APPLICATION FOR AUTHORISATION OF
GENETICALLY MODIFIED PLANTS
AND DERIVED FOOD AND FEED
IN ACCORDANCE WITH REGULATION (EC) No 1829/2003

DP51291
(DP-Ø51291-2) maize

GMFF-2021-0071

PART III – Cartagena Protocol

Submitted by:

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PART III – Cartagena Protocol

A. INFORMATION REQUIRED CONCERNING LIVING MODIFIED ORGANISMS INTENDED FOR DIRECT USE AS FOOD OR FEED, OR FOR PROCESSING UNDER ANNEX II OF REGULATION (EC) No 1946/2003

(a) The name and contact details of the applicant for a decision for domestic use

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Represented by:
Rue Montoyer 25,
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(b) The name and contact details of the authority responsible for the decision

European Commission
1049 Brussels
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(c) Name and identity of the GMO

The name of the genetically modified organism (GMO) described in this application is DP51291 maize.

(d) Description of the gene modification, the technique used, and the resulting characteristics of the GMO

DP-Ø51291-2 maize (referred to as DP51291 maize) was genetically modified to express the IPD072Aa protein, for control of susceptible corn rootworm pests, as well as the phosphinothricin acetyltransferase (PAT) protein for tolerance to glufosinate herbicide, and the phosphomannose isomerase (PMI) protein that was used as a selectable marker. The PAT and PMI proteins present in DP51291 maize are identical to the corresponding proteins found in a number of approved events across several different crops that are currently in commercial use.

(e) Any unique identification of the GMO

The unique identifier assigned to DP51291 maize is DP-Ø51291-2.

(f) Taxonomic status, common name, point of collection or acquisition, and characteristics of recipient organism or parental organisms related to biosafety

Taxonomy of recipient organism:

Family name: Poaceae

Genus: *Zea*

Species: *Zea maize* L.

Subspecies: Zea *mays* ssp. *mays* L.

Common name: maize, corn

Point of collection or acquisition: USA

Characteristics of recipient organism or parental organisms related to biosafety:

Maize has a history of safe use, being used in foods and feed. It is grown for the production of grain and forage (silage), and is mainly used as a feedstuff for livestock.

(g) Centres of origin and centres of genetic diversity, if known, of the recipient organism and/or the parental organisms and a description of the habitats where the organisms may persist or proliferate

Centre of origin and centre of genetic diversity of maize: Meso-American region

Description of the habitats where the organisms may persist or proliferate:

It is generally accepted that most crop plants, including maize, have undergone many years of selective breeding and domestication, and only function optimally under managed agricultural conditions, such as high soil fertility or low plant competition. These conditions rarely occur in natural habitats (including roadsides and ports), resulting in poor fitness of maize plants outside of a managed field. Reduced recruitment, low survivorship, poor competitive ability, and low seed production are common indicators of poor fitness of maize in natural situations.

(h) Taxonomic status, common name, point of collection or acquisition, and characteristics of the donor organism or organisms related to biosafety

Taxonomy, common name, and characteristics of donor organisms:

- The *ipd072Aa* gene is derived from *Pseudomonas chlororaphis*, a rod-shaped, aerobic, Gram-negative bacterium that is ubiquitous in the environment (soil and water), and has evolved to be a common inhabitant of the root environment of many plants. *P. chlororaphis* has been reported to promote plant growth, stimulate microbial communities and protect plants by producing compounds that inhibit fungal growth, insects and nematodes. In addition, *P. chlororaphis* has a history of safe use as a biopesticide in the United States and Europe[1] and has not been shown to be pathogenic to plants, livestock, and humans.

- *Streptomyces viridochromogenes*, donor of the pat gene, is a Gram-positive, saprophytic, aerobic bacterium commonly found in soil. *S. viridochromogenes* produces the tripeptide L-phosphinothricyl-L-alanyl-alanine (L-PPT), which was developed as a non-selective herbicide. *S. viridochromogenes* is not considered pathogenic to humans or animals and is not known to be an allergen or toxin.

