Title

Summary of the Literature Review for T25 corn
October 1, 2020 – September 30, 2021

Final Report

Data or guideline requirement

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

Principal author: [redacted] Date 2021-11-25
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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

Zea mays (maize, corn) plants were transformed by direct gene transfer using transformation vector pUC/Ac, carrying a phosphinothricin acetyltransferase (*pat*) gene and a beta-lactamase (*bla*) gene cassette. The *pat* gene encodes the phosphinothricin acetyltransferase (PAT/*pat*) protein conferring tolerance to glufosinate-ammonium herbicides. The *bla* gene is not expressed in T25 plants. The OECD unique identifier is ACS-ZMØØ3-2.

A scoping review was performed for T25 corn and its newly expressed protein, phosphinothricin acetyltransferase. The objective of this scoping review was to determine if there were studies about the molecular characterization of T25 corn, its effect on food and feed safety or environmental safety, that might require an in-depth examination. A set of broad literature searches was performed using several bibliographic databases covering the scientific literature from October 1, 2020 to September 30, 2021. Additional sources of information, such as web pages of food safety, agriculture, and biotechnology-related regulatory authorities were searched for the same time window, along with the bibliographies of relevant reviews. The references identified were evaluated for potential relevance to the scoping review questions according to pre-defined criteria.

These literature searches identified a total of 547 unique publications, which were subject to rapid assessment to exclude obviously irrelevant publications. A total of 8 publications were progressed for detailed assessment.

None of the 8 publications was determined to be relevant after detailed review. There was no new data on molecular characterization of T25 corn, or the phosphinothricin acetyltransferase protein, nor any potential adverse effects on human and animal health or on the environment. No evidence was identified that would warrant conducting a systematic review.

In summary, these literature searches and review of the retrieved articles did not identify relevant publications regarding the safety assessment of T25 corn.

1. INTRODUCTION

Zea mays (maize, corn) plants were transformed by direct gene transfer using transformation vector pUC/Ac, carrying a phosphinothricin acetyltransferase (*pat*) gene and a beta-lactamase (*bla*) gene cassette. The *pat* gene encodes the phosphinothricin acetyltransferase (PAT/*pat*) protein conferring tolerance to glufosinate-ammonium herbicides. The *bla* gene is not expressed in T25 plants. The OECD unique identifier is ACS-ZMØØ3-2.

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 T25 corn, and/or any adverse effect of T25 corn in food, feed or the environment. In that context, a broad and inclusive literature search was performed as a scoping review, and the articles retrieved were reviewed in a comprehensive and transparent manner. The literature review was performed as recommended in the European Food Safety Authority (EFSA) explanatory note on literature searching conducted in the context of Genetically Modified Organisms (GMO)[1] applications and post-market environmental monitoring activities (2019).

The literature searches were performed for T25 corn and its newly expressed protein, phosphinothricin acetyltransferase. The search terms also included relevant synonyms, trade name and intended trait, plant species and general GMO terms.

2. OVERALL METHODS

2.1. Objective of the scoping review

The objective of the scoping review was to survey the evidence base for T25 corn and its newly expressed protein, phosphinothricin acetyltransferase, in order to identify any specific issues related to food or feed safety, molecular characterization or environmental safety that might require an 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 T25 corn and its newly expressed protein phosphinothricin acetyltransferase?

Key elements:

Population: Human health; animal health; environmental safety
Exposure: T25 corn, derived food/feed products, newly expressed protein in T25 corn
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 T25 corn and its newly expressed protein phosphinothricin acetyltransferase in corn?

Key elements:

Population: T25 corn and newly expressed protein in T25 corn
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.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

No relevant publications for T25 corn were known before starting the search, therefore, a related publication was used as the reference publication. This publication includes the intended trait (glufosinate resistance) and the crop of interest (corn).

- Krenchinski FH; Carbonari CA; Cesco VJ; Albrecht AJ; Campos Arcuri ML; de Godoy MI; Velini ED (2018). Glufosinate resistance level is proportional to phosphinothricin acetyltransferase gene expression in glufosinate-resistant maize. Journal of Agriculture and Food Chemistry 66(48):12641-12650

Since this article was published outside the search period, the search profiles were tested excluding the time limitation 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 18, 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, trade name, newly expressed protein and intended trait. Since the 'trade name', the 'newly expressed proteins' and the 'intended trait' profiles produced too many results when used on their own, they were combined with additonal profiles: the 'trade name' and 'newly expressed proteins' profiles were combined with a 'plant species' profile while the 'intended trait' profile was combined with a 'general GMO' profile as well as with the 'plant species' profile. The reference publication (Section 2.4) was identified by the search profile, confirming the validity of the applied search strategy. See Table 2 for a detailed search profile.

