Review of Scientific Literature Relevant to the Food/Feed and Environmental Risk Assessment of FG72 soybean

Literature Review

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Company: *Syngenta Seeds, LLC*

Company Representative:

[redacted] October 25, 2023

[redacted] Date

Global Regulatory Manager, Regulatory Affairs

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This is not a study as defined by 40 CFR Part 160.3 and is therefore not subject to Federal Insecticide, Fungicide, and Rodenticide Act Good Laboratory Practice Standards (GLPS; US EPA, 1989). However, all components of this analysis were performed according to accepted scientific practices, and relevant records have been retained.

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LIST OF ACRONYMS AND ABBREVIATIONS

2mEPSPS	Double mutant 5-enolpyruvylshikimate-3-phosphate synthase
AGRICOLA	AGRICultural OnLine Access
CAB	Commonwealth Agricultural Bureaux
CFIA	Canadian Food Inspection Agency
CONABIA	National Advisory Commission on Agricultural Biotechnology (*Comisión Nacional Asesora de Biotecnología Agropecuaria*)
CTNBio	National Technical Commission on Biosafety (*Comissão Técnica Nacional de Biossegurança*)
EFSA	European Food Safety Authority
ERA	Environmental risk assessment
EU	European Union
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
GMO	Genetically Modified Organism
HC	Health Canada
HPPD W336	4-hydroxyphenylpyruvate dioxygenase
MAFF	Ministry of Agriculture, Forestry and Fisheries
MEDLINE	MEDical Literature Analysis and Retrieval System (online version)
NTO	Nontarget organisms
OGTR	Office of the Gene Technology Regulator
PICO/PECO	Population, Intervention/Exposure, Comparator, Outcomes
US EPA	US Environmental Protection Agency
US FDA	US Food and Drug Administration
USDA	US Department of Agriculture

1.0 EXECUTIVE SUMMARY

A systemtic literature search and scoping review was conducted to collect, identify, and assess information (published between June 1, 2022 and July 1, 2023) relevant to the risk assessment of FG72 soybean and its newly expressed proteins, double mutant 5-enolpyruvylshikimate-3-phosphate synthase (2mEPSPS) and 4-hydroxyphenylpyruvate dioxygenase (HPPD W336) proteins, for use as food/feed. This literature search was performed in the context of an annual post-market environmental monitoring (PMEM) report on GMOs authorized in the European Union (EU) market and was conducted in compliance with the 2019 EFSA explanatory note on literature searching for GMO applications (EFSA 2019).

Electronic databases and regulatory agency webpages were searched using a validated, comprehensive search strategy. Two technical experts independently reviewed the retrieved records to determine their relevance. A total of 82 records were retrieved from the database search and a total of 79 records were retrieved from the internet search. None of the records retrieved were considered relevant to the risk assessment of FG72 soybean and its newly expressed proteins. Therefore, the outcome of this literature search and scoping review did not identify any new information regarding hazards, modified exposure pathways, or scientific uncertainties for FG72 soybean.

In conclusion, the results of this literature search and scoping review do not change the risk assessment of FG72 soybean.

2.0 INTRODUCTION

Soybean (*Glycine max*) was transformed to produce Event FG72, which confers tolerance to glyphosate and HPPD-inhibiting herbicide products. Soybean plants derived from Event FG72 express the genes *2mepsps* derived from maize (*Zea mays*) and *hppdPf W336* derived from *Pseudomonas fluorescens*. The gene *2mepsps* encodes a double mutant 5-enolpyruvylshikimate-3-phosphate synthase (2mEPSPS) protein. The native EPSPS from *Z. mays* is a key enzyme in the shikimic acid pathway involved in the biosynthesis of aromatic amino acids (phenylalanine, tyrosine, and tryptophan). The transgenic protein 2mEPSPS produced by FG72 soybean has low affinity for glyphosate molecules compared to the native EPSPS, thus conferring tolerance to glyphosate-based herbicide products (Lebrun *et al.* 2003; Spencer *et al.* 2000). The gene *hppdPf W336* encodes the 4-hydroxyphenylpyruvate dioxygenase protein of *P. fluorescens* strain A32, modified by the replacement of the amino acid glycine at position 336 with a tryptophan, as described by (Boudec *et al.* 2001). HPPD catalyzes the formation of homogentisic acid, the aromatic precursor in plastoquinone and vitamin E biosynthesis. The transgenic protein HPPD W336 has lower binding affinity for herbicides that inhibit HPPD than native HPPD, thus conferring tolerance to HPPD-inhibiting herbicide products.

The objective of this systematic literature search and scoping review was to collect, identify, and assess information relevant to the risk assessment of FG72 soybean, including the newly expressed 2mEPSPS and HPPD W336 proteins, for use as food/feed. Information published between June 1, 2022 and July 1, 2023 was evaluated. This literature search was performed in the context of an annual post-market environmental monitoring (PMEM) report on GMOs authorized in the European Union (EU) market, and was conducted in compliance with the

2019 EFSA explanatory note on literature searching for GMO applications (EFSA 2019). This scoping literature search and review was conducted by an experienced information specialist and a team of technical experts with knowledge of genetically modified (GM) crop research, development, and safety assessment (Appendix A).

3.0 METHODS

3.1 Formulating the Review Question and Clarifying its Purpose

The literature search and scoping review outlined in this report was aimed at identifying potential adverse effects of FG72 soybean, and the associated newly expressed proteins/intended traits, on human/animal health and the environment. Therefore, the associated review question was defined as:

Do either food or feed products derived from FG72 soybean, or the intended traits, have adverse effects on human/animal health and/or the environment?

This review question follows the Population, Intervention/Exposure, Comparator, Outcome (PICO/PECO) structure. Key elements of the review question are defined in Table 1.

TABLE 1 Review question in PICO/PECO structure

Element	Components of Review Question
Population	Human and animal health and the environment
Intervention/Exposure	FG72 soybean derived food/feed products and/or 2mEPSPS and HPPD W336 newly expressed proteins
Comparator	Conventional counterpart (if applicable)
Outcome	Adverse effects

Pre-defined eligibility/inclusion criteria (Table 2) were used to identify records relevant to answering the review question. Eligibility/inclusion criteria were derived from relevant factors outlined in Section 3.1.2 of the 2019 EFSA explanatory note on literature searching for GMO applications (EFSA 2019) and refined by technical experts in the fields of GMO research, development, and product safety. The eligibility/inclusion criteria were assessed and validated using a pilot study in the 2022 literature review for FG72 ([redacted] 2022), and have a history of successful use in literature reviews for identifying information relevant to the food/feed and environmental risk assessment of GM crops.

Table 2 provides high-level key concepts for eligibility/inclusion. A detailed breakdown of specific information/data requirements used to assess the associated eligibility/inclusion criteria is provided in Table 3. The criteria are ordered by importance/expected ease of locating the information in a publication. The first failed eligibility/inclusion criterion was used as the primary reason for exclusion and the remaining criteria were not assessed (Frampton *et al.* 2017).

TABLE 2 Eligibility/inclusion criteria to establish relevance

Concepts	Criteria	Comment
Intervention/exposure	The record addresses FG72 soybean, derived food/feed products, and/or the newly expressed proteins/intended traits.	The intended trait of FG72 is glyphosate herbicide tolerance, imparted by 2mEPSPS, and hydroxyphenylpyruvate dioxygenase-inhibiting herbicide (e.g., isoxaflutole) tolerance, imparted by HPPD W336.
Information/data requirements	The record contains data that answers the review question (Section 3.1) and contributes knowledge informing the human/animal health and/or environmental risk assessments of FG72 soybean.	A non-exhaustive list of information/data that may answer the review question and contribute knowledge informing the human/animal health and environmental risk assessments is outlined in Table 3. Records that did not cover topics informing the review question or risk assessment (i.e., benefits, socio-economics, ethics, crop protection, detection methods, efficacy, public perception, or risk communication) were excluded using this criterion.
Scope of GMO application	The record must address pathways and/or exposure routes that are relevant to the intended use of FG72 soybean and derived food/feed products (i.e., import, processing, and use as food/feed).	Publications were considered for relevance if they addressed pathways and routes of exposure that are relevant to the scope of the application: import and processing of FG72 soybean for food/feed uses.
Reporting format	The record presents original/primary data or is a risk assessment from a relevant key organization (i.e., regulatory agencies and risk assessment bodies involved in the safety assessment of GMOs).	Records that do not present original/primary data (e.g., editorials, reviews, position papers) were excluded. Risk assessments performed and reported by relevant key organizations were considered for relevance if they addressed the intervention/exposure. Documents posted to regulatory agency websites that were not authored by the key organizations (i.e., applications, dossiers, or risk assessments submitted by applicants) were not considered relevant. Draft and partial reports published by regulatory agencies were also excluded using this criterion, since they contain no new information and do not represent the final official opinion of the agency. Similarly, reports that reflect individual reviewer opinions were excluded from evaluation because they are considered when developing the official final opinion of the agency.
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 the EFSA/GO Panel output.	As indicated by EFSA (2019), publications previously considered by EFSA were excluded. Any cited/referenced publications contained within documents produced by EFSA and/or its GMO Panel were excluded.
Access	The full-text document is accessible.	If potentially relevant full-text documents could not be obtained, they were listed in a table with a description of the (unsuccessful) methods used in the attempt to obtain a copy.
Population	Human/animal health and/or the environment are addressed as general protection goals in the publication.	Publications that address protection goals relevant to the risk assessment of FG72 soybean were considered for relevance.

Concepts	Criteria	Comment
Outcomes	Effects/impacts on human and animal health and/or the environment are addressed.	Publications that address FG72 soybean must also address effects/impacts on entities of concern, and potential determinants of exposure that place these entities at risk.
Comparator	If the publication is a comparative study that uses plant material as a test material, eligible publications must report a non-GM variety.	Publications that address FG72 soybean must have also included a conventional counterpart as a comparator in cases where comparative analysis was conducted and plant material was used as test material. Any uncertainties about the appropriateness of the comparator were addressed in the assessment of the publication.
Plant species	The publication may address the same plant species as the GMO under consideration, but could also address any plant species producing the 2mEPSPS and/or HPPD W336 proteins.	The review question addressed the safe use of the intended trait(s) of FG72 soybean. Therefore, studies on GMOs of another species that contain the newly expressed proteins in-scope were also considered for relevance. However, for certain information/data requirements, publications regarding the presence of the transgenic proteins in a different plant species did not impact the assessment of FG72 soybean and were not considered for relevance (Table 3, denoted by an asterisk to indicate the information/data must be “specific to FG72 soybean”).
Reporting format – Duplicate Studies	A study should only be presented once, but if it is presented in more than one publication, all publications were listed and grouped.	Duplicate publications were excluded at the initial screening stage. If a specific study was represented in separate publications, all publications were grouped and the study was only be evaluated once.

TABLE 3 Overview of main categories of information/data requirements

Information/data requirement	Non-exhaustive list of specific information/data requirements
Molecular characterization of the genetic modification of the GMO	• Information on the insert including: sequence, size, copy number, genetic element arrangement, deletions, location, sequence similarity searches, and analysis of open reading frames* • Expression data of inserted/modified sequences* • Genetic stability* • Molecular and biochemical characterization of the protein(s) such as: primary structure, molecular weight, post-translational modifications • Assessment of enzymatic activity including substrate specificity and reaction products with respect to safety and/or nutritional balance • Data on the equivalence between plant-produced and microbially-produced proteins
Agronomic, phenotypic and compositional characterization of the GM plant	• Comparative assessment of agronomic and phenotypic characteristics under field or controlled conditions* • Comparative analysis of key nutritional constituents (e.g., proximates, key macro- and micro-nutrients, anti-nutritional compounds, natural toxins, endogenous allergens)*
Toxicological assessment of newly expressed protein(s), new constituents other than proteins, and the whole GM food/feed	• Amino acid sequence comparison between the newly expressed protein(s) and toxic proteins • Stability of the protein(s) under relevant processing and storage conditions and expected treatment of food/feed • Investigation of proteolytic susceptibility of the newly expressed protein(s) • Animal toxicity studies using purified protein (e.g., 28-day repeated-dose oral toxicity studies) • Feeding studies using plant material (e.g., 90-d feeding studies in rodents, reproductive and development toxicity testing)* • Other animal feeding studies examining safety and characteristics of FG72 soybean and derived food/feed products in target species such as livestock animals*
Allergenicity assessment of the newly expressed protein and the GM food/feed, and adjuvanticity	• Amino acid sequence comparison of the newly expressed protein(s) to known allergens or celiac disease peptide sequences* • Serum screening • Pepsin susceptibility testing of newly expressed protein(s) • *In vitro* cell-based assays • *In vivo* tests in animal models • Expression data for endogenous allergens* • Comparison of functional aspects/structural similarities between newly expressed proteins and known strong adjuvants

