

Title

**Summary of the Literature Review for GHB614 x T304-40 x GHB119 Cotton  
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 Agricultural Solutions GmbH  
67063 Ludwigshafen  
Germany

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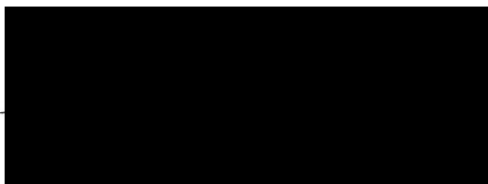
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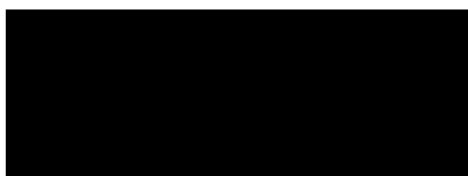
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## PERSONNEL

<b>Electronic database search</b>	<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>
<b>Agency website search</b>	<p>■■■■■■■■■■ Global Regulatory Affairs Manager – Cotton, Ph.D. in Plant Pathology, 24 years experience in Regulatory Affairs Plant Biotechnology.</p>
<b>Manual search (checking reference lists)</b>	<p>■■■■■■■■■■ PhD in Food Science and Technology. Twenty years of expertise in food chemistry, food allergy and safety assessment of GMOs.</p>
<b>Stage 1 assessment</b>	<p>■■■■■■■■■■ ■■■■■■■■■■</p>
<b>Stage 2 assessment</b>	<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>
<b>Report</b>	<p>■■■■■■■■■■ ■■■■■■■■■■■■■■■■■■■■ ■■■■■■■■■■</p>

## TABLE OF CONTENTS

<b>STATEMENT OF NO DATA CONFIDENTIALITY CLAIMS .....</b>	<b>2</b>
<b>SIGNATURE PAGE .....</b>	<b>3</b>
<b>STUDY PERSONNEL .....</b>	<b>4</b>
<b>TABLE OF CONTENTS .....</b>	<b>5</b>
<b>TABLES .....</b>	<b>6</b>
<b>APPENDICES .....</b>	<b>6</b>
<b>SUMMARY .....</b>	<b>7</b>
<b>1. INTRODUCTION .....</b>	<b>8</b>
<b>2. OVERALL METHODS .....</b>	<b>8</b>
2.1. Objective of the scoping review .....	8
2.2. Review questions .....	8
2.3. Criteria for relevance .....	9
2.4. Reference publication .....	12
<b>3. SEARCH METHODS AND OUTCOMES .....</b>	<b>12</b>
3.1. Time window and date of the literature search .....	13
3.2. Databases used in the literature search .....	13
3.3. Search strategy .....	13
<b>4. INTERNET and MANUAL SEARCHES .....</b>	<b>17</b>
4.1. Internet Searches of food safety, agriculture, and biotechnology-related authority webpages .....	17
4.2. Manual searches of reference lists of recent review articles .....	17
<b>5. RESULTS OF THE STUDY IDENTIFICATION AND SELECTION PROCESS .....</b>	<b>18</b>
5.1. Screening of titles and abstracts to exclude obviously irrelevant references (Stage 1) ...	20
5.2. Detailed assessment of eligible references (Stage 2) .....	21
<b>6. NARRATIVE SYNTHESIS/SUMMARY OF RELEVANT STUDIES .....</b>	<b>24</b>
<b>7. CONCLUSION .....</b>	<b>24</b>
<b>8. REFERENCES .....</b>	<b>24</b>
<b>9. APPENDICES .....</b>	<b>25</b>

## TABLES

Table 1: Eligibility/inclusion criteria to establish the relevance of retrieved publications .....	9
Table 2: Search profile for database search .....	13
Table 3: Relevant controlled terms (CT) and index terms (IT) in each database .....	15
Table 4: Overview of the selected databases and summary of search results from each database .....	16
Table 5: Results of search of food safety, agriculture, and biotechnology-related authority websites .....	17
Table 6: Documents for which reference lists were scanned for relevant studies .....	18
Table 7: Results of the publication selection process .....	21
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) .....	22
Table 9: Report of publications excluded from the risk assessment after detailed assessment of full-text documents .....	22
Table 10: Report of unobtainable/unclear publications .....	23

## APPENDICES

Appendix 1: Database descriptions .....	25
Appendix 2: Search history .....	27

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## SUMMARY

BASF used conventional breeding techniques to develop the cotton product GHB614 x T304-40 x GHB119 (GlyTol x TwinLink; GLT) which confers insect resistance and herbicide tolerance. Each single trait contributes specific benefits to the final stacked trait product. The OECD identifier BCS-GHØØ2-5 x BCS-GHØØ4-7 x BCS-GHØØ5-8.

A scoping review was performed for the GHB614 x T304-40 x GHB119 cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae. The objective of this scoping review was to determine if there were studies about the molecular characterization of GHB614 x T304-40 x GHB119 (GLT) cotton, its 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 to 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 284 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. Three publications were progressed for detailed assessment and were determined to be not relevant after detailed review.

No new publications were found that contained new data on the molecular characterization of the GHB614 x T304-40 x GHB119 cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae. Similarly, no new publications were found that suggested any potential adverse effects of GHB614 x T304-40 x GHB119 cotton on human health, animal health, or the environment. No issues or topics were identified that would trigger or warrant more specific question formulation or indicate that a systematic review would be of value.

## 1. INTRODUCTION

BASF used conventional breeding techniques to develop the cotton product GHB614 x T304-40 x GHB119 (GlyTol x TwinLink; GLT) which confers insect resistance and herbicide tolerance. Each single trait contributes specific benefits to the final stacked trait product. The OECD identifier BCS-GHØØ2-5 x BCS-GHØØ4-7 x BCS-GHØØ5-8.

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 GHB614 x T304-40 x GHB119 (GLT) cotton, and/or any adverse effect of GHB614 x T304-40 x GHB119 (GLT) cotton 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) applications and post-market environmental monitoring activities (2019; (1)).

The literature searches were performed for the GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae. 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 GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae, 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 (1).

**Question 1:** Were any studies published during the reporting period that describe adverse effects on human or animal health or the environment of the GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae?

**Key elements:**

**Population:** Human health; animal health; environmental safety

**Exposure:** GHB614 x T304-40 x GHB119 (GLT) cotton, derived food/feed products, newly expressed proteins in [[GHB614 x T304-40 x GHB119 (GLT) cotton

**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 GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae in cotton?



