

Title

**Summary of the Literature Review for FG72 x A5547-127 Soybean  
October 1, 2019 – September 30, 2020**

**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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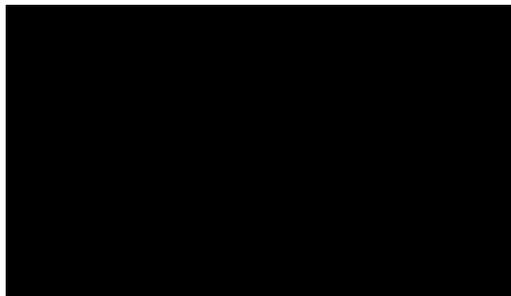
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**STUDY PERSONNEL**

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

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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 the FG72 x A5547-127 soybean and its newly expressed proteins, 2mEPSPS, HPPD W336 and PAT/*pat*. The objective of this scoping review 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 in 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, 2019 to September 30, 2020. 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 95 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of eight publications were progressed for detailed assessment. None of the eight publications were determined to be relevant after detailed review.

No new publications were found that contained new data on the molecular characterization of the 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 of this event on human health, animal health, or the environment.

In summary, these literature searches and review of the retrieved publications identified no publication that would adversely impact the existing safety assessment of the 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, 2019 and September 30, 2020 that mention the molecular characterization of the FG72 x A5547-127 soybean, and/or any adverse effect of FG72 x A5547-127 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)<sup>1</sup> applications and post-market environmental monitoring activities (2019).

The literature searches were performed for the FG72 x A5547-127 soybean and its newly expressed proteins 2mEPSPS, HPPD W336 and PAT/*pat*. The search terms also included relevant synonyms, trade name, 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 FG72 x A5547-127 soybean and its newly expressed proteins 2mEPSPS, HPPD W336 and PAT/*pat*, 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<sup>1</sup>.

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

**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 molecular characterization the of FG72 x A5547-127 soybean and its newly expressed proteins 2mEPSPS, HPPD W336 and PAT/pat in soybean?

**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 note<sup>1</sup> 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
<b>Additional concepts</b>		
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

Two publications related to FG72 x A5547-127 soybean were previously identified and used to test and validate the search strategy::

- 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
- Naegeli, H.; Bresson, J. L.; Dalmay, T.; Dewhurst, I. C.; Epstein, M.; Firbank, L. G.; Guerche, P.; Hejatk, J.; Moreno, F. J.; Mullins, E.; Nogue, F.; Rostoks, N.; Serrano, J. J. S.; Savoini, G.; Veromann, E.; Veronesi, F.; Alvarez, F.; Dumont, A. F.; Papadopoulou, N.; Ardizzone, M.; Devos, Y.; Gennaro, A.; Gomez, J. A. R.; Lanzoni, A.; Neri, F. M.; Paraskevopoulos, K. (2019). Assessment of genetically modified soybean MON 87708 x MON 89788 x A5547-127, for food and feed uses, under regulation (EC) no 1829/2003 (application EFSA-GMO-NL-2016-135). *EFSA Journal* 17(7):e05733

These two articles are not directly relevant to FG72 x A5547-127 soybean, but they were selected because they mention the event names (FG72 and A5547-127), one of the newly expressed proteins (HPPD W336), the intended traits (herbicide resistance) and the crop (soybean). Since these references were published outside the searched time, the profile was tested without applying the time limits used in the final search profile (UP>=20191001 and UP<=20200930).