Nutritional assessment of the newly expressed protein(s), other new constituents, as well as potential alterations in the total diet of the consumer or the animal	• Anticipated dietary intake of food/feed derived from FG72 soybean and the resulting nutritional impact(s)* • Target animal nutritional studies evaluating plant material or derived food/feed products* • Comparative growth performance studies with young rapidly growing animal species that evaluate plant material or derived food/feed products*
Post-market monitoring	• Description of mechanisms for determining actual changes to overall dietary intake patterns of the GM food, to what extent this has occurred and whether or not the product induces known (side) effects or unexpected side effects in human and animal consumers. • Information on the reliability, sensitivity, and specificity of the post market monitoring methods
Persistence and invasiveness assessment, including plant-to-plant gene transfer	• Measurements of volunteer occurrence and establishment* • Testing of replacement capacity/competitiveness* • Fitness of the GM plant expressing the novel traits in various environmental conditions* • Description of relevant avenues and vectors for gene flow, as well as factors affecting these processes
Assessment of plant to micro-organism gene transfer	• Homology searches at the nucleotide level between the GM event and microorganisms*
Assessment of interactions with target organisms	Publications in this category were excluded based on the scope of the application, which covers the import, processing, and food/feed use of FG72 soybean in the EU. Cultivation of FG72 soybean in the EU is not in scope. According to the EFSA Environmental Risk Assessment (ERA) Guidance (EFSA 2010), *"…resistance development is only relevant for applications with scope cultivation of GM plants and not for applications restricted to import and processing of GM plants and their products."* Therefore, assessments of the potential resistance development in target organisms resulting from the import, processing and food/feed use of FG72 soybean are not relevant for this application.
Assessment of interactions with non-target organisms (NTO)	• Studies focusing on indirect exposure of NTOs to FG72 soybean (e.g., through manure/faeces from animals fed the GM plant, by-products of industrial processes) Publications that discuss direct exposure of test proteins to non-target organisms (either from laboratory or field studies) were excluded based on the scope of this application. This was based on recommendation from the EFSA ERA Guidance (EFSA 2010), which states: *"In cases where the application does not include cultivation in the EU, direct environmental exposure of NTOs to the GM plant is via accidental release into the environment of seeds or propagules during transportation and processing. This may result in sporadic occurrence of feral plants and therefore exposure of NTO populations is likely to be negligible. The ERA will then focus on indirect exposure to products of the GM plant (e.g., through manure and faeces from animals fed the GM plant, and other by-products of industrial processes)…".*
Assessment of interactions with biogeochemical and abiotic processes	Publications in this category were excluded based on the scope of the application, which covers the import, processing, and food/feed use of FG72 soybean in the EU. Cultivation of FG72 soybean in the EU is not included in the scope. According to the EFSA ERA Guidance (EFSA 2010): "*Applications concerning food/feed uses and import and processing do not require scientific information on possible environmental effects associated with the cultivation of the plant.*" Therefore, an assessment of the impacts of FG72 soybean on biogeochemical processes resulting from specific cultivation, management, and harvesting techniques is not relevant given the scope of this application.

Assessment of impact of specific cultivation, management and harvesting techniques	Publications in this category were excluded based on the scope of the application, which covers the import, processing, and food/feed use of FG72 soybean in the EU. Cultivation of FG72 soybean in the EU is not included in the scope. According to the EFSA ERA guidance (EFSA 2010): "…*for GM plants for import and processing that are not intended for cultivation in the EU, there is no need for an ERA for altered cultivation, management and harvesting techniques.*" Therefore, an assessment of impact of specific cultivation, management, and harvesting techniques of FG72 soybean is not relevant for this application.
Risk mitigation	Publications in this category were excluded based on the scope of the application. Risk mitigation measures such as high dose/refuge strategy, isolation distance from protected habitats hosting species of conservation concern that are at risk, and integrated pest/weed management are only relevant to cultivation. The scope of this application covers the import, processing and food and feed use of FG72 soybean.
Post-market environmental monitoring	Publications in this category were excluded based on the scope of the application. Monitoring such as insect resistance is relevant only to cultivation. The scope of this application covers the import, processing and food and feed use of FG72 soybean.

*Specific to FG72 soybean

3.2 Searching for/Identifying Relevant Publications

3.2.1 Database searches

3.2.1.1 Electronic bibliographic databases

To search for different types of publications and unpublished work that could provide information on the review question, multidisciplinary citation databases, which include grey literature (i.e., not peer reviewed), were used. Two large, multi-disciplinary databases (Ovid Medline and BIOSIS Previews) and two databases specializing in topics relevant to agricultural and nutrition sciences (AGRICultural OnLine Access (AGRICOLA) and Commonwealth Agricultural Bureaux (CAB) abstracts) were searched via Ovid® search interface (provided by Ovid® Technologies). These four databases were selected because of their extensive coverage of scientific literature related to relevant subjects that include, but are not limited to, biomedicine, plant disease, agriculture, life sciences, pesticides, human health and nutrition, animal health, plant science, biotechnology, and environmental studies (see Appendix B for further details on each database and the reason(s) for selection). Each database has a thesaurus. The document types contained in these databases encompasses a wide range of formats, including journal articles, technical letters and notes, patents, conference proceedings, book chapters, reports, and/or articles in press. Detailed specifications of these databases are outlined in Appendix B.

The selection of databases for this study complied with the 2019 explanatory note on literature searching (EFSA 2019), which indicates that a minimum of two large/multi-disciplinary databases are necessary to provide adequate coverage while still providing some level of complementary results. Using a combination of multi-disciplinary and specialized databases provides valuable results (Stevinson and Lawlor 2004). Therefore, the present combination of databases was suitable for retrieving publications relevant to the risk assessment of Syngenta GM soybean products as it relates to food/feed and the environment, while adhering to EFSA's definition of "best" search strategy practices (defined in Glanville *et al.* (2014) as "a situation where as few resources as possible are searched with a high probability that most of the relevant research evidence will be identified").

3.2.1.2 Database search strategy

The electronic bibliographic databases search strategy was designed to retrieve information on FG72 soybean. The same search strategy was used in all databases through the Ovid® search interface (outlined in Table 4). The search strategy was developed by an information specialist in collaboration with technical experts with experience in GM crop research, development, and safety assessment (Appendix A). Database search strategy construction is described in a detailed synopsis in Appendix C.

TABLE 4 Search string strategy

a. Set	Field	Search String	Concepts/Key Elements
1	Topic	FG72 OR FG 72 OR MST-FG#72	Event FG72[a]
2	Topic	GT27*	Trade name for FG72
3	Topic	((5 enolpyruvylshikimate 3 phosphate synthase OR 5 enolpyruvyl shikimate 3 phosphate synthase OR 5 enol pyruvyl shikimate 3 phosphate synthase) ADJ5 (double mutat* OR double modif*)) OR 5 enolpyruvylshikimate 3 phosphate synthase OR 5 enolpyruvyl shikimate 3 phosphate synthase OR 5 enol pyruvyl shikimate 3 phosphate synthase OR EPSP synthase OR MEPSP synthase OR EPSPS OR MEPSPS OR 2MEPSPS OR 2 MEPSPS OR "EC 2.5.1.19" OR "E.C. 2.5.1.19"	Newly expressed protein in FG72 (herbicide tolerance)
4	Topic	((hydroxyphenylpyruvate dioxygenase OR hydroxy phenylpyruvate dioxygenase OR hydroxyphenyl pyruvate dioxygenase OR hydroxy phenyl pyruvate dioxygenase OR HPPD) ADJ5 (mutat* OR modif*)) OR HPPDW336 OR HPPD W336 OR HPPD W 336	Newly expressed protein in FG72 (herbicide tolerance)
5		3 OR 4	Newly expressed proteins combined
6	Topic	(HPPD inhibit* OR isoxaflutole* OR diketonitrile* OR pyrazolone* OR triketone* OR gl#phosate OR gl#fosate OR G360 OR G 360 OR roundup* OR round up* OR herbicide* OR pesticide*) ADJ2 (toleran* OR resistan* OR protect*)	Intended trait (herbicide tolerance)
7	Topic	GMO* OR LMO* OR GM OR GE OR transgen* OR ((genetic* OR living OR biotech*) ADJ3 (modif* OR transform* OR manipulat* OR improv* OR engineer* OR deriv*))	GMO general
8	Topic	GMHT OR GEHT OR GMHR OR GEHR OR GMHTs OR GEHTs OR GMHRs OR GEHRs	GMO general × intended trait-HT
9	Topic	Soy OR soya OR soja OR soybean* OR soyabean* OR sojabean* OR Glycine max OR G max	Plant species
10		5 AND (7 OR 9)	Newly expressed proteins AND (GMO general OR Plant species)
11		(6 AND 7) OR 8	(Intended trait AND GMO general) OR GMO general × intended trait-HT
12		11 AND 9	((Intended trait AND GMO general) OR GMO general × intended trait-HT) AND Plant species
13		1 OR 2 OR 10 OR 12	Event OR (Newly expressed proteins AND (GMO general OR plant species)) OR (((Intended trait AND GMO general) OR GMO general × intended trait-HT) AND Plant species)

a. The mandated wildcard symbol (#) is used as a substitute for one required character on the Ovid platform.

3.2.1.3 Reference Publications

Prior to starting this literature search and review, the search strategy was assessed and validated using reference publications. All reference publications were retrieved from at least one of the four searched databases (100% overall retrieval), indicating satisfactory performance of the search strategy for acquiring the breadth of information available for the key elements highlighted in the search strategy (event, newly expressed proteins, and intended traits). Details of this process (including rationale for selection of the reference publications) and the outcomes (including the percentage of reference publications retrieved from each database) are outlined in Appendix D.

3.2.2 Internet searches

3.2.2.1 Key organizations and internet search strategy for regulatory agency webpages

The internet pages of relevant regulatory agency websites (Table 5) were searched for documents related to GMO applications, risk assessments, and approvals. Only the websites of agencies that conduct and post risk assessments to their websites are considered relevant for searching. Records were collected from webpages (Table 5) that listed regulatory documents/information specific to the safety assessment of GMOs. All records from these webpages that were published during the relevant time period (June 1, 2022-July 1, 2023) were collected for full-text review as described in the "Search strategy and limits applied" column. If a record's publication date could not be determined, it was retrieved for review.

TABLE 5 Key organization pages included in the search

Regulatory agency/risk assessment body[a,b]	Webpage address	Search strategy and limits applied[d]
Food Standards Australia New Zealand (FSANZ)	https://www.foodstandards.gov.au/consumer/gmfood/applications/Pages/default.aspx	The list of current GM applications and approvals was examined. Safety assessments and approval documents (when available) for foods produced using gene technology (plant origin) that have a status of "Approved" or "Under assessment" and were published during or after 2022 were retrieved for assessment.
Health Canada (HC)[c]	https://www.canada.ca/en/health-canada/services/food-nutrition/genetically-modified-foods-other-novel-foods/approved-products.html	The list of completed safety assessments of GM foods was examined. The technical summaries linked to the novel food safety assessments with a "Decision Date" listed as 2022 or later were retrieved for review.
Canadian Food Inspection Agency (CFIA)[c]	https://inspection.canada.ca/plant-varieties/plants-with-novel-traits/approved-under-review/decision-documents/eng/1303704378026/1303704484236	The table of decision documents for determination of environmental and livestock feed safety was examined. All documents for decisions made during or after 2022 were retrieved for review.

