

Title

**Summary of the Literature Review for
MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *Brassica napus*
July 1, 2022 – June 30, 2023**

Final Report

Data or guideline requirement

Explanatory note on literature searching
conducted in the context of GMO applications for (renewed) market authorization
and annual post-market environmental monitoring reports on GMOs authorised in the EU market.
EFSA supporting publications 2019:EN-1614

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Principal author


BASF Belgium Coordination Center CommV
Technologiepark-Zwijnaarde 101
9052 Gent
Belgium

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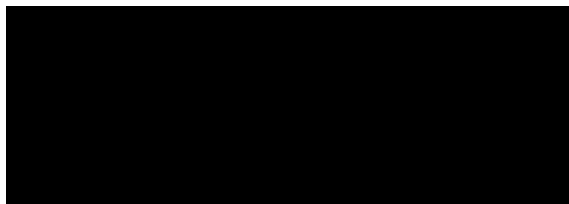
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SIGNATURE PAGE

Principal author:



Product Safety Manager
Regulatory Science Seeds & Traits
BASF Belgium Coordination Center CommV

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PERSONNEL

Electronic database search	<p>Information Professional, PhD in Molecular Biology. Over 20 years of expertise in Plant Molecular Biology and Plant Biotechnology. Ten years of experience on professional-level database searches.</p>
Agency website search	<p>PhD in Biomedical Sciences. Ten years of experience in Regulatory Affairs for plant biotechnology products.</p>
Manual search (checking reference lists)	<p>PhD in Food Science and Technology. Twenty years of expertise in food chemistry, food allergy and safety assessment of GMOs.</p>
Stage 1 assessment	
Stage 2 assessment	<p><u>Food and Feed safety</u></p> <p>PhD in Toxicology. Regulatory Toxicologist for plant biotechnology since 2013.</p> <p>PhD in Pathology with focus in Toxicology. Experience in regulatory toxicology for crop protection products. Regulatory Product Safety Manager for Environmental and Human Health for biotechnology products since 2021.</p> <p><u>Molecular characterization</u></p> <p>PhD in Plant Molecular Genetics. Ten years of expertise in molecular characterization and detection methods of GMOs.</p> <p>PhD in Microbiology (focus enzymology). Twelve years of experience in protein production and characterization for biopharmaceutical- and IVD purposes.</p> <p><u>Environmental safety</u></p> <p>Agronomist Engineer, PhD in Agronomy (Vegetable Production/Integrated Pest Management). Ten years of expertise in field entomology and environmental safety assessment of GM crops.</p>
Report	

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SUMMARY

MS8 x RF3 x GT73 is a genetically modified (GM) *Brassica napus* (*B. napus*) stacked trait product designed to provide tolerance to glyphosate and glufosinate herbicides. MS8 x RF3 x GT73 *B. napus* was obtained by traditional breeding of MS8, RF3 and GT73. MS8 *B. napus* contains the *barnase* gene (origin *Bacillus amyloliquefaciens*) coding for the Barnase protein, conferring male sterility. RF3 *B. napus* contains the *barstar* gene (origin *Bacillus amyloliquefaciens*) coding for the Barstar protein, an inhibitor of Barnase. Both MS8 and RF3 contain the *bar* gene (origin *Streptomyces hygroscopicus*) coding for the phosphinothricin acetyl transferase (PAT/*bar*) protein conferring tolerance to glufosinate-ammonium. GT73 *B. napus* contains the *goxv247* gene (origin *Ochrobactrum anthropi* strain LBAA) coding for the glyphosate oxidoreductase (GOXv247) protein and the *cp4 epsps* gene (origin *Agrobacterium* sp. strain CP4) coding for the 5-enolpyruvylshikimate-3-phosphate synthase (CP4 EPSPS) protein. Together, these 2 proteins are responsible for conferring tolerance to glyphosate. The OECD identifier for this product is ACS-BNØØ5-8 x ACS-BNØØ3-6 x MON-ØØØ73-7.

A scoping review was performed for the MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus* and their newly expressed proteins, CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar. The objective of this scoping review was to determine if there were studies about the molecular characterization of MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*, their effect on food and feed safety or environmental safety, that might require in-depth examination. A set of broad literature searches was performed using several bibliographic databases covering scientific literature from July 1, 2022 until June 30, 2023. 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 98 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of 5 publications were progressed for detailed assessment.

None of the 5 publications were determined to be relevant after detailed review. There was no new data on molecular characterization of MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus*, or the CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar proteins, nor any indications on potential adverse effects on human and animal health or on the environment. No evidence was identified that would warrant conducting a systematic review.

In summary, these literature searches and review of the retrieved articles did not identify any relevant publication that would contradict the previous safety assessment of MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*.

1. INTRODUCTION

MS8 x RF3 x GT73 is a genetically modified (GM) *Brassica napus* (*B. napus*) stacked trait product designed to provide tolerance to glyphosate and glufosinate herbicides. MS8 x RF3 x GT73 *B. napus* was obtained by traditional breeding of MS8, RF3 and GT73. MS8 *B. napus* contains the *barnase* gene (origin *Bacillus amyloliquefaciens*) coding for the Barnase protein, conferring male sterility. RF3 *B. napus* contains the *barstar* gene (origin *Bacillus amyloliquefaciens*) coding for the Barstar protein, an inhibitor of Barnase. Both MS8 and RF3 contain the *bar* gene (origin *Streptomyces hygroscopicus*) coding for the phosphinothricin acetyl transferase (PAT/*bar*) protein conferring tolerance to glufosinate-ammonium. GT73 *B. napus* contains the *goxv247* gene (origin *Ochrobactrum anthropi* strain LBAA) coding for the glyphosate oxidoreductase (GOXv247) protein and the *cp4 epsps* gene (origin *Agrobacterium* sp. strain CP4) coding for the 5-enolpyruvylshikimate-3-phosphate synthase (CP4 EPSPS) protein. Together, these 2 proteins are responsible for conferring tolerance to glyphosate. The OECD identifier for this product is ACS-BNØØ5-8 x ACS-BNØØ3-6 x MON-ØØØ73-7.

The objective of the literature searches described here was to determine if there were publications published between July 1, 2022 and June 30, 2023 that mention the molecular characterization of the MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*, and/or any adverse effect of MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus* in food, feed or the environment. In that context, a broad and inclusive literature search was performed, and the articles retrieved were reviewed in a comprehensive and transparent manner. This was intended as a scoping review. The literature review was performed as recommended in the European Food Safety Authority (EFSA) explanatory note on literature searching conducted in the context of Genetically Modified Organisms (GMO)¹ applications and post-market environmental monitoring activities (2019).