### 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<sup>1</sup>. 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 16, 2020. Only documents updated between October 1, 2019 and September 30, 2020, 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 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 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, 2019 and September 30, 2020 (UP>=20191001 and UP<=20200930), 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	FG72 or MST(w)FGØ72 or MST(w)FG072 or MST(w)FGO72 or MST(w)FGØ72x or MST(w)FG072x or MST(w)FGO72x	Event FG72
2	LL55 or A5547(w)127 or A(w)5547(w)127 or ACS-GMØØ6-4 or ACS-GM006-4 or ACS-GMOO6-4 or ACSGMØØ6(w)4 or ACSGM006(w)4 or ACSGMOO6(w)4 or xA5547(w)127 or xA(w)5547(w)127 or xACS-GMØØ6-4 or xACS-GM006-4 or xACS-GMOO6-4 or xACSGMØØ6(w)4 or xACSGM006(w)4 or xACSGMOO6(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 (ENOL(W)PYRUVYL)SHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYL)SHIKIMATE OR ENOLPYRUVOYL)SHIKIMATE or ENOYLPYRUVOYL)SHIKIMATE OR ENOLPYRUVYL)SHIKIMIC(4W)(PHOSPHATE OR PHOSPHORIC(2W)(SYNTHASE OR SYNTHETASE) or (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL)(W)(PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC or ENOLPYRUVYL)SHIKIMATEPHOSPHATE)(2W)(SYNTHASE OR SYNTHETASE) or (ENOL(W)PYRUVOYL)SHIKIMATE OR ENOLPYRUVYL)SHIKIMATE OR ENOLPYRUVYL)SHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE)(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE) or (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(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?))	Newly expressed proteins FG72
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	Newly expressed protein A5547-127

Set	Search string	Concepts
	phosphinothricin(2w)acetyl(w)transferase or phosphinothricinacetyl(w)transferase	
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 manipul? 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
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)

**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				
Coverage	1970-present	1926-present	1973-present	1907-present	1946-present
Date of search	16 Oct 2020				
Datespan of the search	1 Oct 2019 – 30 Sept 2020				
Latest database update	24 Aug 2020	14 Oct 2020	14 Oct 2020	15 Oct 2020	15 Oct 2020
Number of records retrieved	12	30	29	31	19
Number of records after duplicate removal	7	25	24	20	19
Number of relevant records after rapid assessment	1	3	3	1	0