Regulatory agency/risk assessment body[a,b]	Webpage address	Search strategy and limits applied[d]
Ministry of Agriculture, Forestry and Fisheries (MAFF)	https://www.biodic.go.jp/bch/lmo/OpenSearch.do	The "Genetically modified organism search system approved under the Cartagena method" on the Japan Biosafety Clearing House website was examined (this website is referenced as the relevant repository for documents related to GM organism approvals on the MAFF webpage dedicated to the approval of GM crops - https://www.maff.go.jp/j/syouan/nouan/carta/torikumi/). The documents were searched by limiting "Approval Dates" to 2022-2023 and "Content of Use" to "Cultivation." Items were sorted by approval date. All documents with an approval date on or after 2022 were retrieved for review.
National Advisory Commission on Agricultural Biotechnology (CONABIA)	https://www.argentina.gob.ar/agricultura/alimentos-y-bioeconomia/ogm-vegetal-eventos-con-autorizacion-comercial	The table of "Plant GMO: Events with commercial authorization" was examined. All documents with an approval date on or after 2022 were retrieved for review.
National Technical Commission on Biosafety (CTNBIO)	http://ctnbio.mctic.gov.br/liberacao-comercial#/liberacao-comercial/consultar-processo	The webpages dedicated to the commercial releases of plants (*plantas*) were searched for technical opinion documents. The subfolder "plantas" was accessed from the noted link, and each subfolder contained within ("Soja," "Milho," "Feijão," "Eucalipto," "Cana," and "Algadão") was searched for technical opinion documents. Those published during or after 2022 were retrieved for review.
Office of the Gene Technology Regulator (OGTR)	https://www.ogtr.gov.au/what-weve-approved/dealings-involving-intentional-release	The list of dealings involving the intentional release of GMOs into the environment were examined. The list was filtered to include items with a "Category" of "Agricultural." Documents with an "Issue Date" falling on or after 2022 were retrieved for review. If no "Issue Date" was listed, the document was collected for review.
US Department of Agriculture (USDA)	https://www.aphis.usda.gov/aphis/ourfocus/biotechnology/regulatory-processes/rsr-table/rsr-table	The regulatory status review table was sorted by "Response Date." The "RSR Response" documents with a "Response Date" falling on or after 2022 were retrieved for review.
US Environmental Protection Agency (USEPA)	https://www.epa.gov/ingredients-used-pesticide-products/current-and-previously-registered-section-3-plant-incorporated	The table of "PIP Active Ingredients" was sorted by "Year Registered" and all documents listed under "BRAD and other Regulatory Documents" with a "Year Registered" of 2022 or later, were retrieved for review.

Regulatory agency/risk assessment body[a,b]	Webpage address	Search strategy and limits applied[d]
US Food and Drug Administration (USFDA)	https://www.accessdata.fda.gov/scripts/fdcc/?set=Biocon	The list of New Plant Variety Consultations was sorted by "Date Completed" and all items completed on or after 2022 were retrieved for review.

a. The regulatory agency of Mexico (Intersecretarial Commission on Biosafety of GMOs) does not post the relevant document types on their agency website and was not searched.
b. The Genetic Engineering Appraisal Committee of India (part of the Ministry of Environment, Forest, and Climate Change) has not posted updates to their website regarding clearance decisions for GMOs since 2014 and, therefore, was not searched (https://moef.gov.in/en/project-approvals/geac-clearances/).
c. HC and CFIA are responsible for regulating GM plants in Canada. Environment and Climate Change Canada (ECCC) does not regulate GM plants and, therefore, the ECCC website was not searched.
d. Regulatory agency records are not always posted immediately upon approval. Therefore, the search date range for websites was extended to encompass all of 2022 and 2023. Any records reviewed during the previous year were removed from the search results and only new records were retained. This conservative approach ensured records were not omitted due to delayed posting online.

3.2.2.2 Web-based search engines and databases

General search engines such as GOOGLE Scholar and web-based databases known to contain information specifically on effects of GMOs were not searched. The search of the databases and key organization websites was considered adequate for a comprehensive search of literature.

3.2.3 Manual searches

3.2.3.1 Checking reference lists

If any relevant records were retrieved from the internet searches of regulatory agency websites, their reference list(s) were manually checked/scanned by both reviewers for new records within the relevant time period (June 1, 2022-July 1, 2023) and that met the eligibility/inclusion criteria. The full-text documents of any titles from the reference lists that appeared potentially relevant were obtained and evaluated by both reviewers to determine relevance.

3.2.3.2 Hand searching

Hand searching was not conducted. The search of the databases and key organization websites was considered adequate for a comprehensive search of literature.

3.2.3.3 Citation searching

Citation searching was not conducted. The search of the databases and key organization websites was considered adequate for a comprehensive search of literature.

3.2.4 Use of multiple languages

All search terms used in this study were in the English language (apart from Latin names) and utilized the Roman alphabet. The databases searched apply subject terms and commonly used descriptive terms in English. When available, the databases searched use English titles and abstracts for non-English articles. Additionally, translations are unlikely to exist for event and trade names that do not use words in the English language. Therefore, search terms were not translated.

3.2.5 Time period

All searches were conducted on or after July 1, 2023 (Table 8 and Table 9). The database search was limited, using the Ovid search platform, to records published between June 1, 2022 and the date of the last database update prior to the search (see Table 8). The records retrieved from regulatory agency webpages were limited by manually excluding publications dated prior to 2022 or records reviewed during the previous year. If a date could not be determined for a given record, it was retained for review.

3.3 Reviewing Publications for Relevance

3.3.1 Review of database records

The process for selecting relevant database publications was conducted in two stages, and was assessed/validated, using a pilot study, alongside the eligibility/inclusion criteria (the pilot study was conducted as part of the 2022 literature review for FG72 soybean ([redacted] 2022). Two independent reviewers evaluated each database record using the eligibility/inclusion criteria (Table 2 and Table 3) at all stages of the review process.

The first stage (Stage 1) was a preliminary assessment of titles and abstracts where records were classified as either (1) relevant/unclear relevance or (2) clearly not relevant. Records that were clearly irrelevant upon reviewing the title were excluded from further review. Records with titles that appeared relevant, or had unclear relevance, were retained for abstract review. Only records that were deemed clearly irrelevant by both reviewers upon assessment of the abstract were excluded from further review. This conservative approach ensured that all potentially relevant records were further evaluated. A kappa test was performed after Stage 1 review was completed and prior to discussing disagreements from Stage 1 abstract review. Records with abstracts that appeared relevant, or had unclear relevance, were retained for the second stage of review.

The second stage (Stage 2) was a detailed review of full-length articles. During Stage 2 review, a final decision on record relevance/irrelevance was made. Articles deemed relevant at Stage 2 were subjected to a reliability assessment and evaluation of the record's implications on the food and feed or environmental risk assessment for FG72 soybean. An explanation of exclusion was provided for articles deemed irrelevant at Stage 2.

The reviewers discussed disagreements after Stage 2 (full-text) review of articles. If a disagreement on a record's relevance could not be resolved at Stage 2, an additional reviewer was brought in as a tie-breaker. Considering the tie-breaker's opinion, the majority position of relevance on the record became the agreed position.

3.3.2 Review of internet records from key organizations

Records from the webpages of key organizations were considered potentially relevant if they were risk assessments or scientific opinions/reports sponsored by the key organization. The regulatory agencies of interest (Table 5) do not post primary data; therefore, all other document types were considered irrelevant. The eligibility/inclusion criteria did not include risk assessments/dossiers submitted to regulatory authorities, only "risk assessments performed and reported by relevant key organizations." Therefore, only documents authored by the key organizations and not the applicants qualified as potentially relevant (i.e., dossiers and risk assessments submitted to regulatory authorities were excluded). Draft and partial reports were excluded since they contain no new information and do not represent the final official opinion of the agency. Similarly, reports that reflect individual reviewer opinions were excluded from evaluation because they are considered when developing the official final opinion of the agency. A rationale for exclusion, based on the eligibility/inclusion criteria, was provided when applicable, except for records excluded based on "Reporting Format" (e.g., submissions by applicants, meeting agendas, tables of approval dates, and draft documents).

Two independent reviewers evaluated each internet record using the eligibility/inclusion criteria (Table 2 and Table 3). Internet records from key organizations were not amenable to a multi-stage review (i.e., title and abstract were often not provided in the search results), therefore, these records were only assessed in Stage 2 (full-text) review. Accordingly, a Kappa test (required for Stage 1 review only, as outlined in the 2019 explanatory note (EFSA 2019)) was not conducted for internet reviews.

Some agencies post information in languages other than English. During these instances, publications were translated to English using a neural machine translation software (i.e., Google Translate) prior to review. If translations were unclear or ambiguous, a native speaker of the language was consulted to provide a more accurate translation.

For the purposes of reporting and statistics, we defined a unique internet record as a unique uniform resource locator (URL). If the URLs for two documents were identical except for file format (e.g., pdf *versus* .doc or .docx), one of the documents was considered a duplicate document and it was excluded from reporting and review. Suspected duplicates (i.e., documents with similar URLs) were visually examined by the reviewer. If the content was identical, the record was removed so that only one record was reviewed and reported/used for statistics. If additional duplicates were identified during the review process (i.e., documents with different URLs, but identical content), they were removed such that only one document was used for reporting and statistics.

3.4 Summarizing and Reporting the Data

3.4.1 Results of the publication search and selection process

For the electronic bibliographic database search, the following information was collected: the date on which the search was conducted, the date of the most recent update of the database, the service provider used, date span of the search, any limits applied to the search (e.g., dates), and the total number of records retrieved before and after removing duplicates. The number of database records reviewed and excluded at each stage of review was also recorded. Additionally, the line-by-line strategy with the number of publications identified per line was captured.

For the internet search, the following information was collected (if available): the website/regulatory agency name and service publisher used, justification for choosing the source, the URL, the date on which the search was conducted, the date of the most recent website update at the time it was searched, the date span of the search, any limits to the search, and the total number of records retrieved. The number of internet records reviewed and excluded was also be recorded.

For manual searches of relevant internet record references, the total number of records retrieved was recorded (those falling within the relevant time period). The number of manual search records reviewed and excluded at each stage of review was also be recorded.

3.4.2 Implications of relevant publications on risk assessment

The implications of the relevant publications on the risk assessment were assessed by considering whether any records presented new hazards, modified exposure pathways, or new scientific uncertainties. In addition, the reliability of each relevant record was assessed. "Reliability refers to the extent to which a publication is free from bias and the findings reported reflect true facts" (EFSA 2019). The reliability assessment process was developed following the recommendations outlined in the EFSA (2019) explanatory note on literature searching and in reference to previously established assessment methods (Klimisch *et al.* 1997; Moermond *et al.* 2016). Each reviewer performed a separate reliability assessment on all relevant records. Each record was evaluated using pre-defined reliability assessment criteria (outlined in Appendix E) that were derived from established quality criteria and EFSA guidance documents (EFSA 2010, 2015, 2017a, 2017b; Klimisch *et al.* 1997; Moermond *et al.* 2016) and refined by technical experts in the fields of GMO research, development, and product safety (Appendix A). Reviewers assigned each relevant record to a category of reliability (Table 6) based on their assessment. The reliability assessment results were compared, and reviewers discussed any conflicts to determine a consensus assignment for the category of reliability. If a consensus could not be met, the tie-breaker was consulted. Considering the tie-breaker's opinion, the majority position on the reliability of the record became the agreed position. For each relevant record, the parameters contributing to the reliability rating were described (e.g., parameters potentially leading to false negatives, false positives, or inconclusive results).

TABLE 6 Description of reliability categories

Ranking and Utility	Description
High reliability *To be used as key studies in the risk assessment.*	All critical reliability criteria for this study are fulfilled (Appendix E). The experimental design is appropriate for answering the research question and the publication provides a clear description of the test conditions and procedures that allow for independent replication.
Moderate reliability *Useable as key studies in the risk assessment depending on their specific limitations.*	The study is well-documented and meets basic scientific principles with basic data provided. Most critical reliability criteria for this study are fulfilled (Appendix E). However, not all details are given, raw data are not provided, or there are some minor flaws in the experimental procedures or documentation. Despite the study limitations, it can still be assumed with reasonable certainty that the results are reliable.
Low reliability *Not useable as key studies but may be used as supporting information depending on their specific limitations.*	The study is subject to several limitations and multiple critical reliability criteria are not fulfilled (Appendix E). The flaws in the study design or reporting make it difficult to assume with reasonable certainty that the results are reliable.
Not reliable *Studies that are not reliable are not useful and should not be used in the risk assessment.*	The study does not comply with minimum reliability criteria (Appendix E) and does not meet basic scientific principles, resulting in a high level of uncertainty. There are clear flaws in the study design and/or how the study was performed (e.g., methods are not validated, the test system is not suitable for answering the research question, inappropriate controls are used).
Not assignable/evaluated	Due to the nature of the record, either no or insufficient information about experimental design is reported. This category is used for secondary literature, including risk assessments, which summarize data from primary research studies without providing a thorough description of the experimental methods. Published abstracts with no associated full-text may also be categorized using this ranking.

4.0 SUMMARISING AND REPORTING THE DATA, AND CONSIDERING THE IMPLICATIONS OF THE FINDINGS

4.1 Summary of the Search and Publication Selection Process

A complete summary of the search results and selection process, including the number of records reviewed, included, and excluded during each stage of review, is outlined in Table 7. Across all searches (database, internet, and manual), a total of 161 unique publications were retrieved for review. Of these, 82 were retrieved from the database search and 79 were retrieved from the internet search.

For electronic bibliographic databases, the date on which the search was conducted, the date of the most recent update of the database, the service provider used, date span of the search, any limits applied to the search (e.g., dates) and the total number of records retrieved across all databases was recorded (Table 8). The records were de-duplicated after combining records retrieved from all the databases. Additionally, the search strategy as it was run for each database (including the fields searched), the number of publications identified for each bibliographic database prior to de-duplication (on a line-by-line basis), and the subject indexing used by each database (shown within brackets after each search term), were recorded (see Appendix F for screenshots of the search containing these details).