The literature searches were performed for the MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus* and their newly expressed proteins, CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar. The search terms also included relevant synonyms, the trade name and intended trait. When needed, plant species and general GMO terms were used to limit the search results (described in section 3.3).

2. OVERALL METHODS

2.1. Objective of the scoping review

The objective of the scoping review was to survey the evidence base for the MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus* and their newly expressed proteins, CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar, 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 note¹.

Question 1: Were any studies published during the reporting period that describe adverse effects on human or animal health or the environment of the MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus* and their newly expressed proteins CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar?

Key elements:

Population: Human health; animal health; environmental safety

Exposure: MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*, derived food/feed products, newly expressed proteins in MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*

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 the MS8 x RF3 x GT73 MS8 x GT73 or RF3 x GT73 *B. napus* and their newly expressed proteins CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar in *B. napus*?

Key elements:

Population: MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus* and newly expressed proteins in MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*
Outcome: Molecular characterization (which would indicate the information/data requirement for molecular characteristics)

2.3. Criteria for relevance

Criteria for establishing the relevance of retrieved publications were defined prior to conduct of the search. These criteria were modeled after those given in the EFSA 2019 explanatory note¹ and are described in [Table 1](#).

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

Concepts	Criteria	Comment
Key elements of review questions with PECO structure		
Population	The publication addresses human and animal health, and/or the environment (including biodiversity, ecosystem services, service providing units, and endangered species) as general protection goals	From the publications that address the GMO under consideration, those that address protection goals relevant to the risk assessment of the GMO are eligible
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 MS8 X RF3 X GT73 *B. napus* were known before the start of the search and used to test and validate the search strategy:

- Naegeli, H.; Birch, A. N.; Casacuberta, J.; Schrijver, A. de; Gralak, M. A.; Guerche, P.; Jones, H.; Manachini, B.; Messean, A.; Nielsen, E. E.; Nogue, F.; Robaglia, C.; Rostoks, N.; Sweet, J.; Tebbe, C.; Visioli, F.; Wal, J. M.; Ardizzone, M.; Devos, Y.; Paraskevopoulos, K.; de Schrijver, A. (2017) Assessment of genetically modified oilseed rape MS8, RF3 and MS8 x RF3 for renewal of authorisation under regulation (EC) No 1829/2003 (application EFSA-GMO-RX-004). *EFSA Journal* **15(11)**:e05067
- Lv JinYang; Huang QianXin; Sun YanYan; Qu GaoPing; Guo Yuan; Zhang XiaoJuan; Zhao HuiXian; Hu ShengWu; Lv, J. Y.; Huang, Q. X.; Sun, Y. Y.; Qu, G. P.; Guo, Y.; Zhang, X. J.; Zhao, H. X.; Hu, S. W. (2018). Male sterility of an AHAS-mutant induced by tribenuron-methyl solution correlated with the decrease of AHAS activity in *Brassica napus*. *Frontiers in Plant Science* 9:62

Although none of these articles are directly relevant for the MS8 X RF3 X GT73 *B. napus* stack, they were selected as reference publications because the first one mentions two of the event names (MS8 and RF3), the same traits (male sterility and herbicide tolerance) and the same crop (*B. napus*); while the second one mentions one of the intended traits (male sterility). Since these references were published before the current search period, the search profile was tested without applying the time limit used in the final search profile (UP>=20220701 and UP<=20230630).

3. SEARCH METHODS AND OUTCOMES

The search strategies used here followed the 2019 EFSA explanatory note on literature searching conducted in the context of GMO applications and post-market environmental monitoring activities¹. The search strategies were designed to be broad and sensitive enough to capture any relevant publications, if available.

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

3.1. Time window and date of the literature search

The database searches were performed on August 16, 2023. Only documents updated between July 1, 2022 and June 30, 2023, 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 profile was designed to cover stack event name, stack trade names, stack newly expressed proteins and stack intended traits. Since the 'stack trade names' profile element identified too many documents when used on its own, it was combine with a 'crop' profile element or a general GM profile element. The 'Intended traits all' profile also identified too many documents when used on its own and therefore it was combined with with the 'crop' profile element and the 'general GM' profile element. The reference publication (Section 2.4) was identified by the search profiles, confirming the validity of the applied search strategy. See Table 2 for a detailed search profile.

Table 2: Search profile for database search

Set	Search string	Concepts
1	MS8 or MS8x or ACS(w)BN005(w)8 or ACSBN005(w)8 or ACS(w)BN005(w)8x or ACSBN005(w)8x or ACSBN005 or ACSBN005x or BN005 or BN005x	Event name MS8
2	RF3 or xRF3 or RF3x or xRF3x or ACS(w)BN003(w)6 or xACS(w)BN003(w)6 or ACS(w)BN003(w)6x or xACS(w)BN003(w)6x or BN003 or xBN003 or BN003x or xBN003x	Event name RF3
3	GT73 or RT73 or MON(w)00073(w)7 or MON(w)00073(w)7 or xGT73 or xRT73 or xMON(w)00073(w)7 or xMON(w)00073(w)7	Event name GT73

4	MS8XRF3XGT73 or ACS(w)BN005(w)8xACS(w)BN003(w)6XGT73 or BN005xBN003xGT73	Event name stack
5	(1 and 2) or (1 and 3) or (2 and 3) or (1 and 2 and 3) or 4	Event name all
6	invigor or invigorrr or invigortm invigorrrtm or in(w)vigor or in(w)vigorrr or in(w)vigortm or in(w)vigorrrtm or Roundup?	Trade name all
7	barnase or RNase(w)Ba or (bacterial(w)RiboNuclease and ((Bacillus or b)(w)amyloliquefaciens)) or P00648 or IPR001887 or barstar or barnase(w)inhibitor or IPR000468 or ((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 s phosphinothricin(w)n(w)acetyltransferase or phosphinothricin(2w)acetyltransferase or phosphinothricin(2w)acetyl(w)transferase or phosphinothricinacetyl(w)transferase	Newly expressed proteins MS8
8	barstar or barnase(w)inhibitor or IPR000468 or ((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 s phosphinothricin(w)n(w)acetyltransferase or phosphinothricin(2w)acetyltransferase or phosphinothricin(2w)acetyl(w)transferase or phosphinothricinacetyl(w)transferase	Newly expressed proteins RF3
9	((CP4(w)EPSPS or aroA(w)CP4) or (EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYOYLSHIKIMATE or ENOYLPYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC)(4W)(PHOSPHATE OR PHOSPHORIC)(2W)(SYNTHASE OR SYNTHETASE) or (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVYOYL)(W)(PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC 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 (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVYOYL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)) (2A) (CP4 or aroA))) or (glyphosate(w)oxidase or GOX or GOXv247)	Newly expressed proteins GT73
10	(7 and 9) or (8 and 9) or (7 and 8 and 9)	Newly expressed proteins all
11	((herbicid? or bialaphos or basta or glufosinate or phosphinothricin or liberty)(5a)(resist? or toleran? or protect?)) and (male(3a)steril? or	Intended traits all

