

Title

**Summary of the Literature Review for FG72 x A5547-127 Soybean  
October 1, 2020 – September 30, 2021**

**Final Report**

Data or guideline requirement

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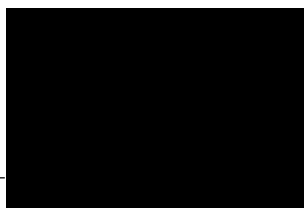
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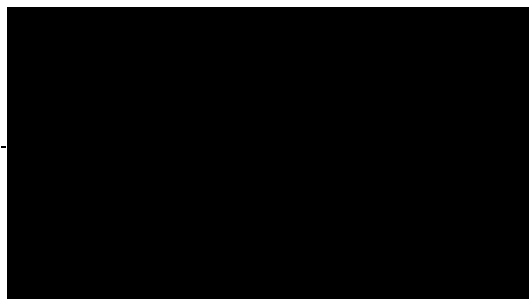
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**SIGNATURE PAGE**

Principal author:



Date

2021-11-24  
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## STUDY PERSONNEL

Electronic database search	[REDACTED]
Agency website search	GRM
Manual search (reference list from review articles)	[REDACTED]
Stage 1 assessment	[REDACTED] [REDACTED]
Stage 2 assessment	<u>Food and Feed safety</u> [REDACTED] [REDACTED] <u>Molecular characterization</u> [REDACTED] [REDACTED] <u>Environmental safety</u> [REDACTED] [REDACTED]
Report	[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 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 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 environmental safety, that might require an in-depth examination. A set of broad literature searches was performed using several bibliographic databases covering scientific literature from October 1, 2020 to September 30, 2021. Additional sources of information, such as web pages of food safety, agriculture, and biotechnology-related regulatory 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 ten publications were progressed for detailed assessment.

None of the ten publications was determined to be relevant after detailed review. No new articles or data on molecular characterization of FG72 x A5547-127 soybean, or the 2mEPSPS, HPPD W336 and PAT/*pat* proteins, that would suggest any potential adverse effects on human and animal health or the environment were found. No evidence was identified that would warrant conducting a systematic review.

In summary, these literature searches and the review of the retrieved articles did not identify any relevant publications that would constitute new data or 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 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 studies published between October 1, 2020 and September 30, 2021 that mention the molecular characterization of 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 as a scoping review, 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)<sup>1</sup> 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, trade name and intended traits, 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 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 PE(I)CO structure (Population, Exposure (Intervention), Comparators, Outcome) if possible, and to address data requirements. They were modeled after the review question examples provided in the EFSA 2019 explanatory note<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 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 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		
Population	The publication addresses human and animal health, and/or the environment (including biodiversity, ecosystem services, service providing units, and endangered species) as general protection goals	From the publications that address the GMO under consideration, those that address protection goals relevant to the risk assessment of the GMO are eligible
Exposure (Intervention)	The publication addresses the GMO, derived food/feed products, and/or the intended trait(s) (e.g., newly expressed proteins(s)) that are identical or like those under regulatory review	This enables the selection of publications that address the GMO, derived food/feed products, and/or the intended trait(s) under consideration
Comparator	If the publication reports a comparative study that uses plant material as test material, eligible publications must report a non-GM variety as comparator	In those cases where the publication addresses the GMO under consideration, reports a comparative analysis study and uses plant material as test material, eligible publications also need to include an appropriate non-GM line as comparator

Concepts	Criteria	Comment
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
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

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

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

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

#### 2.4. Reference publication

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-FG072-2 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.; Hejatko, 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.; Papadopolou, 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>=202091001 and UP<=20210930)



### 3. SEARCH METHODS AND OUTCOMES

The search strategies used here followed the 2019 EFSA explanatory note on literature searching conducted in the context of GMO applications and post-market environmental monitoring activities<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 21, 2021. Only documents updated between October 1, 2020 and September 30, 2021, were considered in the search. The dates of most recent database updates are provided in [Table 3](#).

#### 3.2. Databases used in the literature search

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

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

See [Appendix 1](#) for detailed database descriptions.