[1] E.g. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32004L0071
https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32000D0180
https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018R0524&from=SV

- *Escherichia. coli,* donor of the *pmi* gene, belongs to the *Enterobacteriaceae*, a relatively homogeneous group of rod-shaped, gram-negative, facultative anaerobic bacteria. Members of the genus *Escherichia* are ubiquitous in the environment and found in the digestive tract of vertebrates, including humans. *E. coli* is one of the main species of bacteria that live in the lower intestines of mammals. The bacteria can easily be grown *in vitro* and its genetics are comparatively simple and easily manipulated. The strain *E. coli* K-12 is a strain which has been debilitated, does not normally colonize the human intestine and has a poor survival rate in the environment. *E. coli* K-12 has a history of safe use in human drug and specialty chemical production

(i) Approved uses of the GMO

Regulatory submissions and reviews are in progress in selected countries around the world. The intended use of DP51291 maize includes all uses of DP51291 maize for food and feed purposes, and for all food, feed and processed products derived from DP51291 maize, as with conventional maize, excluding cultivation of DP51291 maize seed products in the EU.

(j) A risk assessment report consistent with Annex II to Directive 2001/18/EC

A risk assessment report consistent with Annex II to Directive 2001/18/EC is included below.

(k) Suggested methods for the safe handling, storage, transport and use, including packaging, labelling, documentation, disposal and contingency procedures, where appropriate

The handling, storage, transport and use of DP51291 maize, including packaging, documentation, disposal and contingency procedures, is expected to be done as for conventional maize. Labelling of DP51291 maize products will be carried out in accordance with Community law.

B. A RISK ASSESSMENT REPORT CONSISTENT WITH ANNEX II TO DIRECTIVE 2001/18/EC

RISK ASSESSMENT

The objective of this risk assessment is to identify and evaluate the potential adverse effects of genetically modified DP51291 maize on the conservation and sustainable use of biological diversity in the likely potential receiving environment, taking also into account risks to human health. The risk assessment may be used by competent authorities to make informed decisions regarding living modified organisms.

This risk assessment for genetically modified DP910521 maize has been carried out in accordance with the Implementing Regulation EU 503/2013 (EC, 2013) [2] and the recommendations outlined in the EFSA ERA Guidance (EFSA, 2010)[3].

The risk assessment of DP51291 maize follows a stepwise approach, taking into account the following technical and scientific details regarding the characteristics of the following subjects:

(a) *Recipient organism or parental organisms:* See **Point A.(f)**.

(b) *Donor organism or organisms:* See **Point A.(h)**.

(c) *Vector:* See **Point A.(d)**.

(d) *Insert or inserts and/or characteristics of modification:* See **Point A.(d)**.

(e) *Living modified organism:* See **Point A.(c)**.

(f) *Detection and identification of the living modified organism:* PCR-based quantitative event-specific detection method has been developed and is under validation by the European Union Reference Laboratory (EURL) for GM Food and Feed, established at the EC Joint Research Centre in Italy.

(g) *Information relating to the intended use:* See **Point A.(i)**.

(h) *Receiving environment:* Cultivation is outside the scope of this application. See **Point A.(i)**.

[2] EC, **2013**. Commission Implementing Regulation (EU) No 503/2013 of 3 April 2013 on applications for authorisation of genetically modified food and feed in accordance with Regulation (EC) No 1829/2003 of the European Parliament and of the Council and amending Commission Regulations (EC) No 641/2004 and (EC) No 1981/2006. Official Journal of the European Union L157, 1-48

[3] EFSA, **2010**. Guidance on the environmental risk assessment of genetically modified plants. The EFSA Journal 8, 1-111. doi.org/10.2903/j.efsa.2010.1879

STEPS IN THE ENVIRONMENTAL RISK ASSESSMENT

Step 1: Identification of characteristics which may cause adverse effects

1. Characteristics of the GMO linked to the genetic modification

The characteristics of DP51291 maize linked to the genetic modification have been described in **Point A.(d)**. DP51291 maize was genetically modified to express the IPD072Aa protein, for control of susceptible corn rootworm pests, as well as the phosphinothricin acetyltransferase (PAT) protein for tolerance to glufosinate herbicide, and the phosphomannose isomerase (PMI) protein that was used as a selectable marker. The PAT and PMI proteins present in DP51291 maize are identical to the corresponding proteins found in a number of approved events across several different crops that are currently in commercial use.

