Title

Summary of the Literature Review for T304-40 cotton
October 1, 2020 – September 30, 2021

Final Report

Data or guideline requirement

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

Completion date

November 9, 2021

Principal author

[redacted]

Report number
21-RSCT0202

Activity ID
RSCT0202

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STUDY PERSONNEL

Electronic database search	[redacted]
Agency website search	GRM
Manual search **(reference list from review articles)**	[redacted]
Stage 1 assessment	[redacted]
Stage 2 assessment	Food and Feed safety [redacted] Molecular characterization [redacted] Environmental safety [redacted]
Report	[redacted]

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SUMMARY

The T304-40 cotton event produces the *Bacillus thuringiensis* subsp. *berliner* Cry1Ab protein that is effective in controlling lepidopteran larvae such as cotton bollworm and tobacco budworm. T304-40 cotton also expresses the herbicide tolerant inert ingredient phosphinothricin acetyl transferase (PAT/*bar*) as a selectable marker which confers tolerance to glufosinate-ammonium herbicides. The OECD identifier is BCS-GHØØ4-7.

A scoping review was performed for the T304-40 cotton and its newly expressed proteins, Cry1Ab and PAT/*bar*. The objective of this scoping review was to determine if there were studies about the molecular characterization of T304-40 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 October 1, 2020 to September 30, 2021. 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 286 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of 12 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 T304-40 cotton and its newly expressed proteins, Cry1Ab and PAT/*bar*. Similarly, no new publications were found that suggested any potential adverse effects of T304-40 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

The T304-40 cotton event produces the *Bacillus thuringiensis* subsp. *berliner* Cry1Ab protein that is effective in controlling lepidopteran larvae such as cotton bollworm and tobacco budworm. T304-40 cotton also expresses the herbicide tolerant inert ingredient phosphinothricin acetyl transferase (PAT/*bar*) as a selectable marker which confers tolerance to glufosinate-ammonium herbicides. The OECD identifier is BCS-GHØØ4-7.

The objective of the literature searches described here was to determine if there were studies published between October 1, 2020 and September 30, 2021 that mention the molecular characterization of the T304-40 cotton, and/or any adverse effect of T304-40 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)[1] applications and post-market environmental monitoring activities (2019).

The literature searches were performed for the T304-40 cotton and its newly expressed proteins, Cry1Ab and PAT/*bar*. The search terms also included relevant synonyms, and intended traits, plant species and general GMO terms.

2. OVERALL METHODS

2.1. Objective of the scoping review

The objective of the scoping review was to survey the evidence base for the T304-40 cotton and its newly expressed proteins, Cry1Ab and PAT/*bar*, 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 T304-40 cotton and its newly expressed proteins Cry1Ab and PAT/*bar*?

Key elements:

Population: Human health; animal health; environmental safety

Exposure (Intervention): T304-40 cotton, derived food/feed products, newly expressed proteins in T304-40 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 T304-40 cotton and its newly expressed proteins Cry1Ab and PAT/*bar* in cotton?

Key elements:

Population: T304-40 cotton and newly expressed proteins in T304-40 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
Additional concepts		

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

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

One publication related to T304-40 cotton was previously identified and used to test and validate the search strategy:

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

Although this article is not directly relevant for the T304-40 event, it was selected as reference publication because it mentions the event (T304-40), one of the newly expressed proteins (PAT/*bar*, phosphinothricin acetyl transferase) 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>=20201001 and UP<=20210930).

3. SEARCH METHODS AND OUTCOMES

The search strategies used here followed the 2019 EFSA explanatory note on literature searching conducted in the context of GMO applications and post-market environmental monitoring activities[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 October 11, 2021. Only documents updated between October 1, 2020 and September 30, 2021, were considered in the search. The dates of most recent database updates are provided in Table 3.

3.2. Databases used in the literature search

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

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

See Appendix 1 for detailed database descriptions.