#### 3.3. Search strategy

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

**Table 2: Search profile for database search**

Set	Search string	Concepts
1	FG72 or MST(w)FG072 or MST(w)FG072 or 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-GMO06-4 or ACSGM006(w)4 or ACSGMO06(w)4 or xA5547(w)127 or xA(w)5547(w)127 or xACS-GM006-4 or xACS-GMO06-4 or xACSGM006(w)4 or xACSGMO06(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)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYOYLSHIKAMATE or ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC)(4W)(PHOSPHATE OR PHOSPHORIC)(2W)(SYNTHASE OR SYNTHETASE) or (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL)(W)(PHOSPHOSHIMKIMATE OR PHOSPHOSHIMKIMIC or ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(SYNTHASE OR SYNTHETASE) or (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVYOYL)(W)SHIKIMATE)(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE) or (PHOSPHOSHIMKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIMKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVYOYL(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 phosphinothricin(2w)acetyl(w)transferase or phosphinothricinacetyl(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 GLIPHOSATE# or GLIFOSATE# 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

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

- **Agricola:** title (TI), controlled term (CT), supplementary term (ST), abstract (AB), named person (NA), corporate name (CO), note (NTE), geographic term, CABA and other fields (GT)
- **Biosis:** title (TI), abstract (AB), biosystematic codes (BC), chemical name (CN), controlled term (CT), gene name (GEN), geographic term (GT), organism (ORGN) and supplementary term (ST); as well as CAS Registry Numbers (RN)
- **CA-Plus:** title (TI), supplementary term (ST), index term (IT) and abstract (AB); as well as CAS Registry Numbers
- **CABA:** title (TI), controlled term (CT), supplementary term (ST), broader term (BT), abstract (AB), organism name (ORGN) and geographic term (GT); as well as CAS Registry Numbers
- **Medline:** title (TI), chemical name (CN), gene name (GEN), controlled term (excluding MeSH numbers) (CT), supplementary term (ST), named person (NA), other source (OS), and abstract (AB), as well as CAS Registry Numbers and GenBank Numbers

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

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

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

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

[Table 4](#) summarizes the number of results obtained from each of the databases searched.

See [Appendix 2](#) for a complete search history.

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

Database	AGRICOLA	BIOSIS	CAB Abstracts	CAPLUS	MEDLINE
Database Provider	STN International	STN International	STN International	STN International	STN International
Coverage	1970-present	1926-present	1973-present	1907-present	1946-present
Date of search	21 Oct 2021	21 Oct 2021	21 Oct 2021	21 Oct 2021	21 Oct 2021
Datespan of the search	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021
Latest database update	11 Oct 2021	20 Oct 2021	19 Oct 2021	20 Oct 2021	20 Oct 2021
Number of records retrieved	11	14	45	31	14
Number of records after duplicate removal	11	10	38	22	14
Number of relevant records after rapid assessment	2	0	5	1	2

#### 4. INTERNET and MANUAL SEARCHES

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

A search of the web pages of food safety, agriculture, and biotechnology-related regulatory authorities was conducted. Search results were manually examined for relevant records that were either published during the time period under consideration (date span of search: October 1, 2020 to September 30,



2021) or that referred 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 5](#). All web pages searched were justified by their recommendation in the EFSA 2019 explanatory note<sup>1</sup>. Of the 13 key organisations cited in the EFSA 2019 explanatory note<sup>1</sup>, Environment and Climate Change Canada and Intersecretarial Commission on Biosafety of GMOs (CIBIOGEM) were excluded, since they are not involved in the risk assessment of GM plants. The US-EPA website was excluded, since FG72 x A5547-127 soybean does not contain an insect-resistant trait. The USDA, FDA, CFIA, Health Canada, FSANZ and MAFF websites were excluded, since these agencies do not regulate GM stacked products obtained by conventional breeding techniques. The GEAC website was excluded, since this agency has only regulated GM cotton products. Therefore, the internet search was limited to three key organisations relevant for FG72 x A5547-127 soybean. Search terms consisted of FG72 x A5547-127, or MST-FG072-2 x ACS-GM006-4, HPPDW336, or modified-hydroxyphenylpyruvate dioxygenase, 2mEPSPS, or double mutant 5-enolpyruvyl shikimate-3-phosphate synthase enzyme, PAT/pat or phosphinothricin (all searched singly, with no search limits applied).