The database search returned a total of 82 records (after deduplication) that covered the dates of June 1, 2022 to July 7, 2023. During Stage 1, the reviewers agreed to include 2 records and exclude 80 records. There were no disagreements between reviewers, resulting in a kappa score of 1 (indicating perfect agreement). Since there were no conflicts during Stage 2 review, a tie-breaker reviewer was not needed.

For internet webpages of regulatory agency websites, the date on which the search was conducted, the date of the most recent update of the webpage (if available), the date span of the search, and the total number of records retrieved from each site were recorded (Table 8). The records from each website were de-duplicated individually. In total, the internet search yielded 79 records from regulatory agency websites that were evaluated only at Stage 2 (full-text) review. The reviewers agreed that all 79 records were irrelevant (Table 11). There were no conflicts between reviewers over internet records.

Since there were no relevant internet records identified, a manual search of reference lists from relevant internet documents was not conducted.

TABLE 7 Results of the publication selection process, for each review question and/or category of information/data requirement or group of information/data requirements searched

Review question and/or category of information/data requirement(s) captured in the search	Number of publications in each subcategory			
	Databases	**Internet**	**Manual[b]**	**Total**
Publications identified after all searches (database, internet, and manual search of references from relevant internet publications) of the scientific literature (excluding duplicates[a])	82	79	0	161
Publications excluded from the search results after screening of title and abstracts (Stage 1)	80	NA[d]	0	80
Publications screened using full-text (Stage 2)[c]	2	79	0	81
Publications excluded after full-text screening[e]	2	79	0	81
Unobtainable/Unclear publications	0	0	0	0
Publications considered relevant	0	0	0	0

a. A total of 224 publications were identified from the database search. Of these, 142 publications were removed because they were duplicates.
b. Manual refers to the records obtained from manually searching the reference lists of internet publications classified as relevant.
c. Internet results are not screened at Stage 1 because they have no title or abstract.
d. NA=Not Applicable.
e. Records that were excluded based on reporting format (e.g., drafts, documents submitted by applicants) are included in the numbers reported on this table, but are not listed with a reason for exclusion in Table 11.

TABLE 8 Electronic bibliographic database search details

Database	Search date (dd/mm/yyyy)	Service provider	Date span of the search (dd/mm/yyyy)[a]	Any limits applied to the search	Total number of records retrieved after removing duplicates[b]
Agricola	07/07/2023	Ovid Technologies	01/06/2022 to 29/06/2023	Dates	1
BIOSIS Previews	07/07/2023	Ovid Technologies	01/06/2022 to 05/07/2023	Dates	14
CAB Abstracts	07/07/2023	Ovid Technologies	01/06/2022 to 29/06/2023	Dates	33
Medline	07/07/2023	Ovid Technologies	01/06/2022 to 06/07/2023	Dates	34

a. Ovid only allows results to be limited by year. The end date reflects the most recent update for each database in the Ovid online platform. The frequency of database updates varies. Ovid has provided us with the following update information: Agricola updated monthly, BIOSIS Previews updated weekly, CAB Abstracts updated weekly, and Medline updated daily.

b. The results were de-duplicated across databases.

TABLE 9 Regulatory agency webpage search details

Regulatory agency name	URL	Date of search (dd/mm/yyyy)	Date of most recent website update (dd/mm/yyyy)	Total records retrieved after removing duplicates[a]	Number of relevant records
Canadian Food Inspection Agency	https://www.canada.ca/en/health-canada/services/food-nutrition/genetically-modified-foods-other-novel-foods/approved-products.html	08/08/2023	08/07/2022	0	0
Food Standards Australia New Zealand	http://www.foodstandards.gov.au/consumer/gmfood/applications/Pages/default.aspx	08/08/2023	May 2023	5	0
Health Canada	https://www.canada.ca/en/health-canada/services/food-nutrition/genetically-modified-foods-other-novel-foods/approved-products.html	08/08/2023	02/03/2023	3	0
Ministry of Agriculture, Forestry and Fisheries	https://www.biodic.go.jp/bch/lmo/OpenSearch.do	10/08/2023	No update information provided	28	0
National Advisory Commission on Agriculture Biotechnology	https://www.argentina.gob.ar/agricultura/alimentos-y-bioeconomia/ogm-vegetal-eventos-con-autorizacion-comercial	09/08/2023	No update information provided	4	0
National Technical Commission on Biosafety	http://ctnbio.mctic.gov.br/liberacao-comercial#/liberacao-comercial/consultar-processo	09/08/2023	No update information provided	7	0
Office of the Gene Technology Regulator	https://www.ogtr.gov.au/what-weve-approved/dealings-involving-intentional-release	09/08/2023	No update information provided	2	0
US Department of Agriculture	https://www.aphis.usda.gov/aphis/ourfocus/biotechnology/regulatory-processes/rsr-table/rsr-table	09/08/2023	27/06/2023	14	0
US Environmental Protection Agency	https://www.epa.gov/ingredients-used-pesticide-products/current-and-previously-registered-section-3-plant-incorporated	09/08/2023	15/11/2022	0	0
US Food and Drug Administration	https://www.accessdata.fda.gov/scripts/fdcc/?set=Biocon	09/08/2023	31/07/2023	16	0

a. Record deduplication was conducted within the results from individual agency websites.
b. There were 14 records retrieved from MAFF that were excluded based on reporting format (all were documents submitted by applicants, not authored by the regulatory agency).

4.2 Lists of Bibliographic References for Relevant Publications

After detailed review of the full-text documents in Stage 2, the 2 database records or 79 internet records were all determined to be not relevant.

4.3 Lists of Bibliographic References for all Excluded Publications After Detailed Assessment of Full-Text Documents for Relevance

After detailed review of the full-text documents in Stage 2, both database records reviewed were excluded (Table 10) and all 79 internet records reviewed were excluded (Table 11). Bibliographic information for the excluded records (author, publication year, title, and source) is included in the following tables, along with the eligibility/inclusion criteria used as a reason for exclusion (see Table 2 for a full list of the eligibility/inclusion criteria used during review).

TABLE 10 Report of database publications excluded from the risk assessment after detailed assessment of full-text documents, giving the reason(s) for exclusion

List of bibliographic references for all database publications excluded from the risk assessment, classified by authors			
Study author(s) and year	**Title**	**Source**	**Reason(s) for exclusion based on eligibility/inclusion criteria**
Yin *et al.* (2023)	*In situ* Proteomic Analysis of Herbicide-Resistant Soybean and Hybrid Seeds via Matrix-Assisted Laser Desorption/Ionization-Mass Spectrometry Imaging	Journal of Agricultural & Food Chemistry	Intervention/exposure - The soybean used in this study was DBN9004.
Varunjikar *et al.* (2023)	Proteomics analyses of herbicide-tolerant genetically modified, conventionally, and organically farmed soybean seeds	Food Control	Intervention/exposure - A variety of GM soybean plants were used in this study, none of which were FG72 soybean.

TABLE 11 Report of internet publications excluded from the risk assessment after detailed assessment of full-text documents, giving the reason(s) for exclusion

List of bibliographic references for all internet publications excluded from the risk assessment, classified by authors			
Study author(s) and year[a]	**Title**	**Source**	**Reason(s) for exclusion based on eligibility/inclusion criteria[b]**
FSANZ (2022)	A1239 -- BPS-BFLFK-2 -- Approval report	https://www.foodstandards.gov.au/code/applications/Documents/A1239_ApprovalReport.pdf	Intervention/Exposure
FSANZ (2023)	A1264 -- IND-00410-5 -- Supporting document 1 - Safety assessment	https://www.foodstandards.gov.au/code/applications/Documents/01_A1264_SD1.pdf	Intervention/Exposure
FSANZ (n.d.)	A1239 -- BPS-BFLFK-2 -- Supporting document 2 - Nutrition Risk Assessment	https://www.foodstandards.gov.au/code/applications/Documents/A1239_SD2_changed.pdf	Intervention/Exposure
FSANZ (2023)	A1270 -- DP-Ø51291-2 -- Supporting document 1 - Safety assessment	https://www.foodstandards.gov.au/code/applications/Documents/01_A1270_SD1%20.pdf	Intervention/Exposure
FSANZ (2023)	A1262 -- MON-95275-7 -- Supporting document 1 - Safety assessment	https://www.foodstandards.gov.au/code/applications/Documents/01_A1262_SD1%20.pdf	Intervention/Exposure
HC (2022)	Canola Protein Isolate and Cruciferin-rich Canola Protein Isolate – Technical Summary	https://www.canada.ca/en/health-canada/services/food-nutrition/genetically-modified-foods-other-novel-foods/approved-products/canola-protein-isolate-cruciferin-rich-canola-protein-isolate/document.html	Intervention/Exposure
HC (2022)	Sugarcane CTC75064-3 – Technical Summary	https://www.canada.ca/en/health-canada/services/food-nutrition/genetically-modified-foods-other-novel-foods/approved-products/sugarcane-ctc75064-3/technical-document.html	Intervention/Exposure
HC (2023)	ROXY® rice expressing an oxyfluorfen herbicide tolerance characteristic – Technical Summary	https://www.canada.ca/en/health-canada/services/food-nutrition/genetically-modified-foods-other-novel-foods/approved-products/roxy-rice-expressing-oxyfluorfen-herbicide-tolerance/document.html	Intervention/Exposure
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. BCS-GM151-6	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1991&ref_no=2	Intervention/Exposure

List of bibliographic references for all internet publications excluded from the risk assessment, classified by authors

Study author(s) and year[a]	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria[b]
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. DP-202216-6	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1949&ref_no=2	Intervention/Exposure
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. DP-915635-4	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1992&ref_no=2	Intervention/Exposure
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. BCS-BN0-12-7 × ACS-BN003-6 × MON-88302-9	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1993&ref_no=2	Intervention/Exposure
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. OECD-UI: MON-95275-7	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1996&ref_no=2	Intervention/Exposure
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. SYN-E3272-5 x SYN-BT011-1 x SYN-IR162-4 x SYN-IR604-5 x DAS-01507-1 x SYN-05307-1 x MON-00021-9	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1995&ref_no=2	Intervention/Exposure
MAFF (2022)	Results of deliberations by the Agricultural Products Subcommittee. MON-95379-3	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1994&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. MON-94804-4	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=2001&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. DBN-09004-6	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=2002&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. MON-94313-8	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=2003&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. KB-KWS201-6	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=2000&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. DP-023211-2	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1997&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. 'Honey Snow', MF-1	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1998&ref_no=2	Intervention/Exposure
MAFF (2023)	Results of deliberations by the Agricultural Products Subcommittee. BPS-BFLFK-2	https://www.biodic.go.jp/bch/lmo/OpenDocDownload.do?info_id=1999&ref_no=2	Intervention/Exposure
CONABIA (2022)	Resolution No. 27/2022 (05/11/2022). IND-ØØ412-7	http://www.magyp.gob.ar/sitio/_pdf/RES_27-2022%20BO.pdf	Intervention/Exposure
CONABIA (2022)	Resolution 51/2022. MON-ØØ6Ø3-6 x ACS-ZMØØ3-2 x DAS-4Ø278-9, Intermediate accumulators	https://magyp.gob.ar/sitio/areas/biotecnologia/_pdf/Resolucion_512022.pdf	Intervention/Exposure

List of bibliographic references for all internet publications excluded from the risk assessment, classified by authors

