PUBLIC VERSION

Before the Panel established pursuant to Chapter 31 (Dispute Settlement) of the Agreement between the United States of America, the United Mexican States and Canada (USMCA)

Mexico – Measures Concerning Genetically Engineered Corn
(MEX-USA-2023-31-01)

Initial Written Submission of the United Mexican States

January 15, 2024

CONTENT

TABLE OF ABBREVIATIONS

Short Name	Complete Name
DNA	Deoxyribonucleic acid
ANAM	National Customs Agency of Mexico
ATSDR	Agency for Disease Registry and Toxic Substances
SPS Agreement	Agreement on the Application of Sanitary and Phytosanitary Measures
ALOP	Adequate level of protection
Bt	Bacterium *Bacillus thuringiensis*
CAC	Codex Alimentarius Commission
CEC	Commission for Environmental Cooperation
CIBIOGEM	Interministerial Commission on Biosafety of Genetically Modified Organisms
CIMMYT	International Corn and Wheat Improvement Center
CINVESTAV	Center of Research and Advanced Studies
ADC	Apparent Domestic Consumption
CNBA	National Committee of Agricultural Biosafety
Codex	Codex Alimentarius
CODG	Center of Origin and Genetic Diversity
COFEPRIS	Federal Commission for the Protection against Sanitary Risks
Collectivity	Collectivity of Holders of the Human Right to a Healthy Environment for the Development and Welfare of Persons
CONABIO	National Commission for the Knowledge and Use of Biodiversity
CONAHCYT	National Council of Humanities, Sciences and Technologies
Constitution or CPEUM	Political Constitution of the United Mexican States
Vienna Convention	Vienna Convention on the Law of the Treaties, done in Vienna on March 23, 1969
2023 Decree or Decree	Decree establishing various actions regarding glyphosate and genetically modified corn, published in the DOF on February 13, 2023
DOF	Official Gazette of the Federation.
United States or USA	United States of America
FAO	Food and Agriculture Organization of the United Nations
FSA	Food Standards Agency of the United Kingdom
GATT or GATT 1994	General Agreement on Tariffs and Trade 1994

GM	Genetically Modified
ARMG	Antibiotic Resistance Marker Genes
GBH	Glyphosate-based herbicides
HT	Herbicide tolerant crops
IARC	International Agency for Research on Cancer
IPN	National Polytechnic Institute
LBOGM or Law of Biosafety	Law of Biosafety of Genetically Modified Organisms
LIGIE	Law of General Taxes of Import and Export
MRL	Maximum Residue Limits
GM corn	Genetically Modified Corn
Mexico or Respondent	United Mexican States
SPS	Sanitary and Phytosanitary Measures
NASS	National Agricultural Statistics Service of the United States
NOAEL	No observed adverse effect Level
OECD	Organization for Economic Cooperation and Development
GMO	Genetically Modified Organisms
ILO	International Labour Organization
OMC	World Trade Organization
NGO	Non-Governmental Organization
Panel	Panel established pursuant to Article 31.6 (Establishment of a Panel) of the USMCA
Global Native Corn Project	Project to collect, generate, update and analyze information on the genetic diversity of corn and its wild relatives in Mexico
Regulations of the Law of Biosafety	Regulations of the Law of Biosafety of Genetically Modified Organisms
SADER	Ministry of Agriculture and Rural Development, formerly known as SAGARPA
SAGARPA	Ministry of Agriculture, Livestock, Rural Development, Fisheries and Food, now known as SADER.
SCJN	Supreme Court of Justice of the Nation
SEMARNAT	Ministry of Environment and Natural Resources
SHCP	Ministry of Finance and Public Credit
SSA	Ministry of Health
GTB	Gastrointestinal tract bacteria

NAFTA	North American Free Trade Agreement
USMCA, Treaty	Agreement between the United States of America, the United Mexican States and Canada
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
USTR	Office of the United States Trade Representative

I. INTRODUCTION

1. Pursuant to the Mechanism of Chapter 31 of the Agreement between the United Mexican States, the United States of America, , and Canada (USMCA), the procedural schedule established on November 13, 2023 by the Panel, and the agreement reached by the Parties regarding a modification to the procedural schedule submitted to the Panel, Mexico presents this Initial Written Submission within the proceedings of the Case *Mexico – Measures Concerning Genetically Engineered Corn* (MEX-USA-2023-31-01).

2. In general terms, the dispute initiated by the United States focuses on an alleged incompatibility between 2023 Decree and Chapter 9 (Sanitary and Phytosanitary Measures) of the USMCA, as well as an alleged prohibition incompatible with Chapter 2 (National Treatment and Market Access for Goods) of the Treaty. As will be explained in this Initial Written Submission, there is no such incompatibility, and the import figures demonstrate that there is no effect on trade . On the contrary, due to various factors (*e.g.* commercial, industrial, weather, among others) corn imports from the United States have increased, and this trend is expected to continue.

3. Indeed, one of the measures claimed by the United States could be considered as Sanitary and Phytosanitary Measures (SPS) contained in 2023 Decree, since one of its objectives is to protect human health and native corn from the risks associated with GM corn grain. However, these SPS objectives are not the only objectives of 2023 Decree and the measures claimed. This instrument also deals with an herbicide of major concern in Mexico –and other trading partners–, due to its serious effects on human health and the environment, *i.*e. glyphosate. 2023 Decree also aims to protect the environment, biodiversity, and establishes the protection of Mexico's cultural heritage, as well as the identity of Mexico's indigenous and peasant communities. In addition, the purpose of 2023 Decree considers the scientific evidence on the potential and proven risks to health, animals and plants, and instructs the competent authorities to carry out appropriate scientific studies on the consumption of GM corn in products for industrial use in human food and animal feed. The foregoing, in accordance with the existing conditions in Mexico, which is the country with the highest consumption of corn in the world, and at the same time a Center of Origin and constant Diversification of corn.

4. According to the United States, the 2023 Decree gives rise to two measures. On the one hand, something they have wrongly called the "Tortilla Corn Ban", and, on the other, what they have called the "Substitution Instruction". However, the arguments submitted by the United States are incorrect. 2023 Decree does not contain a ban, but only an end-use limitation, which means that GM corn will not be used for the production of dough and tortillas, as it is the main food of Mexicans. Gradual substitution is simply an executive order that calls on "the agencies and entities of the Federal Public Administration" to "carry out the appropriate actions" at some point in the future. These actions do not exist yet. They have not been designed, proposed, adopted or implemented, let alone applied. It cannot be said at this stage whether these actions will be designed or applied inconsistently with Mexico's obligations under the USMCA. In relation to this measure, the US claim is, at best, premature.

5. The Mexican government has promoted measures to improve the diet of Mexicans in response of a series of diseases in the population that are directly linked to food and the serious health effects caused by various factors, including the quality of food and the use of highly dangerous pesticides. In this sense, risk assessment methodologies have been developed based on scientific information gathered over the years.

6. The United States alleges that the challenged measures are not based on science, but seeks to prove its arguments with publications without the minimum scientific rigor, outdated, or, if applicable, with an evident conflict of interest.

7. The United States Initial Written Submission ignores the fact that corn is the backbone of food and agricultural production in Mexico. The various cultures settled in Mexican territory considered themselves as "women and men of corn", an expression that, without fear of exaggeration, continues to be a cultural and identity characteristic throughout Mexico.

8. Clearly, in Mexico, corn cannot only be seen as a *commodity* as in other markets, but its trade needs to be approached with the particularities of being the genetic reservoir of the world's most important food crop, which preserves genetic diversity capable of coping with complex climatic conditions and offering alternative forms of production such as the "milpa", which is an ancestral system and of indigenous tradition recognized as an agro-ecological innovation. Moreover, domestic corn production not only has the potential to feed the Mexican population,

but is the basis of traditional Mexican food, which is recognized as Heritage of Humanity by UNCESCO.

9. Mexico has legitimate concerns about the safety and innocuousness of genetically modified corn ("GM corn"), and its indissoluble relationship with its technological package that includes glyphosate. Again, this is not an issue limited to health aspects; there are also environmental, cultural and social aspects that 2023 Decree addresses. Accordingly, Mexico's Initial Written Submission is divided into four sections.

10. *First*, Mexico describes the procedural background to this claim.

11. *Second*, in the Factual Section, the Respondent sets out as context, an overview of agriculture in Mexico, the relevance of corn, the impacts of GM corn and its technology package including glyphosate, and the relevant trade aspects omitted in the United States Initial Written Submission.

12. *Third*, Mexico provides an objective explanation of the text, nature and purpose of 2023 Decree.

13. *Fourth*, in the Legal Section, Mexico refutes the United States' claims, in light of Articles 9.2, 9.6.3, 9.6.4, 9.6.5, 9.6.7, 9.6.8, 9.6.10 and 2.11 of the USMCA, and raises defenses and exceptions under Article XX of the GATT 1994 and Article 32.5 of the USMCA.

14. On this basis, the Panel may conclude that 2023 Decree is consistent with Mexico's obligations under the USMCA. For further context, Mexico's position is recapitulated below.

Facts

15. *First*, Mexico describes the importance of corn for agriculture and the preservation of the nation's biocultural wealth. In total, Mexico has 64 corn breeds, of which 59 are native. Each of these native varieties make up the country's genetic reservoir and form part of Mexico's cultural identity and gastronomic tradition, particularly that of the indigenous peoples. It is essential for the Panel to take into account that corn is the staple food in Mexico. The daily *per capita* consumption of corn is around 350 grams, and approximately 128 kg/year, through tortilla and derivatives from the nixtamalization process of corn grain.

16. *Second*, Respondent provides the necessary context for a general understanding of the genetic manipulation techniques used in the main GM crops. It also refutes the arguments presented by the United States by demonstrating that GMOs have not increased crop yields, and far less decreased the amount of agrochemicals used in agriculture.