3.3. Search strategy

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

Table 2: Search profile for database search

Set	Search string	Concepts
1	T304-40 or T304(w)40 or T(w)304(w)40 or BCS-GH004-7 or BCS-GHOO4-7 or BCS(w)GH004(w)7 or BCS(w)GHOO4(w)7 or BCSGH004(w)7 or BCSGHOO4(w)7	Event name
	none	Trade name
2	(((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 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# 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
3	(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	Intended traits

	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)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 (5a) (resist? OR protect? OR toleran?)	
4	cotton# or gossypium or G(w)hirsutum or g(w)barbadense	Plant species
5	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
6	2 and 4	Newly expressed proteins AND Plant species
7	3 and 4 and 5	Intended traits AND Plant species AND GMO general
8	1 or 6 or 7	Event name OR (Newly expressed proteins AND Plant species) OR (Intended traits AND Plant species 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 (Table 3) were not searched separately because they are included in the Basic Index and were captured by the free-text searches.

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

Database	Event	New proteins	Intended traits	Plant species	GM plants
Agricola	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	"GOSSYPIUM BARBADENSE" "GOSSYPIUM HIRSUTUM"	"TRANSGENIC PLANTS"
Biosis	None	None	No terms for herbicide or insect resistance	"GOSSYPIUM BARBADENSE" "GOSSYPIUM HIRSUTUM"	None
CABA	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	"GOSSYPIUM BARBADENSE"/CT "GOSSYPIUM HIRSUTUM"/CT	"TRANSGENIC PLANTS"
CAS	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	GOSSYPIUM/CT	"GENETICALLY MODIFIED PLANTS"
Medline	None	None	"HERBICIDE RESISTANCE" No terms for insect resistance	"GOSSYPIUM BARBADENSE" "GOSSYPIUM HIRSUTUM"	"PLANTS, GENETICALLY MODIFIED"

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

Table 4 summarizes the number of results obtained from each of the databases searched.

See Appendix 2 for a complete search history.

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

Database	AGRICOLA	BIOSIS	CAB Abstracts	CAPLUS	MEDLINE
Database Provider	STN International	STN International	STN International	STN International	STN International
Coverage	1970-present	1926-present	1973-present	1907-present	1946-present
Date of search	11 Oct 2021	11 Oct 2021	11 Oct 2021	11 Oct 2021	11 Oct 2021

Database	AGRICOLA	BIOSIS	CAB Abstracts	CAPLUS	MEDLINE
Datespan of the search	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021
Latest database update	11 Oct 2021	6 Oct 2021	5 Oct 2021	10 Oct 2021	10 Oct 2021
Number of records retrieved	39	85	112	66	71
Number of records after duplicate removal	33	72	84	26	71
Number of *relevant* records after rapid assessment	0	4	3	3	2

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: October 1, 2020 to September 30, 2021) 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. Therefore, the internet search was limited to 11 key organisations relevant for T304-40 cotton. Search terms consisted of T304-40 cotton, BCS-GHØØ4-7, Cry1Ab, PAT/*bar*, or phosphinothricin acetyl transferase (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
US Environmental Protection Agency (EPA)	https://www.epa.gov/	Oct 22, 2021	Oct 22, 2021	0
US Department of Agriculture (USDA)	https://www.usda.gov/	Oct 22, 2021	Oct 22, 2021	0

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
US Food and Drug Administration (FDA)	https://www.fda.gov/	Oct 22, 2021	Oct 22, 2021	0
Health Canada	https://www.canada.ca/en/health-canada.html	Sep 2021	Oct 21, 2021	0
Canadian Food Inspection Agency (CFIA)	https://www.canada.ca/en/food-inspection-agency.html	Sep 2021	Oct 21, 2021	0
Food Standards Australia New Zealand (FSANZ)	http://www.foodstandards.gov.au/Pages/default.aspx	Oct 10, 2021	Oct 10, 2021	0
Office of the Gene Technology Regulator (OGTR) Australia	http://www.ogtr.gov.au/	Oct 10, 2021	Oct 10, 2021	0
National Technical Commission on Biosafety (CTNBio) Brazil	http://ctnbio.mcti.gov.br/en	Oct 2021	Oct 13-15, 2021	0
National Advisory Commission on Agricultural Biotechnology (CONABIA) Argentina	https://www.argentina.gob.ar/agroindustria/bioeconomia/biotecnologia	Oct 1, 2021	Oct 18, 2021	0
Genetic Engineering Approval Committee (GEAC) India	http://moef.gov.in/	Oct 2021	Oct 14, 2021	0
Ministry of Agriculture, Forestry and Fisheries (MAFF) Japan	http://www.maff.go.jp/	Oct 14, 2021	Oct 14, 2021	0