Study author(s) and year[a]	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria[b]
CONABIA (2022)	Provision 21/2022. DNB-Ø8ØØ2-3	https://www.magyp.gob.ar/sitio/areas/biotecnologia/ogm/_archivos/disposicion21-2022.pdf	Intervention/Exposure
CONABIA (2022)	Resolution No. 28/2022 (05/12/2022). MON-87751-7	http://www.magyp.gob.ar/sitio/_pdf/RESOL-28-2022%20%20BO.pdf	Intervention/Exposure
CTNBio (2022)	Technical Opinion No. 8281-2022	http://ctnbio.mctic.gov.br/documents/566529/2315217/Parecer+T%C3%A9cnico+8281_2022/	Intervention/Exposure
CTNBio (2022)	Technical Opinion No. 8072-2022	http://ctnbio.mctic.gov.br/documents/566529/2319671/Parecer+T%C3%A9cnico+8072_2022/	Intervention/Exposure
CTNBio (2023)	Technical Opinion No. 8407 - 2023	http://ctnbio.mctic.gov.br/documents/566529/2311588/Parecer+T%C3%A9cnico+n%C2%BA%208407+-+2023/	Intervention/Exposure
CTNBio (2023)	Technical Opinion No. 8396-2023	http://ctnbio.mctic.gov.br/documents/566529/2313404/Parecer+T%C3%A9cnico+8396_2023/	Intervention/Exposure
CTNBio (2023)	Technical Opinion No. 8405 - 2023	http://ctnbio.mctic.gov.br/documents/566529/2313904/Parecer+T%C3%A9cnico+8405_2023/	Intervention/Exposure
CTNBio (2023)	Technical Opinion No. 8352-2023	http://ctnbio.mctic.gov.br/documents/566529/2312772/PARECER+T%C3%89CNICO+N%C2%BA%208352_2023/	Intervention/Exposure
CTNBio (2023)	Technical Opinion No. 8393-2023	http://ctnbio.mctic.gov.br/documents/566529/2313088/Parecer+T%C3%A9cnico+8393_2023/	Intervention/Exposure
OGTR (2022)	DIR 190. Commercial release of Indian mustard genetically modified for herbicide tolerance (RF3)	https://www.ogtr.gov.au/sites/default/files/2022-10/dir190_full_risk_assessment_and_risk_management_plan.pdf	Intervention/Exposure
OGTR (2023)	DIR 191. Commercial import and distribution of chrysanthemum genetically modified for altered flower colour	https://www.ogtr.gov.au/sites/default/files/2023-02/dir191_full_risk_assessment_and_risk_management_plan.pdf	Intervention/Exposure
USDA (2022)	21-166-01rsr. Product Quality and Marker Gene (Tomato)	https://www.aphis.usda.gov/brs/pdf/rsr/21-166-01rsr-review-response.pdf	Intervention/Exposure

List of bibliographic references for all internet publications excluded from the risk assessment, classified by authors

Study author(s) and year[a]	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria[b]
USDA (2022)	21-277-01rsr. Altered flower color and marker gene (antibiotic resistance) (Chrysanthemum)	https://www.aphis.usda.gov/brs/pdf/rsr/21-277-01rsr-review-response.pdf	Intervention/Exposure
USDA (2022)	21-257-01rsr. Altered peroxidase and Herbicide Resistance (Corn)	https://www.aphis.usda.gov/brs/pdf/rsr/21-257-01rsr-review-response.pdf	Intervention/Exposure
USDA (2022)	21-245-01rsr. Altered tuber quality (Potato)	https://www.aphis.usda.gov/brs/pdf/rsr/21-245-01rsr-review-response.pdf	Intervention/Exposure
USDA (2022)	21-270-01rsr. Altered tuber quality, Altered tuber sugar profile, Herbicide resistance, Fungal resistance, and Virus resistance, Resistance to potato late blight, (Potato)	https://www.aphis.usda.gov/brs/pdf/rsr/21-270-01rsr-review-response.pdf	Intervention/Exposure
USDA (2022)	21-117-01rsr. Altered Seed Oil Profile and Protein Conten (Soybean)	https://www.aphis.usda.gov/brs/pdf/rsr/21-117-01rsr-review-response.pdf	Intervention/Exposure
USDA (2022)	21-152-01rsr. Altered enzyme levels and Marker gene (carbon source) (Corn)	https://www.aphis.usda.gov/brs/pdf/rsr/21-152-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-224-01rsr. Altered nutritional profile (Potato)	https://www.aphis.usda.gov/brs/pdf/rsr/22-224-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-152-01rsr. Altered plant architecture (Corn)	https://www.aphis.usda.gov/brs/pdf/rsr/22-152-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-276-01rsr. Altered appearance, Marker gene (antibiotic resistance) (Soybean)	https://www.aphis.usda.gov/brs/pdf/rsr/22-276-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-145-01rsr. Altered seed oil profile and Herbicide resistance (Safflower)	https://www.aphis.usda.gov/brs/pdf/rsr/22-145-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-235-01rsr. Altered appearance, Marker gene (antibiotic resistance) (Soybean)	https://www.aphis.usda.gov/brs/pdf/rsr/22-235-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-013-01rsr. Resistance to lodging (Teff)	https://www.aphis.usda.gov/brs/pdf/rsr/22-013-01rsr-review-response.pdf	Intervention/Exposure
USDA (2023)	22-276-02rsr. Altered appearance, Marker gene (antibiotic resistance) (Tomato)	https://www.aphis.usda.gov/brs/pdf/rsr/22-276-02rsr-review-response.pdf	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 173. Animal food use - CVM (Jun 23, 2022)	https://www.fda.gov/media/161332/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 179. Human Food Use - CFSAN (Nov 7, 2022)	https://www.fda.gov/media/164304/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 177. Human Food Use - CFSAN (Sep 27, 2022)	https://www.fda.gov/media/162631/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 175. Human Food Use - CFSAN (Jul 29, 2022)	https://www.fda.gov/media/161445/download	Intervention/Exposure

List of bibliographic references for all internet publications excluded from the risk assessment, classified by authors

Study author(s) and year[a]	Title	Source	Reason(s) for exclusion based on eligibility/inclusion criteria[b]
US FDA (2022)	Biotechnology Notification File No. 175. Animal food use - CVM (Jul 18, 2022)	https://www.fda.gov/media/161446/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 179. Animal food use - CVM (Nov 8, 2022)	https://www.fda.gov/media/164305/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 170. Animal food use - CVM (Jun 7, 2022)	https://www.fda.gov/media/159911/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 170. Human food use - CFSAN (Jun 22, 2022)	https://www.fda.gov/media/159910/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 177. Animal food use - CVM (Sep 28, 2022)	https://www.fda.gov/media/162632/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 173. Human Food Use - CFSAN (Jun 23, 2022)	https://www.fda.gov/media/161331/download	Intervention/Exposure
US FDA (2023)	Biotechnology Notification File No. 178. Human Food Use - CFSAN (Jun 13, 2023)	https://www.fda.gov/media/170057/download	Intervention/Exposure
US FDA (2023)	Biotechnology Notification File No. 186. Animal food use - CVM (May 31, 2023)	https://www.fda.gov/media/170397/download	Intervention/Exposure
US FDA (2023)	Biotechnology Notification File No. 182. Human Food Use - CFSAN (Jul 6, 2023)	https://www.fda.gov/media/170623/download	Intervention/Exposure
US FDA (2023)	Biotechnology Notification File No. 186. Human Food Use - CFSAN (Jun 8, 2023)	https://www.fda.gov/media/170396/download	Intervention/Exposure
US FDA (2023)	Biotechnology Notification File No. 182. Animal food use - CVM (Jun 9, 2023)	https://www.fda.gov/media/170624/download	Intervention/Exposure
US FDA (2022)	Biotechnology Notification File No. 178. Animal Food Use - CVM (Jun 16, 2023)	https://www.fda.gov/media/170058/download	Intervention/Exposure

a. There were 14 records collected from MAFF that were excluded based on reporting format that are not listed in this table (all were documents submitted by applicants, not authored by the regulatory agency).
b. n.d. = no date

4.4 List of the Bibliographic References for all Unobtainable Publications

There were no publications classified as unobtainable.

4.5 List of the Bibliographic References for all Unclear Publications

There were no publications with unclear details.

4.6 Full-Text Documents

No relevant records were identified. Therefore, no full-text documents accompany this final report.

4.7 Implications of Relevant Publications to the Risk Assessment of FG72 soybean

There were no relevant records identified during this comprehensive literature scoping search and review. As such, no hazards, modified exposure pathways, or scientific uncertainties for Syngenta GM soybean products were identified. Therefore, the results of this literature search and scoping review do not change the risk assessment of Syngenta GM soybean products.

5.0 STUDY RECORDS

5.1 Records Maintained

Records maintained include, but are not limited to, documentation of database search dates, database update dates, resolution of differences of opinion on records, the protocol, and any protocol amendments or deviations.

5.2 Archiving of Study Records

The protocol amendments, deviations, raw data, related documentation, and final report are archived at Syngenta in Research Triangle Park, NC, USA.

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APPENDICES SECTION

APPENDIX A. Key Personnel Qualifications and Expertise

Table A1 Key Personnel

Name and Role	Qualifications and Expertise
[redacted], Author & Record Reviewer	• Ph.D. Veterinary Medical Sciences (Toxicology concentration), University of Florida • M.S. Coastal Sciences, University of Southern Mississippi • B.S. Biochemistry and Molecular Biology, Michigan Technological University • 6 years of experience in toxicology and molecular biology research (including experience with genetic manipulation of organisms)
[redacted], Record Reviewer	• Ph.D. Biochemistry and Molecular Biology, Peking University • B.S. Biochemistry, Lanzhou University • More than 15 years of experience conducting research in molecular biology, cell biology, pharmacology, and toxicology; extensive experience working with GM organisms including fungi, plants, and animals.
[redacted], Tiebreaker*	• Ph.D. Pharmacology and Toxicology, West Virginia School of Medicine • B.M. Preventative Medicine, Shandong Medical University • Over 15 years of experience in research and development, regulatory science, and product safety for GM crops
[redacted], Information Specialist	• MLIS (Master of Library and Information Science), UNC Greensboro • M.A., Wake Forest University • B.A., East Carolina University • 23 years of experience as a librarian at Colleges, Universities, and Private Research Libraries • Library Services for Syngenta Crop Protection since 2008

*The role of tie-breaker was assigned prior to starting the study. However, all conflicts were resolved by the reviewers and a tie-breaker was not needed. Therefore, the tie-breaker listed here did not participate in this study.

APPENDIX B. Database Information

TABLE B1 Specifications of each database used in this study*

Database	Database Description	No. of Journals/Records	Dates of Coverage	Frequency of Database Updates in Ovid
Ovid Medline	Database composed of international literature related to a variety of biomedicine topics related to human health. Produced by the National Library of Medicine.	>5,600 Journals/ >23 Million Records	1946-Present	Daily
CAB Abstracts	Database constructed by CAB International. Includes journal articles, patents, conference abstracts, and reports spanning a wide variety of topics in the life sciences that include (but are not limited to) agriculture, human health/nutrition, veterinary sciences, and natural resource management. Resources originate from over 120 countries.	>10.4 Million Records	1910-Present	Weekly
AGRICOLA	Database specializing in resources from agricultural and related sciences. Contains records from journal articles, book chapters, reports, and reprints. Developed by the National Agriculture Library (USDA). The article database provides citations to journal articles, book chapters, reports, and reprints. A limited selection of patents are also available in this library, although none have been indexed recently (past 10 years).	>5.2 Million Records	1970-Present	Monthly
BIOSIS Previews	Database covering a broad array of topics in the life sciences, and includes many publications and journals not found in Medline. Topics include a comprehensive coverage of biological, biochemical, biophysical, bioengineering, and biomedical research. Records include original research articles, national and international conferences, reviews, United States patents, technical letters and notes, and books.	>5,000 Journals/ >18 Million Records	1969 -Present	Weekly

*Information on these databases was retrieved from the Wolters Kluwer group, which hosts Ovid® Technologies. Additional information (i.e., sources for data) can be obtained upon request. (Medline database guide: https://ospguides.ovid.com/OSPguides/medline.htm, description: https://www.wolterskluwer.com/en/solutions/ovid/ovid-medline-901, CAB Abstracts database guide: https://ospguides.ovid.com/OSPguides/cabadb.htm, description: https://www.wolterskluwer.com/en/solutions/ovid/cab-abstracts-31; AGRICOLA database guide: https://ospguides.ovid.com/OSPguides/agradb.htm, description: https://www.wolterskluwer.com/en/solutions/ovid/agricola-9; BIOSIS Previews database guide: https://ospguides.ovid.com/OSPguides/biopdb.htm, description: https://www.wolterskluwer.com/en/solutions/ovid/biosis-previews-26)

APPENDIX C. Development of the Database Search Strategy

The database search strategy utilized a "lumping" approach to obtain a broad range of information related to Syngenta GM soybean products and the intended traits/newly expressed proteins. A single search strategy was developed to capture all categories of information in one search. This strategy was expected to return a manageable number of records while still capturing the breadth of relevant information, based on previous experience.

C.1. Search terms

Search terms were identified by:

- Assessing the subject indexing terms of related, relevant publications[1] from the thesauri of electronic bibliographic databases.
- Seeking suggestions from a multi-disciplinary team of experts and stakeholders (i.e., risk assessors, information specialists, regulatory affairs managers).

C.2. Free-text terms and subject indexing terms

All searches were conducted from the Ovid® platform using the keyword search in the advanced search window. The keyword search executes a multi-field search across a specific combination of free-text and controlled vocabulary fields. The default set of fields (designated as ".mp"), which were used in this study, vary by database[2]. Ovid automatically switches to the appropriate fields when a database is selected (the ".mp" designations for each search are shown in Appendix F).