#### 4. MANUAL SEARCHES

##### 4.1. Manual searches of web pages of food safety, agriculture, and biotechnology-related authority webpages

In accordance with the EFSA 2019 explanatory note<sup>1</sup> the search in electronic bibliographic databases has been complemented with an internet search in webpages of relevant key organisations involved in the risk assessment of GM plants. Of the 13 key organisations cited in the EFSA 2019 explanatory note<sup>1</sup>, two (Environment and Climate Change Canada and CIBIOGEM) are not involved in the risk assessment of GM plants. US-EPA regulates only GM plants with Plant-Incorporated Protectant (PIP), and Genetic Engineering Approval Committee (GAEC) is included only for cotton. Therefore, the internet search focused on nine key organisations as listed below in Table 4. Search results were manually examined for relevant records that were either published during the time period under consideration (date span of search: October 1, 2019 to September 30, 2020) or refer to relevant records published during this time frame. Relevance of results were determined based on the criteria listed in Table 1. Search terms consisted of FG72xA5547-127, MST-FG072-2xACS-GMO06-4, HPPD W336 or modified-hydroxyphenylpyrovate dioxygenase, 2mEPSPS, Double mutant 5-enolpyruvyl shikimate-3-phosphate synthase enzyme, PAT/pat, or Phosphinothricin in FG72 x A5547-127 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 Department of Agriculture (USDA)	<a href="https://www.usda.gov/">https://www.usda.gov/</a>	Oct 30 2020	Nov 2-3 2020	0
US Food and Drug Administration (FDA)	<a href="https://www.fda.gov/">https://www.fda.gov/</a>	Oct 30 2020	Nov 2-3 2020	0
Health Canada	<a href="https://www.canada.ca/en/health-canada.html">https://www.canada.ca/en/health-canada.html</a>	Oct 30 2020	Nov 2-3 2020	0
Canadian Food Inspection Agency	<a href="https://www.canada.ca/en/food-inspection-agency.html">https://www.canada.ca/en/food-inspection-agency.html</a>	Oct 31 2020	Nov 2-3 2020	0
Food Standards Australia New Zealand (FSANZ)	<a href="http://www.foodstandards.gov.au/Pages/default.aspx">http://www.foodstandards.gov.au/Pages/default.aspx</a>	Oct 30 2020	Nov 2-3 2020	0
Office of the Gene Technology Regulator (OGTR)	<a href="http://www.ogtr.gov.au/">http://www.ogtr.gov.au/</a>	Oct 15 2020	Nov 2-3 2020	0
National Technical Commission on Biosafety (CTNBio)	<a href="http://ctnbio.mcti.gov.br/en">http://ctnbio.mcti.gov.br/en</a>	Oct-20	Oct 22-28 2020	0
National Advisory Commission on Agricultural Biotechnology (CONABIA)	<a href="http://www.agroindustria.gov.ar/sitio/areas/biotechnology/conabia/">http://www.agroindustria.gov.ar/sitio/areas/biotechnology/conabia/</a>	later than Aug 21 2020	Oct 21-22 2020	0
Ministry of Agriculture, Forestry and Fisheries (MAFF)	<a href="http://www.maff.go.jp/">http://www.maff.go.jp/</a>	Oct 26 2020	Oct 26 2020	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, 2019 and September 30, 2020. 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	Ansari WA, Chandanshive SU, Bhatt V, Nadaf AB, Vats S, Katara JL, Sonah H, Deshmukh R. 2020	Genome Editing in Cereals: Approaches, Applications and Challenges	Int J Mol Sci. 2020 Jun 5;21(11):4040. doi: 10.3390/ijms21114040.	0
2	Arpaia S, Christiaens O, Giddings K, Jones H, Mezzetti B, Moronta-Barrios F, Perry JN, Sweet JB, Taning CNT, Smaghe G, Dietz-Pfeilstetter A. 2020	Biosafety of GM Crop Plants Expressing dsRNA: Data Requirements and EU Regulatory Considerations	Front Plant Sci. 2020 Jun 24;11:940. doi: 10.3389/fpls.2020.00940. eCollection 2020.	0
3	Babar U, Nawaz MA, Arshad U, Azhar MT, Atif RM, Golokhvast KS, Tsatsakis AM, Shcerbakova K, Chung G, Rana IA. 2020	Transgenic crops for the agricultural improvement in Pakistan: a perspective of environmental stresses and the current status of genetically modified crops	GM Crops Food. 2020;11(1):1-29. doi: 10.1080/21645698.2019.1680078. Epub 2019 Nov 3.	0