17. *Third*, Respondent explains that since the late 1980s, applications for GMO liberalization began to be filed; however, the scientific and peasant community in Mexico identified risks to the genetic wealth of corn and, consequently, led to the imposition of a *de facto* moratorium. Despite this, it was not possible to prevent GM corn transgenes from reaching native corn populations. In response to this situation, Mexico has implemented regulatory instruments to, *inter alia*, protect native corn varieties from GM corn.

18. In this regard, Mexico presents evidence on the impacts of GM corn and glyphosate, which demonstrates that the cultivation and consumption of GM corn have different negative effects on health, native corn and the environment. Furthermore, despite United States efforts not to mention glyphosate in its Initial Written Submission, Mexico explains the relationship between glyphosate and GM corn, as well as the risks to health, native varieties and the environment caused by this herbicide.

19. *Fourth*, for a better understanding of the Panel, Mexico describes and explains the international and national regulations that are part of the Mexican legal system, which regulate and protect Mexico's native corn varieties, the gastronomic tradition, the rights to health and the environment, as well as the protection of indigenous peoples, peasant communities and cultural heritage of Mexico. Furthermore, Respondent describes the most relevant domestic laws for this dispute: The Law of Biosafety of Genetically Modified Organisms ("Law of Biosafety") and its regulations, as well as the Federal Law for the Promotion and Protection of Native Corn.

Fifth, Respondent emphasizes that there has been no commercial impact. The relevant corn trade between Mexico and the United States is related to yellow corn, being the United States the main exporting country to Mexico and, contrary to what the United States alleges, imports have not been affected as a result of the measures at issue in this dispute.

Measures claimed

20. Mexico presents the objective and scope of 2023 Decree, since the measures identified by the United States, subject to this dispute, have been wrongly characterized. The purposes of the two measures in question can be divided into two categories. On the one hand, of a sanitary and phytosanitary nature. On the other hand, for non-sanitary and phytosanitary purposes that must be evaluated under the applicable provisions of other agreements. They are listed:

- The protection of human health, which includes *i)* direct exposure to glyphosate as an agricultural chemical product, and *ii)* the protection of human health from food safety risks arising from the consumption of genetically modified corn grain.
- The conservation and sustainable use of biological diversity with respect to Mexico's native corn varieties and corn *per se*;
- The conservation of the biodiversity and genetic integrity of Mexico's native corn varieties and corn *per se* as "exhaustible natural resources"; and
- The protection of the biocultural, agricultural (*e.g.*, milpa) and gastronomic wealth of Mexico's native corn varieties, including the protection of the agricultural traditions of mostly indigenous peasant communities.

21. With this in mind, it is false that 2023 Decree or any national legislation establishes a ban on the importation of corn into Mexico, or on its commercialization. The competent regulatory authorities must carry out or cease the granting of GMO permits and authorizations in accordance with the applicable regulations (Law of Biosafety), which existed long before the publication of 2023 Decree. In this sense, contrary to what the United States has indicated, there is no "Tortilla Corn Ban", but the 2023 Decree only seeks to regulate the end use of corn for human food.

22. In addition, the United States' statement that 2023 Decree mandates the Mexican regulatory authorities not to issue authorizations for the importation or commercialization of GM corn for industrial human food use is incorrect. This statement is incorrect. The "Gradual Substitution" has not been applied.

Legal Arguments

23. *First,* the United States has failed to demonstrate that the challenged measures fall within the scope of Chapter 9 of the USMCA, as they do not meet the criteria for the SPS Agreement to apply to them. However, in the event that the Panel finds that the challenged measures are covered by Chapter 9 of the USMCA, Mexico demonstrates that the measures are consistent with that Chapter and that the United States has not demonstrated any incompatibility.

24. *Second*, contrary to what the United States might think, Mexico did determine an appropriate level of sanitary or phytosanitary protection, *i.e., i)* to protect human health from risks arising from "contaminants" or "toxins" in the GM corn grain that is consumed directly in everyday food such as tortilla; and *ii)* to protect native corn from the risks arising from transgenic introgression of GM corn plant "pests" into the environment. Given the fundamental importance of corn as everyday staple food in Mexico, the population in Mexico is highly exposed and vulnerable to these risks due to the amount of corn grain consumed directly on a daily basis in the form of tortilla and other foods made with nixtamalized flour and dough.

25. *Third*, the measure described as "Gradual Substitution" has not been applied, so the claims of the United States related to this measure are, at best, premature, and, in any case, it would be a provisional measure covered by Articles 9.6.4 (c) and 9.6.5.

26. *Fourth*, the measures at issue are consistent with Article 9.6.6 (a) because they are applied only to the extent necessary to protect human and plant health of native corn.

27. *Fifth*, the measures (arising from Articles 6, 7 and 8 of 2023 Decree) comply with the provisions of Articles 9.6.3, 9.6.7 and 9.6.8, since Mexico did carry out a risk assessment for the issuance of 2023 Decree, which was documented in the report entitled *Scientific Record on Glyphosate and GM Crops*, which in turn derives from the scientific collection of the National Biosafety Information System by CIBIOGEM, a risk assessment that is still in the process of obtaining more information, which complies with the criteria of Annex A(4) of the WTO SPS Agreement, and took into consideration the relevant international standards, guidelines, and recommendations to determine the appropriate level of protection taking into account the special circumstances of corn consumption in Mexico.[1]

[1] For more than four years, through the USMCA and in an open and respectful dialogue, Mexico has shared with the United States, Mexico's concerns regarding the lack of scientific consensus on the safety of consumption of GM crops, in particular GM corn, and on the safety of glyphosate. In various forums under the USMCA, Mexico has made available to the United States the compilations of scientific information on the biosafety of GMOs contained in the National Biosafety Information System on GMOs, under the responsibility of CIBIOGEM, activated since 2019, as well as the Scientific Record on Glyphosate and GM crops, published since August 2020.

28. *Sixth,* the measures at issue are consistent with Article 9.6.10 because they do not restrict trade more than necessary to achieve the level of protection that Mexico has determined to be adequate.

29. *Seventh,* the challenged measures are not within the scope of Article 2.11 of the USMCA because they do not represent an import restriction, but even if they were, the arguments of the United States are without merit because the measures have not blocked or restricted the process of importation of GM corn.

30. *Eighth,* even if the Panel were to find that the measures are incompatible with Chapters 2 and 9 of the USMCA -which they are not-, the alleged "incompatibilities" would, in any case, be covered by the exceptions contained in Article 32.1, with reference to paragraphs (a) and (g) of Article XX of the GATT, since they are necessary to protect public morals and are aimed at the conservation of exhaustible natural resources; and in Article 32.5 of the USMCA, since the measures are necessary to comply with Mexico's legal obligations to its indigenous peoples.

31. Based on the aforementioned *supra,* and as will be explained throughout this Initial Written Submission, it is clear that the claims of the United States lack factual and legal elements that can support their case.

II. PROCEDURAL BACKGROUND

32. On March 6 and 7, 2023, the governments of the United States and Canada requested consultations with Mexico under Chapter 9 ("Sanitary and Phytosanitary Measures") of the USMCA, regarding the Decree establishing various actions regarding glyphosate and genetically modified corn published on February 13, 2023 in the DOF ("2023 Decree or Decree").

33. On June 2, 2023, Mexico received a request for consultations, under Chapter 31 ("Dispute Settlement") of the USMCA, from the United States. The request was related to 2023 Decree, specifically regarding *i)* certain requests and refusals of authorizations for marketing and imports of genetically modified organisms ("relevant events"), *ii)* the alleged immediate ban established by on GE corn for nixtamalization or flour production *("Tortilla Corn Ban") and iii)* the alleged instruction to gradually substitute GM corn used for other human consumption and for animal feed *(" Substitution Instruction").* Subsequently, on August 25, 2023, Canada submitted a request to join as a third party to these consultations.

34. On August 17, 2023, the Government of the United States of America requested the Government of Mexico to establish a panel in accordance with the provisions of Article 31.6.1 (Establishment of a Panel) of the USMCA.

35. On October 18, 2023, the Panel was constituted in accordance with subsection b, paragraph 1 of Article 31.9 (Composition of the Panel) as follows: the selection of the Chairman of the Panel was made by lot resulting in the appointment of Dr. Christian Häberli. On October 18, 2023, Mexico selected Ms. Jean E. Kalicki, and on October 12, 2023, the United States selected Mr. Hugo Perezcano Díaz, as co-panelist.

III. TERMS OF REFERENCE

36. In its Application for Establishment of the Panel, the United States requested the establishment of this Panel with respect to the following:

a) The alleged ban on GM corn for nixtamalization or flour production (Tortilla Corn Ban). In the view of the United States, the ban on GM corn is reflected in 2023 Decree in conjunction with the Mexican legal system that governs the importation and sale of genetically modified products for purposes other than cultivation.[2]

b) The instruction to gradually substitute GM corn that is used for other purposes of human consumption and animal feed (Substitution Instruction). In view of the United States, the ban on GM corn is reflected in 2023 Decree in conjunction with the Mexican legal system that governs the importation and sale of genetically modified products for purposes other than cultivation.[3]

37. For the United States, the two measures are incompatible with provisions of Chapter 2 (National Treatment and Market Access) and Chapter 9 (Sanitary and Phytosanitary Measures) of the USMCA because:

a) Mexico does not base its measure on relevant international standards, guidelines or recommendations, or on an appropriate risk assessment;

[2] Request for the Establishment of a Panel, ¶ 1.