4.2. Manual searches of reference lists of recent review articles

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

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

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
1	Golnar AJ, Ruell E, Lloyd AL, Pepin KM. 2021	Embracing Dynamic Models for Gene Drive Management.	Trends Biotechnol. 2021 Mar;39(3):211-214. doi: 10.1016/j.tibtech.2020.08.011. Epub 2020 Sep 30. PMID: 33010965.	0
2	Gupta S, Kumar A, Patel R, Kumar V. 2021	Genetically modified crop regulations: scope and opportunity using the CRISPR-Cas9 genome editing approach.	Mol Biol Rep. 2021 May;48(5):4851-4863. doi: 10.1007/s11033-021-06477-9. Epub 2021 Jun 10. PMID: 34114124.	0
3	Hadrup N, Frederiksen M, Wedebye EB, Nikolov NG, Carøe TK, Sørli JB, Frydendall KB, Liguori B, Sejbaek CS, Wolkoff P, Flachs EM, Schlünssen V, Meyer HW, Clausen PA, Hougaard KS. 2021	Asthma-inducing potential of 28 substances in spray cleaning products-Assessed by quantitative structure activity relationship (QSAR) testing and literature review.	J Appl Toxicol. 2021 Jul 11. doi:10.1002/jat.4215. Epub ahead of print. PMID: 34247391.	0
4	Kumar V, Guleria P. 2020	Application of DNA-Nanosensor for Environmental Monitoring: Recent Advances and Perspectives.	Curr Pollut Rep. 2020 Dec 12:1-21. doi: 10.1007/s40726-020-00165-1. Epub ahead of print. PMID: 33344145; PMCID: PMC7732738.	0
5	Hameed A, Mehmood MA, Shahid M, Fatma S, Khan A, Ali S. 2020	Prospects for potato genome editing to engineer resistance against viruses and cold-induced sweetening.	GM Crops Food. 2020 Oct 1;11(4):185-205. doi: 10.1080/21645698.2019.1631115. Epub 2019 Jul 6. PMID: 31280681; PMCID: PMC7518746.	0
6	Leska A, Nowak A, Nowak I, Górczyńska A. 2021	Effects of Insecticides and Microbiological Contaminants on *Apis mellifera*.	Health. Molecules. 2021 Aug 22;26(16):5080. doi: 10.3390/molecules26165080. PMID: 34443668; PMCID: PMC8398688	0
7	Madzak C. 2021	*Yarrowia lipolytica* Strains and Their Biotechnological	J Fungi (Basel). 2021 Jul 10;7(7):548.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
		Applications: How Natural Biodiversity and Metabolic Engineering Could Contribute to Cell Factories Improvement.	doi: 10.3390/jof7070548. PMID: 34356927; PMCID: PMC8307478.	
8	Menz J, Modrzejewski D, Hartung F, Wilhelm R, Sprink T. 2020	Genome Edited Crops Touch the Market: A View on the Global Development and Regulatory Environment.	Front Plant Sci. 2020 Oct 9;11:586027. doi: 10.3389/fpls.2020.586027. PMID:33163013; PMCID: PMC7581933.	0
9	Mushtaq M, Ahmad Dar A, Skalicky M, Tyagi A, Bhagat N, Basu U, Bhat BA, Zaid A, Ali S, Dar TU, Rai GK, Wani SH, Habib-Ur-Rahman M, Hejnak V, Vachova P, Brestic M, Çığ A, Çığ F, Erman M, El Sabagh A. 2021	CRISPR-Based Genome Editing Tools: Insights into Technological Breakthroughs and Future Challenges.	Genes (Basel). 2021 May 24;12(6):797. doi: 10.3390/genes12060797. PMID: 34073848; PMCID: PMC8225059.	0
10	Okoli AS, Blix T, Myhr AI, Xu W, Xu X. 2021	Sustainable use of CRISPR/Cas in fish aquaculture: the biosafety perspective.	Transgenic Res. 2021 Jul 25. doi:10.1007/s11248-021-00274-7. Epub ahead of print. PMID: 34304349.	0
11	Teferra TF. 2021	Should we still worry about the safety of GMO foods? Why and why not? A review.	Food Sci Nutr. 2021 Jul 27;9(9):5324-5331. doi: 10.1002/fsn3.2499. PMID: 34532037; PMCID: PMC8441473.	0
12	Turnbull C, Lillemo M, Hvoslef-Eide TAK. 2021	Global Regulation of Genetically Modified Crops Amid the Gene Edited Crop Boom - A Review. .	Front Plant Sci. 2021 Feb 24;12:630396. doi: 10.3389/fpls.2021.630396. PMID: 33719302; PMCID: PMC7943453	0
13	Woźniak E, Tyczewska A, Twardowski T. 2021	A Shift Towards Biotechnology: Social Opinion in the EU.	Trends Biotechnol. 2021 Mar;39(3):214-218. doi: 10.1016/j.tibtech.2020.08.001. Epub 2020 Sep 4. PMID: 32896439.	0

