR MST(W)FG072X
L2      4 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR
ACS-GM006-4 OR ACS-GMO06-4 OR ACSGM006(W)4 OR ACSGM006(W)4 OR
ACSGMO06(W)4
L3      0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR
XACS-GM006-4 OR XACS-GMO06-4 OR XACSGM006(W)4 OR XACSGM006(W)4
OR XACSGMO06(W)4
L4      8 SEA FG72? OR ?FG72 OR LL55? OR ?LL55 OR FG72.TIME#.LL55 OR
MST(W)FG072-3XA5547(W)12 OR MSTFG072-3XA5547(W)12 OR MST(W)FG07
2-3XA(W)5547(W)12 OR MSTFG072-3XA(W)5547(W)12
L5      8 SEA (L1 AND (L2 OR L3)) OR L4
L6      0 SEA (GT27 OR GT27TM) AND (LIBERTYLINK? OR LIBERTY(W)LINK OR
LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM)
L7      9 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS
L8      4080 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV
OYLSHIKIMATE OR ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (
4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)
L9      0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
YNTHASE OR SYNTHETASE)
L10     344 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE
) (3W)PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)
L11     443 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC (
3W)PHOSPHOSYNTHASE)
L12     22864 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)
L13     14 SEA L7 OR ((L8 OR L9 OR L10 OR L11)) (S)L12)
L14     3 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336
L15     32 SEA ((HYDROXYPHENYLPYRUVATE OR HYDROXY(W)PHENYLPYRUVATE OR
HYDROXYPHENYL(W)PYRUVATE OR HYDROXY(W)PHENYL(W)PYRUVATE) (W) (DEH
YDROGENASE# OR DIOXYGENASE#) OR HPPD) (S) (MODIF? OR MUTANT# OR
MUTAT?)
L16     32 SEA (L14 OR L15)
L17     45 SEA L13 OR L16
L18     1325 SEA ((BAR OR PAT) (2A) (GENE# OR PROTEIN# OR ENZYME#)) OR
PPT(2W)ACETYLTRANSFERASE OR PPT(2W)ACETYL(W)TRANSFERASE OR
PT(W)N(2W)ACETYLTRANSFERASE OR PT(W)N(2W)ACETYL(W)TRANSFERASE
L19     194 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L20     1396 SEA (L18 OR L19)
L21     7 SEA L17 AND L20
L22     2974 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR
DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GLIPHOSATE# OR
GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (R
ESIST? OR TOLERAN? OR PROTECT?)
L23     2838 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
PHOSPHINOTHRICIN OR LIBERTY?) (5A) (RESIST? OR TOLERAN? OR
PROTECT?)
L24     2599 SEA L22 AND L23
L25     60520 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
OR GLYCINE(W)MAX OR G(W)MAX
```

L26 3452374 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR
(GENETIC?(3W) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR
ENGINEER?)) OR (STACKED(W) (GENE# OR TRAIT# OR EVENT#))

L27 207 SEA L24 AND L25 AND L26

L28 216 SEA L5 OR L6 OR L21 OR L27

L29 46 SEA L28 AND PY>=2017

L30 26 SEA L29 AND UP>=20181001 AND UP<=20190930

FILE 'BIOSIS' ENTERED AT 09:28:35 ON 25 NOV 2019

L31 6 SEA FG72 OR MST(W)FG072 OR MST(W)FG072 OR MST(W)FG072X OR
MST(W)FG072X OR MST(W)FG072X OR MST(W)FG072X

L32 14 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR
ACS-GM006-4 OR ACS-GMO06-4 OR ACSGM006(W)4 OR ACSGM006(W)4 OR
ACSGMO06(W)4

L33 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR
XACS-GM006-4 OR XACS-GMO06-4 OR XACSGM006(W)4 OR XACSGM006(W)4
OR XACSGMO06(W)4

L34 12 SEA FG72? OR ?FG72 OR LL55? OR ?LL55 OR FG72.TIME#.LL55 OR
MST(W)FG072-3XA5547(W)12 OR MSTFG072-3XA5547(W)12 OR MST(W)FG07
2-3XA(W)5547(W)12 OR MSTFG072-3XA(W)5547(W)12

L35 12 SEA (L31 AND (L32 OR L33)) OR L34

L36 0 SEA (GT27 OR GT27TM) AND (LIBERTYLINK? OR LIBERTY(W)LINK OR
LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM)

L37 12 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L38 4866 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV
OYLSHIKAMATE OR ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (4W)
(PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)

L39 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
YNTHASE OR SYNTHETASE)

L40 651 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE
) (3W)PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)

L41 27 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC (3W)
PHOSPHOSYNTHASE)

L42 25482 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)

L43 17 SEA L37 OR ((L38 OR L39 OR L40 OR L41)) (S)L42)

L44 3 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPD(W)336

L45 46 SEA ((HYDROXYPHENYLPYRUVATE OR HYDROXY(W)PHENYLPYRUVATE OR
HYDROXYPHENYL(W)PYRUVATE OR HYDROXY(W)PHENYL(W)PYRUVATE) (W) (DEH
YDROGENASE# OR DIOXYGENASE#) OR HPPD) (S) (MODIF? OR MUTANT# OR
MUTAT?)

L46 46 SEA (L44 OR L45)

L47 62 SEA L43 OR L46

L48 2656 SEA ((BAR OR PAT) (2A) (GENE# OR PROTEIN# OR ENZYME#)) OR
PPT (2W)ACETYLTRANSFERASE OR PPT (2W)ACETYL(W)TRANSFERASE OR
PT(W)N(2W)ACETYLTRANSFERASE OR PT(W)N(2W)ACETYL(W)TRANSFERASE

L49 321 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L50 2754 SEA (L48 OR L49)

L51 8 SEA L47 AND L50

L52 10078 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR
DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GL!PHOSATE# OR
GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (R
ESIST? OR TOLERAN? OR PROTECT?)

L53 9075 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
PHOSPHINOTHRICIN OR LIBERTY?) (5A) (RESIST? OR TOLERAN? OR
PROTECT?)

L54 8693 SEA L52 AND L53

L55 156956 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#