	(fertil?(3a)restor?) or restor?(w)line or pollination(w)control) and ((herbicide? or GL!PHOSATE# or GL!FOSATE# OR G360 or g(w)360 or roundup? or round(w)up?) (5a) (resist? or toleran? or protect?))	
12	((BRASSICA or B) (w) (napus or juncea)) OR RAPE? or CANOLA# OR OILSEED(w)RAPE OR oil(w)seed(w)rape or colza	Crop name
13	s 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#))	GM general
14	6 and (12 or 13)	Trade name all and (crop name or GM general)
14	11 and 12 and 13	Inteded traits all and crop name and GM general
15	5 or 14 or 10 or 14	Event name all OR (Trade name all and (crop name or GM general)) OR (Newly expressed proteins all) OR (Intended traits all and crop name and GM general)

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

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

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

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

Database	Events	New proteins	Intended traits	Plant species	GM plants
Agricola	None	None	"HERBICIDE RESISTANCE" "MALE STERILITY"	"BRASSICA NAPUS" CANOLA	"TRANSGENIC PLANTS"
Biosis	None	None	No terms for herbicide resistance "MALE STERILITY"	None	None
CABA	None	None	"HERBICIDE RESISTANCE" "MALE STERILITY"	RAPE	"TRANSGENIC PLANTS"
CAS	None	None	"HERBICIDE RESISTANCE" No terms for male sterility	CANOLA "BRASSICA NAPUS"	"GENETICALLY MODIFIED PLANTS"
Medline	None	None	"HERBICIDE RESISTANCE" No terms for male sterility	BRASSICA NAPUS	"PLANTS, GENETICALLY MODIFIED"

The search results were limited to documents updated between July 1, 2022 and June 30, 2023 (UP>=20220701 and UP<=20230630), 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	CABA	CA-Plus	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	16 Aug 2023	16 Aug 2023	16 Aug 2023	16 Aug 2023	16 Aug 2023
Datespan of the search	1 Jul 2022 – 30 Jun 2023	1 Jul 2022 – 30 Jun 2023	1 Jul 2022 – 30 Jun 2023	1 Jul 2022 – 30 Jun 2023	1 Jul 2022 – 30 Jun 2023
Latest database update	10 Aug 2023	9 Aug 2023	14 Aug 2023	15 Aug 2023	15 Aug 2023

Database	AGRICOLA	BIOSIS	CABA	CA-Plus	Medline
Number of records retrieved	3	18	44	29	18
Number of records after duplicate removal	3	16	40	21	18
Number of relevant records after rapid assessment	0	0	5	0	0

4. INTERNET and MANUAL SEARCHES

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

A search of the web pages of food safety, agriculture, and biotechnology-related authorities was conducted. Search results were manually examined for relevant records that were either published during the time period under consideration (date span of search: July 1, 2022 until June 30, 2023) or refer to relevant records published during this time frame. Relevance of results were determined based on the criteria listed in [Table 1](#) and they were summarized in [Table 5](#).