[3] Request for the Establishment of a Panel, ¶ 2.

b) Mexico does not guarantee that its measure is applied only to the extent necessary to protect human, animal or plant life or health;

c) Mexico does not guarantee that its measure is based on relevant scientific principles, taking into account relevant factors;

d) In the event that Mexico had conducted a risk assessment, it was not conducted with respect to a sanitary or phytosanitary regulation in a manner that is documented and provides other Parties an opportunity to comment;

e) In the case that Mexico had conducted a risk assessment, Mexico did not ensure that it was appropriate to the circumstances and took into consideration the relevant guidance of the WTO SPS Committee and the standards, guidelines and recommendations of relevant international organizations

f) Mexico selected a more restrictive trade SPS measure than the required to meet the level of protection it has determined appropriate; and,

g) Mexico adopts and maintains a prohibition or restriction on the importation of a good from another Party.

38. The disputing Parties have not decided on terms of reference other than those provided for in Article 31.7 (Terms of Reference) of the USMCA. In this regard, the United States requested that the Panel examines the matter in accordance with the terms of reference defined in paragraphs 1 and 2 of Article 31.7 (Terms of Reference) of the USMCA.

39. Consequently, this Panel must:

a) examine, in light of the pertinent provisions [of the USMCA], the matter referred to in the Request for Establishment of a Panel pursuant to Article 31.6 (Establishment of a Panel); and

b) make findings and determinations, and any jointly requested recommendations, together with its reasons therefor, as provided for in Article 31.17 (Panel Report).

IV. STANDARD OF REVIEWAND RULES OF INTERPRETATION

40. Paragraph 1 of Article 31.13 (Function of Panels) of the USMCA establishes as the function of a Dispute Resolution Panel "to make an objective assessment of the matter before it" and to submit a report containing the findings of fact, determinations, recommendations, and their reasons.

41. In this sense, paragraph 4 of Article 31.13 (Function of Panels) requires the Panel to interpret the USMCA "in accordance with customary rules of interpretation of public international law, as reflected in Articles 31 and 32 of the Vienna Convention on the Law of Treaties, done at Vienna on May 23, 1969 " ("Vienna Convention").

V. FACTUAL BACKGROUND

A. Agriculture in Mexico

42. Approximately nine thousand years ago, the process of plant domestication began in the region known as Mesoamerica, as a phase prior to agriculture.[4] Mexico constituted the center of this region.[5] As part of the process, an agricultural civilization emerged in Mexico in which corn played a central role in the development of its culture, civilization and tradition. These cultural elements continue to shape agriculture in Mexico today through indigenous communities that, using small-scale agriculture, maintain the traditional practice of corn production.[6]

43. Mexico has a great biodiversity and is considered one of the centers of origin and domestication of several important agricultural crops. Around 100 economically important crops

[4] Mesoamerica is a region comprising an irregular line from the State of Nayarit, Mexico to the middle portion of Veracruz in Mexico, to Nicaragua. It is recognized as a center of origin of agriculture in the world context. *See,* Kato, T. Á., Mapes, C., Mera, L. M., Serratos, J. A., & Bye, R. A. *"Origin and Diversification of Corn: An Analytical Review"*, 2009, Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México, p.17. **MEX-001**.
[5] Harlan, J. R. "*Agricultural origins: centers and noncenters*", 1971, pp. 472-473. **MEX-002**.
[6] By 2020, small producers contributed about 60% of the national corn production, when combined with medium producers (up to 10 t/ha), they account for 91% of the planted area, which means that together they contribute about 75% of the national corn production. *See,* SADER, *Corn the crop of Mexico,* July 22, 2020. **MEX-003**.

are considered to be native to Mexico, such as beans, tomatoes, cotton, chili, squash, cactus, papaya, guava, amaranth and, of course, corn.[7]

44. Corn is a subsistence crop that influences the economic, social, cultural and identity dynamics of the Mexican population, and especially the indigenous communities that comprise it. Despite the emergence of industrial agriculture, based on the intensive use of pesticides, herbicides and machinery, small-scale agriculture, based on ancestral knowledge, continues to be essential for the well-being and identity of Mexican communities.

1. Mexico is a reservoir of species *in situ*

45. Mexican corn varieties are of special importance because of their pivotal role in the development of modern and highly productive corn varieties in the Americas. The ecological aspect, biodiversity and classification of Mexican corn are crucial not only for crop improvement, but also for genetic engineering and the agrobiotechnology industry.[8]

46. In order to understand the diversity of corn, it is important to highlight the following elements: *i)* Mexico is a country with great biological diversity (10% of the world's biological diversity); *ii)* Mexico is a multicultural country (with 68 linguistic groups and 364 ethnolinguistic variants), *iii)* Mexico is the center of origin and diversity of numerous species, including corn.[9] The convergence of these elements is called "biocultural wealth". Corn is a fundamental part of Mexico's biocultural legacy and is in continuous evolution thanks to indigenous and peasant communities.

47. Corn has its origin in a nine thousand year domestication process from its closest wild relative: the teocintle, which continues to be an important source of genetic variability for corn

[7] From Wet, J. M., "*Dictionary of cultivated plants and their regions of diversity: excluding most ornamentals, forest trees and lower plants*", 1982, pp. 185-198. **MEX-004**. See also, Sanchez G., J. J., Goodman, M. M., & Stuber, C. W. "*Isozymatic and Morphological Diversity in the Races of Corn of Mexico"*, 2000, p. 43. **MEX-005**.

[8] Welhausen, E.J., Roberts, L.M. and Hernández X, E. "*Corn breeds in Mexico, their origin and characteristics*", pp. 9-11 and 211-214. **MEX-006**. *See also,* Massieu Y. and Lechuga Montenegro J. *"Corn in Mexico: Biodiversity and changes in consumption*", Análisis Económico No.36, Vol. XVII, 2 semester of, UAM-Azcapotzalco, p. 294. **MEX-007**.

[9] DOF, *Agreement on the determination of Centers of Origin and Centers of Genetic Diversity of Corn*, November 2, 2012. **MEX-008**.

today, derived from the gene flow that exists between the two.[10] Currently, the greatest diversity of corn in the world is concentrated throughout Mexico, as well as the presence of populations of its wild relatives, the teocintles, and another set of related grasses (*Poaceae*), species of the genus Tripsacum, which are the wild relatives and ancestors of corn.[11]

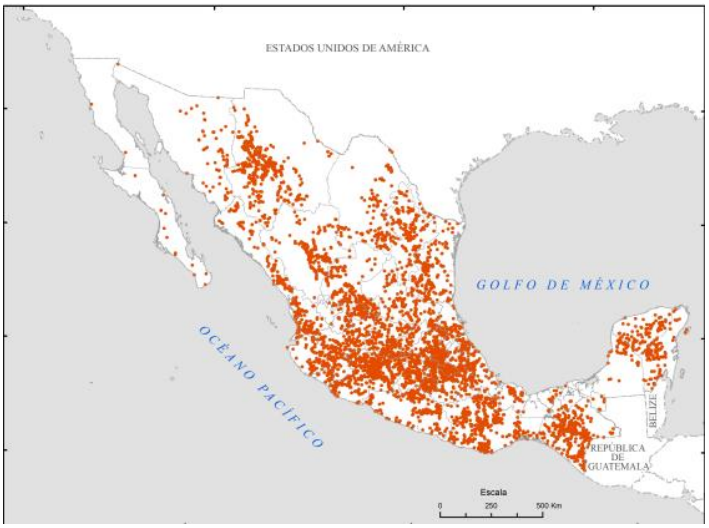
48. The term "native" has been used to differentiate traditional corn populations maintained by farmers from those generated from hybrids and improved varieties. According to the definition of native corn established in Article 2 of the Federal Law for the Promotion and Protection of Native Corn, it is understood that they are those breeds of the taxonomic category Zea mays subspecies mays that indigenous peoples, peasants and farmers have cultivated and cultivate, from seeds selected by themselves or obtained through exchange, in constant evolution and diversification, which are identified by the National Commission for the Knowledge and Use of Biodiversity (CONABIO).[12]

Image 1: Distribution of native corn in Mexico

[10] Kato, T. Á., Mapes, C., Mera, L. M., Serratos, J. A., & Bye, R. A., A., "*Origin and Diversification of Corn: An Analytical Review"*, Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, México, 2009, p. 69. **MEX-001**. Iltis, H. H. and J. F. Doebley. "*Taxonomy of Zea (Gramineae). II. Subspecific categories in the Zea mays complex and a generic synopsis*", 1980, Amer. J. Bot., p.1000. **MEX-009**.

[11] CONABIO, *Corn Breeds*, available at: https://www.biodiversidad.gob.mx/diversidad/alimentos/maices/razas-de-maiz. **MEX-010**. Kato, T. Á., Mapes, C., Mera, L. M., Serratos, J. A., & Bye, R. A. "*Origin and Diversification of Corn: An Analytical Review*", 2009, Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad., México, p.17. **MEX-001**.

[12] Federal Law for the Promotion and Protection of Native Corn, Article 2. **MEX-012**.



Source: CONABIO (2015)

49. Mexico has a total of 64 corn breeds, of which 59 are native according to the most recent classification, based on morphological and molecular (genetic) characteristics.[13] These native races or varieties have been grouped into 7 groups based on morphological, genetic, adaptive and geographical distribution characteristics and a common evolutionary history or by the name by which they are known by the indigenous or mestizo groups that cultivate them.[14] The following table shows the composition of each of these groups.

Table 1. Racial groups and breeds of native corn in Mexico.