```

OR GLYCINE(W)MAX OR G(W)MAX
L56      412275 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR
          (GENETIC?(3W)(MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR
          ENGINEER?)) OR (STACKED(W)(GENE# OR TRAIT# OR EVENT#))
L57      367 SEA L54 AND L55 AND L56
L58      383 SEA L35 OR L36 OR L51 OR L57
L59      62 SEA L58 AND PY>=2017
L60      28 SEA L59 AND UP>=20181001 AND UP<=20190930

FILE 'AGRICOLA' ENTERED AT 09:29:47 ON 25 NOV 2019
L61      3 SEA FG72 OR MST(W)FG072 OR MST(W)FG072 OR MST(W)FG072 OR
          MST(W)FG072X OR MST(W)FG072X OR MST(W)FG072X
L62      6 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR
          ACS-GM006-4 OR ACS-GM006-4 OR ACSGM006(W)4 OR ACSGM006(W)4 OR
          ACSGM006(W)4
L63      0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR
          XACS-GM006-4 OR XACS-GM006-4 OR XACSGM006(W)4 OR XACSGM006(W)4
          OR XACSGM006(W)4
L64      3 SEA FG72? OR ?FG72 OR LL55? OR ?LL55 OR FG72.TIME#.LL55 OR
          MST(W)FG072-3XA5547(W)12 OR MSTFG072-3XA5547(W)12 OR MST(W)FG07
          2-3XA(W)5547(W)12 OR MSTFG072-3XA(W)5547(W)12
L65      3 SEA (L61 AND (L62 OR L63)) OR L64
L66      0 SEA (GT27 OR GT27TM) AND (LIBERTYLINK? OR LIBERTY(W)LINK OR
          LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM)
L67      2 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSFS OR 2(W)M(W)EPSPS
L68      560 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR
          ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV
          OYLSHIKIMATE OR ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (
          4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)
L69      0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
          MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
          YNTHASE OR SYNTHETASE)
L70      270 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
          ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE
          ) (3W) PHOSPHATE (W) (SYNTHASE OR SYNTHETASE)
L71      180 SEA (PHOSPHOSHIKIMATE (2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
          IMATE (2W) CARBOXYVINYL (W) TRANSFERASE OR ENOLPYRUVOYL (W) SHIKIMIC (
          3W) PHOSPHOSYNTHASE)
L72      5879 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)
L73      6 SEA L67 OR ((L68 OR L69 OR L70 OR L71)) (S) L72)
L74      0 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336
L75      26 SEA ((HYDROXYPHENYLPYRUVATE OR HYDROXY(W)PHENYLPYRUVATE OR
          HYDROXYPHENYL (W) PYRUVATE OR HYDROXY (W) PHENYL (W) PYRUVATE) (W) (DEH
          YDROGENASE# OR DIOXYGENASE#) OR HPPD) (S) (MODIF? OR MUTANT# OR
          MUTAT?)
L76      26 SEA (L74 OR L75)
L77      32 SEA L73 OR L76
L78      711 SEA ((BAR OR PAT) (2A) (GENE# OR PROTEIN# OR ENZYME#)) OR
          PPT(2W)ACETYLTRANSFERASE OR PPT(2W)ACETYL(W)TRANSFERASE OR
          PT(W)N(2W)ACETYLTRANSFERASE OR PT(W)N(2W)ACETYL(W)TRANSFERASE