In Ovid, all ".mp" fields are word searchable. Therefore, records indexed to a controlled vocabulary field containing a phrase are captured by searches using any part of that subject heading. For example, a search strategy that includes the search term "genetic*" will return all records indexed to the example fields listed below (words captured by the search term are highlighted in yellow):

[1] Relevant publications from previous literature search reports (that comply with the EFSA explanatory note on literature searching (EFSA, 2019)) for the risk assessment of events and stacks in-scope of this report were examined to identify associated subject indexing terms.

[2] In Agricola the .mp fields are: free-text—abstract; geographic area; identifier; meeting information; map information; note; original title; personal name as subject; title—and controlled vocabulary—category code; subject heading. In BIOSIS Previews the .mp fields are: free-text—abstract; book title; gene name; miscellaneous descriptors; methods & equipment; original language book title; title—and controlled vocabulary—biosystematic codes; chemicals & biochemicals; concept codes; diseases; geopolitical locations; major concepts; organisms; parts, structure & systems of organisms; sequence data; super taxa; taxa notes; time. In CAB Abstracts the .mp fields are: free-text—abstract; identifiers; original title; title—and controlled vocabulary—broad terms; geographic location; organism descriptors; subject headings. In Medline the .mp fields are: free-text—abstract; keyword heading word; original title; synonyms; title; unique identifier—and controlled vocabulary—floating sub-heading word; name of substance word; organism supplementary concept word; protocol supplementary concept word; rare disease supplementary concept word; subject heading word.

- **Genetically modified** foods or **genetic engineering** in the Subject Headings field of Agricola,
- *Zea mays*: species, maize, common**, genetically modified** in the Organism field of BIOSIS Previews,
- **Genetically engineered** organisms in the Subject Headings field of CAB Abstracts,
- Plants, **Genetically Modified** / ge [Genetics] or **Genetic Engineering** of MeSH Subject Headings in Medline

Similarly, controlled vocabulary fields can also be called using combined search terms. Thus, a search strategy that uses "genetic* AND (modif* OR engineer*)" will also return all records indexed to the above example fields (words captured by the search terms are indicated by bold font).

Notably, Ovid® search platform simultaneously searches free-text and controlled-vocabulary subject headings. Therefore, using all search terms in all databases does not present a disadvantage. Therefore, the same search strategy was used across all databases.

C.3. Search terms

The search terms were selected to ensure a wide variety of synonymous and related terms were included. Truncation and wildcards were used, when appropriate, to capture different spelling conventions and variation in the endings of terms.

C.4. Search strings

Search strings were combined with Boolean and proximity operators appropriate for the scope of the review.

C.5. Key elements of the review question used for best results

Based on previous experience, the search strategy returns a very large number of results when only targeting the four key elements of Events, Intended Traits, Newly Expressed Proteins, and Trade Names, as shown below:

- Event OR Intended Trait OR Newly Expressed Protein(s) OR Trade Name

"A very large number" is not defined in the explanatory note on literature searching (EFSA 2019). However, the numbers returned were so large that they could not be de-duplicated by the search platform. Example of these search strategies are listed below:

Therefore, additional key elements (e.g., GMO General, Plant Species) were added to the search strategy. The search strategy employed was:

- Event OR Trade name OR (Newly Expressed Protein(s) AND (GMO general OR Plant Species)) OR (Intended Trait – Insecticidal AND (GMO general AND Plant Species)) OR GMO general × Intended Traits

The altered search strategy retrieved a more manageable number of results without sacrificing sensitivity (defined as the ability to return the previously deemed relevant articles with the new search string). The sensitivity of the search strategy was demonstrated using reference publications (Appendix D).

APPENDIX D. Reference Publications

Reference publications were used to assess the performance of the database search strategy before it was finalized. Reference publications were selected from known relevant records identified in previous literature reviews on the risk assessment of FG72 soybean. A preliminary set of search results was obtained using the methods outlined in Section 3.2.1, with extended relevant search dates to capture the known reference publications from previous years. The presence/absence of reference publications within the preliminary search results was recorded for each database (Table D1). In total, 100% of the reference publications were retrieved using this search strategy. Therefore, the search strategy was considered sufficient for capturing the breadth of relevant literature available for this topic.

TABLE D1. Reference publication retrieval using the database search strategy

Reason for Selection	Reference	Agricola	BIOSIS Previews	CAB Abstracts	Medline
Assessment of the digestibility of 2mEPSPS protein (newly expressed protein).	Schafer *et al.* (2016)		X		X
Toxicological assessment of FG72 soybean (event)	Xie *et al.* (2018)		X	X	X
Characterization and safety assessment of HPPD W336 (newly expressed protein) expressed in herbicide tolerant (intended trait) FG72 soybean (event)	Dreesen *et al.* (2018)		X		X
Number of articles identified in each database		0	3	1	3
Percentage of articles identified in each database		0%	100%	33%	100%

APPENDIX E. Reliability Assessment Criteria

TABLE E1 Reliability assessment criteria

Category/Categories of Information/Data Requirement	Critical Reliability Criteria
General *All primary research studies, regardless of category of data/information requirement, should meet these criteria.*	- The objectives of the study are clearly defined and the hypotheses, where appropriate, are clearly stated. - The study design and methods are well-described in a way that allows for independent replication of experiments. - The methods used are validated and acceptable for measuring the outcomes/endpoints evaluated in the study. - The results are well described and, if applicable, sufficient information/data are provided to check the calculation of outcomes/endpoints. - Appropriate statistical methods/tests are used and clearly described. - Where appropriate, a description of the feasibility of the data to fit the assumptions of the statistical test(s) is included and any data manipulations are justified and described (e.g., transformations, removal of extreme observations).
Agronomic, phenotypic, and compositional characterization of the GM plant Persistence and invasiveness assessment, including plant-to-plant gene transfer	**Field studies** - Test and control substances/organisms ▪ The test and control substances/organisms are clearly described, including the origin/source of the seed used to plant the field trial(s). ▪ The control substance/organism is derived from non-transgenic seed/plants that are near-isogenic to the test substance/organism. - Experimental design ▪ Enough replicates are used (biological and/or technical) and, where applicable, enough organisms per replicate are used. ▪ The location of field trial site(s) and approximate planting dates are well described. ▪ A description of environmental conditions and abnormalities during field growing are reported (e.g., extreme weather conditions, extreme crop pest pressure). ▪ A description of the field trial design (e.g., size, plot shape, inter-plot distances) is provided. ▪ Clear and well-defined descriptions of the agronomic and/or phenotypic characteristics measured are provided, along with the methods used for measurement/assessment. - Statistical evaluation ▪ The design of field trial(s) (e.g., randomized complete block design, completely randomized, split-plot) and the experimental unit(s) are appropriate and well-described. **Compositional characterization** - Test and control substances/organisms

	▪ The test and control substances/organisms are clearly described. ▪ The test control substances/organisms were grown in the same location, during the same growing season, under similar environmental conditions. ▪ The control substance/organism is derived from non-transgenic seed/plants that are near-isogenic to the test substance/organism. - Experimental design ▪ Enough replicates are used (biological and/or technical) and, where applicable, enough organisms per replicate are used. ▪ Clear and well-defined descriptions of the compositional characteristics measured are provided, along with the methods used for measurement/assessment. ▪ A clear description of procedures used to collect samples for compositional analysis is provided. ▪ A description of and references for the analytical methods used to measure compositional analytes is provided.
Toxicological assessment of newly expressed protein(s), new constituents other than proteins, and the whole GM food/feed	***In vivo* Toxicity Testing** - Test and control substance ▪ The test substance is clearly described including its purity, composition, and origin. ▪ The experimental system and any solvents used are appropriate for the test substance, considering its physicochemical characteristics. ▪ Appropriate controls are used in this study (e.g., solvent control, negative and positive controls). - Test organisms ▪ The test organisms used in the study are well described (e.g., scientific name, weight, length, growth, age/life stage, strain/clone, gender if appropriate), and the test organism is appropriate for answering the research question. ▪ The test organisms originate from a trustworthy source and were acclimatized to test conditions. - Experimental design and exposure conditions ▪ Enough replicates are used (biological and/or technical) and, where applicable, enough organisms per replicate are used. ▪ The test conditions are well described and appropriate for the test organisms used (e.g., description of housing setup, light intensity, temperature, number of organisms per cage). ▪ A description of the route of exposure and methods for dose administration are provided (preferably accompanied by analytical verification of the dose administered). ▪ The exposure duration and frequency are described. ▪ The measured parameters and endpoints examined are clearly described and defined. The methods for endpoint measurement are well-defined, validated, and appropriate. **Amino acid sequence comparison to known toxins** - Query sequence ▪ A complete description of the query sequence should be provided. ▪ The experimental system and any solvents used are appropriate for the test substance, considering its

	physicochemical characteristics. ▪ Appropriate controls are used in this study (e.g., solvent control, negative and positive controls). - Algorithms/parameters and sequence databases ▪ Sequence similarity searches should be performed with common local alignment tools such as BLAST or FASTA. ▪ In general, default parameters for alignment tools should be used and the default parameters of the specific system should be listed (e.g., E-value threshold, word size, match/mismatch scores and gap costs). Any deviations from the default parameters should be listed and justified. ▪ The sequence database(s) selected should be publicly available, up-to-date, and contain appropriate information/details for answering the research question. ▪ Details on the sequence database(s) used, including the database version, should be provided. - Results and reporting ▪ Sequence similarity searches should be performed with common local alignment tools such as BLAST or FASTA.
Allergenicity assessment of the newly expressed protein and the GM food/feed, and adjuvanticity	***In vitro* digestion studies and experiments using cellular based assays** - Test and control substances ▪ The test substance is clearly described including its purity, composition, and origin. ▪ Appropriate controls are used in the study (e.g., solvent control, negative and positive controls). ▪ For *in vitro* digestion assays, controls are used to demonstrate the effectiveness of the test system employed (e.g., appropriate control proteins are used to demonstrate the effectiveness of an *in vitro* digestion system). The controls are commercially available and well characterized. ▪ For *in vitro* digestion assays, the concentration, source, purity, and specific activities of the digestive enzymes used are described. - Experimental design ▪ Enough replicates are used (biological and/or technical). ▪ The conditions of the test system are reported (e.g., pH, addition of biosurfactants, and temperature for *in vitro* digestion studies; cell-culture conditions, cell strain, temperature, and seeding density for *in vitro* cell-based assays). ▪ The end-points and read-outs are clearly defined and appropriate to address the research question. **Amino acid sequence comparison to known allergens** - Query sequence ▪ A complete description of the query sequence should be provided. ▪ The experimental system and any solvents used are appropriate for the test substance, considering its physicochemical characteristics. ▪ Appropriate controls are used in this study (e.g., solvent control, negative and positive controls). - Algorithms/parameters and sequence databases ▪ Sequence similarity searches should be performed with common local alignment tools such as BLAST or FASTA. ▪ In general, default parameters for alignment tools should be used and the default parameters of the specific system should be listed (e.g., E-value threshold, word size, match/mismatch scores and gap costs). Any deviations from the default parameters should be listed and justified.

	▪ The sequence database(s) selected should be publicly available, up-to-date, and contain appropriate information/details for answering the research question. ▪ Details on the sequence database(s) used, including the database version, should be provided. - Results and reporting ▪ Sequence similarity searches should be performed with common local alignment tools such as BLAST or FASTA.
Nutritional assessment of the newly expressed protein(s), other new constituents, as well as potential alterations in the total diet of the consumer or the animal	***In vivo* feeding studies** - Test and control substances/diets ▪ The origin/source of the test and control substances are well defined. ▪ If the test-substance is GM plant material, the control substance is a non-transgenic and near-isogenic variety. ▪ An appropriate control diet is used and formulated with a similar nutrient profile. - Experimental design ▪ Enough replicates are used (biological and/or technical) and, where applicable, enough organisms per replicate are used. ▪ The animal species used is appropriate for answering the research question. ▪ The test conditions are well described and appropriate for the test organisms used (e.g., description of housing/pens, number of animals per pen). ▪ For target animal feeding studies, the study spans an appropriate time period (e.g., from the growing and/or finishing period to slaughter for chickens, pigs, and cattle, a major part of the lactation cycle for dairy cows, and the laying cycle for laying hens or quails). ▪ For target animal feeding studies, the endpoints measured in the study are appropriate to answer the research question, but should also include animal health and welfare, animal losses, feed intake, body weight, and animal performance. - Statistical evaluation ▪ Justification for the choice of experimental design (e.g., randomized complete block design, completely randomized) is provided. ▪ The statistical approaches are provided and consider the animal species used in the study.
Assessment of plant to micro-organism gene transfer	**Bioinformatics assessment for plant-to-plant/microorganism gene transfer** - Query sequence ▪ A complete description of the query sequence should be provided. ▪ The experimental system and any solvents used are appropriate for the test substance, considering its physicochemical characteristics. ▪ Appropriate controls are used in this study (e.g., solvent control, negative and positive controls). ▪ The query sequence should be a minimum of 200-bp in length to consider DNA regions with increased recombination potential. - Algorithms/parameters and sequence databases ▪ Sequence similarity searches should be performed with common local alignment tools such as BLAST or FASTA.