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
14	Zhang Y, Restall J, Crisp P, Godwin I, Liu G. 2021	Current status and prospects of plant genome editing in Australia.	In Vitro Cell Dev Biol Plant. 2021 May 24:1-10. doi: 10.1007/s11627-021-10188-y. Epub ahead of print. PMID: 34054265; PMCID: PMC8143062.	0

5. RESULTS OF THE STUDY IDENTIFICATION AND SELECTION PROCESS

The database searches (Section 3) identified a total of 373 references, which were reduced to 286 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 the 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 resistant GM crops, other insect resistant GM crops, unrelated topics, etc.

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

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

5.2. Detailed assessment of eligible references (Stage 2)

Publications tagged as "Relevant" in Stage 1 were assessed in detail independently by two scientific experts in each of three corresponding areas (i.e., Molecular Biology, Food and Feed Safety, Environmental Safety), based on the full text of the publications. If opinions of relevance differed between 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 T304-40 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)	286
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	274
Total number of full-text documents assessed in detail	12
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	12
Total number of unobtainable/unclear publications	0
Total number of relevant publications	0

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

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

Main category of information/data requirement	Study Author(s). Year	Title
Molecular Characterization	No studies in this category	
Food & Feed Safety	No studies in this category	
Environmental Safety	No studies 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
Ahmad, Syed Faisal Gulzar, Asim Tariq, Muhammad Asad, Muhammad Javaid. 2021	Field Evolved Resistance in Earias vittella (*Lepidoptera : Noctuidae*) From Punjab, Pakistan Against Commercial Formulations of *Bacillus thuringiensis kurstaki*.	Journal of economic entomology, (2021 Jul 16) . Electronic Publication Date: 16 Jul 2021 Journal code: 2985127R. E-ISSN: 1938-291X. L-ISSN: 0022-0493.	The authors assessed the resistance level of the spotted bollworm *Earias vittella* to four commercial Bt formulations containing different strains of *B. thuringiensis* subspecies *kurstaki (Btk)* with a range of Cry toxins. The study is not related to the ERA of T304-40.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Chen, Yuan. Liu, Zhen-yu. Tambel, Leila I. M. Zhang, Xiang. Chen, Yuan. Chen De-hua. 2021	Reduced square *Bacillus thuringiensis* insecticidal protein content of transgenic cotton under N deficit.	Journal of Integrative Agriculture, (JAN 2021) Vol. 20, No. 1, pp. 100-108. http://www.elsevier.com/wps/find/journaldescription.cws_home/727934/description#description. ISSN: 2095-3119.	The T304-40 cotton event was not included in this study.
Eum, Soon-Jae Kim, Il Ryong Lim, Hye Song Lee, Jung Ro Choi, Wonkyun. 2020	Event-specific multiplex PCR method for four genetically modified cotton varieties, and its application	Pure and Applied Biology (2020), Volume 9, Number 4, pp. 2182-2189, 15 refs. ISSN: 2304-2478 DOI: https://doi.org/10.19045/bspab.2020.90233 Published by: International Society of Pure and Applied Biology, Quetta	The authors aimed to develop a method to simultaneously detect four GM cotton varieties (COT102, T304-40, MON88701, and DAS-81910-7) in order to establish a screening system for cotton volunteers in South Korea. To validate the developed method, they applied the limit of detection, randomly mixed reference materials (RMs), and living modified organism (LMO) monitoring sample analysis. The study does not provide any new data related to molecular characterization. It is not related to the ERA of T304-40 cotton.
Fast, Brandon J; Shan, Guomin; Herman, Rod A; Gampala, Satyalinga Srinivas. 2020	Transgene expression in sprayed and non-sprayed herbicide-tolerant genetically engineered crops is equivalent.	Regulatory toxicology and pharmacology: RTP, (2020 Mar) Vol. 111, pp. 104572. Electronic Publication Date: 26 Dec 2019 Journal code: 8214983. E-ISSN: 1096-0295. L-ISSN: 0273-2300.	The T304-40 cotton event was not included in this study.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Hernandez-Teran, Alejandra Wegier, Ana Benitez, Mariana Lira, Rafael Sosa Fuentes, Tania Gabriela Escalante, Ana E. 2020	In vitro performance in cotton plants with different genetic backgrounds: the case of *Gossypium hirsutum* in Mexico, and its implications for germplasm conservation.	Science of the Total Environment, (APR 1 2020) Vol. 711, pp. Article No.: 134855. https://www.sciencedirect.com/journal/science-of-the-total- environment. CODEN: STENDL. ISSN: 0048-9697. E-ISSN: 1879-1026.	The authors evaluated and compared in vitro performance of wild and domesticated cotton populations in Mexico and its relationship with transgenes (Cry1Ab/Ac, Cry2Ab and CP4EPSPS). The study is not related to the ERA of T304-40 cotton.