All web pages searched were justified by their recommendation in the EFSA 2019 explanatory note¹. Of the 13 key organisations cited in the EFSA 2019 explanatory note¹, 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 the MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus* do 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. The CTNBio and CONABIA websites were excluded, since these agencies have not regulated any GM products for canola. Therefore, the internet search was limited to 1 key organisation relevant for MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus*. Search terms consisted of MS8 x RF3 x GT73, ACS-BNØØ5-8 x ACS-BNØØ3-6 x MON-ØØØ73-7, CP4 EPSPS, 5-enolpyruvyl shikimate-3-phosphate synthase, GOXv247, GOX, glyphosate oxidoreductase, PAT/*bar*, Phosphinothricin, Barnase and Barstar (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	http://www.ogtr.gov.au/	06/04/2023	10/07/2023	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 July 1, 2022 and June 30, 2023. 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	Bhattacharjee S, Bhowmick R, Kant L, Paul K. 2023	Strategic transgene-free approaches of CRISPR-based genome editing in plants.	Mol Genet Genomics. 2023 May;298(3):507-520	0
2	Cermakova E, Lencova S, Mukherjee S, Horka P, Vobruba S, Demnerova K, Zdenkova K. 2023	Identification of Fish Species and Targeted Genetic Modifications Based on DNA Analysis: State of the Art.	Foods. 2023 Jan 3;12(1):228.	0
3	Connolly JB, Romeis J, Devos Y, Glandorf DCM, Turner G, Coulibaly MB. 2023	Gene drive in species complexes: defining target organisms.	Trends Biotechnol. 2023 Feb;41(2):154-164.	0
4	Eckerstorfer MF, Dolezel M, Engelhard M, Giovannelli V, Grabowski M, Heissenberger A, Lener M, Reichenbecher W, Simon S, Staiano G, Wüst	Recommendations for the Assessment of Potential Environmental Effects of Genome-Editing Applications in Plants in the EU.	Plants (Basel). 2023 Apr 25;12(9):1764.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
	Saucy AG, Zünd J, Lüthi C. 2023			
5	Ghidoli M, Ponzoni E, Araniti F, Miglio D, Pilu R. 2023	Genetic Improvement of <i>Camelina sativa</i> (L.) Crantz: Opportunities and Challenges.	Plants (Basel). 2023 Jan 27;12(3):570.	0
6	Krasnodębski C, Sawuła A, Kaźmierczak U, Żuk M. 2023	Oligo-Not Only for Silencing: Overlooked Potential for Multidirectional Action in Plants.	Int J Mol Sci. 2023 Feb 24;24(5):4466.	0
7	Křížkovská B, Viktorová J, Lipov J. 2022	Approved Genetically Modified Potatoes (<i>Solanum tuberosum</i>) for Improved Stress Resistance and Food Safety.	J Agric Food Chem. 2022 Sep 28;70(38):11833-11843.	0
8	Liang J, Yang X, Jiao Y, Wang D, Zhao Q, Sun Y, Li Y, Wu K. 2022	The evolution of China's regulation of agricultural biotechnology.	aBIOTECH. 2022 Dec 5;3(4):237-249.	0
9	Platani M, Sokefun O, Bassil E, Apidianakis Y. 2023	Genetic engineering and genome editing in plants, animals, and humans: Facts and myths. Gene.	2023 Mar 10; 856:147141.	0
10	Pott A, Bundschuh M, Otto M, Schulz R. 2023	Assessing Effects of Genetically Modified Plant Material on the Aquatic Environment Using higher-tier Studies.	Bull Environ Contam Toxicol. 2023 Jan 2;110(1):35.	0
11	Rai GK, Kumar P, Choudhary SM, Kosser R, Khanday DM, Choudhary S, Kumar B, Magotra I, Kumar RR, Ram C, Roupheal Y, Corrado G, Behera TK. 2022	Biomimetic Strategies for Developing Abiotic Stress-Tolerant Tomato Cultivars:	An Overview. Plants (Basel). 2022 Dec 23;12(1):86	0
12	Rozas P, Kessi-Pérez EI, Martínez C. 2022	Genetically modified organisms: adapting regulatory frameworks for evolving genome editing technologies.	Biol Res. 2022 Oct 20;55(1):31.	0
13	Spök A, Sprink T, Allan AC,	Towards social acceptability of genome-edited plants in industrialised countries? Emerging	Front Genome Ed. 2022 Aug 31;4:899331.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
	Yamaguchi T, Dayé C. 2022	evidence from Europe, United States, Canada, Australia, New Zealand, and Japan.		
14	Tatineni S, Hein GL. 2023	Plant Viruses of Agricultural Importance: Current and Future Perspectives of Virus Disease Management Strategies.	Phytopathology. 2023 Feb;113(2):117-141.	0
15	Tripathi S, Purchase D, Chandra R, Nadda AK, Bhargava PC. 2022	Mitigation of hazards and risks of emerging pollutants through innovative treatment techniques of post methanated distillery effluent - A review.	Chemosphere. 2022 Aug;300:134586. doi: 10.1016/j.chemosphere.2022.134586.	0
16	Wang M, Wang H, Li K, Li X, Wang X, Wang Z. 2023	Review of CRISPR/Cas Systems on Detection of Nucleotide Sequences.	Foods. 2023 Jan 19;12(3):477.	0
17	Zimny T. 2023	Regulation of GMO field trials in the EU and new genomic techniques: will the planned reform facilitate experimenting with gene-edited plants?	BioTechnologia (Pozn). 2023 Mar 27;104(1):75-83.	0

5. RESULTS OF THE STUDY IDENTIFICATION AND SELECTION PROCESS

The database searches ([Section 0](#)) identified a total of 112 references, which were reduced to 98 references 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 0](#) 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 discussion was transferred to Stage 2 for detailed evaluation by the experts. In this search, both evaluators were in 100 % agreement.

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

- Duplicated entries
- Secondary literature (reviews), other than assessments from regulatory agencies
- Articles on non-relevant topics like detection methods, socio-economic implications of GM crops, GM policy, agronomical performance, other herbicide tolerant 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 reviewers within each area, the initial reviewers discussed the discrepancy as necessary and consulted additional reviewers to resolve the discrepancy if needed.

In the relevance assessment of the literature review for the MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus*, reviewers agreed in 100% of the Stage 2 evaluations.

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)	98
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	93
Total number of full-text documents assessed in detail	5
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	5
Total number of unobtainable/unclear publications	0
Total number of relevant publications	0

Table 8 lists the publications determined to be relevant based on the 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 Table 1
Mackie, S. J. W. (2021)	Comparison of RF3 <i>B. juncea</i> to RF3 <i>B. napus</i> .	Food and Nutrition Sciences (2021), Volume 12, Number 11, pp. 1041-1061, 40 refs. ISSN: 2157-944X; 2157-9458 DOI: https://doi.org/10.4236/fns.2021.1211077 Published by: Scientific Research Publishing, Irvine	MS8 x GT73, RF3 x GT73 and MS8 x RF3 x GT73 <i>B. napus</i> are not considered.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Mullins, E., Bresson, J. L., Dalmay, T., Dewhurst, I. C., Epstein, M. M., Firbank, L. G., Guerche, P., Hejatko, J., Moreno, F. J., Naegeli, H., Nogue, F., Rostoks, N., Serrano, J. J. S., Savoini, G., Veromann, E., Veronesi, F., Ardizzone, M., Camargo, A. M., Fernandez, A., Goumperis, T., Lenzi, P., Lewandowska, A., Raffaello, T., Streissl, F. (2023)	Assessment of genetically modified oilseed rape MS8, RF3 and MS8 x RF3 for renewal authorisation under regulation (EC) no 1829/2003 (application EFSA-GMO -RX-024).	EFSA Journal (2023), Volume 21, Number 4, 12 refs. ISSN: 1831-4732 DOI: https://doi.org/10.2903/j.efsa.2023.7934 Published by: Wiley, Oxford	MS8 x GT73, RF3 x GT73 and MS8 x RF3 x GT73 <i>B. napus</i> are not considered.
Mullins, E., Bresson, J. L., Dalmay, T., Dewhurst, I. C., Epstein, M. M., Firbank, L. G., Guerche, P., Hejatko, J., Moreno, F. J., Naegeli, H., Nogue, F., Rostoks, N., Serrano, J. J. S., Savoini, G., Veromann, E., Veronesi, F., Fernandez, A., Gennaro, A., Ruiz, J. A. G., Lenzi, P., Camargo, A. M., Lewandowska, A., Piffanelli, P., Raffaello, T. (2022)	Assessment of genetically modified oilseed rape GT73 for placing on the market of isolated seed protein for food under regulation (EC) no 1829/2003 (application EFSA-GMO -RX-026/2).	EFSA Journal (2022), Volume 20, Number 11, 16 refs. ISSN: 1831-4732 DOI: https://doi.org/10.2903/j.efsa.2022.7590 Published by: Wiley, Oxford	MS8 x GT73, RF3 x GT73 and MS8 x RF3 x GT73 <i>B. napus</i> are not considered.
Mazur, M., Sieradzki, Z., Krol, B., Kwiatek, K. (2022)	Analysis of feed in terms of the presence of genetically modified oilseed rape .	Medycyna Weterynaryjna (2022), Volume 78, Number 2, pp. 95-97, 12 refs. ISSN: 0025-8628 DOI: https://doi.org/10.21521/mw.6604 Published by: Polskie Towarzystwo Nauk Weterynaryjnych, Lublin	MS8 x GT73, RF3 x GT73 and MS8 x RF3 x GT73 <i>B. napus</i> are not considered.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Laforest, M., Martin, S., Soufiane, B., Bisaillon, K., Maheux, L., Fortin, S., James, T., Miville, D., Marcoux, A., Simard, M. J. (2022)	Distribution and genetic characterization of bird rape mustard (<i>Brassica rapa</i>) populations and analysis of glyphosate resistance introgression.	Pest Management Science (2022), Volume 78, Number 12, pp. 5471-5478 ISSN: 1526-498X; 1526-4998 DOI: https://doi.org/10.1002/ps.7170 Published by: Wiley, Chichester	MS8 x GT73, RF3 x GT73 and MS8 x RF3 x GT73 <i>B. napus</i> are not considered.