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

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
Office of the Gene Technology Regulator (OGTR) Australia	<a href="http://www.ogtr.gov.au/">http://www.ogtr.gov.au/</a>	Oct. 10, 2021	Oct. 10, 2021	0
National Technical Commission on Biosafety (CTNBio) Brazil	<a href="http://ctnbio.mcti.gov.br/en">http://ctnbio.mcti.gov.br/en</a>	Oct. 2021	Oct. 13-15, 2021	0
National Advisory Commission on Agricultural Biotechnology (CONABIA) Argentina	<a href="https://www.argentina.gob.ar/agroindustria/bioeconomia/biotecnologia">https://www.argentina.gob.ar/agroindustria/bioeconomia/biotecnologia</a>	Oct. 1, 2021	Oct. 18, 2021	0

#### 4.2. Manual searches of reference lists of recent review articles

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

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

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
1	Golnar AJ, Ruell E, Lloyd AL, Pepin KM. 2021	Embracing Dynamic Models for Gene Drive Management.	Trends Biotechnol. 2021 Mar;39(3):211-214. doi: 10.1016/j.tibtech.2020.08.011. Epub 2020 Sep 30. PMID: 33010965.	0
2	Gupta S, Kumar A, Patel R, Kumar V. 2021	Genetically modified crop regulations: scope and opportunity using the CRISPR-Cas9 genome editing approach.	Mol Biol Rep. 2021 May;48(5):4851-4863. doi: 10.1007/s11033-021-06477-9. Epub 2021 Jun 10. PMID: 34114124.	0
3	Hadrup N, Frederiksen M, Wedeby EB, Nikolov NG, Carøe TK, Sørli JB, Frydendall KB, Liguori B, Sejbaek CS, Wolkoff P, Flachs EM, Schlünssen V, Meyer HW, Clausen PA, Hougaard KS. 2021	Asthma-inducing potential of 28 substances in spray cleaning products-Assessed by quantitative structure activity relationship (QSAR) testing and literature review.	J Appl Toxicol. 2021 Jul 11. doi:10.1002/jat.4215. Epub ahead of print. PMID: 34247391.	0
4	Kumar V, Guleria P. 2020	Application of DNA-Nanosensor for Environmental Monitoring: Recent Advances and Perspectives.	Curr Pollut Rep. 2020 Dec 12:1-21. doi: 10.1007/s40726-020-00165-1. Epub ahead of print. PMID: 33344145; PMCID: PMC7732738.	0
5	Hameed A, Mehmood MA, Shahid M, Fatma S, Khan A, Ali S. 2020	Prospects for potato genome editing to engineer resistance against viruses and cold-induced sweetening.	GM Crops Food. 2020 Oct 1;11(4):185-205. doi: 10.1080/21645698.2019.1631115. Epub 2019 Jul 6. PMID: 31280681; PMCID: PMC7518746.	0