Pan, Xiaoping. 2019	Determining pollen-mediated gene flow in transgenic cotton	Methods in Molecular Biology (New York, NY, United States) (2019), 1902(Transgenic Cotton), 309-321 CODEN: MMBIED; ISSN: 1940-6029	The authors use transgenic IR and HT cotton as two examples to present a field practice method for determining transgene flow in cotton. The study does not present primary data, and it is not related to the ERA of T304-40 cotton and not related to the ERA of T304-40.
Raeman, Reben. Hua, Gang Zhang, Qi. Adang, Michael J. 2020	Fluorescent analyses of Bacillus thuringiensis Cry1Fa and Cry1Ab toxin binding sites on brush border membrane vesicles of Ostrinia nubilalis (Hubner), Diatraea grandiosella (Dyar), and Helicoverpa zea (Boddie) larvae.	Pesticide Biochemistry and Physiology, (JUL 2020) Vol. 167, pp. Article No.: 104592. http://www.journals.elsevier.com/pesticide-biochemistry-and-physiology/#description. CODEN: PCBPBS. ISSN: 0048-3575. E-ISSN: 1095-9939.	In this study a fluorescence-based binding assay was developed to assess Cry1Fa and Cry1Ab toxin binding to brush border membrane preparations from lepidopteran corn target pests. The study is not related to a safety assessment of T304-40 or the Cry1Ab protein.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Saeed, Ahmad. Saghir, Ahmad. Zia, Z. U. Shahid, M. R. Tipu, A. L. Wajid Nazeer. Abdul Jabbar Ghayour Ahmad. Sadiq, M. A. Muhammad Shahid. Muhammad Akram. Saleem, M. A. 2020	Insecticidal effects on pollinator's population and pollen mediated gene flow from transgenic to non-transgenic cotton genotypes.	Pure and Applied Biology (2020), Volume 9, Number 4, pp. 2182-2189, 15 refs. ISSN: 2304-2478 DOI: https://doi.org/10.19045/bspab.2020.90233 Published by: International Society of Pure and Applied Biology, Quetta	The authors evaluated pesticide risks on pollinators and the ultimate effect of pollinators on cotton refuge crop in Pakistan. The GM cotton used was the hybrid MNH-886 [FH - 207 × MNH- 770) × Bollgard] that express Cry1Ac. The study is not related to the ERA of T304-40 cotton.
Silva, I. H. S. da Gomez, I. Pacheco, S. Sanchez, J. Zhang Jie Castellane, T. C. L. Desiderio, J. A. Soberon, M. Bravo, A. Polanczyk, R. A. da Silva, I. H. S. Zhang, J. 2021	Bacillus thuringiensis Cry1AB domain III β-16 is involved in binding to prohibitin, which correlates with toxicity against Helicoverpa armigera (Lepidoptera: Noctuidae).	Applied and Environmental Microbiology (2021), Volume 87, Number 2, 67 refs. ISSN: 0099-2240; 1098-5336 DOI: https://doi.org/10.1128/AEM.01930-20 Published by: American Society for Microbiology (ASM), Washington, D.C.	The study was an in vitro study using heterologously expressed Bt toxin and brush border membrane vesicles (BBMV) prepared from pest. It was not relevant to any specific crop. The study is not related to a safety assessment of T304-40 event.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Vazquez-Barrios, Valeria Boege, Karina Sosa-Fuentes, Tania Gabriela Rojas, Patricia Wegier, Ana. 2019	Ongoing ecological and evolutionary consequences by the presence of transgenes in a wild cotton population	PeerJ, (JUN 10 2019) Vol. 7, pp. Article No.: e7017. https://peerj.com/. ISSN: 2167-8359. E-ISSN: 2167-8359.	The authors analyzed three wild cotton genotypes, two of which are introgressed plants with transgenes. All of them are growing in the species centre of origin: (1) wild genotypes without transgenes; (2) wild genotypes with cry; and (3) wild genotypes with cp4-epsps. The inducibility of extrafloral nectar (EFN) after exogenous application of methyl jasmonate (MeJA) and the response of the ant community and herbivore damage associated with the three cotton genotypes was inestigated. The study is not related to the ERA of T304-40 cotton.
Yan, Shuo. Yu, Jian. Han, Min Michaud, J. P. Guo, Li-Lei Li, Zhen, Zeng, Bo. Zhang, Qing-Wen. Liu, Xiao-Xia. 2020	Intercrops can mitigate pollen-mediated gene flow from transgenic cotton while simultaneously reducing pest densities.	Science of the Total Environment, (APR 1 2020) Vol. 711, pp. Article No.: 134855. https://www.sciencedirect.com/journal/science-of-the-total- environment. CODEN: STENDL. ISSN: 0048-9697. E-ISSN: 1879-1026.	The authors aimed to determine the potential for PGF (pollen mediated gene flow) from GM cotton to susceptible plants in typical Chinese agricultural settings, and the degree to which it might vary as a function of different intercrops. The GM cotton used was Zhongmiansuo79. The study is not related to the ERA of T304-40 cotton.
Zhang Xiang. Tian QiaoFeng Zhao ZiXu. Dong ZhaoDi Chen Yuan. Chen DeHua Zhang, X. Tian, Q. F. Zhao, Z. X. Dong, Z. di Chen, Y. Chen, de H. 2020	Analysis of differentially expressed proteins affecting insecticidal protein content in Bt cotton under high-temperature and water deficit stress using label-free quantitation.	Journal of Agronomy and Crop Science (2020), Volume 207, Number 1, pp. 1-11 ISSN: 0931-2250; 1439-037X DOI: https://doi.org/10.1111/jac.12438 Published by: Wiley, Berlin	The T304-40 cotton event was not included in this study.