Racial groups	**Native corn breeds**
Conical	Arrocillo, Cacahuacintle, Chalqueño, Cónico, Cónico Norteño, Dulce, Elotes Cónicos, Mixteco, Mushito, Mushito de Michoacán, Negrito, Palomero de Jalisco, Palomero Toluqueño y Uruapeño
Chihuahua Highlands	Apachito, Azul, Complejo Serrano de Jalisco, Cristalino de Chihuahua, and Gordo

[13] Torres-Morales, B., Rocandio-Rodríguez, M., Santacruz-Varela, A., Córdova-Téllez, L., Estrada, B. C., & Sánchez, H. L. "*Genetic diversity characterization of corn populations using molecular markers*". Italian Journal of Agronomy, 2023, p. 7. **MEX-013**. Vega-Alvarez, I., Santacruz-Varela, A., Rocandio-Rodríguez, M., Córdova-Téllez, L., López-Sánchez, H., Muñoz-Orozco, A., & Hernández-Bautista, A. "*Genetic diversity and structure of native corn races from Northwestern Mexico*", 2017, Pesquisa Agropecuária Brasileira, p. 1024. **MEX-014**.

[14] Ruiz Corral, J. A., Sánchez González, J. D. J., Hernández Casillas, J. M., Willcox, M. C., Ramírez Ojeda, G., Ramírez Díaz, J. L., & González Eguiarte, D. R., "R., "R., "R., "*Identification of Mexican corn breeds adapted to moisture deficient conditions using biogeographic data*", 2013, Rev. Mex. Cienc. Agríc., pp. 840-841. **MEX-015**. *See also,* Sánchez, G. J. J; Goodman, M. M. and Stuber, C. W. "*Isozymatic and morphological diversity of the races of corn of Mexico*", 2000, p. 56. **MEX-005.**

Ocho hileras	Soft and Onaveño, Harinoso de Ocho, Tabloncillo, Tabloncillo Perla, Bofo, Elotes Occidentales, Tablilla de Ocho, Jala and Zamorano Amarillo, Ancho and Bolita.
Chapalote	Chapalote, Dulcillo del Noroeste, Elotero de Sinaloa and Reventador.
Tropical dent corn	Celaya, Tepecintle, Tuxpeño, Tuxpeño Norteño, Vandeño, Zapalote Grande, Nal-Tel de Altura, Pepitilla, Chiquito, Choapaneco and Cubano Amarillo.
Precocious Tropicals	Rabbit, Nal-Tel, Mouse and Zapalote Chico
Late ripening	Dzit-Bacal, Comiteco, Coscomatepec, Motozinteco, Olotillo, Olotón, Tehua, Negro de Chimaltenango, Quicheño, Serrano, Mixeño and Serrano Mixe.

Source: CONABIO.

50. Each of these native varieties form a genetic reservoir that allows the generation of improved varieties that are more productive, tolerant to environmental factors, resistant to pests and diseases, and that meet consumer needs.[15] Some examples of the importance of native varieties are illustrated below:

- Tuxpeño corn is fundamental for genetic improvement worldwide due to its high protein, starch, oil, fiber and mineral content.[16]
- Oloton corn reduces the need for nitrogen fertilizers; [17]
- High altitude Nal-tel corn is high in essential amino acids such as lysine and tryptophan;[18]
- Mixteco corn has a high content of antioxidants such as flavonoids, phenols and anthocyanins;[19]

[15] Arteaga, M. C., Moreno-Letelier, A., Mastretta-Yanes, A., Vazquez-Lobo, A., Breña-Ochoa, A., Moreno-Estrada, A., Eguiarte, L. E. and Piñero, D., "*Genomic variation in recently collected corn landraces from Mexico*", 2016, pp. 38-39. **MEX-016**.
[16] CONABIO, "*Tuxpeño Breed*", 2020. **MEX-017**.
[17] CONABIO, "*Oloton Breed*", 2020, **MEX-018**. Van Deynze, A., Zamora, P., Delaux, P. M., Heitmann, C., Jayaraman, D., Rajasekar, S., Bennett, A. B. "*Nitrogen fixation in a landrace of corn is supported by a mucilage-associated diazotrophic microbiota*", 2018, p. 3, **MEX-019**.
[18] SAGARPA, "*Policies for the promotion and conservation of native corn in Mexico"*, s/n/d, p.35. **MEX-020**.
[19] CONABIO, "*Oloton Breed*". **MEX-018**. Van Deynze, A., Zamora, P., Delaux, P. M., Heitmann, C., Jayaraman, D., Rajasekar, S. and Bennett, A. B. "*Nitrogen fixation in a landrace of corn is supported by a mucilage-associated diazotrophic microbiota*", PLoS biology, 2018, p. 3. **MEX-019**.

- Conical corn has a high content of natural pigments. In addition, it is an early and drought tolerant breed in different regions of the country;[20]

51. The great diversity of native corn in Mexico is due to the permanence of traditional agricultural systems, where germplasm or native seeds are cultivated, mainly within the peasant and indigenous territories and communities,[21] as well as the deep knowledge of agricultural management of the different ecosystems present in the territory.[22]

52. A prime example of a traditional agricultural system is the "milpa", a system formed by a polyculture of different plants.[23] In the milpa, different varieties of corn, beans, squash and weeds coexist, thus enriching Mexican agricultural biodiversity. This farming system - a pillar of peasant diets in Mexico - makes efficient use of light, water and soil nutrients.[24] In this way, the cultivation of native corn is associated with sustainable agricultural practices that minimize dependence on synthetic chemicals, thus promoting soil health and biodiversity.[25]

2. The relevance of corn in the biocultural wealth of Mexico

53. Corn is the central species in the food, society, culture and economy of Mexico. Its origin, domestication and diversification occurred in Mexico.[26] In fact, the diversity of Mexico's corn is

[20] SAGARPA, "*Policies for the promotion and conservation of native corn in Mexico"*, s/n/d, p.35. **MEX-020**.
[21] Boege, E. (2009). "*Centers of origin, indigenous peoples and corn diversification*", Ciencias, pp. 20-21. **MEX-021**.
[22] Kato, T. Á., Mapes, C., Mera, L. M., Serratos, J. A., & Bye, R. A. "*Origin and Diversification of Corn: An Analytical Review*" [2009] Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México, pp. 22-23. **MEX-001.** Toledo-Manzur, V. M., Barrera-Bassols, N., "*Biocultural Memory. The Ecological Importance of Traditional Wisdoms*" [2008] Icaria Editorial, S.A. Barcelona, España., 233 pp. 138-147, **MEX-022.**
[23] SADER, "*Milpa: the heart of Mexican agriculture*", September 14, 2020. **MEX-023**.
[24] Mapes C., "*¿What is the milpa?"* In: Morales Valderrama, C., Mapes Sánchez, C., Rodríguez Lazcano, C., Serratos Hernández, J.A. "*Answers about corn: The voice of 72 authors. Volume III*." [2021] Instituto Nacional de Antropología e Historia, p. 151-154. **MEX-024**.
[25] Martínez Pérez, D. Y., Sánchez Escudero, J., Rodríguez Mendoza, M. de las N., & Astier Calderón, M., "*Sustainability of milpa agroecosystems in La Trinidad Ixtlán, Oaxaca*", 2020, Magazine 119 (2) From La Facultad De Agronomía, pp. 1-2, 12-14. **MEX-025**.
[26] Kato, T. Á., Mapes, C., Mera, L. M., Serratos, J. A., & Bye, R. A. "*Origin and Diversification of Corn: An Analytical Review*", Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México, 2009, p. 11. **MEX-001**.

the result of three influences: its domestication, cultivation and the diversity of agricultural practices and uses of more than 80 native communities.[27]

54. It should be considered that native corn is part of Mexico's biocultural wealth since it is a cultural and social pillar of rural communities, as well as of their food, it is an irreplaceable element in traditional Mexican cuisine and a fundamental part of the cultural legacy of Mexicans.[28] In the production units, the possibility of better agricultural risk management stands out, which provides greater guarantees in food production in sufficient quantity for the rural environment and for Mexico.[29]

55. Today in Mexico, corn continues to be the most important agricultural crop from a food, economic, political, cultural, spiritual and social point of view.[30] The culture associated with corn continues to shape agriculture in Mexico, especially in central, southern and southeastern regions in indigenous and peasant communities, which depend on small-scale agriculture and maintain a deep knowledge developed over centuries of natural crop cycles. Corn forms a fundamental part of the Mexican population's daily diet and constitutes an essential input for livestock farming as well as for the production of numerous industrial goods.

a. Native corn as a fundamental part of the preservation of indigenous cultural identity and Mexican tradition

56. Indigenous peoples and peasant communities are the main heirs, custodians and improvers of the germplasm of native corn, in a constant process of managing the genetic diversity of native corn for more than nine thousand years.[31]

57. The genetic diversity of corn is the result of the knowledge that indigenous peoples have maintained for generations through the living and dynamic conservation of seeds, the evaluation

[27] *See* SADER, "*Native corns, biological, agricultural, cultural and economic heritage*", March 2, 2023. **MEX-026**.
[28] CONABIO, "*Biocultural Patrimony*". **MEX-027**. ("Biocultural heritage is the local ecological knowledge and practices, the associated biological wealth (ecosystems, species and genetic diversity), the formation of landscape features and cultural landscapes, as well as the heritage, memory and living practices of managed or built environments.") *See also*, Cristina Barros. *Corn our heritage*, p.1. **MEX-028**.
[29] SADER, "*Mexico's wealth is its corn*", March 30, 2021. **MEX-029**.
[30] SAGARPA, "*Corn Current status and prospects 1996-2010*", s/n/d, pp. 7-10. **MEX-030**.
[31] Miranda-Colín, S, "*Genetic improvement of corn in pre-Hispanic times*", 2000, Agric. Téc. Méx, pp. 8-9. **MEX-031**.

of the results of crossbreeding and the selection of different desired traits for cultural, social, technical and economic reasons. In different regions of Mexico, corn was selected on the basis of specific characteristics, such as color, shape, productivity, pest resistance, flavor, or for ceremonial reasons. The specificity of corn cultivars can be such that a corn native to one community may not be sufficiently adapted to the environmental and management conditions of another nearby population.[32]

58. Corn represents a food that gives identity to the indigenous culture present in Mexican territory.[33] The value of this crop for Mesoamerican cultures is reflected in archaeological remains and codices, as well as in the different religious ceremonies, festivities, stories and mythologies associated with corn.[34] An example of the importance of corn is found in the Mayan culture, for which it was the origin of life itself. Experts have even considered that the Mayan calendar developed from the cultivation of corn.[35]

59. While the conservation of the unique genetic diversity of Mexico's native corn has been key to historical and cultural issues, it is also key to the future of corn and food security in Mexico.