**Key elements:**

**Population:** GHB614 x T304-40 x GHB119 (GLT) cotton and newly expressed proteins in GHB614 x T304-40 x GHB119 (GLT) cotton

**Outcome:** Molecular characterization (which would indicate the information/data requirement for molecular characteristics)

**2.3. Criteria for relevance**

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

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

Concepts	Criteria	Comment
Key elements of review questions with PECO structure		
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
Outcome	The publication addresses effects/impacts on human and animal health, and/or the environment	Publications that address the GMO under consideration also need to address effects/impacts on entities of concern, and potential determinants of exposure that place these entities at risk, in order to be relevant to the risk assessment of the GMO

Concepts	Criteria	Comment
Additional concepts		
Information/data requirements	The publication reports information pertaining to one or more information/data requirement(s) outlined in Appendix A for the GMO and derived food/feed products under consideration, including the intended trait(s)	Publications that potentially contribute to the knowledge informing the risk assessment of the GMO under consideration, and thus the risk hypotheses addressed, taking account of both hazard and exposure, can be considered relevant according to this eligibility/inclusion criterion. Publications addressing other issues such as benefits, socio-economics, ethics, crop protection, detection methods, efficacy, public perception and risk communication can be excluded, as they are not necessarily relevant to the risk assessment of GMOs
Plant species	The publication addresses the same plant species as the GMO under consideration	This eligibility/inclusion criterion permits the exclusion of publications on GMOs that contain the same intended trait(s) as the GMO under consideration, but which are introduced in another plant species
Scope of GMO application	The publication addresses pathways and levels of exposure to the GMO, derived food/feed products, and the intended trait(s) that are relevant for the intended uses of the GMO and derived food/feed products under regulatory review	From the publications that address the GMO under consideration, those that consider pathways and levels of exposure relevant to the scope of the GMO application ( <i>i.e.</i> , import and processing for food/feed uses, cultivation) are eligible
Target pests/organisms	The publication addresses target pests/organisms that are established in the EU	This permits the exclusion of publications that address interactions between the GMO and target pests/organisms that do not occur in the EU

Concepts	Criteria	Comment
Stacked events obtained by conventional crosses/ subcombinations	The publication addresses the higher stacked event and/or a subcombination or subcombinations of the single events of the higher stacked event, independently of its/their origin	This permits the selection of publications on the higher stacked event and/or subcombinations of the single events of the higher stacked event that are in the scope of the GMO application(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>i.e.</i> , 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 (1).

## 2.4. Reference publication

One publication related to GHB614 x T304-40 x GHB119 cotton was used to test and validate the search strategy:

- Wu A-J; Sathischandra S; Massengill J; Araujo R; Soria M; Bugas M; Bishop Z; Haas C; Cisneros K; Lor J; Canez C; New S; Mackie S; Ghoshal D; Privalle L; Hunst P (2019). GHB614 x T304-40 x GHB119 x COT102 Cotton: Protein Expression Analyses of Field-Grown Samples. *Journal of Agricultural and Food Chemistry* 67(1):275-281

Although this article is not directly relevant for the GHB614 x T304-40 x GHB119 cotton, it was selected as reference publication because its title and abstract mention the event names (GHB614, T304-40 and GHB119 cotton), one of the newly expressed proteins (PAT/*bar*), and the intended traits (herbicide tolerance, insect control). Since this reference was 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 activities (1). The search strategies were designed to be broad and sensitive enough to capture any relevant publications, if available.

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

### 3.1. Time window and date of the literature search

The database searches were performed on August 14, 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 4](#).

### 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 the higher stack's and substacks' event names, newly expressed proteins, trade names and intended traits. Since the 'intended trait' profiles produced too many results when used on their own, they were combined with additional profiles: a 'general GMO' profile as well as a 'plant species' profile. 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**

#	Profile	Element
1	GHB614 OR GHB(W)614 OR BCS-GH002-5 OR BCSGH002-5 OR BCS(W)GH002(W)5 OR BCSGH002(W)5 OR BCS-GH002-5 OR BCS(W)GH002(W)5 OR BCSGH002(W)5	Event name GHB614
2	T304-40 or T304(w)40 or T(w)304(w)40 or BCS-GH004-7 or BCS-GH004-7 or BCS-GH004-7 or BCS(w)GH004(w)7 or BCS(w)GH004(w)7 or BCSGH004(w)7 or BCSGH004(w)7	Event name T304-40
3	GHB119 or GHB(w)119 or BCS-GH005-8 or BCS-(w)GH005(w)8 or BCSGH005(w)8 or BCS-GH005-8 or BCS-(w)GH005(w)8 or BCSGH005(w)8	Event name GHB119
4	GHB614xT304-40xGHB119	Event name stack
5	(1 and 2) or (2 and 3) or (1 and 3) or (1 and 2 and 3) or 4	Event name ALL
6	GLYTOL OR GLYTOLTM OR GLYTOLRTM OR GLY(w)TOL OR GLY(w)TOLTM OR GLY(w)TOLRTM	Trade name GHB614
7	LibertyLink or LibertyLinktm or LibertyLinkr or LibertyLinkrtm or Liberty(w)Link or Liberty(w)Linktm or Liberty(w)Linkr or Liberty(w)Linkrtm	Trade name T304-40 and GHB119
8	TwinLink or TwinLinktm or TwinLinkr or TwinLinkrtm or twin(w)link or twin(w)linktm or twin(w)linkr or twin(w)linkrtm	Trade name T304-40 x GHB119
9	(6 and 8) or (6 and 7 and 8)	Trade name ALL