Table 10: Report of unobtainable/unclear publications

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

6. NARRATIVE SYNTHESIS/SUMMARY OF RELEVANT STUDIES

A total of 286 publications were selected during Stage 1 evaluation (rapid assessment based on title and abstract). After Stage 2 evaluation (detailed review based on full text), it was determined that no publications were relevant for the safety assessment of the T304-40 cotton and its newly expressed proteins Cry1Ab and PAT/*bar*.

7. CONCLUSION

The literature searches performed for the T304-40 cotton and its newly expressed proteins, Cry1Ab and PAT/*bar*, for the period from October 1, 2020 to September 30, 2021, identified a total of 286 unique publications (after duplicate removal). A total of 12 publications were progressed for detailed assessment after excluding 274 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The 12 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 T304-40 cotton and its newly expressed proteins, Cry1Ab and PAT/*bar*. Similarly, no new publications were found that suggested any potential adverse effects of T304-40 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	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. 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.
STN	BIOSIS	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. 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. Bibliographic information, indexing terms, abstracts, and CAS Registry Numbers are all searchable.
STN	CABA/CAB	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. Sources for CABA include journals, books, reports, published theses, conference proceedings, and patents. Bibliographic information, indexing terms, abstracts, and CAS Registry Numbers are searchable.
STN	CAS-CA/CAPLUS	The Chemical Abstracts (CA) database covers all areas of Biochemistry, Chemistry and Chemical engineering, and related sciences. 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. Bibliographic terms, indexing terms, roles, CAS Registry Numbers, International Patent Classification, and abstracts are searchable.