L79      238 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
          N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
          ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L80      785 SEA (L78 OR L79)
L81      3 SEA L77 AND L80
L82      7723 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR
          DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GL!PHOSATE# OR
          GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (R
          ESIST? OR TOLERAN? OR PROTECT?)
L83      7419 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
          PHOSPHINOTHRICIN OR LIBERTY?) (5A) (RESIST? OR TOLERAN? OR
          PROTECT?)
L84      7262 SEA L82 AND L83

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L85 82172 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
OR GLYCINE(W)MAX OR G(W)MAX

L86 89242 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR
(GENETIC?(3W) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR
ENGINEER?)) OR (STACKED(W) (GENE# OR TRAIT# OR EVENT#))

L87 353 SEA L84 AND L85 AND L86

L88 357 SEA L65 OR L66 OR L81 OR L87

L89 30 SEA L88 AND PY>=2017

L90 16 SEA L89 AND UP>=20181001 AND UP<=20190930

FILE 'CABA' ENTERED AT 09:32:17 ON 25 NOV 2019

L91 8 SEA FG72 OR MST(W)FG072 OR MST(W)FG072 OR MST(W)FG072 OR
MST(W)FG072X OR MST(W)FG072X OR MST(W)FG072X

L92 14 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR
ACS-GM006-4 OR ACS-GMO06-4 OR ACSGM006(W)4 OR ACSGM006(W)4 OR
ACSGMO06(W)4

L93 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR
XACS-GM006-4 OR XACS-GMO06-4 OR XACSGM006(W)4 OR XACSGM006(W)4
OR XACSGMO06(W)4

L94 10 SEA FG72? OR ?FG72 OR LL55? OR ?LL55 OR FG72.TIME#.LL55 OR
MST(W)FG072-3XA5547(W)12 OR MSTFG072-3XA5547(W)12 OR MST(W)FG07
2-3XA(W)5547(W)12 OR MSTFG072-3XA(W)5547(W)12

L95 10 SEA (L91 AND (L92 OR L93)) OR L94

L96 0 SEA (GT27 OR GT27TM) AND (LIBERTYLINK? OR LIBERTY(W)LINK OR
LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM)

L97 12 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L98 948 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV
OYLSHIKIMATE OR ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (4W)
(PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)

L99 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
YNTHASE OR SYNTHETASE)

L100 373 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE
) (3W)PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)

L101 142 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC(3W)
PHOSPHOSYNTHASE)

L102 6659 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)

L103 16 SEA L97 OR ((L98 OR L99 OR L100 OR L101)) (S)L102)

L104 2 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336

L105 46 SEA ((HYDROXYPHENYLPYRUVATE OR HYDROXY(W)PHENYLPYRUVATE OR
HYDROXYPHENYL(W)PYRUVATE OR HYDROXY(W)PHENYL(W)PYRUVATE) (W) (DEH
YDROGENASE# OR DIOXYGENASE#) OR HPPD) (S) (MODIF? OR MUTANT# OR
MUTAT?)