10	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 ENOLPYRUVYLSHIKIMATE OR ENOYLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC(4W)(PHOSPHATE OR PHOSPHORIC)(2W)(SYNTHASE OR SYNTHETASE) or (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVYOL)(W)(PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC or ENOLPYRUVYLSHIKIMATEPHOSPHATE)(2W)(SYNTHASE OR SYNTHETASE) or (ENOL(W)PYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W)(PYRUVYL OR PYRUVYOL)(W)SHIKIMATE)(3W)PHOSPHATE(W)(SYNTHASE OR SYNTHETASE) or (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVYOL(W)SHIKIMIC(3W)PHOSPHOSYNTHASE)) (s)((DOUBL# or DOBL#)(W)(MUTANT# OR MUTAT?) OR 2M)	Newly expressed proteins GHB614
11	((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 or cry1ab# or cry(w)1(w)ab# or cry(w)1ab# or cry1(w)ab# or cry1(w)a(w)b# or cry(w)1(w)a(w)b# or cry1a(w)b# or crylab# or cry(w)l(w)ab# or cry(w)lab# or cryl(w)ab# or cryl(w)a(w)b# or cry(w)l(w)a(w)b# or cryla(w)b# or crylab# or cry(w)l(w)ab# or cry(w)lab# or cryl(w)ab# or cryl(w)a(w)b# or cry(w)l(w)a(w)b# or cryla(w)b#	Newly expressed proteins T304-40
12	cry2ae# or cry(w)2(w)ae# or cry(w)2ae# or cry2(w)ae# or cry2(w)a(w)e# or cry(w)2(w)a(w)e# or cry2a(w)e# or cryllae# or cry(w)ll(w)ae# or cry(w)llae# or cryll(w)ae# or cryll(w)a(w)e# or cry(w)ll(w)a(w)e# or crylla(w)e# or cry(w)llae# or cryll(w)ae# or cryll(w)a(w)e# or cry(w)ll(w)a(w)e# or crylla(w)e#	Newly expressed proteins GHB119
13	(10 and 11) or (11 and 12) or (10 and 12) or (10 and 11 and 12)	Newly expressed proteins ALL
14	(herbicid? or GLIPHOSATE# or GLIFOSATE# OR G360 or g(w)360 or roundup? or round(w)up?)(5a)(resist? or toleran? or protect?)	Intended trait GHB614
15	herbicid? or bialaphos or basta or glufosinate or gluphosinate or phosphinothricin or liberty? or Insect# OR pest# OR Lepidoptera# OR Noctuidae OR Crambidae OR borer# OR cornborer# OR stalkborer# OR earworm# OR ear(w)worm# OR armyworm# OR army(w)worm# OR cutworm# OR cut(w)worm# OR Ostrinia OR O(w)nubilalis OR Sesamia OR S(w)nonagrioides or Diatraea OR D(w)grandiosella OR D(w)crambidoides OR Helicoverpa OR H(w)zea OR Spodoptera OR S(w)frugiperda OR Papaipema OR P(w)nebris OR Elasmopalpus OR E(w)lignosellus OR D(w)saccharalis OR Striacosta OR S(w)albicosta or Agrotis OR A(w)ipion OR S(w)cretica OR Mythimna OR M(w)unipuncta OR ECB OR MCB OR SWCB OR SCSB OR CEW OR FAW OR SCB OR WBC) (5a) (resist? OR protect? OR toleran?)	Intended trait T304-40 Intended trait GHB614
16	14 and 15	Intended trait ALL
17	cotton# or gossypium or G(w)hirsutum or g(w)barbadense	Crop
18	GMO OR GMOs OR LMO OR LMOs OR GM OR GE OR transgen? OR (genetic?(3a)(modif? OR transform? OR manipulat? OR improv? OR engineer?))	GMO general
19	16 and 17 and 18	Intended trait all and crop and GMO general
20	5 or 9 or 13 or 19	Event name ALL or trade name ALL or newly expressed proteins ALL or (intended traits ALL and crop and GMO 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 (Tabel 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" No terms for insect resistance	"GOSSYPIMUM BARBADENSE" "GOSSYPIMUM HIRSUTUM"	"TRANSGENIC PLANTS"
<b>Biosis</b>	None	None	No terms for herbicide or insect resistance	"GOSSYPIMUM BARBADENSE" "GOSSYPIMUM HIRSUTUM"	None
<b>CABA</b>	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	"GOSSYPIMUM BARBADENSE"/CT "GOSSYPIMUM HIRSUTUM"/CT	"TRANSGENIC PLANTS"
<b>CAS</b>	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	GOSSYPIMUM/CT	"GENETICALLY MODIFIED PLANTS"
<b>Medline</b>	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	"GOSSYPIMUM BARBADENSE" "GOSSYPIMUM HIRSUTUM"	"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	14 Aug 2023	14 Aug 2023	14 Aug 2023	14 Aug 2023	14 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	9 Aug 2023	13 Aug 2023	13 Aug 2023
Number of records retrieved	12	51	185	56	60
Number of records after duplicate removal	10	43	146	25	60
Number of relevant records after rapid assessment	0	0	3	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 to 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 note (1). Of the 13 key organisations cited in the EFSA 2019 explanatory note (1), 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 USDA, EPA, FDA, CFIA, Health Canada, FSANZ and MAFF websites were excluded, since these agencies do not regulate GM stacked products obtained by conventional breeding techniques. Therefore, the internet search was limited to four key organisations relevant for GHB614 x T304-40 x GHB119 (GLT) cotton. Search terms consisted of GHB614 x T304-40 x GHB119 or GlyTol x Twinlink or BCS-GHØØ2-5 x BCS-GHØØ4-7 x BCS-GHØØ5-8, 2mEPSPS or double mutant 5-enolpyruvyl shikimate-3-phosphate synthase enzyme, PAT/*bar* or Phosphinothricin, Cry1Ab, and Cry2Ae (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 (dd.mm.yyyy)	Date of Search (dd.mm.yyyy)	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>	06.04.2023	10.07.2023	0
National Technical Commission on Biosafety (CTNBio) Brazil	<a href="http://ctnbio.mcti.gov.br/en">http://ctnbio.mcti.gov.br/en</a>	24.07.2023	17-24.07.2023	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>	17.07.2023	17.07.2023	0
Genetic Engineering Approval Committee (GEAC) India	<a href="http://moef.gov.in/">http://moef.gov.in/</a>	19.07.2023	19.07.2023	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, Vobruha 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 Saucy AG, Zünd J, Lüthi C. 2023	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
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

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

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
13	Spök A, Sprink T, Allan AC, Yamaguchi T, Dayé C. 2022	Towards social acceptability of genome-edited plants in industrialised countries? Emerging evidence from Europe, United States, Canada, Australia, New Zealand, and Japan.	Front Genome Ed. 2022 Aug 31;4:899331.	0
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 3](#)) identified a total of 364 references, which were reduced to 284 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 3](#) were assessed for relevance based on information in their title and abstract by two reviewers independently. If opinions of relevance differed, the discrepancies were discussed between the reviewers and if a disagreement persisted, the publication under 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 GHB614 x T304-40 x GHB119 (GLT) cotton, 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)	284
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	281
Total number of full-text documents assessed in detail	3
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	3
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 any 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
Naegeli, H. Bresson, J. L; Dalmay, T. Dewhurst, I. C. Epstein, M. 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. Ardizzone, M. Raffaello, T. 2021	Assessment of genetically modified cotton GHB614 for renewal authorisation under regulation (EC) No 1829/2003 (application EFSA-GMO -RX-018).	EFSA Journal (2021), Volume 19, Number 7, 10 refs. ISSN: 1831-4732 DOI: <a href="https://doi.org/10.2903/j.efs.a.2021.6671">https://doi.org/10.2903/j.efs.a.2021.6671</a> Published by: Wiley, Oxford	This publication is the EFSA evaluation of GHB614 cotton. Publications on single events are not considered relevant for stacked events.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Sharkey, S. M. Williams, B. J. Parker, K. M. 2021	Herbicide drift from genetically engineered herbicide -tolerant crops.	Environmental Science + Technology (2021), Volume 55, Number 23, pp. 15559-15568, 107 refs. ISSN: 0013-936X; 1520-5851 DOI: <a href="https://doi.org/10.1021/acs.est.1c01906">https://doi.org/10.1021/acs.est.1c01906</a> Published by: American Chemical Society, Washington	The paper focuses on herbicide drift and the impacts of dicamba and 2,4-D to non-target vegetation in herbicide tolerant traits. This publication is no environmental safety assessment related to GHB614 x T304-40 x GHB119 cotton.
Luz, C. E. A. Zuim, V. Oliveira, A. A. S. Santos, P. de J. dos Campos, K. L. Haro, M. M. Vivan, L. M. Bastos, C. S. Guedes, R. N. C. dos Santos, P. de J. 2021	Arthropod food webs associated with cotton: does Bt cotton mediate community stress?	Journal of Applied Entomology (2021), Volume 146, Number 1/2, pp. 56-66, 57 refs. ISSN: 0931-2048; 1439-0418 DOI: <a href="https://doi.org/10.1111/jen.12928">https://doi.org/10.1111/jen.12928</a> Published by: Wiley, Berlin	The authors analysed the short-term impact of Bt cotton on the associated arthropod community in Neotropical fields. Bt cotton (MON15985; Bollgard II) and related non-Bt cotton (FMT 709) were cultivated for two years, and the arthropods were sampled. The Bt cotton-associated food webs were similar to those of the non-Bt cotton, indicating no significant impact of the event on arthropod food webs. This publication is no environmental safety assessment related to GHB614 x T304-40 x GHB119 cotton.