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.			

Table 11: Summary report for all relevant publications retrieved after detailed assessment of full-text documents for relevance 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	Implications for risk assessment
No publications in this category.					

6. NARRATIVE SYNTHESIS/SUMMARY OF RELEVANT STUDIES

A total of 5 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 these publications were relevant for the safety assessment of the MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus* and their newly expressed proteins, CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar.

7. CONCLUSION

The literature searches performed for the MS8 x RF3 x GT73, MS8 x GT73 and RF3 x GT73 *B. napus* and their newly expressed proteins, CP4 EPSPS, GOXv247, PAT/*bar*, Barnase and Barstar, for the period from July 1, 2022 until June 30, 2023, identified a total of 98 unique publications (after duplicate removal). A total of 5 publications were progressed for detailed assessment after excluding 93 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The 5 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 publications with bearing on molecular characterization were identified. The data and knowledge generated from these studies do not impact the safety assessment of MS8 x RF3 x GT73, MS8 x GT73 or RF3 x GT73 *B. napus*. 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
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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>
STN	CAS/CAPLUS	<p>The Chemical Abstracts (CA) database covers all areas of Biochemistry, Chemistry and Chemical engineering, and related sciences.</p> <p>Sources include over 8,000 journals, patents from 38 national patent offices and two international patent organizations, technical reports, books, conference proceedings, and dissertations. Electronic only journals and Web preprints are also covered.</p> <p>Bibliographic terms, indexing terms, roles, CAS Registry Numbers, International Patent Classification, and abstracts are searchable.</p>

Host	File	Description
STN	MEDLINE	<p>MEDLINE contains information on every area of medicine. The MEDLINE database corresponds to Index Medicus, Index to Dental Literature, and International Nursing Index; OLDMEDLINE, with data from NLM's from the Cumulated Index Medicus (1960-1965) and Current List of Medical Literature (1958-1959); and, since August 2001, IN-PROCESS records, the latest documents before they have been completely indexed for inclusion on MEDLINE.</p> <p>Sources include journals and chapters in books or symposia. Bibliographic information, indexing terms, abstracts, chemical names, and CAS Registry Numbers are all searchable.</p> <p>Online thesauri are available for the Medical Subject Headings (/MN), Controlled Terms (/CT) and Chemical Name (/CN) fields.</p>

Appendix 2: Search history

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FILE 'MEDLINE' ENTERED AT 11:13:29 ON 16 AUG 2023
L1      87 SEA MS8 OR MS8X OR ACS(W)BN005(W)8 OR ACSBN005(W)8 OR ACS(W)BN0
      05(W)8X OR ACSBN005(W)8X OR ACSBN005 OR ACSBN005X OR BN005 OR
      BN005X
L2      184 SEA RF3 OR XRF3 OR RF3X OR XRF3X OR ACS(W)BN003(W)6 OR
      XACS(W)BN003(W)6 OR ACS(W)BN003(W)6X OR XACS(W)BN003(W)6X OR
      BN003 OR XBN003 OR BN003X OR XBN003X
L3      34 SEA GT73 OR RT73 OR MON(W)00073(W)7 OR MON(W)00073(W)7 OR
      XGT73 OR XRT73 OR XMON(W)00073(W)7 OR XMON(W)00073(W)7
L4      0 SEA MS8XRF3XGT73 OR ACS(W)BN005(W)8XACS(W)BN003(W)6XGT73 OR
      BN005XBN003XGT73
L5      14 SEA (L1 AND L2) OR (L2 AND L3) OR (L1 AND L3) OR (L1 AND L2
      AND L3) OR L4
L6      172 SEA INVIGOR OR INVIGORR OR INVIGORTM INVIGORRTM OR IN(W)VIGOR
      OR IN(W)VIGORR OR IN(W)VIGORTM OR IN(W)VIGORRTM
L7      1450 SEA ROUNDUP?
L8      1620 SEA L6 OR L7
L9      658 SEA BARNASE OR RNASE(W)BA OR (BACTERIAL(W)RIBONUCLEASE AND
      ((BACILLUS OR B) (W)AMYLOLIQUUEFACIENS)) OR P00648 OR IPR001887
L10     381 SEA BARSTAR OR BARNASE(W)INHIBITOR OR IPR000468
L11     1593 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
L12     208 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
      N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
      ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L13     1668 SEA (L11 OR L12)
L14     137 SEA CP4(W)EPSPS OR AROA(W)CP4
L15     4351 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)
L16     0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVYOYL) (W) (PHOSPHOSHIKI
      MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
      YNTHASE OR SYNTHETASE)
L17     422 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
      ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVYOYL) (W) SHIKIMATE
      ) (3W) PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)
L18     514 SEA (PHOSPHOSHIKIMATE(2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
      IMATE(2W) CARBOXYVINYL(W) TRANSFERASE OR ENOLPYRUVYOYL(W) SHIKIMIC (
      3W) PHOSPHOSYNTHASE)
L19     1014 SEA CP4 OR AROA
L20     173 SEA L14 OR (((L15 OR L16 OR L17 OR L18)) (2A) L19)
L21     2513 SEA GLYPHOSATE(W)OXIDASE OR GOX OR GOXV247
L22     2047 SEA L10 OR L13
L23     2470 SEA L9 OR L10 OR L13
L24     2683 SEA L20 OR L21
L25     5 SEA (L22 AND L24) OR (L23 AND L24) OR (L22 AND L23 AND L24)
L26     3837 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
      PHOSPHINOTHRICIN OR LIBERTY) (5A) (RESIST? OR TOLERAN? OR
      PROTECT?)
L27     10079 SEA MALE(3A)STERIL? OR (FERTIL?(3A)RESTOR?) OR RESTOR?(W)LINE
      OR POLLINATION(W)CONTROL
L28     4046 SEA (HERBICID? OR GL!PHOSATE# OR GL!FOSATE# OR G360 OR G(W)360
      OR ROUNDUP? OR ROUND(W)UP?) (5A) (RESIST? OR TOLERAN? OR
      PROTECT?)
L29     3550 SEA (L26 OR L27) AND L28
L30     25857 SEA ((BRASSICA OR B) (W) (NAPUS OR JUNCEA)) OR RAPE? OR CANOLA#
      OR OILSEED(W)RAPE OR OIL(W)SEED(W)RAPE OR COLZA
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L31 4187755 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#))