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[32] Ortega-Paczka, R. "*Corn diversity in Mexico*". In: Esteva, G. and C. Marielle (Coords.) Sin Maíz no Hay País (Consejo Nacional para la Cultura y las Artes, Museo Nacional de Culturas Populares. México, D. F., 2003), pp. 125-131. **MEX-032**.

[33] Toledo-Manzur, V. M., Barrera-Bassols, N., "*Biocultural Memory. The Ecological Importance of Traditional Wisdoms*", 2008, Icaria Editorial, S.A. Barcelona, España., pp. 138-147, **MEX-022**. Ortega-Paczka, R. (2003*). "Corn diversity in Mexico*" In: G Esteva, C Marielle (Coords.), Without Corn There Is No Country (Consejo Nacional para la Cultura y las Artes, Museo Nacional de Culturas Populares. D.F., México, 2003) pp.125-131. **MEX-032**. Barros, C., Bermúdez, S., Garrido, F., Leyva, J. P., Riestra, M., & Vega, H. G. "*Chapter 1: The People of Corn Record. The ancestral cuisine of Mexico*", pp.54-61. **MEX-033**.

[34] Gutiérrez, N.G., Gómez Espinoza, J.A., "*Stories of productive life around corn. Corn, milpa, knowledge and local knowings in agricultural communities*", in: Argueta Villamar, A., Corona-M, E., Hersch, P. (Eds.), "*Collective Knowings And Dialogues of Knowings In Mexico*". Universidad Nacional Autónoma de México, México, pp. 340-341. **MEX-034**. Sánchez G.J.J., "*Corn and Teocintle Diversity*". Report prepared for the project: "Compilation, generation, updating and analysis of information on the genetic diversity of corn and its wild relatives in Mexico". CONABIO. Manuscrito, p. 3. **MEX-035**. García Barrios, A. "*Preliminary iconographic analysis of fragments of codex-style vessels from Calakmul. Studies of Maya Culture"*, 2011, pp. 75-78. **MEX-036**.

[35] Mariani, F. and Rebrej Pradas, M. V. "*Agriculture, religiosity and time: their articulation in Mayan cosmovision*", 2015, pp. 153-168. **MEX-037.**

b. Corn as a main element in the Mexican diet

60. Corn is the main staple food in Mexico. It is fundamental in the daily diet of Mexicans, who directly consume significant amounts of whole corn grain in the form of traditional foods. The annual *per capita* consumption of corn in Mexico is about 123.47 kg, mainly through tortillas, but also other dishes of Mexican gastronomy, based on the process of nixtamalization of the grain. The nixtamalization of corn enhances the absorption of amino acids by consumers, allowing for better nutrition in Mexico. In addition, nixtamalization generates resistant starch in tortillas, acting as soluble fiber and benefiting intestinal health.[36] A Mexican receives 1022 kcal and 26.3 g of protein daily from corn, which for an adult person represents 50% of his or her daily intake, based on a diet of 2000 kcal and 56 g of protein.[37]

61. According to FAO data, compared to consumption in the United States, corn and its products were consumed in Mexico in 2021 at a rate 10 times higher than in the United States. In addition, the energy supply that corn provided was 10 times greater, and the protein supply that came from corn was almost 15 times greater.

Table 2. The 2021 corn and corn products balance sheet for Mexico and the United States is shown below.[38]

USA	Amount of food supply	12.46 kg/person/year
	Energy food supply	92.21 kcal/person/day
	Amount of protein supply	1.59 g/person/day
Mexico	Amount of food supply	123.47 kg/person/year
	Energy food supply	1024.83 kcal/person/day
	Amount of protein supply	21.04 g/person/day

Source: FAO.

62. It is worth noting that in Mexico, approximately 98.6% of Mexicans consume corn in the form of tortillas in their daily diet.[39]

[36] CONABIO. "*What corn provides us*", 2020. **MEX-038**.

[37] Fernández-Suárez R., L.M. Morales-Chávez and A. Gálvez-Mariscal, "*Importance of Mexico's native corn in the national diet. An indispensable review*", 2013, Revista Fitotecnia Mexicana, p. 278. **MEX-039**.

[38] FAO. Food balances (2010-), 2022, FAOSTAT. **MEX-040**.

[39] Sánchez G.J.J., "*Corn and Teocintle Diversity*". Report prepared for the project: "Compilation, generation, updating and analysis of information on the genetic diversity of corn and its wild relatives in Mexico", 2011, CONABIO. Manuscrito, p. 11. **MEX-035.**

c. Native corn as the main element to preserve the Mexican gastronomic tradition

63. Mexican corn varieties, adapted to diverse ecological environments, are crucial to traditional Mexican cuisine. Preserving their genetic diversity is essential to maintain the unique characteristics that contribute to the richness of Mexican dishes, a cuisine that has even been acknowledged as intangible cultural heritage of humanity by UNESCO in 2010.[40] UNESCO describes the cultural importance of Mexican agriculture and farming methods, the "everyday" staple foods made from corn and traditional methods of food preparation as follows:

> Traditional Mexican cuisine is a comprehensive cultural model comprising farming, ritual practices, age-old skills, culinary techniques and ancestral community customs and manners. It is made possible by collective participation in the entire traditional food chain: from planting and harvesting to cooking and eating. The basis of the system is founded on corn, beans and chili; unique farming methods such as milpas (rotating swidden fields of corn and other crops) and chinampas (man-made farming islets in lake areas); cooking processes such as nixtamalization (lime-hulling maize, which increases its nutritional value); and singular utensils including grinding stones and stone mortars. Native ingredients such as varieties of tomatoes, squashes, avocados, cocoa and vanilla augment the basic staples. Mexican cuisine is elaborate and symbol-laden, with everyday tortillas and tamales, both made of corn, forming an integral part of Day of the Dead offerings. Collectives of female cooks and other practitioners devoted to raising crops and traditional cuisine are found in the State of Michoacán and across Mexico. Their knowledge and techniques express community identity, reinforce social bonds, and build stronger local, regional and national identities. Those efforts in Michoacán also underline the importance of traditional cuisine as a means of sustainable development.[41]

64. Agrobiodiversity is the basis of traditional Mexican dishes. Indigenous communities and farmers continuously cultivate corn varieties for specialized culinary purposes. The numerous varieties of native corn are used to make more than 600 forms of traditional culinary preparations.

65. Corn varieties serve different purposes, providing different textures and flavors to traditional foods. For example, popcorn varieties such as Toluqueño and Jalisciense are ideal for making popcorn when exposed to dry heat. To make pozole, corn varieties such as Cacahuacintle, Ancho and Jala are chosen for their starch content. In Oaxaca, Bolita corn is preferred for tlayudas, and Zapalote chico from the Isthmus for totopos. In addition, red and blue corn varieties are

[40] UNESCO, "*Decision of the intergovernmental Committee; 5.COM 6.30*", 2010. **MEX-041**.
[41] UNESCO, "Traditional Mexican cuisine - ancestral, ongoing community culture, the Michoacán paradigm". **MEX-042**.

preferred for making pinoles, a traditional corn flour that is usually consumed alone or mixed with cocoa or sugar.

66. Corn varieties such as Cónico, Chalqueño, Olotillo, Pepitilla and Tuxpeño are considered suitable for making good tortillas because they are high quality corn. For tortilla production, native corn of pigmented genotypes (white, yellow, red, pink, orange, orange, black, blue, purple, etc.) are also considered the best because, among other characteristics, they are more resistant to aflatoxins (highly toxic, carcinogenic and teratogenic mycotoxins).[42] In turn, many communities acknowledge the symbolic meaning of the colors of the corn grain, which leads to the selection of red, blue and black for certain ceremonial atoles. [43]

67. In general, the culinary preference for native varieties is marked by their use in the rituals of various ceremonies and festivities, management techniques, forms of utilization, and their medicinal use.[44]

68. The use of corn in Mexico for human consumption is linked to nixtamalization, a process of cooking corn grains with lime to eliminate the covering of the grain, making it less fibrous. This process increases the calcium content of the food as well as optimizing protein assimilation and the release of niacin (vitamin B3) present in the grain. The nixtamalization process also provides corn with antioxidant, antimutagenic and anticarcinogenic properties.[45] It was nixtamalization that

[42] Ortega-Beltran, A., Guerrero-Herrera, M. D., Ortega-Corona, A., Vidal-Martinez, V. A., & Cotty, P. J., "*Susceptibility to aflatoxin contamination among corn landraces from Mexico*", 2014, Journal of food protection, p. 156, **MEX-043**. Colín-Chávez, C., Virgen-Ortiz, J. J., Serrano-Rubio, L. E., Martínez-Téllez, M. A., & Astier, M., "*Comparison of nutritional properties and bioactive compounds between industrial and artisan fresh tortillas from corn landraces*", 2020, Current Research in Food Science, pp.193-194. **MEX-044**.

[43] Bonfil Batalla, G., "*Corn. Fundament for Mexican popular culture*", 1982, CONACULTA, pp. 39-48. **MEX-045**.

[44] Tuxill, J., Reyes, LA, Moreno, LL, Uicab, VC and Jarvis, DI, "*All Corn Is Not Equal: Corn Variety Choices and Mayan Foodways in Rural Yucatan, Mexico*", 2010, pp. 483-484. **MEX-046**. Atlas of Plants of Traditional Mexican Medicine, *"Corn"*. **MEX-047**.