**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

Three 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 the GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae.

## 7. CONCLUSION

The literature searches performed for the GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae, for the period from July 1, 2022 to June 30, 2023, identified a total of 284 unique publications (after duplicate removal). A total of three publication(s) were progressed for detailed assessment after excluding 281 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract). The three 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 new publications were found that contained new data on the molecular characterization of the GHB614 x T304-40 x GHB119 (GLT) cotton and its newly expressed proteins, 2mEPSPS, PAT/*bar*, Cry1Ab and Cry2Ae. Similarly, no new publications were found that suggested any potential adverse effects of GHB614 x T304-40 x GHB119 (GLT) cotton on human health, animal health, or the environment. No issues or topics were identified that would trigger or warrant more specific question formulation or indicate that a systematic review would be of value.

## 8. REFERENCES

No.	Author(s), title, source, edition, year, pages
1.	Devos Y, Guajardo IM, Alvarez F and Glanville J. Explanatory note on literature searching conducted in the context of GMO applications for (renewed) market authorisation and annual post-market environmental monitoring reports on GMOs authorised in the EU market. EFSA supporting publications 2019:EN-1614. 62 pages. doi:10.2903/sp.efsa.2019.EN-1614.



## 9. APPENDICES

### Appendix 1: Database descriptions

Host	File	Description
STN	AGRICOLA	<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

```

FILE 'MEDLINE' ENTERED AT 16:58:41 ON 14 AUG 2023
L1      4 SEA GHB614 OR GHB(W)614 OR BCS-GH002-5 OR BCSGH002-5 OR
        BCS(W)GH002(W)5 OR BCSGH002(W)5 OR BCS-GH002-5 OR BCS(W)GH002(W)
        )5 OR BCSGH002(W)5
L2      4 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR
        BCS-GH004-7 OR BCS(W)GH004(W)7 OR BCS(W)GH004(W)7 OR BCSGH004(W)
        )7 OR BCSGH004(W)7
L3      4 SEA GHB119 OR GHB(W)119 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR
        BCSGH005(W)8 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8
L4      2 SEA GHB614XT304-40XGHB119 OR GHB614.TIME#.T304-40.TIME#.GHB119

L5      4 SEA (L1 AND L2) OR (L2 AND L3) OR (L1 AND L3) OR (L1 AND L2
        AND L3) OR L4
L6      0 SEA GLYTOL OR GLYTOLTM OR GLYTOLRTM OR GLY(W)TOL OR GLY(W)TOLTM
        OR GLY(W)TOLRTM
L7      18 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKR OR LIBERTYLINK
        RTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKR
        OR LIBERTY(W)LINKRTM
L8      6 SEA TWINLINK OR TWINLINKTM OR TWINLINKR OR TWINLINKRTM OR
        TWIN(W)LINK OR TWIN(W)LINKTM OR TWIN(W)LINKR OR TWIN(W)LINKRTM
L9      0 SEA (L6 AND L8) OR (L6 AND L7 AND L8)
L10     14 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS
L11     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)
L12     0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI
        MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S
        YNTHASE OR SYNTHETASE)
L13     422 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR
        ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W) SHIKIMATE
        ) (3W) PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)
L14     514 SEA (PHOSPHOSHIKIMATE(2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK
        IMATE(2W) CARBOXYVINYL(W) TRANSFERASE OR ENOLPYRUVOYL(W) SHIKIMIC (
        3W) PHOSPHOSYNTHASE)
L15     25955 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)
L16     21 SEA L10 OR (((L11 OR L12 OR L13 OR L14)) (S) L15)
L17     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
L18     208 SEA PHOSPHINOTHRICIN(W)N(W) ACETYLTRANSFERASE OR PHOSPHINOTHRICI
        N(2W) ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W) ACETYL(W) TRANSFER
        ASE OR PHOSPHINOTHRICINACETYL(W) TRANSFERASE
L19     981 SEA CRY1AB# OR CRY(W)1(W)AB# OR CRY(W)1AB# OR CRY1(W)AB# OR
        CRY1(W)A(W)B# OR CRY(W)1(W)A(W)B# OR CRY1A(W)B#
L20     115 SEA CRYIAB# OR CRY(W)I(W)AB# OR CRY(W)IAB# OR CRYI(W)AB# OR
        CRYI(W)A(W)B# OR CRY(W)I(W)A(W)B# OR CRYIA(W)B#
L21     36 SEA CRYLAB# OR CRY(W)L(W)AB# OR CRY(W)LAB# OR CRYL(W)AB# OR
        CRYL(W)A(W)B# OR CRY(W)L(W)A(W)B# OR CRYLA(W)B#
L22     2769 SEA (L17 OR L18 OR L19 OR L20 OR L21)
L23     13 SEA CRY2AE# OR CRY(W)2(W)AE# OR CRY(W)2AE# OR CRY2(W)AE# OR
        CRY2(W)A(W)E# OR CRY(W)2(W)A(W)E# OR CRY2A(W)E#
L24     0 SEA CRYIIAE# OR CRY(W)II(W)AE# OR CRY(W)IIAE# OR CRYII(W)AE#
        OR CRYII(W)A(W)E# OR CRY(W)II(W)A(W)E# OR CRYIIA(W)E#
L25     0 SEA CRYLLAE# OR CRY(W)LL(W)AE# OR CRY(W)LLAE# OR CRYLL(W)AE#