L32 411 SEA L8 AND (L30 OR L31)

L33 197 SEA L29 AND L30 AND L31

L34 613 SEA L5 OR L25 OR L32 OR L33

L35 51 SEA L34 AND PY>=2021

L36 18 SEA L35 AND UP>=20220701 AND UP<=20230630

FILE 'BIOSIS' ENTERED AT 11:13:41 ON 16 AUG 2023

L37 123 SEA MS8 OR MS8X OR ACS(W)BN005(W)8 OR ACSBN005(W)8 OR ACS(W)BN0
05(W)8X OR ACSBN005(W)8X OR ACSBN005 OR ACSBN005X OR BN005 OR
BN005X

L38 279 SEA RF3 OR XRF3 OR RF3X OR XRF3X OR ACS(W)BN003(W)6 OR
XACS(W)BN003(W)6 OR ACS(W)BN003(W)6X OR XACS(W)BN003(W)6X OR
BN003 OR XBN003 OR BN003X OR XBN003X

L39 53 SEA GT73 OR RT73 OR MON(W)00073(W)7 OR MON(W)00073(W)7 OR
XGT73 OR XRT73 OR XMON(W)00073(W)7 OR XMON(W)00073(W)7

L40 0 SEA MS8XRF3XGT73 OR ACS(W)BN005(W)8XACS(W)BN003(W)6XGT73 OR
BN005XBN003XGT73

L41 20 SEA (L37 AND L38) OR (L38 AND L39) OR (L37 AND L39) OR (L37
AND L38 AND L39) OR L40

L42 61 SEA INVIGOR OR INVIGORR OR INVIGORTM INVIGORRTM OR IN(W)VIGOR
OR IN(W)VIGORR OR IN(W)VIGORTM OR IN(W)VIGORRTM

L43 1845 SEA ROUNDUP?

L44 1904 SEA L42 OR L43

L45 774 SEA BARNASE OR RNASE(W)BA OR (BACTERIAL(W)RIBONUCLEASE AND
(BACILLUS OR B) (W)AMYLOLIQUEFACIENS)) OR P00648 OR IPR001887

L46 361 SEA BARSTAR OR BARNASE(W)INHIBITOR OR IPR000468

L47 2994 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

L48 338 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L49 3101 SEA (L47 OR L48)

L50 203 SEA CP4(W)EPSPS OR AROA(W)CP4

L51 5185 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) (4
W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)

L52 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
YNTHASE OR SYNTHETASE)

L53 767 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE
) (3W)PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)

L54 29 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC (3
W)PHOSPHOSYNTHASE)

L55 1378 SEA CP4 OR AROA

L56 255 SEA L50 OR (((L51 OR L52 OR L53 OR L54)) (2A)L55)

L57 1647 SEA GLYPHOSATE(W)OXIDASE OR GOX OR GOXV247

L58 3456 SEA L46 OR L49

L59 3979 SEA L45 OR L46 OR L49

L60 1895 SEA L56 OR L57

L61 27 SEA (L58 AND L60) OR (L59 AND L60) OR (L58 AND L59 AND L60)

L62 10645 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR
PHOSPHINOTHRICIN OR LIBERTY) (5A) (RESIST? OR TOLERAN? OR
PROTECT?)

L63 17153 SEA MALE(3A)STERIL? OR (FERTIL?(3A)RESTOR?) OR RESTOR?(W)LINE
OR POLLINATION(W)CONTROL

L64 11919 SEA (HERBICID? OR GL!PHOSATE# OR GL!FOSATE# OR G360 OR G(W)360

OR ROUNDUP? OR ROUND(W)UP?) (5A) (RESIST? OR TOLERAN? OR PROTECT?)

L65 10220 SEA (L62 OR L63) AND L64

L66 50521 SEA ((BRASSICA OR B) (W) (NAPUS OR JUNCEA)) OR RAPE? OR CANOLA# OR OILSEED(W)RAPE OR OIL(W)SEED(W)RAPE OR COLZA

L67 474422 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#))

L68 618 SEA L44 AND (L66 OR L67)

L69 366 SEA L65 AND L66 AND L67

L70 1005 SEA L41 OR L61 OR L68 OR L69

L71 36 SEA L70 AND PY>=2021

L72 18 SEA L71 AND UP>=20220701 AND UP<=20230630

FILE 'AGRICOLA' ENTERED AT 11:13:53 ON 16 AUG 2023

L73 54 SEA MS8 OR MS8X OR ACS(W)BN005(W)8 OR ACSBN005(W)8 OR ACS(W)BN005(W)8X OR ACSBN005(W)8X OR ACSBN005 OR ACSBN005X OR BN005 OR BN005X

L74 86 SEA RF3 OR XRF3 OR RF3X OR XRF3X OR ACS(W)BN003(W)6 OR XACS(W)BN003(W)6 OR ACS(W)BN003(W)6X OR XACS(W)BN003(W)6X OR BN003 OR XBN003 OR BN003X OR XBN003X

L75 28 SEA GT73 OR RT73 OR MON(W)00073(W)7 OR MON(W)00073(W)7 OR XGT73 OR XRT73 OR XMON(W)00073(W)7 OR XMON(W)00073(W)7

L76 0 SEA MS8XRF3XGT73 OR ACS(W)BN005(W)8XACS(W)BN003(W)6XGT73 OR BN005XBN003XGT73

L77 11 SEA (L73 AND L74) OR (L74 AND L75) OR (L73 AND L75) OR (L73 AND L74 AND L75) OR L76

L78 138 SEA INVIGOR OR INVIGORR OR INVIGORTM INVIGORRTM OR IN(W)VIGOR OR IN(W)VIGORR OR IN(W)VIGORTM OR IN(W)VIGORRTM

L79 1397 SEA ROUNDUP?