Table 2: Search profile for database search

Set	Search string	Concepts
1	T25 or T(w)25 or ACS-ZMØØ3-2 or ACS-ZM003-2 or ACS-ZMOO3-2 or ACS(w)ZMØØ3(w)2 or ACS(w)ZM003(w)2 or ACS(w)ZMOO3(w)2 or ACSZMØØ3-2 or ACSZM003-2 or ACSZMOO3-2	Event name
2	libertylink or libertylinktm or libertylinkrtm or liberty(w)link or liberty(w)linktm or liberty(w)linkrtm or LL or LLTM or LLRTM	Trade name
3	((bar or pat)(2a)(gene# or protein# or enzyme#)) or ppt(2w)acetyltransferase or ppt(2w)acetyl(w)transferase or pt(w)n(2w)acetyltransferase or pt(w)n(2w)acetyl(w)transferase or phosphinothricin(w)n(w)acetyltransferase or phosphinothricin(2w)acetyltransferase or phosphinothricin(2w)acetyl(w)transferase or phosphinothricinacetyl(w)transferase	Newly expressed protein
4	(herbicid? or bialaphos or basta or glufosinate or phosphinothricin or liberty?)(5a)(resist? or toleran? or protect?)	Intended trait
5	corn# or maize# or maiz or zea(w)mays or z(w)mays or chardon	Plant species
6	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
7	2 AND 5	Trade name AND Plant species

8	3 AND 5	Newly expressed protein AND Plant species
9	4 AND 5 AND 6	Intended trait AND Plant species AND GMO general
10	1 or 7 or 8 or 9	Event name OR (Trade name AND plant species) OR (Newly expressed protein AND Plant species) OR (Intended trait 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"	CORN, MAIZE, "ZEA MAYS"	"TRANSGENIC PLANTS"
Biosis	None	None	No terms	None	None
CABA	None	None	"HERBICIDE RESISTANCE"	MAIZE	"TRANSGENIC PLANTS"
CAS	None	None	"HERBICIDE RESISTANCE"	CORN "ZEA MAYS"	"GENETICALLY MODIFIED PLANTS"
Medline	None	None	"HERBICIDE RESISTANCE"	"ZEA MAYS"	"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	18 Oct 2021	18 Oct 2021	18 Oct 2021	18 Oct 2021	18 Oct 2021
Datespan of the search	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021	1 Oct 2020 – 30 Sept 2021
Latest database update	11 Oct 2021	13 Oct 2021	5 Oct 2021	17 Oct 2021	17 Oct 2021
Number of records retrieved	62	125	114	266	148
Number of records after duplicate removal	50	87	61	201	148
Number of *relevant* records after rapid assessment	1	1	2	1	3

4. INTERNET and MANUAL SEARCHES

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

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

2021) or that referred to relevant records published during this time frame. Relevance of results was determined based on the criteria listed in Table 1 and are summarized in Table 5. All web pages searched were justified by their recommendation in the EFSA 2019 explanatory note[1]. Of the thirteen 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 US-EPA website was excluded, since T25 corn does not contain an insect-resistant trait. The GEAC website was excluded, since this agency has only regulated GM cotton products. Therefore, the internet search was limited to nine key organisations relevant for T25 corn. Search terms consisted of T25 or LibertyLink corn, or ACS-ZMØØ3-2, PAT/*pat* or phosphinothricin (all searched singly, with no search limits applied).

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

Source Site Name	Website URL	Date of Most Recent Site Update	Date of Search	No. of Relevant Records
US Department of Agriculture (USDA)	https://www.usda.gov/	Oct. 22, 2021	Oct. 22, 2021	0
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	Sept. 2021	Oct. 21, 2021	0
Canadian Food Inspection Agency (CFIA)	https://www.canada.ca/en/food-inspection-agency.html	Sept. 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
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 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

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

No	Author(s) and Year	Title	Source	Number of relevant bibliographic references retrieved
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
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 715 references, which were reduced to 547 after removal of duplicates (Table 4). No additional studies were identified in the manual searches (Section 4).

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

All references identified in the database searches described in Section 3 were assessed for relevance based on information in their title and abstract by two reviewers independently. If opinions of relevance differed, the discrepancies were discussed between the reviewers and if a disagreement had persisted, the publication in queston was transferred to Stage 2 for a 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 authorities
- Articles on non-relevant topics like detection methods, socio-economic implications of GM crops, GM policy, agronomical performance, other herbicide resistant GM crops, other insect resistant GM crops, unrelated topics, etc.