L106 46 SEA (L104 OR L105)

L107 60 SEA L103 OR L106

L108 1442 SEA ((BAR OR PAT) (2A) (GENE# OR PROTEIN# OR ENZYME#)) OR
PPT(2W)ACETYLTRANSFERASE OR PPT(2W)ACETYL(W)TRANSFERASE OR
PT(W)N(2W)ACETYLTRANSFERASE OR PT(W)N(2W)ACETYL(W)TRANSFERASE

L109 364 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L110 1540 SEA (L108 OR L109)

L111 8 SEA L107 AND L110

L112 17344 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR
DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GL!PHOSATE# OR
GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (R
ESIST? OR TOLERAN? OR PROTECT?)

L113 16705 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
PHOSPHINOTHRICIN OR LIBERTY?) (5A) (RESIST? OR TOLERAN? OR
PROTECT?)

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L114      16332 SEA L112 AND L113
L115      178283 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
           OR GLYCINE(W)MAX OR G(W)MAX
L116      163611 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR
           (GENETIC?(3W) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR
           ENGINEER?)) OR (STACKED(W) (GENE# OR TRAIT# OR EVENT#))
L117      692 SEA L114 AND L115 AND L116
L118      702 SEA L95 OR L96 OR L111 OR L117
L119      70 SEA L118 AND PY>=2017
L120      29 SEA L119 AND UP>=20181001 AND UP<=20190930
L121      29 SEA L120 NOT P/DT
L122      0 SEA L120 AND (P/DT AND J/DT)
L123      29 SEA L121 OR L122

FILE 'HCAPLUS' ENTERED AT 09:33:28 ON 25 NOV 2019
L124      12 SEA FG72 OR MST(W)FG072 OR MST(W)FG072 OR MST(W)FG072 OR
           MST(W)FG072X OR MST(W)FG072X OR MST(W)FG072X
L125      19 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR
           ACS-GM006-4 OR ACS-GMO06-4 OR ACSGM006(W)4 OR ACSGM006(W)4 OR
           ACSGM006(W)4
L126      0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR
           XACS-GM006-4 OR XACS-GMO06-4 OR XACSGM006(W)4 OR XACSGM006(W)4
           OR XACSGMO06(W)4
L127      24 SEA FG72? OR ?FG72 OR LL55? OR ?LL55 OR FG72.TIME#.LL55 OR
           MST(W)FG072-3XA5547(W)12 OR MSTFG072-3XA5547(W)12 OR MST(W)FG07
           2-3XA(W)5547(W)12 OR MSTFG072-3XA(W)5547(W)12
L128      24 SEA (L124 AND (L125 OR L126)) OR L127
L129      0 SEA (GT27 OR GT27TM) AND (LIBERTYLINK? OR LIBERTY(W)LINK OR
           LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM)
L130      29 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSFS OR 2(W)M(W)EPSPS
L131      4131 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR
           ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV
           OYLSHIKAMATE OR ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (
           4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)
L132      9 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
           MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
           YNTHASE OR SYNTHETASE)
L133      1009 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
           ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE
           ) (3W) PHOSPHATE (W) (SYNTHASE OR SYNTHETASE)
L134      79 SEA (PHOSPHOSHIKIMATE (2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
           IMATE (2W) CARBOXYVINYL (W) TRANSFERASE OR ENOLPYRUVOYL (W) SHIKIMIC (
           3W) PHOSPHOSYNTHASE)
L135      71966 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)
L136      39 SEA L130 OR ((L131 OR L132 OR L133 OR L134)) (S) L135)
L137      4 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336
L138      130 SEA ((HYDROXYPHENYLPYRUVATE OR HYDROXY(W)PHENYLPYRUVATE OR
           HYDROXYPHENYL (W) PYRUVATE OR HYDROXY (W) PHENYL (W) PYRUVATE) (W) (DEH
           YDROGENASE# OR DIOXYGENASE#) OR HPPD) (S) (MODIF? OR MUTANT# OR
           MUTAT?)
L139      130 SEA (L137 OR L138)
L140      166 SEA L136 OR L139
L141      6317 SEA ((BAR OR PAT) (2A) (GENE# OR PROTEIN# OR ENZYME#)) OR
           PPT (2W) ACETYLTRANSFERASE OR PPT (2W) ACETYL (W) TRANSFERASE OR
           PT (W) N (2W) ACETYLTRANSFERASE OR PT (W) N (2W) ACETYL (W) TRANSFERASE
L142      744 SEA PHOSPHINOTHRICIN (W) N (W) ACETYLTRANSFERASE OR PHOSPHINOTHRICI
           N (2W) ACETYLTRANSFERASE OR PHOSPHINOTHRICIN (2W) ACETYL (W) TRANSFER
           ASE OR PHOSPHINOTHRICINACETYL (W) TRANSFERASE
L143      6597 SEA (L141 OR L142)
L144      27 SEA L140 AND L143
L145      26084 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR
           DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GL!PHOSATE# OR
           GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (R