6	Leska A, Nowak A, Nowak I, Górczyńska A. 2021	Effects of Insecticides and Microbiological Contaminants on <i>Apis mellifera</i> .	Health. Molecules. 2021 Aug 22;26(16):5080. doi: 10.3390/molecules26165080. PMID: 34443668; PMCID: PMC8398688	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
7	Madzak C. 2021	<i>Yarrowia lipolytica</i> Strains and Their Biotechnological Applications: How Natural Biodiversity and Metabolic Engineering Could Contribute to Cell Factories Improvement.	J Fungi (Basel). 2021 Jul 10;7(7):548. doi: 10.3390/jof7070548. PMID: 34356927; PMCID: PMC8307478.	0
8	Menz J, Modrzejewski D, Hartung F, Wilhelm R, Sprink T. 2020	Genome Edited Crops Touch the Market: A View on the Global Development and Regulatory Environment.	Front Plant Sci. 2020 Oct 9;11:586027. doi: 10.3389/fpls.2020.586027. PMID:33163013; PMCID: PMC7581933.	0
9	Mushtaq M, Ahmad Dar A, Skalicky M, Tyagi A, Bhagat N, Basu U, Bhat BA, Zaid A, Ali S, Dar TU, Rai GK, Wani SH, Habib-Ur-Rahman M, Hejnak V, Vachova P, Brestic M, Çığ A, Çığ F, Erman M, El Sabagh A. 2021	CRISPR-Based Genome Editing Tools: Insights into Technological Breakthroughs and Future Challenges.	Genes (Basel). 2021 May 24;12(6):797. doi: 10.3390/genes12060797. PMID: 34073848; PMCID: PMC8225059.	0
10	Okoli AS, Blix T, Myhr AI, Xu W, Xu X. 2021	Sustainable use of CRISPR/Cas in fish aquaculture: the biosafety perspective.	Transgenic Res. 2021 Jul 25. doi:10.1007/s11248-021-00274-7. Epub ahead of print. PMID: 34304349.	0
11	Teferra TF. 2021	Should we still worry about the safety of GMO foods? Why and why not? A review.	Food Sci Nutr. 2021 Jul 27;9(9):5324-5331. doi: 10.1002/fsn3.2499. PMID: 34532037; PMCID: PMC8441473.	0
12	Turnbull C, Lillemo M, Hvoslef-Eide TAK. 2021	Global Regulation of Genetically Modified Crops Amid the Gene Edited Crop Boom - A Review.	Front Plant Sci. 2021 Feb 24;12:630396. doi: 10.3389/fpls.2021.630396. PMID: 33719302; PMCID: PMC7943453	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
13	Woźniak E, Tyczewska A, Twardowski T. 2021	A Shift Towards Biotechnology: Social Opinion in the EU.	Trends Biotechnol. 2021 Mar;39(3):214-218. doi: 10.1016/j.tibtech.2020.08.001. Epub 2020 Sep 4. PMID: 32896439.	0
14	Zhang Y, Restall J, Crisp P, Godwin I, Liu G. 2021	Current status and prospects of plant genome editing in Australia.	In Vitro Cell Dev Biol Plant. 2021 May 24:1-10. doi: 10.1007/s11627-021-10188-y. Epub ahead of print. PMID: 34054265; PMCID: PMC8143062.	0