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

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

5.2. Detailed assessment of eligible references (Stage 2)

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

Table 7 gives an overview of the reference selection process and results of the detailed assessment.

Table 7: Results of the publication selection process

Total number of publications retrieved after all searches of the scientific literature (excluding duplicates)	547
Number of publications excluded from the search results after rapid assessment for relevance (Stage 1)	539
Total number of full-text documents assessed in detail	8
Number of publications excluded from further consideration after detailed assessment for relevance (Stage 2)	8
Total number of unobtainable/unclear publications	0
Total number of relevant publications	0

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

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

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

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

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Carlson, A. B. Mukerji, P. Mathesius, C. A. Huang, E. Herman, R. A. Hoban, D. Thurman, J. D. Roper, J. M. 2020	DP-2O2216-6 maize does not adversely affect rats in a 90-day feeding study.	Regulatory Toxicology and Pharmacology (2020), Volume 117, 50 refs. ISSN: 0273-2300 DOI: 10.1016/j.yrtph.2020.104779 Published by: Elsevier, New York.	Not relevant for T25 corn.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
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.	T25 corn was not included in the study.
Gasperini, M. Garcia-Cela, E. Sulyok, M. Medina, A. Magan, N. [Reprint Author] 2021	Fungal diversity and metabolomic profiles in GM and isogenic non-GM maize cultivars from Brazil.	Mycotoxin Research, (FEB 2021) Vol. 37, No. 1. http://www.springer.com/life+sciences/microbiology/journal/12550. ISSN: 0178-7888. E-ISSN: 1867-1632.	The objective of the authors was to examine harvested maize grain of 6 GM and their related non-GM isogenic cultivars to compare (a) moisture content when harvested and stored, (b) fungal populations and the fungal diversity and (c) mycotoxins and related secondary metabolite profiles. The range and number of mycotoxins present in the GM cultivars were significantly lower than in the non-GM maize samples. GM corn hybrids with the following technologies from Monsanto and Corteva were used in the study: PRO, PRO2, PW, H and Hx; none of them related to T25 corn. Therefore, the publication is not relevant to the risk assessment of T25 corn.
Lovei Gabor L Ferrante Marco Bacle Victor Lang Andreas 2021	Can the growing of transgenic maize threaten protected Lepidoptera in Europe?.	Insect science, (2021 Aug) Vol. 28, No. 4, pp. 1159-1168. Electronic Publication Date: 18 Aug 2020 Journal code: 101266965. E-ISSN: 1744-7917. L-ISSN: 1672-9609.	The authors aimed to provide an overall evaluation of potential exposure of protected European butterflies to IR maize pollen, and to identify protected species that feed on weed species common in maize, which therefore would possibly be exposed to the hazard of reduced host plant densities as a consequence of increased herbicide sprays under the scenario of widespread planting of HR maize in Europe. Not relevant to the risk assessment of T25 corn.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
McNaughton, J. Roberts, M. Smith, B. Carlson, A. Mathesius, C. Roper, J. Zimmermann, C. Walker, C. Huang, E. Herman, R. 2020	Evaluation of broiler performance and carcass yields when fed diets containing maize grain from transgenic product DP-2O2216-6.	Journal of applied poultry research (Sep 2020), Volume 29, Number 3, pp. 700-711, 12 p. ISSN: 1056-6171 Source Note: September 2020 v. 29, no. 3.	T25 corn was not included in the study.
Nascimento, P. T. Fadini, M. A. M. Pinho, R. G. von Souza, C. da S. F. Valicente, F. H. von Pinho, R. G. 2020	Influence of transgenic maize on behavior of adult females of *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae).	Revista Brasileira de Milho e Sorgo (2020), Volume 19, 26 refs. ISSN: 1676-689X; 1980-6477. Published by: Associacao Brasileira de Milho e Sorgo, Sete Lagoas	The objective of this study was to evaluate if singular and stacked maize events interfere with the quantity and quality of *S. frugiperda* egg masses. GM corn hybrids with the following technologies from Monsanto were used in the study: VTPRO, VTPRO2, VTPRO3; none of them related to T25 corn. Therefore, the publication is not relevant to the risk assessment of T25 corn.
Nascimento P T Von Pinho R G Souza C S F Fadini M A M Valicente F H 2020	Does Singular and Stacked Corn Affect Choice Behavior for Oviposition and Feed in *Spodoptera frugiperda* (Lepidoptera: Noctuidae)?.	Neotropical entomology, (2020 Apr) Vol. 49, No. 2, pp. 302-310. Electronic Publication Date: 22 Jan 2020 Journal code: 101189728. E-ISSN: 1678-8052. L-ISSN: 1519-566X.	The authors assessed whether singular and stacked corn events interfere in the feeding of larvae and oviposition of *S. frugiperda* females. GM corn hybrids with the following technologies from Monsanto were used in the study: VTPRO, VTPRO2, VTPRO3, RR2; none of them related to T25 corn. Therefore, the publication is not relevant to the risk assessment of T25 corn.