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ESIST? OR TOLERAN? OR PROTECT?)
L146 25037 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
PHOSPHINOTHRICIN OR LIBERTY?) (5A) (RESIST? OR TOLERAN? OR
PROTECT?)
L147 24506 SEA L145 AND L146
L148 372883 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#
OR GLYCINE(W)MAX OR G(W)MAX
L149 572993 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR
(GENETIC?(3W) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR
ENGINEER?)) OR (STACKED(W) (GENE# OR TRAIT# OR EVENT#))
L150 5192 SEA L147 AND L148 AND L149
L151 5226 SEA L128 OR L129 OR L144 OR L150
L152 1406 SEA L151 AND PY>=2017
L153 330 SEA L152 AND UP>=20181001 AND UP<=20190930
L154 26 SEA L153 NOT P/DT
L155 0 SEA L153 AND (P/DT AND J/DT)
L156 26 SEA L154 OR L155

FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 09:34:34 ON 25
NOV 2019

L157 90 DUP REM L30 L60 L90 L123 L156 (35 DUPLICATES REMOVED)
ANSWERS '1-26' FROM FILE MEDLINE
ANSWERS '27-47' FROM FILE BIOSIS
ANSWERS '48-60' FROM FILE AGRICOLA
ANSWERS '61-76' FROM FILE CABA
ANSWERS '77-90' FROM FILE HCAPLUS

Appendix 2 Database descriptions

Host	File	Description
STN	AGRICOLA	<p>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.</p> <p>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.</p>
STN	BIOSIS	<p>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.</p> <p>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.</p> <p>Bibliographic information, indexing terms, abstracts, and CAS Registry Numbers are all searchable.</p>
STN	CABA/CAB	<p>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.</p> <p>Sources for CABA include journals, books, reports, published theses, conference proceedings, and patents.</p> <p>Bibliographic information, indexing terms, abstracts, and CAS Registry Numbers are searchable.</p>
STN	CAS-CA/CAPLUS	<p>The Chemical Abstracts (CA) database covers all areas of Biochemistry, Chemistry and Chemical engineering, and related sciences.</p> <p>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.</p> <p>Bibliographic terms, indexing terms, roles, CAS Registry Numbers, International Patent Classification, and abstracts are searchable.</p>

Host	File	Description
STN	MEDLINE	<p>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.</p> <p>Sources include journals and chapters in books or symposia. Bibliographic information, indexing terms, abstracts, chemical names, and CAS Registry Numbers are all searchable.</p> <p>Online thesauri are available for the Medical Subject Headings (/MN), Controlled Terms (/CT) and Chemical Name (/CN) fields.</p>