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

The database searches ([Section 3](#)) identified a total of 115 references, which were reduced to 95 after removal of duplicates ([Table 4](#)). No additional studies were identified in the manual searches ([Section 4](#)).

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

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

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

- Duplicated 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, other insect resistant GM crops, unrelated topics, etc.

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

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

### 5.2. Detailed assessment of eligible references (Stage 2)

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



[Table 7](#) gives an overview of the reference selection process and results of the detailed assessment.

**Table 7: Results of the publication selection process**

Total number of publications retrieved after all searches of the scientific literature (excluding duplicates)	95
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	85
Total number of full-text documents assessed in detail	10
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	10
Total number of unobtainable/unclear publications	0
Total number of relevant publications	0

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

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

Main category of information/data requirement	Study (Author(s) and year)	Title	Source
No publications in this category.			

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

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in <a href="#">Table 1</a>
Fast Brandon J Shan Guomin Herman Rod A Gampala Satyalinga Srinivas	Transgene expression in sprayed and non-sprayed herbicide -tolerant genetically engineered crops is equivalent.	Regulatory toxicology and pharmacology : RTP, (2020 Mar) Vol. 111, pp. 104572. Electronic Publication Date: 26 Dec 2019 Journal code: 8214983. E-ISSN: 1096-0295. L-ISSN: 0273-2300.	FG72 x A5547-127 soybean was not included in the study.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in <a href="#">Table 1</a>
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), 1-8 CODEN: ABCPCW; ISSN: 2468-0842	The authors aimed to determine gene flow rates from glyphosate- and glufosinate-resistant transgenic soybeans (transgenic line Bert-4-3 developed from the cultivar 'Bert') to five commercial soybean cultivars and three accessions of wild soybeans in South Korea. Not related to the risk assessment of FG72 x A5547-127.
Liu JinYue Sheng ZeWen Hu YuQi Liu Qi Qiang Sheng Song XiaoLing Liu Biao Liu, J. Y. Sheng, Z. W. Hu, Y. Q. Liu, Q. Qiang, S. Song, X. L. Liu, B. 2021	Fitness of F1 hybrids between 10 maternal wild soybean populations and transgenic soybean .	Transgenic Research (2021), Volume 30, Number 1, pp. 105-119, many ref. ISSN: 0962-8819; 1573-9368 Published by: Springer, Dordrecht	The authors aimed to predict the risk and consequences of gene flow from transgenic soybean to different wild soybeans and the potential risk without competition and under competition with weeds. The glyphosate-resistant (GR) soybeans, T14R 1251–70, provided by the National Soybean Improvement Center of Nanjing Agricultural University was used in the study together with other ten wild soybean population collected in six different provinces of China. Not related to the risk assessment of FG72 x A5547-127, hence, not relevant.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in <a href="#">Table 1</a>
Mbatyoti, A. Daneel, M. S. Swart, A. Arais, D. De Waele, D. Fourie, H. 2020	Plant-parasitic nematode assemblages associated with glyphosate tolerant and conventional soybean cultivars in South Africa.	African Zoology (2020), Volume 55, Number 1, pp. 93-107, 55 refs. ISSN: 1562-7020. Published by: Zoological Society of Southern Africa, Pretoria	Not related to the risk assessment of FG72 x A5547-127, hence, not relevant.
Naegeli Hanspeter, Bresson Jean Louis, Dalmay Tamas, Dewhurst Ian Crawford, Epstein Michelle M, Firbank Leslie George, Guerche Philippe, Hejatko Jan, Moreno Francisco Javier, Mullins Ewen, Nogue Fabien, Rostoks Nils, Sanchez Serrano Jose Juan, Savoini Giovanni, Veromann Eve, Veronesi Fabio, Alvarez Fernando, Ardizzzone Michele, Fernandez Antonio, Gennaro Andrea, Gomez Ruiz Jose Angel, Kagkli Dafni Maria, Lanzoni Anna, Neri Franco Maria, Papadopoulou Nikolettta, Paraskevopoulos Konstantinos, Raffaello Tommaso, Streissl Franz, De Sanctis Giacomo 2021	Assessment of genetically modified soybean GMB151 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO - NL-2018-153).	EFSA journal. European Food Safety Authority, (2021 Apr) Vol. 19, No. 4, pp. e06424. Electronic Publication Date: 19 Apr 2021 Journal code: 101642076. E-ISSN: 1831-4732. L-ISSN: 1831-4732. Report No.: PMC-PMC8054566.	FG72 x A5547-125 soybean was not considered.



Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in <a href="#">Table 1</a>
Pan Guang Yang Fan Zhang GuiMing Liu XinJiao Lu XiaoYu Xiang CaiYu Ling XingYuan Pan, G. Yang, F. Zhang, G. M. Liu, X. J. Lu, X. Y. Xiang, C. Y. Ling, X. Y. 2020	Event detection and analysis of imported genetically modified soybean.	Chinese Journal of Oil Crop Sciences (2020), Volume 42, Number 2, pp. 298-305, 11 refs. ISSN: 1007-9084 Published by: Editorial Department of Chinese Journal of Oil Crop Sciences, Wuchang	Batches of soybean imported from the United States, Brazil, Canada and Argentina were tested with the event-specific detection method for 17 genetically modified (GM) soybean events. The analyzed results showed that out of 17 GM soybean events, only 7 approved ones were detected in all batches of imported soybeans (including FG72 and A5547-127). According to the authors the results could be useful for China to detect and identify imported GM soybeans, and improve surveillance of imported GM soybean. Not related to the risk assessment of FG72 x A5547-127, hence, not relevant.
Sahin, O. Karlik, E. Meric, S. Ari, S. Gozukirmizi, N. 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), Volume 67, Number 6, pp. 1551-1566, many ref. ISSN: 0925-9864; 1573-5109. Published by: Springer, Dordrecht.	FG72 x A5547-127 soybean was not included in the study.
Shi, Zongyong Zou, Shiyong Lu, Chao Wu, Boze Huang, Kunlun Zhao, Changhui He, Xiaoyun 2019	Evaluation of the effects of feeding glyphosate - tolerant soybeans (CP4 EPSPS) on the testis of male Sprague-Dawley rats.	GM crops + food (3 Jul 2019), Volume 10, Number 3, pp. 181-190, 10 p. ISSN: 2164-5698; 2164-5701; 2164-5701 Source Note: 20190703, v. 10, no. 3	FG72 x A5547-127 soybean was not considered.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in <a href="#">Table 1</a>
Xu, Junyi Cao, Jijuan Li, Xin Luo, Jia Bai, Jinglian Zheng, Qiuyue Yang, Lili Wang, Yong 2020	Detection and analysis of stacked-trait transgenic events in imported practical soybean	Oil crop science (21 Sep 2020) ISSN: 2096-2428 Source Note: 20200921	The authors performed a survey using the real-time qPCR to detect and analyze seven batches of imported practical transgenic soybean samples in China, in which eight mixed events have been detected. Based on that, practical soybean single-seed was extracted for single-seed multi-target detection analysis to detect the stacked-trait transgenic soybean MON87708 x MON89788 event (not approved in China) and to further make relative content estimations. Not related to the risk assessment of FG72 x A5547-127, hence, not relevant. In addition, the publication does not contain primary data.
Yook MinJung Park HaeRim Zhang ChuanJie Lim SooHyun Jeong SoonChun Chung YoungSoo Kim DoSoon Yook, M. J. Park, H. R. Zhang, C. J. Lim, S. H. Jeong, S. C. Chung, Y. S. Kim, do S. 2021	Environmental risk assessment of glufosinate-resistant soybean by pollen-mediated gene flow under field conditions in the region of the genetic origin.	Science of the Total Environment (2021), Volume 762 ISSN: 0048-9697 DOI: 10.1016/j.scitotenv.2020.143073 Published by: Elsevier Ltd, Oxford	Two-year field experiments were conducted to quantify the gene flow from GM soybean (event AtSIZ #6, <i>Glycine max</i> L. cv. Kwangankong) glufosinate resistant to wild soybean ( <i>Glycine soja</i> Sieb. and Zucc., IT 182932) and model the potential gene flow under field conditions in Korea. In addition, field performance of hybrids resulted from gene flow was evaluated and compared with parent soybeans (GM and wild soybean) to estimate the potential weed risk of hybrids. Not related to the risk assessment of FG72 x A5547-127.

**Table 10: Report of unobtainable/unclear publications**

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

## 6. NARRATIVE SYNTHESIS/SUMMARY OF RELEVANT STUDIES

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

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

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

Main category of information/data requirement	Study (Author(s) and year)	Intervention/ test materials used	Adverse effects reported	Which adverse effect reported	Summary of reliability appraisal	Implications for risk assessment
No publications in this category.						

## 7. CONCLUSION

The literature searches performed for FG72 x A5547-127 soybean and its newly expressed proteins, 2mEPSPS, HPPD W336 and PAT/*pat*, for the period from October 1, 2020 to September 30, 2021, identified a total of 95 unique publications (after duplicate removal). A total of ten publications were progressed for detailed assessment after excluding 85 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The ten 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 references with bearing on molecular characterization, environmental safety or food and feed 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
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- |    |   |
|----|---|
| 1. | Devos Y, Guajardo IM, Alvarez F and Glanville J. Explanatory note on literature searching conducted in the context of GMO applications for (renewed) market authorisation and annual post-market environmental monitoring reports on GMOs authorised in the EU market. EFSA supporting publications 2019:EN-1614. 62 pages. doi:10.2903/sp.efsa.2019.EN-1614. |
|----|---|

## 9. APPENDICES

### Appendix 1 Database descriptions

Host	File	Description
STN	AGRICOLA	<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>

Host	File	Description
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>
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 11:22:11 ON 21 OCT 2021

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

L2 6 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR  
ACS-GMOO6-4 OR ACSGM006(W)4 OR ACSGM006(W)4

L3 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR  
XACS-GMOO6-4 OR XACSGM006(W)4 OR XACSGMOO6(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 14 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L8 4218 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)

L9 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVYOYL)(W)(PHOSPHOSHIKI  
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(S  
YNTHASE OR SYNTHETASE)

L10 382 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR  
ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVYOYL)(W)SHIKIMATE  
(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)