        OR CRYLL(W)A(W)E# OR CRY(W)LL(W)A(W)E# OR CRYLLA(W)E#
L26     13 SEA (L23 OR L24 OR L25)
L27     17 SEA (L16 AND L22) OR (L22 AND L26) OR (L16 AND L26) OR (L16
        AND L22 AND L26)
L28     4044 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 33534 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?

L30 227782 SEA INSECT# OR PEST# OR LEPIDOPTERA# OR NOCTUIDAE OR CRAMBIDAE OR BORER# OR CORNBORER# OR STALKBORER# OR EARWORM# OR EAR(W)WORM# OR ARMYWORM# OR ARMY(W)WORM# OR CUTWORM# OR CUT(W)WORM# OR OSTRINIA OR O(W)NUBILALIS OR SESAMIA OR S(W)NONAGRIOIDES

L31 15218 SEA DIATRAEA OR D(W)GRANDIOSELLA OR D(W)CRAMBIDOIDES OR HELICOVERPA OR H(W)ZEA OR SPODOPTERA OR S(W)FRUGIPERDA OR PAPAIPEMA OR P(W)NEBRIS OR ELASMOPALPUS OR E(W)LIGNOSELLUS OR D(W)SACCHARALIS OR STRIACOSTA OR S(W)ALBICOSTA

L32 26443 SEA AGROTIS OR A(W)IPSILON OR S(W)CRETICA OR MYTHIMNA OR M(W)UNIPUNCTA OR ECB OR MCB OR SWCB OR SCSB OR CEW OR FAW OR SCB OR WBC

L33 2707218 SEA (RESIST? OR PROTECT? OR TOLERAN?)

L34 13983 SEA ((L28 OR L29 OR L30 OR L31 OR L32)) (5A)L33

L35 30656 SEA COTTON# OR GOSSYPIUM OR G(W)HIRSUTUM OR G(W)BARBADENSE

L36 4191164 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))

L37 760 SEA L34 AND L35 AND L36

L38 773 SEA L5 OR L9 OR L27 OR L37

L39 139 SEA L38 AND PY>=2021

L40 60 SEA L39 AND UP>=20220701 AND UP<=20230630

FILE 'BIOSIS' ENTERED AT 16:58:57 ON 14 AUG 2023

L41 5 SEA GHB614 OR GHB(W)614 OR BCS-GH002-5 OR BCSGH002-5 OR BCS(W)GH002(W)5 OR BCSGH002(W)5 OR BCS-GH002-5 OR BCS(W)GH002(W)5 OR BCSGH002(W)5

L42 3 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR BCS-GH004-7 OR BCS(W)GH004(W)7 OR BCS(W)GH004(W)7 OR BCSGH004(W)7 OR BCSGH004(W)7

L43 3 SEA GHB119 OR GHB(W)119 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8

L44 0 SEA GHB614XT304-40XGHB119 OR GHB614.TIME#.T304-40.TIME#.GHB119

L45 3 SEA (L41 AND L42) OR (L42 AND L43) OR (L41 AND L43) OR (L41 AND L42 AND L43) OR L44

L46 2 SEA GLYTOL OR GLYTOLTM OR GLYTOLRTM OR GLY(W)TOL OR GLY(W)TOLTM OR GLY(W)TOLRTM

L47 47 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKR OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKR OR LIBERTY(W)LINKRTM

L48 6 SEA TWINLINK OR TWINLINKTM OR TWINLINKR OR TWINLINKRTM OR TWIN(W)LINK OR TWIN(W)LINKTM OR TWIN(W)LINKR OR TWIN(W)LINKRTM

L49 0 SEA (L46 AND L48) OR (L46 AND L47 AND L48)

L50 12 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L51 5185 SEA 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)

L52 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (SYNTHASE 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 PHOSPHOSHIKIMATE (2W) CARBOXYVINYL (W) TRANSFERASE OR ENOLPYRUVOYL (W) SHIKIMIC (3W) PHOSPHOSYNTHASE)

L55 28161 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)

L56 21 SEA L50 OR ((L51 OR L52 OR L53 OR L54)) (S)L55)  
L57 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  
L58 338 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE  
L59 1624 SEA CRY1AB# OR CRY(W)1(W)AB# OR CRY(W)1AB# OR CRY1(W)AB# OR  
CRY1(W)A(W)B# OR CRY(W)1(W)A(W)B# OR CRY1A(W)B#  
L60 229 SEA CRYIAB# OR CRY(W)I(W)AB# OR CRY(W)IAB# OR CRYI(W)AB# OR  
CRYI(W)A(W)B# OR CRY(W)I(W)A(W)B# OR CRYIA(W)B#  
L61 267 SEA CRYLAB# OR CRY(W)L(W)AB# OR CRY(W)LAB# OR CRYL(W)AB# OR  
CRYL(W)A(W)B# OR CRY(W)L(W)A(W)B# OR CRYLA(W)B#  
L62 4937 SEA (L57 OR L58 OR L59 OR L60 OR L61)  
L63 19 SEA CRY2AE# OR CRY(W)2(W)AE# OR CRY(W)2AE# OR CRY2(W)AE# OR  
CRY2(W)A(W)E# OR CRY(W)2(W)A(W)E# OR CRY2A(W)E#  
L64 0 SEA CRYIIAE# OR CRY(W)II(W)AE# OR CRY(W)IIAE# OR CRYII(W)AE#  
OR CRYII(W)A(W)E# OR CRY(W)II(W)A(W)E# OR CRYIIA(W)E#  
L65 0 SEA CRYLLAE# OR CRY(W)LL(W)AE# OR CRY(W)LLAE# OR CRYLL(W)AE#  
OR CRYLL(W)A(W)E# OR CRY(W)LL(W)A(W)E# OR CRYLLA(W)E#  
L66 19 SEA (L63 OR L64 OR L65)  
L67 19 SEA (L56 AND L62) OR (L62 AND L66) OR (L56 AND L66) OR (L56  
AND L62 AND L66)  
L68 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?)  
L69 92948 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN  
ATE OR PHOSPHINOTHRICIN OR LIBERTY?  
L70 1487090 SEA INSECT# OR PEST# OR LEPIDOPTERA# OR NOCTUIDAE OR CRAMBIDAE  
OR BORER# OR CORNBORER# OR STALKBORER# OR EARWORM# OR EAR(W)WOR  
M# OR ARMYWORM# OR ARMY(W)WORM# OR CUTWORM# OR CUT(W)WORM# OR  
OSTRINIA OR O(W)NUBILALIS OR SESAMIA OR S(W)NONAGRIOIDES  
L71 29449 SEA DIATRAEA OR D(W)GRANDIOSELLA OR D(W)CRAMBIDOIDES OR  
HELICOVERPA OR H(W)ZEA OR SPODOPTERA OR S(W)FRUGIPERDA OR  
PAPAIPEMA OR P(W)NEBRIS OR ELASMOPALPUS OR E(W)LIGNOSELLUS OR  
D(W)SACCHARALIS OR STRIACOSTA OR S(W)ALBICOSTA  
L72 37315 SEA AGROTIS OR A(W)IPSILON OR S(W)CRETICA OR MYTHIMNA OR  
M(W)UNIPUNCTA OR ECB OR MCB OR SWCB OR SCSB OR CEW OR FAW OR  
SCB OR WBC  
L73 2631166 SEA (RESIST? OR PROTECT? OR TOLERAN?)  