[45] Mendoza-Díaz, S., Ortiz-Valerio, M. D. C., Castaño-Tostado, E., Figueroa-Cárdenas, J. D. D., Reynoso-Camacho, R., Ramos-Gómez, M., et al., "*Antioxidant capacity and antimutagenic activity of anthocyanin and carotenoid extracts from nixtamalized pigmented creole corn races (Zea mays L.)*", 2012, Plant foods for human nutrition, pp. 448. **MEX-048**. De la Parra, C., Serna Saldivar, S. O., & Liu, R. H. "*Effect of processing on the phytochemical profiles and antioxidant activity of corn for production of masa, tortillas, and tortilla chips*"[2007] 55(10) Journal of Agricultural and Food Chemistry, pp. 4181-4183. **MEX-049**.

allowed the Mesoamerican people to base their diet mainly on corn without having nutritional problems.[46] In addition, the nixtamalization of corn is the key to tortilla production, but, in turn, masa, nixtamalized corn and tortillas are used to prepare a large number of dishes. In this way, the numerous varieties of native corn are used to make, in addition to tortillas, an enormous number of traditional culinary preparations, making corn one of the fundamental elements of Mexican cuisine, which includes 605 different ways of cooking and preparing corn-based foods, as illustrated in the following table.

Table 3. Corn-based food products

Vegetative stage	Common name of food
Baby corn	Corn, tamales, bread, corn toqueras, corn pictes, uchepos, cuitlacoche, esquites, pozoles, menudos, chacales, chicales, huachales and soups.
Grain corn	Tlayoyos, memelas, tlaxcales, tortillas, tlacoyos, sopes, itacates, picaditas, quesadillas, tacos, tostadas, tlayudas, remekes, totopos oaxaqueños, gorditas, palomitas, totopos, chilaquiles, enchiladas, enfrijoladas, entomatadas, garapaches, panuchos, papatzules, enjococadas, chopas de perico, chalupas, molotes, peneques, tlatloyos, salbutes, nachos, frituras. Tamales: de nixtamal, de cazuela, joroch, nacatamales, kehil hua, buulil hua, zacahuil, pibipollo, tobi holoch, colados, chanchamitos, corundas, agrios, colados, con frijoles, de garbanzo, cacahuete, tortilla, tismiche, ceniza, chaya, juacane, chipilín, de frutas (pineapple, coconut, orange, almond, hazelnut, prune guayaba Pinoles: tascalate, "alfajores", batarete yaqui, corn burritos, blue corn manjar, "maría gorda", melcocha, memenshas, tepopoztes, pemoles, totopos de huetamo, boronitas, buñuelos, traditional gorditas, corn, piloncillo, cacahuacintle corn, gondoches de pabellon, Zacazonapan cookies, corn bread, corn cakes, corn turuletes, ponteduro, coricos, *tzualli*, popcorn.
Beverages and ferments	Atoles, puchas or mazamorras, atole agrio or morado, usua, champurrado, chileatole, cuatole, nicuatole, malarrabia, tanchucuá, nixteme, de pinole, frijol, cacahuate, avellana, frutas, chiles, pepita, aguamiel, coyol, grano, common of various flavors (chocolate, vanilla, among others), pozol or chorote tabasqueño, tejate, chicha, tesgüino (teshuino or tejuino), yorique, chilote, elisquiate, menjengue, piznate, sende and pox.

B. Genetically Modified Organisms

69. Genetically modified organisms ("GMOs") result from the manipulation of the deoxyribonucleic acid ("DNA") of a living organism by genetic engineering techniques, which are different from the natural modifications that occur in species, and from conventional or traditional human-mediated modifications. [47]

[46] Perales R., Hugo R., Maíz, "*Richness of Mexico*", 2009, Revista de cultura científica, p. 49. **MEX-050**. Bello-Pérez, L. A., Flores-Silva, P. C., Camelo-Méndez, G. A., Paredes-López, O., & Figueroa-Cárdenas, J. D. D. "*Effect of the nixtamalization process on the dietary fiber content, starch digestibility, and antioxidant capacity of blue corn tortilla*", 2015, 92(3) Cereal Chemistry, pp. 269. **MEX-051**.
[47] Boto, L. (2009), "*Horizontal gene transfer in evolution: facts and challenges*", Proceedings of the Royal Society B: Biological Sciences, p. 821. **MEX-052**.

1. Explanation of the technology

70. The genetic manipulation techniques used to generate the main commercial GM crops are based on the insertion of DNA sequences from different species into the genome of another species. This is carried out through two main techniques: *i)* the mediation of bacteria *Agrobacterium tumefaciens* and *ii)* biobalistics. As explained subsequently, both are inaccurate and inefficient, leading to undesired gene[48] and epigenetic[49] expressions.

71. With regard to the first of the techniques referred to above, *Agrobacterium tumefaciens* is a bacteria specie that interacts as a parasite with dicotyledonous plant species, specifically, with the legume group. As it is a predatory interaction, the bacteria benefits through these genes by obtaining the plant's resources, reducing the growth and reproduction of the host species.

72. The production of GMO requires the attenuation of a plasmid (DNA molecule) into which the DNA sequences of interest to the genetic engineer are inserted. This plasmid is introduced into a transforming bacteria which, in the vast majority of cases, is the species *Escherichia coli*. Upon entering the bacterial cell, the introduced genes begin to be expressed, although this does not occur precisely and the frequencies of desired transformations are usually low, due to a large number of factors involved in such transformation. [50]

73. The second technique is the one most commonly used today to insert genes from one species into another. These guns shoot DNA-covered micro-projectiles into plant cells.[51] This genetic material, at a very low frequency, is integrated into unknown regions of the chromosomes through the process of recombination, which is a constitutive process of cells.[52] This type of transformation is extremely ineffective mainly because, as the name suggests, it is triggered by bombardment of the cell and it is not possible to know where in the plant genome the genes being

[48] Related to the activity or production of specific proteins encoded by the genes introduced or modified in the organism.
[49] Related to changes in gene activity that do not involve alterations in DNA sequence.
[50] Gelvin, S.B., "*Agrobacterium-mediated plant transformation: the biology behind the "gene-jockeying" tool*", 2003, Microbiol Mol Biol Rev. 67(1), pp. 20-22. **MEX-053**.
[51] Sanford, J. C., "*The development of the biolistic process. In Vitro Cellular & Developmental Biology-Plant*", 2000, pp. 303-304, 3017. **MEX-054**.
[52] Taylor, N. J., & Fauquet, C. M., "*Microparticle bombardment as a tool in plant science and agricultural biotechnology*", 2002, *DNA and cell biology*, pp. 971-972. **MEX-055**.

bombarded are inserted.[53] In addition, it is necessary to point out that transgenesis in plants of commercial agronomic interest is not achieved with the insertion of a single gene.

74. In addition to the above, it is important to give a brief explanation of the GM events, which are the GM construct that is inserted. Each one of the genetic modifications that are registered with a specific name and code. In addition, they are protected under a patent or plant breeders' rights with a specific trade name. The "expression" (*i.e.,* function) that is obtained (such as glyphosate tolerance or insect resistance) is known as a GM trait.[54]

75. The simplest GM constructs, for example, the construction of a GM sequence inserted into corn (MON87427) combine a promoter (region of DNA that controls the activity of a gene), a sequence of interest, in this case glyphosate tolerance (and a terminator sequence (sequence that terminates the activity of a gene of interest). There are more complex constructs known as stacked type events because there is more than one transgene in the genetically modified segment of the sequence.[55]

76. Both genetic manipulation techniques are imprecise, resulting in undesired expressions. For example, the promoter most commonly used to make the construct comes from cauliflower mosaic virus (*Cauliflower Mosaic Virus* =CaMV), in its long variants, contains an open reading frame that, when expressed, can lead to undesirable phenotypic changes.[56] In complete GM constructs, pleiotropic effects (where the same gene influences distinct and unrelated phenotypic characteristics) may cause changes in the level of components that would then be undetected but would affect the safety of the food.[57] Therefore, as early as 2000, a group of experts convened by

[53] Yang, G., Y. H. Lee, Y. Jiang, S. P. Kumpatla & T. C. Hall (2005). "*Organization, not duplication, triggers silencing in a complex transgene locus in rice*", Plant Mol Biol, pp. 360-362. **MEX-056**.

[54] Breyer, D., Kopertekh, L., & Reheul, D.,"*Alternatives to antibiotic resistance marker genes for in vitro selection of genetically modified plants–scientific developments, current use, operational access and biosafety considerations*", 2014, Critical reviews in plant sciences, pp. 306-308. **MEX-057**.

[55] Breyer, D., Kopertekh, L., & Reheul, D.,"*Alternatives to antibiotic resistance marker genes for in vitro selection of genetically modified plants–scientific developments, current use, operational access and biosafety considerations*", 2014, Critical reviews in plant sciences, pp. 308-309. **MEX-057**.

[56] Podevin N, du Jardin P, "*Possible consequences of the overlap between the CaMV 35S promoter regions in plant transformation vectors used and the viral gene VI in transgenic plants*", 2012, GM Crops Food, p. 298. **MEX-058**.

[57] Novak WK, Haslberger AG, "*Substantial equivalence of antinutrients and inherent plant toxins in genetically modified novel foods*", 2000, Food Chem Toxicol, p. 475. **MEX-059**.

the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) recommended carrying out adequate assessments to identify the risks associated with these effects.[58]

2. Features, commercial events, crops, producing countries

77. Since the early 1980s, with the emergence of genetic manipulation techniques, attempts have been made to replicate transfer processes exclusive to bacteria and archaea.[59] In the specific case of agriculturally important plants, this manipulation has been theoretically aimed at obtaining better yields, although, in real terms, this feature has not been fully achieved in a way that can be efficient and sustainable.