L11 482 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR  
PHOSPHOSHIK  
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVYOYL(W)SHIKIMIC(  
3W)PHOSPHOSYNTHASE)

L12 24435 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)

L13 20 SEA L7 OR (((L8 OR L9 OR L10 OR L11))(S)L12)

L14 5 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W336 OR HPPDW(W)336

L15 42 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 43 SEA (L14 OR L15)

L17 60 SEA L13 OR L16

L18 1464 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 203 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L20 1538 SEA (L18 OR L19)

L21 8 SEA L17 AND L20

L22 3541 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 3354 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)

L24 3085 SEA L22 AND L23

L25 67223 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#

OR GLYCINE(W)MAX OR G(W)MAX

L26 3822157 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 233 SEA L24 AND L25 AND L26

L28 243 SEA L5 OR L6 OR L21 OR L27

L29 34 SEA L28 AND PY>=2019

L30 14 SEA L29 AND UP>=20201001 AND UP<=20210930

FILE 'BIOSIS' ENTERED AT 11:23:07 ON 21 OCT 2021

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

L32 15 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR  
ACS-GMO06-4 OR ACSGM006(W)4 OR ACSGM006(W)4

L33 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR  
XACS-GMO06-4 OR XACSGM006(W)4 OR XACSGM006(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 5038 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)

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

L40 720 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR  
ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVYOYL(W)SHIKIMATE  
(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)

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

L42 26907 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)

L43 19 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 59 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 59 SEA (L44 OR L45)

L47 77 SEA L43 OR L46

L48 2842 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 332 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L50 2944 SEA (L48 OR L49)

L51 8 SEA L47 AND L50

L52 11104 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)(RESIST? OR TOLERAN? OR PROTECT?)  
L53 9919 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)  
L54 9509 SEA L52 AND L53  
L55 168672 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX  
L56 445827 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 393 SEA L54 AND L55 AND L56  
L58 409 SEA L35 OR L36 OR L51 OR L57  
L59 39 SEA L58 AND PY>=2019  
L60 14 SEA L59 AND UP>=20201001 AND UP<=20210930

FILE 'AGRICOLA' ENTERED AT 11:23:59 ON 21 OCT 2021  
L61 4 SEA FG72 OR MST(W)FG072 OR MST(W)FGO72 OR MST(W)FG072X OR MST(W)FGO72X  
L62 7 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR ACS-GMOO6-4 OR ACSGM006(W)4 OR ACSGMOO6(W)4  
L63 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR XACS-GMOO6-4 OR XACSGM006(W)4 OR XACSGMOO6(W)4  
L64 4 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  
L65 4 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 4 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS  
L68 653 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV OYLSHIKIMATE OR ENOYLPYRUV OYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC)(4W)(PHOSPHATE OR PHOSPHORIC)(2W)(SYNTHASE OR SYNTHETASE)  
L69 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUV OYL)(W)(PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(SYNTHASE OR SYNTHETASE)  
L70 307 SEA (ENOL(W)PYRUV OYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUV OYL)(W)SHIKIMATE)(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)  
L71 238 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUV OYL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)  
L72 6578 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)  
L73 9 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 37 SEA ((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?)  
L76 37 SEA (L74 OR L75)  
L77 46 SEA L73 OR L76  
L78 779 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 252 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFERASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L80 858 SEA (L78 OR L79)

L81 4 SEA L77 AND L80

L82 8643 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)(RESIST? OR TOLERAN? OR PROTECT?)

L83 8217 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)

L84 8042 SEA L82 AND L83

L85 92479 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN# OR GLYCINE(W)MAX OR G(W)MAX

L86 101526 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 384 SEA L84 AND L85 AND L86

L88 389 SEA L65 OR L66 OR L81 OR L87

L89 20 SEA L88 AND PY>=2019

L90 11 SEA L89 AND UP>=20201001 AND UP<=20210930

FILE 'CABA' ENTERED AT 11:26:07 ON 21 OCT 2021

L91 10 SEA FG72 OR MST(W)FG072 OR MST(W)FGO72 OR MST(W)FG072X OR MST(W)FGO72X

L92 17 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR ACS-GMOO6-4 OR ACSGM006(W)4 OR ACSGM006(W)4