L74 38586 SEA ((L68 OR L69 OR L70 OR L71 OR L72)) (5A)L73  
L75 79646 SEA COTTON# OR GOSSYPIMUM OR G(W)HIRSUTUM OR G(W)BARBADENSE  
L76 497423 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR  
(GENETIC?(3A) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR  
ENGINEER?))  
L77 1090 SEA L74 AND L75 AND L76  
L78 1106 SEA L45 OR L49 OR L67 OR L77  
L79 127 SEA L78 AND PY>=2021  
L80 51 SEA L79 AND UP>=20220701 AND UP<=20230630

FILE 'AGRICOLA' ENTERED AT 16:59:13 ON 14 AUG 2023

L81 2 SEA GHB614 OR GHB(W)614 OR BCS-GH002-5 OR BCSGH002-5 OR  
BCS(W)GH002(W)5 OR BCSGH002(W)5 OR BCS-GH002-5 OR BCS(W)GH002(W)  
)5 OR BCSGH002(W)5  
L82 3 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR  
BCS-GH004-7 OR BCS(W)GH004(W)7 OR BCS(W)GH004(W)7 OR BCSGH004(W)  
)7 OR BCSGH004(W)7  
L83 2 SEA GHB119 OR GHB(W)119 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR  
BCSGH005(W)8 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8  
L84 1 SEA GHB614XT304-40XGHB119 OR GHB614.TIME#.T304-40.TIME#.GHB119  
L85 2 SEA (L81 AND L82) OR (L82 AND L83) OR (L81 AND L83) OR (L81

AND L82 AND L83) OR L84

L86 2 SEA GLYTOL OR GLYTOLTM OR GLYTOLRTM OR GLY(W)TOL OR GLY(W)TOLTM  
OR GLY(W)TOLRTM

L87 42 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKR OR LIBERTYLINK  
RTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKR  
OR LIBERTY(W)LINKRTM

L88 4 SEA TWINLINK OR TWINLINKTM OR TWINLINKR OR TWINLINKRTM OR  
TWIN(W)LINK OR TWIN(W)LINKTM OR TWIN(W)LINKR OR TWIN(W)LINKRTM

L89 0 SEA (L86 AND L88) OR (L86 AND L87 AND L88)

L90 4 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L91 742 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)

L92 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI  
MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S  
YNTHASE OR SYNTHETASE)

L93 337 SEA (ENOL(W)PYRUVYOYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR  
ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE  
) (3W)PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)

L94 271 SEA (PHOSPHOSHIKIMATE(2W)CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK  
IMATE(2W)CARBOXYVINYL(W)TRANSFERASE OR ENOLPYRUVOYL(W)SHIKIMIC (3W)  
PHOSPHOSYNTHASE)

L95 7076 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)

L96 10 SEA L90 OR ((L91 OR L92 OR L93 OR L94)) (S)L95)

L97 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

L98 258 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI  
N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER  
ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L99 945 SEA CRY1AB# OR CRY(W)1(W)AB# OR CRY(W)1AB# OR CRY1(W)AB# OR  
CRY1(W)A(W)B# OR CRY(W)1(W)A(W)B# OR CRY1A(W)B#

L100 158 SEA CRYIAB# OR CRY(W)I(W)AB# OR CRY(W)IAB# OR CRYI(W)AB# OR  
CRYI(W)A(W)B# OR CRY(W)I(W)A(W)B# OR CRYIA(W)B#

L101 11 SEA CRYLAB# OR CRY(W)L(W)AB# OR CRY(W)LAB# OR CRYL(W)AB# OR  
CRYL(W)A(W)B# OR CRY(W)L(W)A(W)B# OR CRYLA(W)B#

L102 1998 SEA (L97 OR L98 OR L99 OR L100 OR L101)

L103 10 SEA CRY2AE# OR CRY(W)2(W)AE# OR CRY(W)2AE# OR CRY2(W)AE# OR  
CRY2(W)A(W)E# OR CRY(W)2(W)A(W)E# OR CRY2A(W)E#

L104 0 SEA CRYIIAE# OR CRY(W)II(W)AE# OR CRY(W)IIAE# OR CRYII(W)AE#  
OR CRYII(W)A(W)E# OR CRY(W)II(W)A(W)E# OR CRYIIA(W)E#

L105 0 SEA CRYLLAE# OR CRY(W)LL(W)AE# OR CRY(W)LLAE# OR CRYLL(W)AE#  
OR CRYLL(W)A(W)E# OR CRY(W)LL(W)A(W)E# OR CRYLLA(W)E#

L106 10 SEA (L103 OR L104 OR L105)

L107 10 SEA (L96 AND L102) OR (L102 AND L106) OR (L96 AND L106) OR  
(L96 AND L102 AND L106)

L108 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?)

L109 60740 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN  
ATE OR PHOSPHINOTHRICIN OR LIBERTY?

L110 356395 SEA INSECT# OR PEST# OR LEPIDOPTERA# OR NOCTUIDAE OR CRAMBIDAE  
OR BORER# OR CORNBORER# OR STALKBORER# OR EARWORM# OR EAR(W)WORM#  
OR ARMYWORM# OR ARMY(W)WORM# OR CUTWORM# OR CUT(W)WORM# OR  
OSTRINIA OR O(W)NUBILALIS OR SESAMIA OR S(W)NONAGRIOIDES

L111 15343 SEA DIATRAEA OR D(W)GRANDIOSELLA OR D(W)CRAMBIDOIDES OR  
HELICOVERPA OR H(W)ZEA OR SPODOPTERA OR S(W)FRUGIPERDA OR  
PAPAIPEMA OR P(W)NEBRIS OR ELASMOPALPUS OR E(W)LIGNOSELLUS OR  
D(W)SACCHARALIS OR STRIACOSTA OR S(W)ALBICOSTA

L112 8268 SEA AGROTIS OR A(W)IPSILON OR S(W)CRETICA OR MYTHIMNA OR  
M(W)UNIPUNCTA OR ECB OR MCB OR SWCB OR SCSB OR CEW OR FAW OR

SCB OR WBC

L113 716512 SEA (RESIST? OR PROTECT? OR TOLERAN?)

L114 32610 SEA ((L108 OR L109 OR L110 OR L111 OR L112)) (5A)L113

L115 68221 SEA COTTON# OR GOSSYPIMUM OR G(W)HIRSUTUM OR G(W)BARBADENSE

L116 113924 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))

L117 810 SEA L114 AND L115 AND L116

L118 818 SEA L85 OR L89 OR L107 OR L117

L119 56 SEA L118 AND PY>=2021

L120 12 SEA L119 AND UP>=20220701 AND UP<=20230630

FILE 'CABA' ENTERED AT 10:59:29 ON 14 AUG 2023