78. The main arguments for the promotion of GMO have been two: *i)* to increase crop yields and thus obtain greater production of basic grains, especially corn; and *ii)* to reduce the amount of agrochemicals, especially insecticides and herbicides.[60] The evidence establishes, however, that genetically modified ("GM") crops have not been effective in contributing to these objectives.

a. Crop yields have not increased

79. After over 30 years since the first release of GM crops into the environment, although the statistical data obtained from the FAO show that corn production has increased, the higher production generated is not actually associated with higher yields, but rather with an increase in the cultivable area, i.e., more is produced because there is more land for these crops. In the case of the United States, the country with the largest area under GM corn cultivation, there is a similar scenario to what is happening in the world. Even in some years, the relationship between production and cultivable area has had a parallel trend.

80. Consequently, the increase in crop production is not directly related to the introduction of GMO, nor is it evidence that GMO favor crop yields. Mexico emphasizes three core issues.

[58] OMS/FAO, "*Safety aspects of genetically modified food of plant origin*", 2000, pp. 6-7. **MEX-060**.
[59] Fuchsman, C. A., Collins, R. E., Rocap, G., & Brazelton, W. J., "*Effect of the environment on horizontal gene transfer between bacteria and archaea*", 2017, PeerJ, p.10. **MEX-061**.
[60] *See* Section C.3.

81. *First,* there is evidence that the introduction of GMO has not led to an increase in crop yields. For example, a study from 1961 to 2010 compared the production systems of the United States (with GMO since the 1990s) and Eastern Europe (without GMO), territories characterized as highly productive with similar conditions in terms of production costs. This study corroborates that GMO have not led to an increase in yield.[61] The corn yield trend in the United States, in the period from 1940 to 1995, compared to the period from 1996 to 2011, when GM corn began to be grown, increased by only 1%.[62] In the case of Mexico, the introduction of GM corn would not result in a significant increase in the yield trend compared to hybrid corn. [63]

82. *Second,* it should be pointed out that the claims about the alleged yield benefits of GMO crops are based on publications whose results have been obtained under controlled conditions (greenhouses) or through experiments with a few individuals (small-scale field trials), without the results on yields having been possible under real conditions in the crops.[64]

83. *Third,* field reports from the United States Department of Agriculture (USDA) have indicated, contrary to what the United States contends in this proceeding,[65] that "[o]ver the first 15 years of commercial use, GE seeds have not been shown to increase yield potentials of the varieties. In fact, the yields of herbicide-tolerant or insect-resistant seeds may be occasionally lower than the yields of conventional varieties if the varieties used to carry the HT or Bt genes are not the highest yielding cultivars, as in the earlier years of adoption".[66]

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[61] Heinemann, J., M. Massaro, D. S. Coray, S. Z. Agapito-Tenfen and J. D. Wen, "*Sustainability and innovation in staple crop production in the US Midwest*", 2013, International Journal of Agricultural Sustainability, pp. 76-77, 83-83. **MEX-062**.

[62] González Merino, A., & Ávila Castañeda, J. F. "*Corn in the United States and Mexico. Hegemony in the production of a crop Arguments*", 2014, Universidad Autónoma Metropolitana Unidad Xochimilco, p. 225. **MEX-063**.

[63] Márquez-Sánchez, F. "*From corn native varieties to transgenic hybrids: II. Hybridization*", 2009, Agricultura, sociedad y desarrollo, pp. 173-174. **MEX-064**. Gurian-Sherman, D., "*Failure to yield: Evaluating the performance of genetically engineered crops*", 2009, pp. 28, 33-34. **MEX-065**.

[64] Khaipho-Burch, M., M. Cooper, J. Crossa, N. de Leon, J. Holland, R. Lewis, S. McCouch, S. C. Murray, I. Rabbi, P. Ronald, J. Ross-Ibarra, D. Weigel & E. S. Buckler., "*Genetic modification can improve crop yields — but stop overselling it"*, 2023, pp. 621, 470-473. **MEX-066**.

[65] U.S. Initial Written Submission, ¶ 21.

[66] Fernandez-Cornejo, J., S. Wechsler, M. Livingston & L. Mitchell, "*Genetically Engineered Crops in the United States*", U.S. Department of Agriculture, Economic Research Service, 2014, p.12. **MEX-067**.

84. *Fourth*, the intensive agricultural systems of GMO crops, far from contributing to the fight against famine or to the increase in production, are related to the generation of raw material to produce large quantities of ultra-processed food, high in calories but nutritionally deficient. [67]

85. It is important to mention that most countries and farmers around the world do not plant or import GMO. Globally, there is no widespread preference for GM crops, particularly for GM corn, or for approving its importation for food, feed or industrial processing. Of the 195 countries recognized internationally, 85% do not plant GMO. While nearly 80% of the world's countries do not import GMO for any use; only 43 (22%) import them for human food, animal feed or industrial use.[68] Of the 165 countries in the world that, in 2019, planted and harvested corn,[69] plus those in the European Union, only 14 countries (8.5%) planted GM corn (United States, Brazil, Argentina, South Africa, Canada, Philippines, Paraguay, Uruguay, Spain, Vietnam, Colombia, Honduras, Chile, and Portugal).[70]

86. In addition, there are several countries that have established express prohibitions for release into the environment, even totally, as in the cases of Austria and Luxembourg.[71] Countries such as Switzerland have recognized the problem of GMO and have acknowledged that importation, since they have not planted GMO since 2005 and importers have refrained from introducing GM food and feed into the country.[72]

87. In almost 30 years of genetically modified organisms ("GMO"), at the commercial level, contrary to what the United States may infer, there is no generalized or global preference for this type of crop. In addition, there are at least 40 countries that, in order to protect health and the environment, have established express, total, partial or temporary restrictions, most of them to

[67] Abrams, S. A., J. L. Albin, P. J. Landrigan, Committee on nutrition, Council on environmental health and climate change, "*Use of Genetically Modified Organism (GMO)-Containing Food Products in Children. Pediatrics*", 2023, pp. 4-6, 8. **MEX-068**. Miguel A. Altieri & Clara I. Nicholls, "*Agroecology and the reconstruction of a post-COVID-19 agriculture*", 2020, The Journal of Peasant Studies, pp. 3-5. **MEX-069**.
[68] Dionglay, C., "*Commercially Available Biotech Crops and Where to Find Them*", 2022, ISAAA, p. 1. **MEX-070**.
[69] Data obtained from the FAO, available at: https://www.fao.org/faostat/en/#data/QCL.
[70] Dionglay, C., "*Commercially Available Biotech Crops and Where to Find Them*", 2022, ISAAA, p. 2. **MEX-070**.
[71] *See,* AGES, "*Information on genetically modified organisms*", 2022. **MEX-071**. GLP, "*Luxembourg's parliament votes unanimously to prohibit farmers from growing GMO corn*", June 26,2017. **MEX-072**.
[72] FOEN, "*Biotechnology: In brief*", December 19, 2022. **MEX-073**.

prohibit the planting of GMOs and, several, their importation.[73] GM corn, in particular, has not achieved a position of global preference either. It should not be overlooked the fact that Mexico is one of the most important producers of white corn without using GM seeds.

88. Over these three decades, according to the scientific literature, there is no scientific consensus on the safety of GM crop consumption, particularly on GM corn and on the safety of glyphosate.[74] What there are, however, are studies, free of conflict of interest, which point to the fact that: *i)* the consumption of GMO, particularly GM corn, and exposure to glyphosate, result in pernicious effects on animals, as well as impacts on human health and the environment; and *ii)* Mexican corn, mainly native corn, has a better quality in nutritional terms, including compounds that prevent diseases and promote human health.[75] This information contrasts with pseudo-scientific propaganda that boasts a "body of scientific research" that supposedly confirms the safety of GM corn. [76]

b. The amount of agrochemicals used has increased

89. Of the 472 GM events with approvals in various countries, the most representative traits are*: i)* herbicide tolerance (HT, they depend on the application of herbicides for the expressed trait

[73] *See* figures from the International Service for the Acquisition of Agri-Biotech Applications (ISAAA), an international organization whose partners and donors are major global biotech and agribusiness companies, governmental and non-governmental organizations, and some research institutions. Dionglay, C. "*Commercially Available Biotech Crops and Where to Find Them*." **MEX-070**.

[74] Papers prepared under the scientific method, in the exact or social sciences (depending on the discipline), being primarily manuscripts, written by specialists, submitted to a peer review process for publication in international indexed journals. Domingo. J. L. "*Health Risks of GM Foods: Many Opinions but Few Data*." [2000] Science, p. 288. **MEX-117**; Domingo JL, Giné Bordonaba J. "*A literature review on the safety assessment of genetically modified plants*", 2011, Environ Int, pp.734-42. **MEX-223**; Shen, C., et al. "*Evaluation of adverse effects/events of genetically modified food consumption: a systematic review of animal and human studies*", 2022, Environ Sci Eu. **MEX-141**.

[75] In Mexico there are scientific compilations and files that bring together the aforementioned literature.

[76] These are publications that lack scientific rigor: they are not endorsed by scientific institutions, neither public nor private, they have not been peer-reviewed, they are not based on the scientific, experimental or social method, and many times they are biased or their authors have a conflict of interest. There is also propaganda that, in order to favor and promote the use of GM crops, sustains its arguments on *ad hominem* or *ad verecundiam* fallacies: without providing real arguments with scientific support or bases, a statement or argument is refuted by alluding to personal attributes of the person making the statement; or some authority figure is appealed to in order to defend a sophism. *For example*, Norero, D. (2017). *More than 280 scientific and technical institutions support the safety of GM crops*. I want transgenics, **USA-001**; Vv. Aa. (2016). Laureates *Letter Supporting Precision Agriculture (GMOs).* **USA-033**.

to be exploited) y *ii)* insect resistance (Bt, for the bacterium *Bacillus thuringiensis*, which is the "donor" organism of the genes, to express the production of insecticidal toxins of the Cry).