4	Bachtarzi H, Farries T. 2019	The Genetically Modified Organism Medicinal Framework in Europe, United States, and Japan: Underlying Scientific Principles and Considerations Toward the Development of Gene Therapy and Genetically Modified Cell-Based Products	Hum Gene Ther Clin Dev. 2019 Sep;30(3):114-128. doi: 10.1089/humc.2019.042. Epub 2019 Jun 21.	0
5	Bedair M, Glenn KC. 2020	Evaluation of the use of untargeted metabolomics in the safety assessment of genetically modified crops	Metabolomics. 2020 Oct 9;16(10):111. doi: 10.1007/s11306-020-01733-8.	0
6	Feng XJ, Yi HM, Ren XX, Ren JL, Ge JR, Wang FG. 2020	[Digital PCR and its application in biological detection]	Yi Chuan. 2020 Apr 20;42(4):363-373. doi: 10.16288/j.ycz.19-351.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
7	Giraldo PA, Shinozuka H, Spangenberg GC, Cogan NOI, Smith KF. 2019	Safety Assessment of Genetically Modified Feed: Is There Any Difference From Food?	Front Plant Sci. 2019 Dec 11;10:1592. doi: 10.3389/fpls.2019.01592. eCollection 2019.	0
8	Hameed A, Mehmood MA, Shahid M, Fatma S, Khan A, Ali S. 2020	Prospects for potato genome editing to engineer resistance against viruses and cold-induced sweetening	GM Crops Food. 2020 Oct 1;11(4):185-205. doi: 10.1080/21645698.2019.1631115. Epub 2019 Jul 6.	0
9	Holme IB, Gregersen PL, Brinch-Pedersen H. 2019	Induced Genetic Variation in Crop Plants by Random or Targeted Mutagenesis: Convergence and Differences	Front Plant Sci. 2019 Nov 14;10:1468. doi: 10.3389/fpls.2019.01468. eCollection 2019.	0
10	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 Dec;96:77-90. doi: 10.1016/j.semcdb.2019.03.010. Epub 2019 Apr 7.	0
11	Kadoić Balaško M, Mikac KM, Bažok R, Lemic D. 2020	Modern Techniques in Colorado Potato Beetle ( <i>Leptinotarsa decemlineata</i> Say) Control and Resistance Management: History Review and Future Perspectives	Insects. 2020 Sep 1;11(9):581. doi: 10.3390/insects11090581.	0
12	Kamle M, Mahato DK, Devi S, Soni R, Tripathi V, Mishra AK, Kumar P. 2020	Nanotechnological interventions for plant health improvement and sustainable agriculture	3 Biotech. 2020 Apr;10(4):168. doi: 10.1007/s13205-020-2152-3. Epub 2020 Mar 14.	0
13	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. Epub 2019 Sep 4.	0
14	Kenter MJH, Clevers JC, Cornelissen J, Medema RH. 2019	[Environmental regulations impede cancer research and treatment]	Ned Tijdschr Geneeskd. 2019 Dec 5;163:D4267.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
15	Keshani P, Sharifi MH, Heydari MR, Joulaei H. 2020	The Effect of Genetically Modified Food on Infertility Indices: A Systematic Review Study	ScientificWorldJournal. 2020 Aug 13;2020:1424789. doi: 10.1155/2020/1424789. eCollection 2020.	0
16	Kumar K, Gambhir G, Dass A, Tripathi AK, Singh A, Jha AK, Yadava P, Choudhary M, Rakshit S. 2020	Genetically modified crops: current status and future prospects	Planta. 2020 Mar 31;251(4):91. doi: 10.1007/s00425-020-03372-8.	0
17	Papadopoulou N, Devos Y, Álvarez-Alfageme F, Lanzoni A, Waigmann E. 2020	Risk Assessment Considerations for Genetically Modified RNAi Plants: EFSA's Activities and Perspective	Front Plant Sci. 2020 Apr 21;11:445. doi: 10.3389/fpls.2020.00445. eCollection 2020.	0
18	Pottinger SE, Innes RW. 2020	RPS5-Mediated Disease Resistance: Fundamental Insights and Translational Applications	Annu Rev Phytopathol. 2020 Aug 25;58:139-160. doi: 10.1146/annurev-phyto-010820-012733. Epub 2020 Apr 13.	0
19	Rumin J, Nicolau E, Junior RGO, Fuentes-Grünwald C, Picot L. 2020	Analysis of Scientific Research Driving Microalgae Market Opportunities in Europe	Mar Drugs. 2020 May 18;18(5):264. doi: 10.3390/md18050264.	0
20	Woźniak E, Waszkowska E, Zimny T, Sowa S, Twardowski T. 2019	The Rapeseed Potential in Poland and Germany in the Context of Production, Legislation, and Intellectual Property Rights	Front Plant Sci. 2019 Nov 5;10:1423. doi: 10.3389/fpls.2019.01423. eCollection 2019.	0