L121 7 SEA GHB614 OR GHB(W)614 OR BCS-GH002-5 OR BCSGH002-5 OR BCS(W)GH002(W)5 OR BCSGH002(W)5 OR BCS-GH002-5 OR BCS(W)GH002(W)5 OR BCSGH002(W)5

L122 6 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR BCS-GH004-7 OR BCS(W)GH004(W)7 OR BCS(W)GH004(W)7 OR BCSGH004(W)7 OR BCSGH004(W)7

L123 6 SEA GHB119 OR GHB(W)119 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8

L124 2 SEA GHB614XT304-40XGHB119 OR GHB614.TIME#.T304-40.TIME#.GHB119

L125 4 SEA (L121 AND L122) OR (L122 AND L123) OR (L121 AND L123) OR (L121 AND L122 AND L123) OR L124

L126 4 SEA GLYTOL OR GLYTOLTM OR GLYTOLRTM OR GLY(W)TOL OR GLY(W)TOLTM OR GLY(W)TOLRTM

L127 105 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKR OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKR OR LIBERTY(W)LINKRTM

L128 9 SEA TWINLINK OR TWINLINKTM OR TWINLINKR OR TWINLINKRTM OR TWIN(W)LINK OR TWIN(W)LINKTM OR TWIN(W)LINKR OR TWIN(W)LINKRTM

L129 0 SEA (L126 AND L128) OR (L126 AND L127 AND L128)

L130 14 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS

L131 1282 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR ENOL(W)PYRUVYL(W)SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOYLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (4W) (PHOSPHATE OR PHOSPHORIC) (2W) (SYNTHASE OR SYNTHETASE)

L132 0 SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKIMATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (SYNTHASE OR SYNTHETASE)

L133 480 SEA (ENOL(W)PYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W)SHIKIMATE) (3W) PHOSPHATE (W) (SYNTHASE OR SYNTHETASE)

L134 204 SEA (PHOSPHOSHIKIMATE (2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIKIMATE (2W) CARBOXYVINYL (W) TRANSFERASE OR ENOLPYRUVOYL (W) SHIKIMIC (3W) PHOSPHOSYNTHASE)

L135 7813 SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)

L136 24 SEA L130 OR ((L131 OR L132 OR L133 OR L134)) (S)L135)

L137 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

L138 387 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFERASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE

L139 1771 SEA CRY1AB# OR CRY(W)1(W)AB# OR CRY(W)1AB# OR CRY1(W)AB# OR CRY1(W)A(W)B# OR CRY(W)1(W)A(W)B# OR CRY1A(W)B#

L140 221 SEA CRYIAB# OR CRY(W)I(W)AB# OR CRY(W)IAB# OR CRYI(W)AB# OR CRYI(W)A(W)B# OR CRY(W)I(W)A(W)B# OR CRYIA(W)B#

L141 27 SEA CRYLAB# OR CRY(W)L(W)AB# OR CRY(W)LAB# OR CRYL(W)AB# OR CRYL(W)A(W)B# OR CRY(W)L(W)A(W)B# OR CRYLA(W)B#

L142 3719 SEA (L137 OR L138 OR L139 OR L140 OR L141)



L143 17 SEA CRY2AE# OR CRY(W)2(W)AE# OR CRY(W)2AE# OR CRY2(W)AE# OR  
CRY2(W)A(W)E# OR CRY(W)2(W)A(W)E# OR CRY2A(W)E#  
L144 0 SEA CRYIIAE# OR CRY(W)II(W)AE# OR CRY(W)IIAE# OR CRYII(W)AE#  
OR CRYII(W)A(W)E# OR CRY(W)II(W)A(W)E# OR CRYIIA(W)E#  
L145 0 SEA CRYLLAE# OR CRY(W)LL(W)AE# OR CRY(W)LLAE# OR CRYLL(W)AE#  
OR CRYLL(W)A(W)E# OR CRY(W)LL(W)A(W)E# OR CRYLLA(W)E#  
L146 17 SEA (L143 OR L144 OR L145)  
L147 21 SEA (L136 AND L142) OR (L142 AND L146) OR (L136 AND L146) OR  
(L136 AND L142 AND L146)  
L148 20678 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?)  
L149 161334 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN  
ATE OR PHOSPHINOTHRICIN OR LIBERTY?  
L150 992183 SEA INSECT# OR PEST# OR LEPIDOPTERA# OR NOCTUIDAE OR CRAMBIDAE  
OR BORER# OR CORNBORER# OR STALKBORER# OR EARWORM# OR EAR(W)WORM#  
OR ARMYWORM# OR ARMY(W)WORM# OR CUTWORM# OR CUT(W)WORM# OR  
OSTRINIA OR O(W)NUBILALIS OR SESAMIA OR S(W)NONAGRIOIDES  
L151 35477 SEA DIATRAEA OR D(W)GRANDIOSELLA OR D(W)CRAMBIDOIDES OR  
HELICOVERPA OR H(W)ZEA OR SPODOPTERA OR S(W)FRUGIPERDA OR  
PAPAIPEMA OR P(W)NEBRIS OR ELASMOPALPUS OR E(W)LIGNOSELLUS OR  
D(W)SACCHARALIS OR STRIACOSTA OR S(W)ALBICOSTA  
L152 15221 SEA AGROTIS OR A(W)IPSILON OR S(W)CRETICA OR MYTHIMNA OR  
M(W)UNIPUNCTA OR ECB OR MCB OR SWCB OR SCSB OR CEW OR FAW OR  
SCB OR WBC  
L153 1484040 SEA (RESIST? OR PROTECT? OR TOLERAN?)  
L154 93981 SEA ((L148 OR L149 OR L150 OR L151 OR L152)) (5A)L153  
L155 113009 SEA COTTON# OR GOSSYPIMUM OR G(W)HIRSUTUM OR G(W)BARBADENSE  
L156 206061 SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR  
(GENETIC?(3A) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR  
ENGINEER?))  
L157 2590 SEA L154 AND L155 AND L156  
L158 2605 SEA L125 OR L129 OR L147 OR L157  
L159 230 SEA L158 AND PY>=2021  
L160 185 SEA L159 AND UP>=20220701 AND UP<=20230630  
L161 185 SEA L160 NOT P/DT  
L162 0 SEA L160 AND (P/DT AND J/DT)  
L163 185 SEA L161 OR L162

FILE 'HCAPLUS' ENTERED AT 10:59:56 ON 14 AUG 2023

L164 7 SEA GHB614 OR GHB(W)614 OR BCS-GH002-5 OR BCSGH002-5 OR  
BCS(W)GH002(W)5 OR BCSGH002(W)5 OR BCS-GH002-5 OR BCS(W)GH002(W)  
)5 OR BCSGH002(W)5  
L165 4 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR  
BCS-GH004-7 OR BCS(W)GH004(W)7 OR BCS(W)GH004(W)7 OR BCSGH004(W)  
)7 OR BCSGH004(W)7  
L166 7 SEA GHB119 OR GHB(W)119 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR  