However, the scope of this application does not include authorisation for the cultivation of DP51291 maize seed products in the EU. Exposure to the environment from the import of DP51291 maize will be limited to unintended release of DP51291 maize, which can be controlled with current measures used to control unintended release of commercially available maize, such as use of mechanical means and selective use of herbicides (with the exception of glufosinate herbicides).

2. Potential adverse effects of the GMO(s)

a) Disease to humans including toxic or allergenic effects

The DP51291 maize expresses the IPD072Aa, PAT and PMI proteins. The *ipd072Aa* gene is derived from *Pseudomonas chlororaphis*, a rod-shaped, aerobic, Gram-negative bacterium that is ubiquitous in the environment (soil and water) and that has a history of safe use as a biopesticide in the United States and Europe, and the safety of the IPD072Aa protein has been evaluated. The safety of the PAT protein and of the PMI protein, based on a broad body of evidence, has been previously assessed and was reported in several EFSA scientific opinions. Numerous regulatory agencies determined that these proteins pose no significant risks to the environment, human, or animal health.

Detailed compositional analyses and nutritional assessment of DP51291 maize have confirmed that whole food and feed consisting of or derived from DP51291 maize is nutritionally comparable to whole food and feed consisting of or derived from commercial maize.

The allergenicity of the newly expressed proteins in DP51291 maize has been assessed using a weight-of-the-evidence approach. The newly expressed proteins in DP51291 maize are not known to be allergenic, they do not have the characteristics of known allergenic proteins, and they are not derived from organisms with a known allergenic potential. Therefore, it can be concluded that expression of the insert-related proteins in DP51291 maize is unlikely to alter the overall allergenicity of maize.

Similarity searches using up-to-date databases have also confirmed the absence of any biologically relevant amino acid sequence similarity of the insert-encoded proteins in DP51291 maize to known allergens, toxins, or other proteins that would be harmful to humans or animals

In conclusion, DP51291 maize is as safe to human and animal health as conventional available maize.

b) Disease to animals and plants including toxic, and where appropriate, allergenic effects

The safety of DP51291 maize to animal health is comparable to that of conventional maize. Please refer to **Section 2.a)** above.

c) Effects on the dynamics of populations of species in the receiving environment and the genetic diversity of each of these populations

The scope of this application is for authorisation of DP51291 maize for all food and feed uses, and for all food, feed and processed products derived from DP51291 maize, and does not include cultivation of DP51291 maize seed products in the EU. Therefore, any potential exposure of DP51291 maize to a potential receiving environment will be restricted to limited unintentional release, *e.g.* accidental spillage of grain during loading/unloading of vessels, trains or trucks, or during transportation; or to the indirect exposure through manure or faeces from animals fed on this maize. Any unintentional release or misuse of DP51291 maize would likely be limited and highly unlikely to have any adverse environmental effect. Furthermore, and if necessary, such limited release can be controlled by management practices currently applied to control unintentional releases of any other commercially available maize, such as selective use of herbicides (with the exception of glufosinate herbicides) and manual or mechanical removal.