Study (Author(s) and year)	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria listed in Table 1
Sivamani, Elumalai Nalapalli, Samson Prairie, Anna Bradley, David Richbourg, Lee Strebe, Tim Liebler, Tara Wang, Daolong Que, Qiudeng 2019	A study on optimization of pat gene expression cassette for maize transformation.	Molecular Biology Reports (2019), 46(3), 3009-3017 CODEN: MLBRBU; ISSN: 0301-4851	The study was to improve plant transformation efficiency by using codon optimized *pat* gene as selective marker, and is not relevant to product safety assessment.

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 eight publications were selected during Stage 1 evaluation (rapid assessment based on title and abstract). After Stage 2 evaluation (detailed review based on full text), it was determined that none of the publications were relevant for the safety assessment of T25 corn and its newly expressed protein phosphinothricin acetyltransferase.

Table 11 lists the relevant publications along with a summary of any adverse effects reported and the reliability of the publications.

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

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

7. CONCLUSION

The literature searches performed for T25 corn and its newly expressed protein, phosphinothricin acetyltransferase, for the period from October 1, 2020 to September 30, 2021, identified a total of 547 unique publications (after duplicate removal). A total of eight publications were progressed for detailed assessment after excluding 539 obviously irrelevant publications during Stage 1 evaluation (rapid assessment based on title and abstract).

The eight publications that progressed to Stage 2 were evaluated in detail, based on full text, for potential relevance, following the pre-established criteria listed in Table 1. No relevant references with bearing on molecular characterization, environmental safety, or food and feed safety were identified. The data and knowledge generated from this study does not impact the safety assessment of T25 corn. No issues or topics were identified that would trigger or warrant more specific question formulation.

8. REFERENCES

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

Host	File	Description
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.
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

FILE 'MEDLINE' ENTERED AT 13:51:14 ON 18 OCT 2021
L1 1153 SEA T25 OR T(W)25 OR ACS-ZM003-2 OR ACS-ZMOO3-2 OR ACS(W)ZM003(W)2 OR ACS(W)ZMOO3(W)2 OR ACSZM003-2 OR ACSZMOO3-2
L2 13859 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM
L3 1464 SEA ((BAR OR PAT)(2A)(GENE# OR PROTEIN# OR ENZYME#)) OR PPT(2W)ACETYLTRANSFERASE OR PPT(2W)ACETYL(W)TRANSFERASE OR PT(W)N(2W)ACETYLTRANSFERASE OR PT(W)N(2W)ACETYL(W)TRANSFERASE
L4 203 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L5 1538 SEA (L3 OR L4)
L6 3354 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)
L7 78305 SEA CORN# OR MAIZE# OR MAIZ OR ZEA(W)MAYS OR Z(W)MAYS OR CHARDON
L8 3826556 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?))
L9 52 SEA L2 AND L7
L10 125 SEA L5 AND L7
L11 391 SEA L6 AND L7 AND L8
L12 1643 SEA L1 OR L9 OR L10 OR L11
L13 253 SEA L12 AND PY>=2019
L14 148 SEA L13 AND UP>=20201001 AND UP<=20210930

FILE 'BIOSIS' ENTERED AT 13:51:42 ON 18 OCT 2021
L15 1249 SEA T25 OR T(W)25 OR ACS-ZM003-2 OR ACS-ZMOO3-2 OR ACS(W)ZM003(W)2 OR ACS(W)ZMOO3(W)2 OR ACSZM003-2 OR ACSZMOO3-2
L16 14763 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM
L17 2839 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 332 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L19 2941 SEA (L17 OR L18)
L20 9910 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)
L21 249077 SEA CORN# OR MAIZE# OR MAIZ OR ZEA(W)MAYS OR Z(W)MAYS OR CHARDON
L22 466382 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?))
L23 155 SEA L16 AND L21
L24 299 SEA L19 AND L21
L25 593 SEA L20 AND L21 AND L22
L26 2172 SEA L15 OR L23 OR L24 OR L25
L27 251 SEA L26 AND PY>=2019