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

Appendix 2 Search history

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     FILE 'MEDLINE' ENTERED AT 14:37:54 ON 11 OCT 2021
L1             4 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR
                  BCS-GHOO4-7 OR BCS(W)GH004(W)7 OR BCS(W)GHOO4(W)7 OR BCSGH004(W
                  )7 OR BCSGHOO4(W)7
L2          1460 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
L3           203 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
                  N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
                  ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L4           913 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#
L5           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#
L6            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#
L7          2568 SEA (L2 OR L3 OR L4 OR L5 OR L6)
L8         30346 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN
                  ATE OR PHOSPHINOTHRICIN OR LIBERTY?
L9        208149 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
L10        14032 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
L11        22808 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
L12      2408030 SEA (RESIST? OR PROTECT? OR TOLERAN?)
L13        11549 SEA ((L8 OR L9 OR L10 OR L11))(5A)L12
L14        26882 SEA COTTON# OR GOSSYPIUM OR G(W)HIRSUTUM OR G(W)BARBADENSE
L15      3821686 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?))
L16           73 SEA L7 AND L14
L17          653 SEA L13 AND L14 AND L15
L18          692 SEA L1 OR L16 OR L17
L19          128 SEA L18 AND PY>=2019
L20           71 SEA L19 AND UP>=20201001 AND UP<=20210930

     FILE 'BIOSIS' ENTERED AT 14:38:40 ON 11 OCT 2021
L21            2 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR
                  BCS-GHOO4-7 OR BCS(W)GH004(W)7 OR BCS(W)GHOO4(W)7 OR BCSGH004(W
                  )7 OR BCSGHOO4(W)7
L22         2837 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
L23          332 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
                  N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
                  ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L24         1543 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#
L25          228 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#
L26          263 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#
L27         4696 SEA (L22 OR L23 OR L24 OR L25 OR L26)
L28        88591 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN
                  ATE OR PHOSPHINOTHRICIN OR LIBERTY?
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L29     1424729 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
L30       27327 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
L31       32862 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
L32     2411544 SEA (RESIST? OR PROTECT? OR TOLERAN?)
L33       34015 SEA ((L28 OR L29 OR L30 OR L31))(5A)L32
L34       75276 SEA COTTON# OR GOSSYPIUM OR G(W)HIRSUTUM OR G(W)BARBADENSE
L35      465984 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?))
L36         192 SEA L27 AND L34
L37         964 SEA L33 AND L34 AND L35
L38        1081 SEA L21 OR L36 OR L37
L39         129 SEA L38 AND PY>=2019
L40          85 SEA L39 AND UP>=20201001 AND UP<=20210930

     FILE 'AGRICOLA' ENTERED AT 14:39:21 ON 11 OCT 2021
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                BCS-GHOO4-7 OR BCS(W)GH004(W)7 OR BCS(W)GHOO4(W)7 OR BCSGH004(W
                )7 OR BCSGHOO4(W)7
L42         779 SEA ((BAR OR PAT)(2A)(GENE# OR PROTEIN# OR ENZYME#)) OR
                PPT(2W)ACETYLTRANSFERASE OR PPT(2W)ACETYL(W)TRANSFERASE OR
                PT(W)N(2W)ACETYLTRANSFERASE OR PT(W)N(2W)ACETYL(W)TRANSFERASE
L43         252 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
                N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
                ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L44         903 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#
L45         156 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#
L46          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#
L47        1903 SEA (L42 OR L43 OR L44 OR L45 OR L46)
L48       57413 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN
                ATE OR PHOSPHINOTHRICIN OR LIBERTY?
L49      337276 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
L50       14234 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
L51        4888 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
L52      622092 SEA (RESIST? OR PROTECT? OR TOLERAN?)
L53       29680 SEA ((L48 OR L49 OR L50 OR L51))(5A)L52
L54       64263 SEA COTTON# OR GOSSYPIUM OR G(W)HIRSUTUM OR G(W)BARBADENSE
L55      103308 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?))
L56         100 SEA L47 AND L54
L57         751 SEA L53 AND L54 AND L55
L58         810 SEA L41 OR L56 OR L57
L59          59 SEA L58 AND PY>=2019
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L60          39 SEA L59 AND UP>=20201001 AND UP<=20210930