L80 1535 SEA L78 OR L79

L81 114 SEA BARNASE OR RNASE(W)BA OR (BACTERIAL(W)RIBONUCLEASE AND ((BACILLUS OR B) (W)AMYLOLIQUEFACIENS)) OR P00648 OR IPR001887

L82 57 SEA BARSTAR OR BARNASE(W)INHIBITOR OR IPR000468

L83 830 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

L84 258 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFERASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L85 912 SEA (L83 OR L84)

L86 126 SEA CP4(W)EPSPS OR AROA(W)CP4

L87 742 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV OYLSHIKAMATE OR ENOYLPYRUV OYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)

L88 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUV OYL) (W) (PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (SYNTHASE OR SYNTHETASE)

L89 337 SEA (ENOL(W)PYRUV OYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUV OYL) (W)SHIKIMATE) (3W)PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)

L90 271 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUV OYL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)

L91 444 SEA CP4 OR AROA

L92 148 SEA L86 OR ((L87 OR L88 OR L89 OR L90)) (2A)L91)

L93 1260 SEA GLYPHOSATE(W)OXIDASE OR GOX OR GOXV247

L94 969 SEA L82 OR L85

L95 1042 SEA L81 OR L82 OR L85

L96 1404 SEA L92 OR L93

L97 12 SEA (L94 AND L96) OR (L95 AND L96) OR (L94 AND L95 AND L96)

L98 8897 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR

PHOSPHINOTHRICIN OR LIBERTY) (5A) (RESIST? OR TOLERAN? OR PROTECT?)

L99 8679 SEA MALE (3A) STERIL? OR (FERTIL? (3A) RESTOR?) OR RESTOR? (W) LINE OR POLLINATION (W) CONTROL

L100 9431 SEA (HERBICID? OR GL!PHOSATE# OR GL!FOSATE# OR G360 OR G(W) 360 OR ROUNDUP? OR ROUND(W) UP?) (5A) (RESIST? OR TOLERAN? OR PROTECT?)

L101 8710 SEA (L98 OR L99) AND L100

L102 29783 SEA ((BRASSICA OR B) (W) (NAPUS OR JUNCEA)) OR RAPE? OR CANOLA# OR OILSEED(W) RAPE OR OIL(W) SEED(W) RAPE OR COLZA

L103 111825 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#))

L104 440 SEA L80 AND (L102 OR L103)

L105 248 SEA L101 AND L102 AND L103

L106 697 SEA L77 OR L97 OR L104 OR L105

L107 16 SEA L106 AND PY>=2021

L108 3 SEA L107 AND UP>=20220701 AND UP<=20230630

FILE 'CABA' ENTERED AT 05:14:05 ON 16 AUG 2023

L109 140 SEA MS8 OR MS8X OR ACS(W) BN005(W) 8 OR ACSBN005(W) 8 OR ACS(W) BN005(W) 8X OR ACSBN005(W) 8X OR ACSBN005 OR ACSBN005X OR BN005 OR BN005X

L110 235 SEA RF3 OR XRF3 OR RF3X OR XRF3X OR ACS(W) BN003(W) 6 OR XACS(W) BN003(W) 6 OR ACS(W) BN003(W) 6X OR XACS(W) BN003(W) 6X OR BN003 OR XBN003 OR BN003X OR XBN003X

L111 59 SEA GT73 OR RT73 OR MON(W) 00073(W) 7 OR MON(W) 00073(W) 7 OR XGT73 OR XRT73 OR XMON(W) 00073(W) 7 OR XMON(W) 00073(W) 7

L112 0 SEA MS8XRF3XGT73 OR ACS(W) BN005(W) 8XACS(W) BN003(W) 6XGT73 OR BN005XBN003XGT73

L113 30 SEA (L109 AND L110) OR (L110 AND L111) OR (L109 AND L111) OR (L109 AND L110 AND L111) OR L112

L114 292 SEA INVIGOR OR INVIGORR OR INVIGORTM INVIGORRTM OR IN(W) VIGOR OR IN(W) VIGORR OR IN(W) VIGORTM OR IN(W) VIGORRTM

L115 3255 SEA ROUNDUP?

L116 3543 SEA L114 OR L115

L117 157 SEA BARNASE OR RNASE(W) BA OR (BACTERIAL(W) RIBONUCLEASE AND ((BACILLUS OR B) (W) AMYLOLIQUEFACIENS)) OR P00648 OR IPR001887

L118 70 SEA BARSTAR OR BARNASE(W) INHIBITOR OR IPR000468

L119 1641 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

L120 387 SEA PHOSPHINOTHRICIN(W) N(W) ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W) ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W) ACETYL(W) TRANSFERASE OR PHOSPHINOTHRICINACETYL(W) TRANSFERASE

L121 1747 SEA (L119 OR L120)

L122 282 SEA CP4(W) EPSPS OR AROA(W) CP4

L123 1282 SEA EPSPS OR EPSP(W) SYNTHASE OR (ENOL(W) PYRUVYL SHIKIMATE OR ENOL(W) PYRUVYL(W) SHIKIMATE OR ENOLPYRUVYL SHIKIMATE OR ENOLPYRUV OYL SHIKIMATE OR ENOYL PYRUV OYL SHIKIMATE OR ENOLPYRUVYL SHIKIMIC) (4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)

L124 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUV OYL) (W) (PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYL SHIKIMATE PHOSPHATE) (2W) (SYNTHASE OR SYNTHETASE)

L125 480 SEA (ENOL(W) PYRUV OYL SHIKIMATE OR ENOLPYRUVYL SHIKIMATE OR ENOLPYRUVYL SHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUV OYL) (W) SHIKIMATE) (3W) PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)