L28 125 SEA L27 AND UP>=20201001 AND UP<=20210930

FILE 'AGRICOLA' ENTERED AT 13:52:07 ON 18 OCT 2021
L29 402 SEA T25 OR T(W)25 OR ACS-ZM003-2 OR ACS-ZMOO3-2 OR ACS(W)ZM003(W)2 OR ACS(W)ZMOO3(W)2 OR ACSZM003-2 OR ACSZMOO3-2
L30 3247 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM
L31 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
L32 252 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L33 858 SEA (L31 OR L32)
L34 8217 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)
L35 147212 SEA CORN# OR MAIZE# OR MAIZ OR ZEA(W)MAYS OR Z(W)MAYS OR CHARDON
L36 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?))
L37 90 SEA L30 AND L35
L38 133 SEA L33 AND L35
L39 427 SEA L34 AND L35 AND L36
L40 968 SEA L29 OR L37 OR L38 OR L39
L41 110 SEA L40 AND PY>=2019
L42 62 SEA L41 AND UP>=20201001 AND UP<=20210930

FILE 'CABA' ENTERED AT 13:52:50 ON 18 OCT 2021
L43 704 SEA T25 OR T(W)25 OR ACS-ZM003-2 OR ACS-ZMOO3-2 OR ACS(W)ZM003(W)2 OR ACS(W)ZMOO3(W)2 OR ACSZM003-2 OR ACSZMOO3-2
L44 5355 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM
L45 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
L46 378 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L47 1641 SEA (L45 OR L46)
L48 18325 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)
L49 349501 SEA CORN# OR MAIZE# OR MAIZ OR ZEA(W)MAYS OR Z(W)MAYS OR CHARDON
L50 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?))
L51 196 SEA L44 AND L49
L52 286 SEA L47 AND L49
L53 972 SEA L48 AND L49 AND L50
L54 1973 SEA L43 OR L51 OR L52 OR L53
L55 217 SEA L54 AND PY>=2019

L56 114 SEA L55 AND UP>=20201001 AND UP<=20210930
L57 114 SEA L56 NOT P/DT
L58 0 SEA L56 AND (P/DT AND J/DT)
L59 114 SEA L57 OR L58

FILE 'HCAPLUS' ENTERED AT 13:53:20 ON 18 OCT 2021
L60 3250 SEA T25 OR T(W)25 OR ACS-ZM003-2 OR ACS-ZMOO3-2 OR ACS(W)ZM003(W)2 OR ACS(W)ZMOO3(W)2 OR ACSZM003-2 OR ACSZMOO3-2
L61 19981 SEA LIBERTYLINK OR LIBERTYLINKTM OR LIBERTYLINKRTM OR LIBERTY(W)LINK OR LIBERTY(W)LINKTM OR LIBERTY(W)LINKRTM OR LL OR LLTM OR LLRTM
L62 5215 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 783 SEA PHOSPHINOTHRICIN(W)N(W)ACETYLTRANSFERASE OR PHOSPHINOTHRICI N(2W)ACETYLTRANSFERASE OR PHOSPHINOTHRICIN(2W)ACETYL(W)TRANSFER ASE OR PHOSPHINOTHRICINACETYL(W)TRANSFERASE
L64 5515 SEA (L62 OR L63)
L65 28005 SEA (HERBICID? OR BIALAPHOS OR BASTA OR GLUFOSINATE OR PHOSPHINOTHRICIN OR LIBERTY?)(5A)(RESIST? OR TOLERAN? OR PROTECT?)
L66 398505 SEA CORN# OR MAIZE# OR MAIZ OR ZEA(W)MAYS OR Z(W)MAYS OR CHARDON
L67 693131 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?))
L68 158 SEA L61 AND L66
L69 761 SEA L64 AND L66
L70 6664 SEA L65 AND L66 AND L67
L71 10454 SEA L60 OR L68 OR L69 OR L70
L72 1848 SEA L71 AND PY>=2019
L73 618 SEA L72 AND UP>=20201001 AND UP<=20210930
L74 266 SEA L73 NOT P/DT
L75 0 SEA L73 AND (P/DT AND J/DT)
L76 266 SEA L74 OR L75

FILE 'MEDLINE, BIOSIS, AGRICOLA, CABA, HCAPLUS' ENTERED AT 13:53:50 ON 18 OCT 2021
L77 547 DUP REM L14 L28 L42 L59 L76 (168 DUPLICATES REMOVED)
ANSWERS '1-148' FROM FILE MEDLINE
ANSWERS '149-235' FROM FILE BIOSIS
ANSWERS '236-285' FROM FILE AGRICOLA
ANSWERS '286-346' FROM FILE CABA
ANSWERS '347-547' FROM FILE HCAPLUS