	▪ In general, default parameters for alignment tools should be used and the default parameters of the specific system should be listed (e.g., E-value threshold, word size, match/mismatch scores and gap costs). Any deviations from the default parameters should be listed and justified. ▪ The sequence database(s) selected should be publicly available, up-to-date, and contain appropriate information/details for answering the research question. ▪ Details on the sequence database(s) used, including the database version, should be provided. - Results and reporting ▪ The analysis should be presented in a graphic summary that depicts the results against the insert and flanking region. ▪ Results of significant matches should report the target organism, the length and percentage of identity, and the orientation of the alignment.
Assessment of interactions with non-target organisms (NTO)	***In vivo* toxicity/feeding studies assessing indirect exposure routes** - Test and control substances ▪ The origin/source of the test and control substances are well defined. ▪ Appropriate controls are used in the study (e.g., negative and positive controls). - Test species ▪ The test organisms used in the study are well described (e.g., scientific name, weight, length, growth, age/life stage, strain/clone, gender if appropriate), healthy, and of similar age. ▪ Justification for selection of the test organism is provided and appropriate. ▪ The biological performance of organisms used as controls shall be within acceptable limits (e.g., control mortality less than 20% depending on the testing system and organism) ▪ The test organisms originate from a trustworthy source and were acclimatized to test conditions. - Experimental design ▪ A sufficient number of replicates are used (biological and/or technical) and, where applicable, a sufficient number of organisms per replicate are used. ▪ The environmental test conditions in growth chambers, mesocosms, and greenhouses are explicitly described and justified. ▪ Exposure pathways are clearly defined in the experimental setup and exposure to known quantities of testing material is maintained throughout the study. ▪ The experiment is conducted for a time span adequate to reliably estimate measurement endpoints. ▪ If reproduction is an endpoint, the processes of the reproductive biology are included in the testing phase and the life-history of the test-organisms is reported (age at maturation, duration of egg development, and instars subjected to exposure). ▪ If reproduction is an endpoint, optimization of conditions for growth and reproduction must be provided.

APPENDIX F. Search History and Subject Indexing

▼ **Search History** (14) View Saved

	# ▲	Searches	Results	Type	Actions	Annotations
☐	1	(FG72 or FG 72 or MST-FG#72).mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	6	Advanced	Display Results | More	🗨
☐	2	GT27*.mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	1	Advanced	Display Results | More	🗨
☐	3	(((5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase) adj5 (double mutat* or double modif*)) or 5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase or EPSP synthase or MEPSP synthase or EPSPS or MEPSPS or 2MEPSPS or 2 MEPSPS or "EC 2.5.1.19" or "E.C. 2.5.1.19").mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	714	Advanced	Display Results | More	🗨
☐	4	(HPPDW336 or HPPD W336 or HPPD W 336 or ((hydroxyphenylpyruvate dioxygenase or hydroxy phenylpyruvate dioxygenase or hydroxyphenyl pyruvate dioxygenase or hydroxy phenyl pyruvate dioxygenase or HPPD) adj5 (mutat* or modif*))).mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	4	Advanced	Display Results | More	🗨
☐	5	3 or 4	718	Advanced	Display Results | More	🗨
☐	6	((HPPD inhibit* or isoxaflutole* or diketonitrile* or pyrazolone* or triketone* or gl#phosate or gl#fosate or G360 or G 360 or roundup* or round up* or herbicide* or pesticide*) adj2 (toleran* or resistan* or protect*)).mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	7446	Advanced	Display Results | More	🗨
☐	7	(GMO* or LMO* or GM or GE or transgen* or ((genetic* or living or biotech*) adj3 (modif* or transform* or manipulat* or improv* or engineer* or deriv*))).mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	99483	Advanced	Display Results | More	🗨
☐	8	(GMHT or GEHT or GMHR or GEHR or GMHTs or GEHTs or GMHRs or GEHRs).mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	58	Advanced	Display Results | More	🗨

Contract

AGRICOLA

☐	9	(Soy or soya or soja or soybean* or soyabean* or sojabean* or Glycine max or G max).mp. [mp=meeting information, title, original title, map information, note, abstract, heading words]	70623	Advanced	Display Results | More	
☐	10	5 and (7 or 9)	347	Advanced	Display Results | More	
☐	11	(6 and 7) or 8	1938	Advanced	Display Results | More	
☐	12	11 and 9	400	Advanced	Display Results | More	
☐	13	1 or 2 or 10 or 12	690	Advanced	Display Results | More	
☐	14	limit 13 to yr="2022 -Current"	28	Advanced	Display Results | More	

Save | Remove | Combine with: AND | OR

Save All | Edit | Create RSS | Create Auto-Alert | View Saved | Email All Search History | Copy Search History Link | Copy Search History Details

Basic Search | Find Citation | Search Tools | Search Fields | **Advanced Search** | Multi-Field Search

1 Resource selected | Hide | Change

AGRICOLA 1970 to June 2023

Enter keyword or phrase (* or $ for truncation)

◉ **Keyword** ○ Author ○ Title ○ Journal

Search

▸ **Limits** *(expand)* ☐ Include Multimedia ☑ Map Term to Subject Heading

Options ◂ Print Email Export + My Projects Keep Selected

View By

Text (28 Results)

Multimedia (0 Results)

Search Information

You searched:

limit 13 to yr="2022 -Current"

Search terms used:

2

☐ All Range Clear 5 Per Page 1 Go Next ›

☐ 1. **Characterizing the lethal and sub-lethal effects of genetically modified soybean expressing Cry1A.105, Cry2Ab2, and Cry1Ac insecticidal proteins against Spodoptera species (Lepidoptera: Noctuidae) in Brazil**

Cite + My Projects + Annotate

☐ 2. **Distribution and genetic characterization of bird rape mustard (Brassica rapa) populations and analysis of glyphosate resistance introgression**

3
5
72
336
360
mepsps
2mepsps
enol
pyruvyl
shikimate
phosphate
synthase
enolpyruvyl
enolpyruvylshikimate
biotech*
deriv*
diketonitrile*
double
modif*
mutat*
e.c.
2.5.1.19
ec
engineer*
epsp
epsps
fg
fg72
g
max
g360
ge
gehr
gehrs
geht
gehts
genetic*
gl#fosate
gl#phosate
glycine
gm
gmhr
gmhrs
gmht
gmhts

Cite + My Projects + Annotate

AGRICOLA

3. **Conventional and transgenic herbicid -r sistant soyb an cultivars yi ld d similarly across fiv sit -y ars in Nebraska**

Cite + My Projects + Annotate

4. **Glyphosate-resistant Brassica juncea (oilseed mustard) transgenics for possible control of root parasite Orobanche aegyptiaca and conservation agriculture**

Cite + My Projects + Annotate

5. **Digital PCR-Based Characterization of a g10evo-epsps Gene-Specific Matrix Reference Material for Its Food and Feed Detection**

Cite + My Projects + Annotate

All Range Clear 5 Per Page 1 Go Next ›

Print Email Export + My Projects Keep Selected

▼ **Search History** (14) View Saved

	# ▲	Searches	Results	Type	Actions	Annotations
☐	1	(FG72 or FG 72 or MST-FG#72).mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	11	Advanced	Display Results | More	
☐	2	GT27*.mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	14	Advanced	Display Results | More	
☐	3	(((5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase) adj5 (double mutat* or double modif*)) or 5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase or EPSP synthase or MEPSP synthase or EPSPS or MEPSPS or 2MEPSPS or 2 MEPSPS or "EC 2.5.1.19" or "E.C. 2.5.1.19").mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	6265	Advanced	Display Results | More	
☐	4	(HPPDW336 or HPPD W336 or HPPD W 336 or ((hydroxyphenylpyruvate dioxygenase or hydroxy phenylpyruvate dioxygenase or hydroxyphenyl pyruvate dioxygenase or hydroxy phenyl pyruvate dioxygenase or HPPD) adj5 (mutat* or modif*))).mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	38	Advanced	Display Results | More	
☐	5	3 or 4	6301	Advanced	Display Results | More	
☐	6	((HPPD inhibit* or isoxaflutole* or diketonitrile* or pyrazolone* or triketone* or gl#phosate or gl#fosate or G360 or G 360 or roundup* or round up* or herbicide* or pesticide*) adj2 (toleran* or resistan* or protect*)).mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	17462	Advanced	Display Results | More	
☐	7	(GMO* or LMO* or GM or GE or transgen* or ((genetic* or living or biotech*) adj3 (modif* or transform* or manipulat* or improv* or engineer* or deriv*))).mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	658489	Advanced	Display Results | More	
☐	8	(GMHT or GEHT or GMHR or GEHR or GMHTs or GEHTs or GMHRs or GEHRs).mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	179	Advanced	Display Results | More	

Contract

☐	9	(Soy or soya or soja or soybean* or soyabean* or sojabean* or Glycine max or G max).mp. [mp=abstract, original language book title (non-english), book title (english), title, heading words]	218877	Advanced	Display Results | More	🗨
☐	10	5 and (7 or 9)	999	Advanced	Display Results | More	🗨
☐	11	(6 and 7) or 8	4402	Advanced	Display Results | More	🗨
☐	12	11 and 9	853	Advanced	Display Results | More	🗨
☐	13	1 or 2 or 10 or 12	1749	Advanced	Display Results | More	🗨
☐	14	limit 13 to yr="2022 -Current"	70	Advanced	Display Results | More	🗨

BIOSIS

Save | Remove | Combine with: AND | OR

Save All | Edit | Create RSS | Create Auto-Alert | View Saved | Email All Search History | Copy Search History Link | Copy Search History Details

Basic Search | Find Citation | Search Tools | Search Fields | **Advanced Search** | Multi-Field Search

1 Resource selected | Hide | Change

BIOSIS Previews 1969 to 2023 Week 33

Enter keyword or phrase (* or $ for truncation)

◉ **Keyword** ○ Author ○ Title ○ Journal

Search

▸ **Limits** *(expand)* ☐ Include Multimedia ☐ Map Term to Subject Heading

To search Open Access content on Ovid, go to Basic Search.

Options ◂ Print Email Export + My Projects Keep Selected

View By

Text (70 Results)

Multimedia (0 Results)

☐ All Range Clear 5 Per Page 1 Go Next ›

☐ 1. **Toxicity assessment of transgenic cotton containing double gene (Cry1Ac and Cry2Ab) and triple gene (Cry1Ac, Cry2Ab, and EPSPS) as plant incorporated protectants against insects and weed**

Cite + My Projects + Annotate

☐ 2. **Effects of Three Different Herbicide-resistant Transgenic Soybeans on Arthropod Diversity in Field**

Search Information

You searched:

limit 13 to yr="2022 -Current"

Search terms used:

2

3
5
72
336
360
mepsps
2mepsps
enol
pyruvyl
shikimate
phosphate
synthase
enolpyruvyl
enolpyruvylshikimate
biotech*
deriv*
diketonitrile*
double
modif*
mutat*
e.c.
2.5.1.19
ec
engineer*
epsp
epsps
fg
fg72
g
max
g360
ge
gehr
gehrs
geht
gehts
genetic*
gl#fosate
gl#phosate
glycine
gm
gmhr
gmhrs
gmht
gmhts

Cite + My Projects + Annotate

BIOSIS

3. **Genetically engineered varieties and applied pesticide toxicity in US maize and soybeans: Heterogeneous and evolving impacts**

Cite + My Projects + Annotate

4. **Worldwide patent trend analysis of herbicide-resistant genes**

Cite + My Projects + Annotate

5. **Proteomics analyses of herbicide-tolerant genetically modified, conventionally, and organically farmed soybean seeds**