BCSGH005(W)8 OR BCS-GH005-8 OR BCS(W)GH005(W)8 OR BCSGH005(W)8  
L167 1 SEA GHB614XT304-40XGHB119 OR GHB614.TIME#.T304-40.TIME#.GHB119  
  
L168 3 SEA (L164 AND L165) OR (L165 AND L166) OR (L164 AND L166) OR  
(L164 AND L165 AND L166) OR L167  
L169 5 SEA GLYTOL OR GLYTOLTM OR GLYTOLRTM OR GLY(W)TOL OR GLY(W)TOLTM  
OR GLY(W)TOLRTM  
L170 53 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKR OR LIBERTYLINK  
RTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKR  
OR LIBERTY(W)LINKRTM  
L171 4 SEA TWINLINK OR TWINLINKTM OR TWINLINKR OR TWINLINKRTM OR  
TWIN(W)LINK OR TWIN(W)LINKTM OR TWIN(W)LINKR OR TWIN(W)LINKRTM  
L172 0 SEA (L169 AND L171) OR (L169 AND L170 AND L171)  
L173 31 SEA 2MEPSPS OR 2(W)MEPSPS OR 2M(W)EPSPS OR 2(W)M(W)EPSPS  
L174 4638 SEA EPSPS OR EPSP(W)SYNTHASE OR (ENOL(W)PYRUVYLSHIKIMATE OR



		ENOL(W) PYRUVYL(W) SHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUV OYLSHIKAMATE OR ENOYL PYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC) (
L175	9	SEA (ENOLPYRUVYL OR ENOLPYRUYL OR ENOLPYRUVOYL) (W) (PHOSPHOSHIKI MATE OR PHOSPHOSHIKIMIC OR ENOLPYRUVYLSHIKIMATEPHOSPHATE) (2W) (S YNTHASE OR SYNTHETASE)
L176	1137	SEA (ENOL(W) PYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMATE OR ENOLPYRUVYLSHIKIMIC OR ENOL(W) (PYRUVYL OR PYRUVOYL) (W) SHIKIMATE ) (3W) PHOSPHATE(W) (SYNTHASE OR SYNTHETASE)
L177	90	SEA (PHOSPHOSHIKIMATE(2W) CARBOXYVINYLTRANSFERASE OR PHOSPHOSHIK IMATE (2W) CARBOXYVINYL(W) TRANSFERASE OR ENOLPYRUVOYL(W) SHIKIMIC (
L178	77345	SEA ((DOUBL# OR DOBL#) (W) (MUTANT# OR MUTAT?) OR 2M)
L179	46	SEA L173 OR ((L174 OR L175 OR L176 OR L177)) (S) L178)
L180	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
L181	810	SEA PHOSPHINOTHRICIN(W) N(W) ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W) ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W) ACETYL(W) TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W) TRANSFERASE
L182	1902	SEA CRY1AB# OR CRY(W) 1(W) AB# OR CRY(W) 1AB# OR CRY1(W) AB# OR CRY1(W) A(W) B# OR CRY(W) 1(W) A(W) B# OR CRY1A(W) B#
L183	1499	SEA CRYIAB# OR CRY(W) I(W) AB# OR CRY(W) IAB# OR CRYI(W) AB# OR CRYI(W) A(W) B# OR CRY(W) I(W) A(W) B# OR CRYIA(W) B#
L184	58	SEA CRYLAB# OR CRY(W) L(W) AB# OR CRY(W) LAB# OR CRYL(W) AB# OR CRYL(W) A(W) B# OR CRY(W) L(W) A(W) B# OR CRYLA(W) B#
L185	8437	SEA (L180 OR L181 OR L182 OR L183 OR L184)
L186	49	SEA CRY2AE# OR CRY(W) 2(W) AE# OR CRY(W) 2AE# OR CRY2(W) AE# OR CRY2(W) A(W) E# OR CRY(W) 2(W) A(W) E# OR CRY2A(W) E#
L187	9	SEA CRYIIAE# OR CRY(W) II(W) AE# OR CRY(W) IIAE# OR CRYII(W) AE# OR CRYII(W) A(W) E# OR CRY(W) II(W) A(W) E# OR CRYIIA(W) E#
L188	0	SEA CRYLLAE# OR CRY(W) LL(W) AE# OR CRY(W) LLAE# OR CRYLL(W) AE# OR CRYLL(W) A(W) E# OR CRY(W) LL(W) A(W) E# OR CRYLLA(W) E#
L189	53	SEA (L186 OR L187 OR L188)
L190	63	SEA (L179 AND L185) OR (L185 AND L189) OR (L179 AND L189) OR (L179 AND L185 AND L189)
L191	32292	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?)
L192	165959	SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN ATE OR PHOSPHINOTHRICIN OR LIBERTY?
L193	344344	SEA INSECT# OR PEST# OR LEPIDOPTERA# OR NOCTUIDAE OR CRAMBIDAE OR BORER# OR CORNBORER# OR STALKBORER# OR EARWORM# OR EAR(W) WOR M# OR ARMYWORM# OR ARMY(W) WORM# OR CUTWORM# OR CUT(W) WORM# OR OSTRINIA OR O(W) NUBILALIS OR SESAMIA OR S(W) NONAGRIOIDES
L194	25716	SEA DIATRAEA OR D(W) GRANDIOSELLA OR D(W) CRAMBIDOIDES OR HELICOVERPA OR H(W) ZEA OR SPODOPTERA OR S(W) FRUGIPERDA OR PAPAIPEMA OR P(W) NEBRIS OR ELASMOPALPUS OR E(W) LIGNOSELLUS OR D(W) SACCHARALIS OR STRIACOSTA OR S(W) ALBICOSTA
L195	29747	SEA AGROTIS OR A(W) IPSILON OR S(W) CRETICA OR MYTHIMNA OR M(W) UNIPUNCTA OR ECB OR MCB OR SWCB OR SCSB OR CEW OR FAW OR SCB OR WBC
L196	6600009	SEA (RESIST? OR PROTECT? OR TOLERAN?)
L197	63766	SEA ((L191 OR L192 OR L193 OR L194 OR L195)) (5A) L196
L198	294683	SEA COTTON# OR GOSSYPIUM OR G(W) HIRSUTUM OR G(W) BARBADENSE
L199	750089	SEA GMO OR GMOS OR LMO OR LMOS OR GM OR GE OR TRANSGEN? OR (GENETIC?(3A) (MODIF? OR TRANSFORM? OR MANIPULAT? OR IMPROV? OR ENGINEER?))
L200	2704	SEA L197 AND L198 AND L199
L201	2746	SEA L168 OR L172 OR L190 OR L200
L202	580	SEA L201 AND PY>=2021
L203	135	SEA L202 AND UP>=20220701 AND UP<=20230630

L204            56 SEA L203 NOT P/DT  
L205            0 SEA L203 AND (P/DT AND J/DT)  
L206            56 SEA L204 OR L205

FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 11:00:14 ON 14  
AUG 2023

L207            284 DUP REM L40 L80 L120 L163 L206 (80 DUPLICATES REMOVED)  
                  ANSWERS '1-60' FROM FILE MEDLINE  
                  ANSWERS '61-103' FROM FILE BIOSIS  
                  ANSWERS '104-113' FROM FILE AGRICOLA  
                  ANSWERS '114-259' FROM FILE CABA  
                  ANSWERS '260-284' FROM FILE HCAPLUS