L93 0 SEA XA5547(W)127 OR XA(W)5547(W)127 OR XACS-GM006-4 OR XACS-GMOO6-4 OR XACSGM006(W)4 OR XACSGM006(W)4

L94 11 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 11 SEA (L91 AND (L92 OR L93)) OR L94

L96 2 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 14 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L98 1124 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYOYLSHIKIMATE OR ENOYL(PYRUVYOYL)SHIKIMATE OR ENOLPYRUVYLSHIKIMIC)(4W)(PHOSPHATE OR PHOSPHORIC)(2W)(SYNTHASE OR SYNTHETASE)

L99 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVYOYL)(W)(PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(SYNTHASE OR SYNTHETASE)

L100 434 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVYOYL)(W)SHIKIMATE)(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)

L101 173 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVYOYL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)

L102 7312 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)

L103 21 SEA L97 OR (((L98 OR L99 OR L100 OR L101))(S)L102)

L104 4 SEA HPPDW336 OR HPPD(W)W336 OR HPPD(W)W(W)336 OR HPPDW(W)336

L105 63 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 63 SEA (L104 OR L105)  
L107 81 SEA L103 OR L106  
L108 1541 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 378 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR  
PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE  
L110 1642 SEA (L108 OR L110)  
L111 9 SEA L107 AND L110  
L112 19095 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 18346 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)  
L114 17950 SEA L112 AND L113  
L115 194402 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX  
L116 181148 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 762 SEA L114 AND L115 AND L116  
L118 775 SEA L95 OR L96 OR L111 OR L117  
L119 77 SEA L118 AND PY>=2019  
L120 45 SEA L119 AND UP>=20201001 AND UP<=20210930  
L121 45 SEA L120 NOT P/DT  
L122 0 SEA L120 AND (P/DT AND J/DT)  
L123 45 SEA L121 OR L122

FILE 'HCAPLUS' ENTERED AT 11:27:05 ON 21 OCT 2021  
L124 13 SEA FG72 OR MST(W)FG072 OR MST(W)FGO72 OR MST(W)FG072X OR  
MST(W)FGO72X  
L125 21 SEA LL55 OR A5547(W)127 OR A(W)5547(W)127 OR ACS-GM006-4 OR  
ACS-GMOO6-4 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-GMOO6-4 OR XACSGM006(W)4 OR XACSGMOO6(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 28 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS  
L131 4391 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 ENOLPYRUVYOYL)(W)(PHOSPHOSHIKI  
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(S  
YNTHASE OR SYNTHETASE)  
L133 1076 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR



- L134 ENOLPYRUVYL SHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE  
(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)  
83 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR  
PHOSPHOSHIK  
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC  
(3W)PHOSPHOSYNTHASE)
- L135 74659 SEA ((DOUBL# OR DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)
- L136 40 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 211 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 211 SEA (L137 OR L138)
- L140 248 SEA L136 OR L139
- L141 5216 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 783 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR  
PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
- L143 5516 SEA (L141 OR L142)
- L144 28 SEA L140 AND L143
- L145 29204 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?)
- L146 28014 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR  
PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR  
PROTECT?)
- L147 27437 SEA L145 AND L146
- L148 411787 SEA SOY OR SOYA OR SOJA OR SOYBEAN# OR SOYABEAN# OR SOJABEAN#  
OR GLYCINE(W)MAX OR G(W)MAX
- L149 622209 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 6024 SEA L147 AND L148 AND L149
- L151 6058 SEA L128 OR L129 OR L144 OR L150
- L152 1509 SEA L151 AND PY>=2019
- L153 464 SEA L152 AND UP>=20201001 AND UP<=20210930
- 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 11:28:08 ON 21  
OCT 2021

- L157 95 DUP REM L30 L60 L90 L123 L156 (20 DUPLICATES REMOVED)  
ANSWERS '1-14' FROM FILE MEDLINE  
ANSWERS '15-24' FROM FILE BIOSIS  
ANSWERS '25-35' FROM FILE AGRICOLA  
ANSWERS '36-73' FROM FILE CABA  
ANSWERS '74-95' FROM FILE HCAPLUS