## 5. RESULTS OF THE STUDY IDENTIFICATION AND SELECTION PROCESS

The database searches (Section 3) identified a total of 121 references, which were reduced to 95 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. In this search, both stage 1 reviewers agreed in 100% of the evaluations.

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, one element of the stack, 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<sup>1</sup> 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)	95
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	87
Total number of full-text documents assessed in detail	8
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	8
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 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
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
Liu, Weixiao [Reprint Author]; Xu, Wentao; Li, Liang; Dong, Mei; Wan, Yusong; He, Xiaoyun; Huang, Kunlun [Reprint Author]; Jin, Wujun [Reprint Author] 2018	iTRAQ-based quantitative tissue proteomic analysis of differentially expressed proteins (DEPs) in non-transgenic and transgenic soybean seeds.	Scientific Reports, 8:17681.	The study does not cover FG72 x A5547-127 soybean.
Sahin, Olcay Karlik, Elif Meric, Sinan Ari, Sule Gozukirmizi, Nermin. 2020.	Genome organization changes in GM and non-GM soybean [Glycine max (L.) Merr.] under salinity stress by retro-transposition events	Genetic Resources and Crop Evolution (2020 ), 67(6), 1551-1566.	FG72 x A5547-127 soybean was not the focus of this study. In addition, safety evaluation was not covered by the study.
Xie, Zixin Zou, Shiyong Xu, Wentao Liu, Xu Huang, Kunlun He, Xiaoyun [Reprint Author] 2018	No subchronic toxicity of multiple herbicide -resistant soybean FG72 in Sprague-Dawley rats by 90-days feeding study.	Regulatory Toxicology and Pharmacology, (APR 2018 ) Vol. 94, pp. 299-305. <a href="http://www.journals.elsevier.com/regulatory-toxicology-and-pharmacology/#description">http://www.journals.elsevier.com/regulatory-toxicology-and-pharmacology/#description</a> . CODEN: RTOPDW. ISSN: 0273-2300. E-ISSN: 1096-0295.	FG72 x A5547-127 soybean was not the focus of this study.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Dreesen, Rozemarijn [Reprint Author] Capt, Annabelle Oberdoerfer, Regina Coats, Isabelle Kenneth, Edward Pallett 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, (AUG 2018 ) Vol. 97, pp. 170-185. <a href="http://www.journals.elsevier.com/regulatory-toxicology-and-pharmacology/#description">http://www.journals.elsevier.com/regulatory-toxicology-and-pharmacology/#description</a> . CODEN: RTOPDW. ISSN: 0273-2300. E-ISSN: 1096-0295.	FG72 x A5547-127 soybean was not the focus of this study.
Kim, Hye Jin Kim, Do Young Moon, Ye Seul Pack, In Soon Park, Kee Woong Chung, Young Soo Kim, Young Joong Nam, Kyong-Hee Kim, Chang-Gi 2019	Gene flow from herbicide resistant transgenic soybean to conventional soybean and wild soybean	Applied biological chemistry (2019), 62(1):54.	The study evaluated gene flow between GM and non-GM soybeans, as well as wild soybeans. The study did not cover environmental risk assessment of FG72 x LL55 soybean.
Tao Bo Cao BaoXiang Han YuJun Zhao BaoGuang Qiu LiJuan Tao, B. Cao, B. X. Han, Y. J. Zhao, B. G. Qiu, L. J. 2019	Effects of glyphosate resistant soybean pyramided with G2-EPSPS and GAT on soil microenvironment.	Chinese Journal of Biological Control (2019), 35(2): 203-208.	GM soybean ZH10-6 pyramiding two genes of G2-EPSPS and GAT and non-transgenic soybean of the receptor variety (ZH10) were investigated for soil microorganisms and soil enzyme activities in three years using biological methods. The results indicated that transgenic soybean ZH10-6 has as the same environmental safety as its receptor of ZH10. The study did not cover environmental risk assessment of FG72 x LL55 soybean.
Stenoien, C. Nail, K. R. Zalucki, J. M. Parry, H. Oberhauser, K. S. Zalucki, M. P. Editor(s): Lovei, G. L. 2018	Monarchs in decline: a collateral landscape-level effect of modern agriculture. Special Section: The impact of transgenic crops on protected arthropods.	Insect Science (2018), 25(4):528-541.	The publication covered a review of literature only. Environmental risk assessment of FG72 x A5547-127 soybean was not covered by this review.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Ricroch, A. Akkoyunlu, S. Martin-Laffon, J. Kuntz, M. Editor(s): Kuntz, M. 2018	Assessing the environmental safety of transgenic plants: honey bees as a case study. Special Issue: Transgenic plants and beyond.	Advances in Botanical Research (2018), 86:111-167.	Publication covers a 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. There was no original/primary data on environmental risk assessment of FG72 x LL55 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 eight publications were selected during Stage 1 evaluation (rapid assessment based on title and abstract). After Stage 2 evaluation (detailed review based on full text), it was determined that no publication was relevant for the safety assessment of the FG72 x A5547-127 soybean and its newly expressed proteins 2mEPSPS, HPPD W336 and PAT/*pat*.