L126 204 SEA (PHOSPHOSHIKIMATE (2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE (2W) CARBOXYVINYL(W) TRANSFERASE OR ENOLPYRUV OYL(W) SHIKIMIC (3W) PHOSPHOSYNTHASE)

L127 826 SEA CP4 OR AROA

L128 311 SEA L122 OR ((L123 OR L124 OR L125 OR L126)) (2A) L127)

L129 444 SEA GLYPHOSATE(W) OXIDASE OR GOX OR GOXV247

L130 1809 SEA L118 OR L121
L131 1887 SEA L117 OR L118 OR L121
L132 746 SEA L128 OR L129
L133 32 SEA (L130 AND L132) OR (L131 AND L132) OR (L130 AND L131 AND L132)
L134 19884 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY) (5A) (RESIST? OR TOLERAN? OR PROTECT?)
L135 25748 SEA MALE(3A)STERIL? OR (FERTIL?(3A)RESTOR?) OR RESTOR?(W)LINE OR POLLINATION(W)CONTROL
L136 20689 SEA (HERBICID? OR GL!PHOSATE# OR GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (RESIST? OR TOLERAN? OR PROTECT?)
L137 19477 SEA (L134 OR L135) AND L136
L138 76774 SEA ((BRASSICA OR B) (W) (NAPUS OR JUNCEA)) OR RAPE? OR CANOLA# OR OILSEED(W)RAPE OR OIL(W)SEED(W)RAPE OR COLZA
L139 202021 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#))
L140 862 SEA L116 AND (L138 OR L139)
L141 616 SEA L137 AND L138 AND L139
L142 1490 SEA L113 OR L133 OR L140 OR L141
L143 49 SEA L142 AND PY>=2021
L144 44 SEA L143 AND UP>=20220701 AND UP<=20230630
L145 44 SEA L144 NOT P/DT
L146 0 SEA L144 AND (P/DT AND J/DT)
L147 44 SEA (L145 OR L146)

FILE 'HCAPLUS' ENTERED AT 05:14:24 ON 16 AUG 2023

L148 158 SEA MS8 OR MS8X OR ACS(W)BN005(W)8 OR ACSBN005(W)8 OR ACS(W)BN005(W)8X OR ACSBN005(W)8X OR ACSBN005 OR ACSBN005X OR BN005 OR BN005X
L149 917 SEA RF3 OR XRF3 OR RF3X OR XRF3X OR ACS(W)BN003(W)6 OR XACS(W)BN003(W)6 OR ACS(W)BN003(W)6X OR XACS(W)BN003(W)6X OR BN003 OR XBN003 OR BN003X OR XBN003X
L150 87 SEA GT73 OR RT73 OR MON(W)00073(W)7 OR MON(W)00073(W)7 OR XGT73 OR XRT73 OR XMON(W)00073(W)7 OR XMON(W)00073(W)7
L151 0 SEA MS8XRF3XGT73 OR ACS(W)BN005(W)8XACS(W)BN003(W)6XGT73 OR BN005XBN003XGT73
L152 36 SEA (L148 AND L149) OR (L149 AND L150) OR (L148 AND L150) OR (L148 AND L149 AND L150) OR L151
L153 9 SEA INVIGOR OR INVIGORR OR INVIGORTM INVIGORRTM OR IN(W)VIGOR OR IN(W)VIGORR OR IN(W)VIGORTM OR IN(W)VIGORRTM
L154 3280 SEA ROUNDUP?
L155 3287 SEA L153 OR L154
L156 1328 SEA BARNASE OR RNASE(W)BA OR (BACTERIAL(W)RIBONUCLEASE AND ((BACILLUS OR B) (W)AMYLOLIQUUEFACIENS)) OR P00648 OR IPR001887
L157 658 SEA BARSTAR OR BARNASE(W)INHIBITOR OR IPR000468
L158 5722 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
L159 810 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFERASE
L160 6039 SEA (L158 OR L159)
L161 406 SEA CP4(W)EPSPS OR AROA(W)CP4
L162 4639 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVOYLSHIKIMATE OR ENOYLPYRUVOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)
L163 9 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (SYNTHASE OR SYNTHETASE)

L164 1138 SEA (ENOL(W)PYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVOYL)(W)SHIKIMATE) (3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE)

L165 90 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)

L166 2207 SEA CP4 OR AROA

L167 545 SEA L161 OR ((L162 OR L163 OR L164 OR L165)) (2A)L166)

L168 5458 SEA GLYPHOSATE(W)OXIDASE OR GOX OR GOXV247

L169 6671 SEA L157 OR L160

L170 7496 SEA L156 OR L157 OR L160

L171 5979 SEA L167 OR L168

L172 112 SEA (L169 AND L171) OR (L170 AND L171) OR (L169 AND L170 AND L171)

L173 31131 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY) (5A) (RESIST? OR TOLERAN? OR PROTECT?)

L174 27419 SEA MALE(3A)STERIL? OR (FERTIL?(3A)RESTOR?) OR RESTOR?(W)LINE OR POLLINATION(W)CONTROL

L175 32313 SEA (HERBICID? OR GL!PHOSATE# OR GL!FOSATE# OR G360 OR G(W)360 OR ROUNDUP? OR ROUND(W)UP?) (5A) (RESIST? OR TOLERAN? OR PROTECT?)

L176 30574 SEA (L173 OR L174) AND L175

L177 118005 SEA ((BRASSICA OR B) (W) (NAPUS OR JUNCEA)) OR RAPE? OR CANOLA# OR OILSEED(W)RAPE OR OIL(W)SEED(W)RAPE OR COLZA

L178 674960 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#))

L179 1132 SEA L155 AND (L177 OR L178)

L180 1166 SEA L176 AND L177 AND L178

L181 2386 SEA L152 OR L172 OR L179 OR L180

L182 397 SEA L181 AND PY>=2021

L183 106 SEA L182 AND UP>=20220701 AND UP<=20230630

L184 29 SEA L183 NOT P/DT

L185 0 SEA L183 AND (P/DT AND J/DT)

L186 29 SEA (L184 OR L185)

FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 05:14:35 ON 16 AUG 2023

L187 98 DUP REM L36 L72 L108 L147 L186 (14 DUPLICATES REMOVED)
ANSWERS '1-18' FROM FILE MEDLINE
ANSWERS '19-34' FROM FILE BIOSIS
ANSWERS '35-37' FROM FILE AGRICOLA
ANSWERS '38-77' FROM FILE CABA
ANSWERS '78-98' FROM FILE HCAPLUS