In conclusion, negligible effects are expected on the dynamics of populations in the receiving environment and the genetic diversity of each of these populations.

d) Altered susceptibility to pathogens facilitating the dissemination of infectious diseases and/or creating new reservoirs or vectors

There have been no signs observed of any altered susceptibility of DP51291 maize to pathogens in field trials with this maize. The assessment of the agronomic characteristics of DP51291 maize has confirmed that it is comparable to conventional maize except for the intended traits. Therefore, no adverse effects are expected to human or animal health or to the environment as a result of an altered susceptibility of DP51291 maize to pathogens.

e) Compromising prophylactic or therapeutic medical, veterinary, or plant protection treatments

Expression of the newly expressed proteins in DP51291 maize do not compromise prophylactic or therapeutical medical, veterinary, or plant protection treatments. No genetic material coding for genes conferring resistance to antibiotics, including those used in human or veterinary medicine, is present DP51291 maize.

f) Effects on biogeochemistry (biogeochemical cycles), particularly carbon and nitrogen recycling through changes in soil decomposition of organic material

As the scope of this application does not cover cultivation of DP51291 maize in the EU, any effects on biogeochemical processes are not expected.

g) Other potential adverse effects

Adverse effects may occur directly or indirectly through mechanisms that may include:

- The spread of the GMO in the environment;
- The transfer of the inserted genetic material to other organisms, or the same organism, whether genetically modified or not;
- Phenotypic and genetic instability;
- Interactions with other organisms;
- Changes in management, including, where applicable, in agricultural practices.

An evaluation to identify any potential adverse effects on human and animal health or the environment that may occur through these mechanisms has been carried out and the results obtained are presented below.

The spread of the GMO in the environment: there is negligible likelihood for DP51291 maize to become environmentally persistent or invasive giving rise to weediness. Maize does not possess any traits for weediness and the expression of the IPD072Aa, PAT and PMI proteins in DP51291 maize does not introduce new traits for weediness.

The transfer of the inserted genetic material to other organisms, or the same organism, whether genetically modified or not: there are no sexually compatible indigenous wild or weedy relatives of maize known to exist in the EU, which eliminates the possibility of potential gene transfer to such species. As indicated by the EFSA GMO Panel regarding teosinte "Outside its centres of origin, teosinte is not indigenous, but has become naturalised/established in some countries. In these situations, teosinte does not represent an environmental entity of concern that requires protection. Instead, it is occasionally cultivated for its forage potential, or considered a weed that can compete with cultivated maize in agricultural fields, thereby reducing yield and compromising harvest quality. In infested agricultural fields, teosinte is subject to control and/or eradication measures" (Devos et al., 2018[4]; EFSA, 2016[5]). The potential for gene transfer is therefore limited to other maize grown in agricultural systems. In addition, there is negligible likelihood for DP51291 maize plants to become environmentally persistent or invasive giving rise to weediness. Furthermore, expression of the IPD072Aa, PAT and PMI proteins in DP51291 maize does not provide a significant selective advantage outside the agricultural environment. Should the DP51291 maize plants resulting from the accidental spillage of DP51291 maize into the environment be exposed to glufosinate-containing herbicides, even if the trait(s) would confer a selective advantage to these maize plants, it would be only a short-term selective advantage, limited temporally and spatially, with no relevance to the development of longer term populations, not affecting the persistence and invasiveness of the GM plants.

Phenotypic and genetic instability: the DP51291 maize is phenotypically and genetically stable. This has been confirmed through multiple studies including molecular and compositional analyses, and

[4] Devos Y, Ortiz-Garcia S, Hokanson KE and Raybould A, **2018**. Teosinte and maize * teosinte hybrid plants in Europe-Environmental risk assessment and management implications for genetically modified maize. Agriculture, Ecosystems & Environment 259, 19-27. 10.1016/j.agee.2018.02.032

[5] EFSA, **2016**. Relevance of new scientific evidence on the occurrence of teosinte in maize fields in Spain and France for previous environmental risk assessment conclusions and risk management recommendations on the cultivation of maize events MON810, Bt11, 1507 and GA21. EFSA Supporting Publications 13, EN-1094. 10.2903/sp.efsa.2016.EN-1094

evaluation of the agronomic characteristics and expression levels of the IPD072Aa, PAT and PMI proteins in DP51291 maize.

Interactions with other organisms: considering the scope of this application, which does not include authorisation for the cultivation of DP51291 maize seed products in the EU, any exposure to the environment from the import of DP51291 maize will be limited to accidental releases of this maize during loading/unloading or during processing, or to the indirect exposure through manure or faeces from animals fed on this maize. In general, any proteins present in maize, including the insert-encoded proteins, are readily degraded as a result of the processes applied during harvesting, storage and processing of maize materials.