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
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: 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 the FG72 x A5547-127 soybean and its newly expressed proteins 2mEPSPS, HPPD W336 and PAT/*pat* for the period from October 1, 2019 to September 30, 2020, identified a total of 95 unique publications (after duplicate removal). A total of eight publications were progressed for detailed assessment after excluding 87 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The eight publications that progressed to Stage 2 were evaluated in detail, based on full text, for potential relevance, following the pre-established criteria listed in Table 1. No relevant reference 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 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.<br>doi:10.2903/sp.efsa.2019.EN-1614. |
|----|--|

## 9. APPENDICES

### Appendix 1 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>

<b>Host</b>	<b>File</b>	<b>Description</b>
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>

**Appendix 2 Search history**

FILE 'MEDLINE' ENTERED AT 09:34:04 ON 16 OCT 2020

L1 6 SEA FG72 OR MST(W)FGØ72 OR MST(W)FG072 OR MST(W)FGO72 OR  
MST(W)FGØ72X OR MST(W)FG072X OR MST(W)FGO72X

L2 6 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GMØØ6-4 OR  
ACS-GM006-4 OR ACS-GMOØ6-4 OR ACSGMØØ6(W)4 OR ACSGM006(W)4 OR  
ACSGMOØ6(W)4

L3 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GMØØ6-4 OR  
XACS-GM006-4 OR XACS-GMOØ6-4 OR XACSGMØØ6(W)4 OR XACSGM006(W)4  
OR XACSGMOØ6(W)4

L4 9 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 9 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 12 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L8 4135 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR  
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV  
OYLSHIKIMATE OR ENOYLPYRUVOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC(  
4W)(PHOSPHATE OR PHOSPHORIC)(2W)(SYNTHASE OR SYNTHETASE)

L9 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL)(W)(PHOSPHOSHIK  
IMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(S  
YNTHASE OR SYNTHETASE)

L10 357 SEA (ENOL(W)PYRUVOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR  
ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE  
(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)

L11 458 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK  
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC(  
3W)PHOSPHOSYNTHASE)

L12 23584 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)

L13 18 SEA L7 OR (((L8 OR L9 OR L10 OR L11))(S)L12)

L14 4 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336

L15 35 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 36 SEA (L14 OR L15)

L17 52 SEA L13 OR L16

L18 1390 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 202 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L20 1464 SEA (L18 OR L19)

L21 8 SEA L17 AND L20

L22 3244 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR  
DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GLIPHOSATE# OR  
GLIFOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?)(5A)(R  
ESIST? OR TOLERAN? OR PROTECT?)

L23 3080 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)

L24 2830 SEA L22 AND L23

L25 63530 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX

L26 3599643 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 222 SEA L24 AND L25 AND L26