Cite + My Projects + Annotate

All Range Clear 5 Per Page 1 Go Next ›

Print Email Export + My Projects Keep Selected

▼ **Search History** (14) View Saved

	# ▲	Searches	Results	Type	Actions	Annotations
☐	1	(FG72 or FG 72 or MST-FG#72).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	11	Advanced	Display Results | More	💬
☐	2	GT27*.mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	6	Advanced	Display Results | More	💬
☐	3	(((5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase) adj5 (double mutat* or double modif*)) or 5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase or EPSP synthase or MEPSP synthase or EPSPS or MEPSPS or 2MEPSPS or 2 MEPSPS or "EC 2.5.1.19" or "E.C. 2.5.1.19").mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	1288	Advanced	Display Results | More	💬
☐	4	(HPPDW336 or HPPD W336 or HPPD W 336 or ((hydroxyphenylpyruvate dioxygenase or hydroxy phenylpyruvate dioxygenase or hydroxyphenyl pyruvate dioxygenase or hydroxy phenyl pyruvate dioxygenase or HPPD) adj5 (mutat* or modif*))).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	12	Advanced	Display Results | More	💬
☐	5	3 or 4	1297	Advanced	Display Results | More	💬
☐	6	((HPPD inhibit* or isoxaflutole* or diketonitrile* or pyrazolone* or triketone* or gl#phosate or gl#fosate or G360 or G 360 or roundup* or round up* or herbicide* or pesticide*) adj2 (toleran* or resistan* or protect*)).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	24368	Advanced	Display Results | More	💬
☐	7	(GMO* or LMO* or GM or GE or transgen* or ((genetic* or living or biotech*) adj3 (modif* or transform* or manipulat* or improv* or engineer* or deriv*))).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	212915	Advanced	Display Results | More	💬
☐	8	(GMHT or GEHT or GMHR or GEHR or GMHTs or GEHTs or GMHRs or GEHRs).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	238	Advanced	Display Results | More	💬
☐	9	(Soy or soya or soja or soybean* or soyabean* or sojabean* or Glycine max or G max).mp. [mp=abstract, title, original title, broad terms, heading words, identifiers, cabicodes]	208783	Advanced	Display Results | More	💬

Contract

☐	10	5 and (7 or 9)	715	Advanced	Display Results | More	🗨
☐	11	(6 and 7) or 8	5541	Advanced	Display Results | More	🗨
☐	12	11 and 9	960	Advanced	Display Results | More	🗨
☐	13	1 or 2 or 10 or 12	1566	Advanced	Display Results | More	🗨
☐	14	limit 13 to yr="2022 -Current"	79	Advanced	Display Results | More	🗨

CAB

Save | Remove | Combine with: AND | OR

Save All | Edit | Create RSS | Create Auto-Alert | View Saved | Email All Search History | Copy Search History Link | Copy Search History Details

Basic Search | Find Citation | Search Tools | Search Fields | **Advanced Search** | Multi-Field Search

1 Resource selected | Hide | Change

CAB Abstracts 1973 to 2023 Week 26

Enter keyword or phrase (* or $ for truncation)

◉ **Keyword** ○ Author ○ Title ○ Journal

Search

▸ **Limits** *(expand)* ☐ Include Multimedia ☐ Map Term to Subject Heading

Options ◀ Print Email Export + My Projects Keep Selected

View By

Text (79 Results)

Multimedia (0 Results)

☐ All Range Clear 5 Per Page 1 Go Next ›

☐ 1. **Potent antifungal functions of a living modified organism protein, CP4-EPSPS, against pathogenic fungal cells.**

Cite + My Projects + Annotate

☐ 2. **Genetically engineered varieties and applied pesticide toxicity in U.S. maize and soybeans: heterogeneous and evolving impacts.**

Search Information

You searched:

limit 13 to yr="2022 -Current"

Search terms used:

2
3
5
72
336

360
mepsps
2mepsps
enol
pyruvyl
shikimate
phosphate
synthase
enolpyruvyl
enolpyruvylshikimate
biotech*
deriv*
diketonitrile*
double
modif*
mutat*
e.c.
2.5.1.19
ec
engineer*
epsp
epsps
fg
fg72
g
max
g360
ge
gehr
gehrs
geht
gehts
genetic*
gl#fosate
gl#phosate
glycine
gm
gmhr
gmhrs
gmht
gmhts
gmo*
gt27*
herbicide*
hppd

Cite + My Projects + Annotate

3. **Effect of soybean protein concentrate preparation on copy numbers and structural characteristics of DNA from genetically modified soybean.**

Cite + My Projects + Annotate

4. **Generation of herbicide-resistant soybean by base editing.**

Cite + My Projects + Annotate

5. **Proteomics analyses of herbicide-tolerant genetically modified, conventionally, and organically farmed soybean seeds.**

Cite + My Projects + Annotate

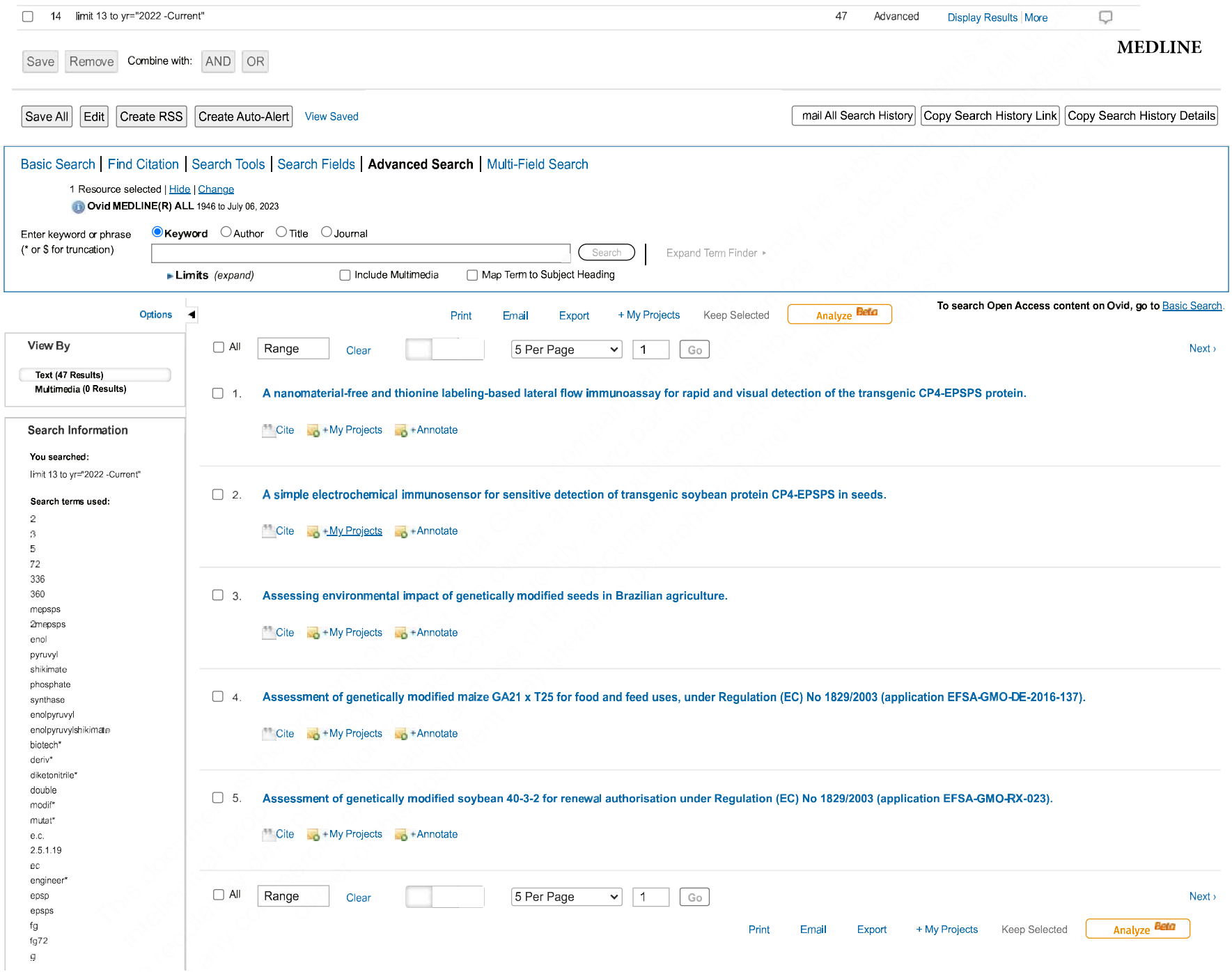
All Range Clear 5 Per Page 1 Go Next ›

Print Email Export + My Projects Keep Selected

▼ **Search History** (14) View Saved

	# ▲	Searches	Results	Type	Actions	Annotations
☐	1	(FG72 or FG 72 or MST-FG#72).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	7	Advanced	Display Results | More	
☐	2	GT27*.mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	6	Advanced	Display Results | More	
☐	3	(((5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase) adj5 (double mutat* or double modif*)) or 5 enolpyruvylshikimate 3 phosphate synthase or 5 enolpyruvyl shikimate 3 phosphate synthase or 5 enol pyruvyl shikimate 3 phosphate synthase or EPSP synthase or MEPSP synthase or EPSPS or MEPSPS or 2MEPSPS or 2 MEPSPS or "EC 2.5.1.19" or "E.C. 2.5.1.19").mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	4675	Advanced	Display Results | More	
☐	4	(HPPDW336 or HPPD W336 or HPPD W 336 or ((hydroxyphenylpyruvate dioxygenase or hydroxy phenylpyruvate dioxygenase or hydroxyphenyl pyruvate dioxygenase or hydroxy phenyl pyruvate dioxygenase or HPPD) adj5 (mutat* or modif*))).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	24	Advanced	Display Results | More	
☐	5	3 or 4	4696	Advanced	Display Results | More	
☐	6	((HPPD inhibit* or isoxaflutole* or diketonitrile* or pyrazolone* or triketone* or gl#phosate or gl#fosate or G360 or G 360 or roundup* or round up* or herbicide* or pesticide*) adj2 (toleran* or resistan* or protect*)).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	4363	Advanced	Display Results | More	
☐	7	(GMO* or LMO* or GM or GE or transgen* or ((genetic* or living or biotech*) adj3 (modif* or transform* or manipulat* or improv* or engineer* or deriv*))).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	465905	Advanced	Display Results | More	
☐	8	(GMHT or GEHT or GMHR or GEHR or GMHTs or GEHTs or GMHRs or GEHRs).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	1057	Advanced	Display Results | More	
☐	9	(Soy or soya or soja or soybean* or soyabean* or sojabean* or Glycine max or G max).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]	73995	Advanced	Display Results | More	
☐	10	5 and (7 or 9)	431	Advanced	Display Results | More	
☐	11	(6 and 7) or 8	2559	Advanced	Display Results | More	
☐	12	11 and 9	280	Advanced	Display Results | More	
☐	13	1 or 2 or 10 or 12	656	Advanced	Display Results | More	

Contract



14 limit 13 to yr="2022 -Current" 47 Advanced Display Results | More

Save Remove Combine with: AND OR

MEDLINE

Save All Edit Create RSS Create Auto-Alert View Saved mail All Search History Copy Search History Link Copy Search History Details

Basic Search | Find Citation | Search Tools | Search Fields | **Advanced Search** | Multi-Field Search

1 Resource selected | Hide | Change

Ovid MEDLINE(R) ALL 1946 to July 06, 2023

Enter keyword or phrase (* or $ for truncation) **Keyword** Author Title Journal Search Expand Term Finder

Limits *(expand)* Include Multimedia Map Term to Subject Heading

Options Print Email Export + My Projects Keep Selected Analyze Beta

To search Open Access content on Ovid, go to Basic Search.

View By

Text (47 Results)
Multimedia (0 Results)

All Range Clear 5 Per Page 1 Go Next ›

1. **A nanomaterial-free and thionine labeling-based lateral flow immunoassay for rapid and visual detection of the transgenic CP4-EPSPS protein.**
   Cite +My Projects +Annotate

2. **A simple electrochemical immunosensor for sensitive detection of transgenic soybean protein CP4-EPSPS in seeds.**
   Cite +My Projects +Annotate

3. **Assessing environmental impact of genetically modified seeds in Brazilian agriculture.**
   Cite +My Projects +Annotate

4. **Assessment of genetically modified maize GA21 x T25 for food and feed uses, under Regulation (EC) No 1829/2003 (application EFSA-GMO-DE-2016-137).**
   Cite +My Projects +Annotate

5. **Assessment of genetically modified soybean 40-3-2 for renewal authorisation under Regulation (EC) No 1829/2003 (application EFSA-GMO-RX-023).**
   Cite +My Projects +Annotate

All Range Clear 5 Per Page 1 Go Next ›

Print Email Export + My Projects Keep Selected Analyze Beta

Search Information

You searched:
limit 13 to yr="2022 -Current"

Search terms used:
2
3
5
72
336
360
mepsps
2mepsps
enol
pyruvyl
shikimate
phosphate
synthase
enolpyruvyl
enolpyruvylshikimate
biotech*
deriv*
diketonitrile*
double
modif*
mutat*
e.c.
2.5.1.19
ec
engineer*
epsp
epsps
fg
fg72
g