Changes in management, including, where applicable, in agricultural practices: Not applicable, as the scope of this application does not include authorisation for the cultivation of DP51291 maize seed products in the EU.

Step 2: Evaluation of the potential consequences of each adverse effect, if it occurs

On the basis of the available weight of evidence (**Step 1**), no adverse effects of DP51291 maize could be identified on the conservation and sustainable use of biological diversity or on human or animal health, resulting from the transboundary movement of this maize for direct use as food or feed, or for processing.

Accordingly, no consequences of such effects are conceivable.

Step 3: Evaluation of the likelihood of the occurrence of each identified potential adverse effect

As mentioned in **Step 1**, there are no identified adverse effects to human and animal health or the environment arising from DP51291 maize.

Therefore, we can conclude that the relative likelihood of occurrence of any potential adverse effect to human and animal health or the environment arising from DP51291 maize is as negligible as conventional maize.

Step 4: Estimation of the risk posed by each identified characteristic of the GMO

An estimation of the risk to human and animal health or the environment posed by any identified characteristic of DP51291 maize which has the potential to cause adverse effects has been made by combining the magnitude of the consequences and the likelihood of the adverse effect, if it occurs, on the basis of the conclusions reached in **Steps 2** and **3**, respectively:

- No potential adverse effects have been identified and therefore the magnitude of the potential consequences is as negligible as conventional maize; and,

- The likelihood of occurrence of potential adverse effects is as negligible as for conventional maize.

As a result, the potential risk to human and animal health or the environment arising from DP51291 maize is negligible, *i.e.* as insignificant as conventional maize.

The overall uncertainty underlying the conclusion that negligible risk will arise from DP51291 maize is very low, *i.e.* it is comparable to the overall uncertainty related to any potential risks that might arise from the food and feed use and the import and processing of conventional maize.

Step 5: Application of management strategies for risks from the deliberate release or marketing of the GMO

The scope of this application does not include authorisation for the cultivation of DP51291 maize seed products in the EU. Exposure to the environment from the import of DP51291 maize will be limited to unintended release of DP51291 maize, which can be controlled with current measures used to control accidental releases of commercially available maize, such as use of mechanical means and selective use of herbicides (with the exception of glufosinate herbicides), or to the indirect exposure through manure or faeces from animals fed on this maize.

Furthermore, the conclusions obtained from **Steps 1** to **4** of this risk assessment have not identified any risks to human and animal health or the environment arising from DP51291 maize. Therefore, the same management strategies for safeguarding apply to DP51291 maize as for any other commercial maize.

Step 6: Determination of the overall risk of the GMO

The overall risk to human and animal health or the environment arising from DP51291 maize has been evaluated by taking into account the conclusions obtained from the consecutive steps followed in this risk assessment.

*Conclusions from **Step 1** of this risk assessment:*

There are no identified adverse effects to human and animal health or the environment arising from DP51291 maize.

*Conclusions from **Step 2** of this risk assessment:*

The magnitude of the potential consequences arising from DP51291 maize will be as negligible as conventional maize.

*Conclusions from **Step 3** of this risk assessment:*

The likelihood of the occurrence of potential adverse effects to human and animal health or the environment arising from DP51291 maize is as negligible as conventional maize.

*Conclusions from **Step 4** of this risk assessment:*

The potential risk to human and animal health or the environment arising from DP51291 maize is negligible, *i.e.* as insignificant as conventional maize.

*Conclusions from **Step 5** of this risk assessment:*

The conclusions obtained from **Steps 1** to **4** of this risk assessment have not identified any risks to human and animal health or the environment arising from DP51291 maize. Therefore, the same management strategies apply to DP51291 maize as for any other commercial maize.

Overall risk

Based on the above conclusions, we conclude that there is negligible overall risk to human and animal health or the environment arising from the use of DP51291 maize for all food and feed uses, import and processing purposes.