     FILE 'CABA' ENTERED AT 14:40:43 ON 11 OCT 2021
L61           6 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR
                BCS-GHOO4-7 OR BCS(W)GH004(W)7 OR BCS(W)GHOO4(W)7 OR BCSGH004(W
                )7 OR BCSGHOO4(W)7
L62        1540 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
L63         378 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
                N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
                ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L64        1670 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#
L65         219 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#
L66          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#
L67        3514 SEA (L62 OR L63 OR L64 OR L65 OR L66)
L68      152910 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN
                ATE OR PHOSPHINOTHRICIN OR LIBERTY?
L69      923687 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
L70        32661 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
L71        13266 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
L72      1307757 SEA (RESIST? OR PROTECT? OR TOLERAN?)
L73        86416 SEA ((L68 OR L69 OR L70 OR L71))(5A)L72
L74        96175 SEA COTTON# OR GOSSYPIUM OR G(W)HIRSUTUM OR G(W)BARBADENSE
L75       184643 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?))
L76          224 SEA L67 AND L74
L77         2233 SEA L73 AND L74 AND L75
L78         2354 SEA L61 OR L76 OR L77
L79          198 SEA L78 AND PY>=2019
L80          112 SEA L79 AND UP>=20201001 AND UP<=20210930
L81          112 SEA L80 NOT P/DT
L82            0 SEA L80 AND (P/DT AND J/DT)
L83          112 SEA L81 OR L82

     FILE 'HCAPLUS' ENTERED AT 14:41:47 ON 11 OCT 2021
L84            4 SEA T304-40 OR T304(W)40 OR T(W)304(W)40 OR BCS-GH004-7 OR
                BCS-GHOO4-7 OR BCS(W)GH004(W)7 OR BCS(W)GHOO4(W)7 OR BCSGH004(W
                )7 OR BCSGHOO4(W)7
L85         5210 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
L86          783 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI
                N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER
                ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L87         1792 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#
L88         1402 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#
L89           57 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#
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L90         7761 SEA (L85 OR L86 OR L87 OR L88 OR L89)
L91       155295 SEA HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR GLUPHOSIN
                 ATE OR PHOSPHINOTHRICIN OR LIBERTY?
L92       309866 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
L93        23058 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
L94        24164 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
L95      5857452 SEA (RESIST? OR PROTECT? OR TOLERAN?)
L96        55733 SEA ((L91 OR L92 OR L93 OR L94))(5A)L95
L97       266122 SEA COTTON# OR GOSSYPIUM OR G(W)HIRSUTUM OR G(W)BARBADENSE
L98       692665 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?))
L99          488 SEA L90 AND L97
L100        2420 SEA L96 AND L97 AND L98
L101        2660 SEA L84 OR L99 OR L100
L102         680 SEA L101 AND PY>=2019
L103         124 SEA L102 AND UP>=20201001 AND UP<=20210930
L104          66 SEA L103 NOT P/DT
L105           0 SEA L103 AND (P/DT AND J/DT)
L106          66 SEA L104 OR L105

     FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 14:42:33 ON 11
     OCT 2021
                 SET NOTICE DISPLAY LOGIN
                 SET NOTICE SEARCH LOGIN
L107         286 DUP REM L20 L40 L60 L83 L106 (87 DUPLICATES REMOVED)
                       ANSWERS '1-71' FROM FILE MEDLINE
                       ANSWERS '72-143' FROM FILE BIOSIS
                       ANSWERS '144-176' FROM FILE AGRICOLA
                       ANSWERS '177-260' FROM FILE CABA
                       ANSWERS '261-286' FROM FILE HCAPLUS
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