L28 232 SEA L5 OR L6 OR L21 OR L27  
L29 46 SEA L28 AND PY>=2018  
L30 19 SEA L29 AND UP>=20191001 AND UP<=20200930

FILE 'BIOSIS' ENTERED AT 09:35:00 ON 16 OCT 2020

L31 6 SEA FG72 OR MST(W)FGØ72 OR MST(W)FG072 OR MST(W)FGO72 OR  
MST(W)FGØ72X OR MST(W)FG072X OR MST(W)FGO72X  
L32 14 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GMØØ6-4 OR  
ACS-GM006-4 OR ACS-GMOØ6-4 OR ACSGMØØ6(W)4 OR ACSGM006(W)4 OR  
ACSGMOØ6(W)4  
L33 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GMØØ6-4 OR  
XACS-GM006-4 OR XACS-GMOØ6-4 OR XACSGMØØ6(W)4 OR XACSGM006(W)4  
OR XACSGMOØ6(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 4944 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR  
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV  
OYLSHIKIMATE OR ENOYLPYRUVOYLSHIKIMATE 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 682 SEA (ENOL(W)PYRUVOYLSHIKIMATE 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 26139 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)  
L43 18 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 HPPDW(W)336  
L45 50 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 50 SEA (L44 OR L45)  
L47 67 SEA L43 OR L46  
L48 2749 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 326 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE  
L50 2849 SEA (L48 OR L49)  
L51 8 SEA L47 AND L50  
L52 10510 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR  
DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GLIFOSATE# OR  
GLIFOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?)(5A)(R  
ESIST? OR TOLERAN? OR PROTECT?)  
L53 9424 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)  
L54 9034 SEA L52 AND L53  
L55 162149 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX  
L56 427689 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 383 SEA L54 AND L55 AND L56  
L58 399 SEA L35 OR L36 OR L51 OR L57  
L59 58 SEA L58 AND PY>=2018  
L60 30 SEA L59 AND UP>=20191001 AND UP<=20200930

FILE 'AGRICOLA' ENTERED AT 09:35:48 ON 16 OCT 2020

L61 3 SEA FG72 OR MST(W)FGØ72 OR MST(W)FG072 OR MST(W)FGO72 OR  
MST(W)FGØ72X OR MST(W)FG072X OR MST(W)FGO72X  
L62 6 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GMØØ6-4 OR  
ACS-GM006-4 OR ACS-GMOØ6-4 OR ACSGMØØ6(W)4 OR ACSGM006(W)4 OR  
ACSGMOØ6(W)4  
L63 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GMØØ6-4 OR  
XACS-GM006-4 OR XACS-GMOØ6-4 OR XACSGMØØ6(W)4 OR XACSGM006(W)4  
OR XACSGMOØ6(W)4  
L64 3 SEA FG72? OR ?FG72 OR LL55? OR ?LL55 OR FG72.TIME#.LL55 OR  
MST(W)FGØ72-3XA5547(W)12 OR MSTFGØ72-3XA5547(W)12 OR MST(W)FGØ7  
2-3XA(W)5547(W)12 OR MSTFGØ72-3XA(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)EPSPS OR 2(W)M(W)EPSPS  
L68 594 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR  
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV  
OYLSHIKIMATE OR ENOYLPYRUVOYLSHIKIMATE 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 287 SEA (ENOL(W)PYRUVOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR  
ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE  
) (3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)  
L71 210 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK  
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC(  
3W)PHOSPHOSYNTHASE)  
L72 6202 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)  
L73 7 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 29 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 29 SEA (L74 OR L75)  
L77 36 SEA L73 OR L76  
L78 727 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 240 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE  
L80 802 SEA (L78 OR L79)  
L81 3 SEA L77 AND L80  
L82 8055 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR  
DIKTONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GLIPHOSATE# OR  
GLIFOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?)(5A)(R  
ESIST? OR TOLERAN? OR PROTECT?)  
L83 7715 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)  
L84 7555 SEA L82 AND L83  
L85 85722 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX

- L86 93167 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 363 SEA L84 AND L85 AND L86
- L88 367 SEA L65 OR L66 OR L81 OR L87
- L89 26 SEA L88 AND PY>=2018
- L90 12 SEA L89 AND UP>=20191001 AND UP<=20200930
- FILE 'CABA' ENTERED AT 09:36:44 ON 16 OCT 2020
- L91 9 SEA FG72 OR MST(W)FGØ72 OR MST(W)FG072 OR MST(W)FGO72 OR MST(W)FGØ72X OR MST(W)FG072X OR MST(W)FGO72X
- L92 15 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GMØØ6-4 OR ACS-GM006-4 OR ACS-GMOO6-4 OR ACSGMØØ6(W)4 OR ACSGM006(W)4 OR ACSGMOO6(W)4
- L93 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GMØØ6-4 OR XACS-GM006-4 OR XACS-GMOO6-4 OR XACSGMØØ6(W)4 OR XACSGM006(W)4 OR XACSGMOO6(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)FG072-3XA(W)5547(W)12 OR MSTFG072-3XA(W)5547(W)12
- L95 10 SEA (L91 AND (L92 OR L93)) OR L94
- L96 1 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 1022 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 400 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE )(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)
- L101 151 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)
- L102 6860 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)
- L103 17 SEA L97 OR (((L98 OR L99 OR L100 OR L101))(S)L102)
- L104 3 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336
- L105 51 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 51 SEA (L104 OR L105)
- L107 66 SEA L103 OR L106
- L108 1482 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 368 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
- L110 1582 SEA (L108 OR L109)
- L111 9 SEA L107 AND L110
- L112 18059 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GLIPHOSATE# OR GLIFOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?)(5A)(R ESIST? OR TOLERAN? OR PROTECT?)
- L113 17371 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)
- L114 16988 SEA L112 AND L113

- L115 185029 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX
- L116 170455 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 718 SEA L114 AND L115 AND L116
- L118 729 SEA L95 OR L96 OR L111 OR L117
- L119 73 SEA L118 AND PY>=2018
- L120 29 SEA L119 AND UP>=20191001 AND UP<=20200930
- 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 09:37:31 ON 16 OCT 2020
- L124 14 SEA FG72 OR MST(W)FGØ72 OR MST(W)FG072 OR MST(W)FG072 OR  
MST(W)FGØ72X OR MST(W)FG072X OR MST(W)FG072X
- L125 21 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GMØØ6-4 OR  
ACS-GM006-4 OR ACS-GMOØ6-4 OR ACSGMØØ6(W)4 OR ACSGM006(W)4 OR  
ACSGMOØ6(W)4
- L126 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GMØØ6-4 OR  
XACS-GM006-4 OR XACS-GMOØ6-4 OR XACSGMØØ6(W)4 OR XACSGM006(W)4  
OR XACSGMOØ6(W)4
- L127 25 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 25 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)EPSPS OR 2(W)M(W)EPSPS
- L131 4246 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR  
ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV  
OYLSHIKIMATE OR ENOYLPYRUVOYLSHIKIMATE 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 1039 SEA (ENOL(W)PYRUVOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR  
ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE  
) (3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)
- L134 87 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK  
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC(  
3W)PHOSPHOSYNTHASE)
- L135 73372 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)
- L136 41 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 189 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 189 SEA (L137 OR L138)
- L140 227 SEA L136 OR L139
- L141 6894 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 761 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
- L143 7183 SEA (L141 OR L142)
- L144 28 SEA L140 AND L143
- L145 27560 SEA (HERBICID? OR HPPD(W)INHIBITOR# OR ISOXAFLUTOLE# OR  
DIKETONITRILE# OR PYRAZOLONE# OR TRIKETONE# OR GLIPHOSATE# OR  
GLIFOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?)(5A)(R

L146        ESIST? OR TOLERAN? OR PROTECT?)  
26446 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)  
L147        25898 SEA L145 AND L146  
L148        391620 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX  
L149        596327 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        5565 SEA L147 AND L148 AND L149  
L151        5601 SEA L128 OR L129 OR L144 OR L150  
L152        1414 SEA L151 AND PY>=2018  
L153        437 SEA L152 AND UP>=20191001 AND UP<=20200930  
L154        31 SEA L153 NOT P/DT  
L155        0 SEA L153 AND (P/DT AND J/DT)  
L156        31 SEA L154 OR L155

FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 09:38:27 ON 16  
OCT 2020

L157        95 DUP REM L30 L60 L90 L123 L156 (26 DUPLICATES REMOVED)  
ANSWERS '1-19' FROM FILE MEDLINE  
ANSWERS '20-44' FROM FILE BIOSIS  
ANSWERS '45-51' FROM FILE AGRICOLA  
ANSWERS '52-75' FROM FILE CABA  
ANSWERS '76-95' FROM FILE HCAPLUS