90. When analyzing the impacts on human health from the consumption of GM corn or its planting, it is essential to consider the effects associated with:

- Cry family proteins, which are expressed in Bt corn and inherently form part of the chemical constitution of GM[77] cobs that can then find their way into foods made from those cobs, and
- herbicides that are part of the technological package applied to HT corn, since they can remain as residues in the cobs and also end up in the foodstuffs made from these corn. Mainly, the herbicide to be considered is glyphosate.

91. With respect to HT crops, these have genetic modifications so that the GM plant survives the application of a certain herbicide (such as glyphosate), so that it can be applied as part of agricultural work to eliminate weeds. There are hundreds of records of glyphosate-tolerant GM events in various crops such as corn, cotton, soybean, canola, potato, alfalfa and wheat.[78] Of the GM herbicide tolerant crops, 63% are glyphosate tolerant internationally.[79]

92. According to the manufacturer's specifications, glyphosate is a non-selective systemic herbicide of the substituted glycine chemical group, with post-emergent application and systemic action, recommended for the control of most annual and perennial weeds.[80] The fact that it is systemic means that the chemical is absorbed by the plant and transported throughout its tissues, so it accumulates within the crop and the crop becomes tolerant to phytotoxic chemical effects due to GM traits. A systemic herbicide (and the contaminants or toxins into which it can be broken down within the plant) cannot be "washed out" because it accumulates within the plant itself.

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[77] Cobs include the corn kernels that grow and mature on the cobs, so the cobs, including the corn kernels, are the "fruiting bodies" of the corn plant.

[78] ISAAA (consulted in June 2020), "*GM Events with Glyphosate herbicide tolerance*". Service for the Acquisition of Agri-biotech Applications. (Available at: https://www.isaaa.org/gmapprovaldatabase/gmtrait/default.asp?TraitID=2&GMTrait=Glyphosate%20herbicide%20tolerance). **MEX-074**.

[79] ISAAA (consulted in December 2023). "*GM Approval database*". Service for the Acquisition of Agri-biotech Applications. Available at: https://www.isaaa.org/gmapprovaldatabase/default.asp) **MEX-075**.

[80] Andrade, F. A., & Espinal, O. N., "*Use of glyphosate, glufosinate and paraquat for weed management in lettuce crop*", 2021, p. 10. **MEX-076**.

93. Contrary to what the United States proposes,[81] GMO do not reduce the amount of agrochemicals, especially insecticides and herbicides. Quite the contrary. The use of herbicides, such as glyphosate, on GM crops has increased. Based on FAO statistical information, it is possible to note that the amount of herbicides applied on crops during these 27 years has not only not decreased, but has increased since the end of the 1990s to date.[82] Glyphosate and glufosinate-ammonium herbicides have been the main herbicides. During this time, there has also been an increase in the use of GMOs at the international level by countries that have opted for this model, such as the United States and Argentina.

94. It should be noted that Bt technology has also failed to reduce the use of insecticides in GMO. In fact, the insecticidal toxins produced by GM plants have led to the development of resistance in pest insects, which would indicate that Bt technology is environmentally and agronomically unsustainable. Therefore, it should not be overlooked that the planting of herbicide-tolerant and insect-resistant GMOs has led to the development of "super weeds" and "super pests", respectively, which translates into an increase in the quantity and types of pesticides applied on agricultural land. [83]

95. Now, by crop area, the top five GM crops in the world are: soybean (91.9 million hectares), corn (60.9 million hectares), cotton (25.7 million hectares), canola (10.1 million hectares) and alfalfa (1.28 million hectares). Together, these five plants occupy 99% of the world's GM crop area. The crop with the highest number of approvals is GM corn, with 172 events (36.5%). The NK603 (HT) and MON810 (Bt) corn events have the highest number of approvals at the international level.[84]

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[81] U.S. Initial Written Submission, ¶¶ 26-28.

[82] FAO. (2024). *"Pesticides Use"* (1990-2021). FAOSTAT. (Available at: https://www.fao.org/faostat/es/#data/RP/visualize) **MEX-077**.

[83] Bravo Velásquez, E., "*GM crops and the scientific paradigms from which they emerge in light of the rights of nature*", 2014, Letras Verdes. *Revista Latinoamericana de Estudios Socioambientales*, p.66. **MEX-078**.

[84] ISAAA (consulted in December 2023). "*GM Approval database*". Service for the Acquisition of Agri-biotech Applications. (Available at: https://www.isaaa.org/gmapprovaldatabase/default.asp) **MEX-075**. ISAAA. "*Brief 55: Global Status of Commercialized Biotech/GM Crops*", 2019. (Available at: https://www.isaaa.org/resources/publications/briefs/55/executivesummary/default.asp). **MEX-079**.

96. In the United States, according to data obtained from the USDA's National Agricultural Statistics Service, as of the June 2020-2022 agricultural survey, more than 90% of that country's corn crop is GM.[85] By 2023, 91% of its GM corn planted is herbicide tolerant.[86]

C. Genetically modified corn in Mexico

97. In Mexico, the release of GMO into the environment began in 1988, with an authorization for the trial planting of GM tomatoes by the company Sinalopasta (at that time owned by the U.S. company Campbells). Between 1988 and 2004, nearly 317 authorizations were granted to 38 companies, 3 research institutes and universities, for 26 experimental GMO crops, in 48 sites in 17 Mexican States. Of the authorized trials, 11.9% were for GM corn.[87]

98. By way of context of GMOs in Mexico, from 2005 to date, 651 permits have been granted for the planting of GM crops, in experimental, pilot and commercial stages; 53.5% correspond to GM cotton crops and 30% to GM corn crops (suspended and restricted since 2013 by court order as explained below). About 80% of the permits are for crops tolerant to the herbicide glyphosate.[88]

99. As for authorizations, from 1995 to 2018, 181 were granted, with indeterminate validity. Nearly half (49.7%) are for GM corn, followed by cotton (19.8%) and soybean (15.5%), in addition to canola, potato, alfalfa, tomato, lemon, beet and rice (Figure 6). Glyphosate tolerant GM crops account for 67.4% and 83.4% are tolerant to various herbicides, including dicamba and 2,4-D. Of the corn crops, 90% were glyphosate-tolerant events. [89]

1. The introduction of GMO to Mexico in the 1990s

100. In 1993, the Center of Research and Advanced Studies (CINVESTAV, by its Spanish acronym) of the National Polytechnic Institute (IPN, by its Spanish acronym), requested the first field trial for GM corn, which was followed by other requests for trials by the International Center

[85] USDA (consulted in 2023). *Adoption of Genetically Engineered Crops in the U.S* (Available at: https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-u-s/) **MEX-080**.
[86] USDA, "*Recent Trends in GE Adoption*". **MEX-081**.
[87] Sandoval-Vázquez, D., "*Thirty years of transgenics in Mexico*", 2017, Centro de Estudios para el Cambio en el Campo Mexicano, p. 2. **MEX-082**. CIBIOGEM, "*Authorizations issued by agency from 1995 to 2021*" (Available at: https://conahcyt.mx/cibiogem/index.php/ensayos-productos-autorizados-por-cultivo-1988-2005). **MEX-083**.
[88] CIBIOGEM, "*National GMO Registry*". **MEX-084**.
[89] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, p.3. **MEX-085**.

for Corn and Wheat Improvement (CIMMYT, by its Spanish acronym), all of them in areas of no more than one hectare and with strict control measures.[90]

101. According to CIBIOGEM data, also in 1993, the multinational Pioneer Hi-Bred International Inc. requested authorization for the experimental planting of herbicide-tolerant and virus-resistant corn. In 1995, the International Center for Corn and Wheat Improvement (CIMMYT) joined the requests for the experimental release of insect-resistant corn, followed by Asgrow Mexicana in 1996, when it requested permission to release herbicide-tolerant corn. In 1997, the multinational Monsanto began applying for permits to release various insect-resistant and herbicide-tolerant GM corn events. In total, 73 applications for environmental release of GM corn were registered between 1993 and 2003.[91]

102. Due to the fact that, between 1996 and 1998, there had been an increase in the number of applications for the authorization of trials for the planting of GM corn which, since then, was considered by the scientific and peasant community of the country as a risk for the genetic wealth of corn, the then Ministry of Agriculture, Livestock and Rural Development (SAGAR, today SADER), imposed a *de facto* moratorium, which remained in force from 1998 to 2005, based on the recommendation of the National Agricultural Biosafety Committee (CNBA, by its Spanish acronym).[92] As discussed in this Brief, this moratorium did not prevent transgenes from reaching native corn populations.

[90] Sandoval-Vázquez, D., "*Thirty years of transgenics in Mexico*", Centro de Estudios para el Cambio en el Campo Mexicano, 2017, 18. **MEX-082**.
[91] CIBIOGEM, "*National GMO Registry*". **MEX-084.**
[92] Serratos Hernández, J. A., "*Biosafety and the spread of transgenic corn in Mexico*", 2009, Revista Ciencias, pp. 133-134. **MEX-086**.

2. The presence of transgenes in native varieties of Mexico

103. It is important to note that the dispersal of transgenes in Mexico occurs in two main ways: *i)* through the flow of seeds (*i.e.*, viable grain)[93] and *ii)* through the flow of pollen.[94] Corn breeds and varieties are not static, nor can they be protected from pollination; therefore, corn as a crop is a dynamic and continuous system. Its pollination is free, since the female flower is separate from the male flower, its pollination is cross-pollinated and, therefore, it is not possible to control pollen dispersal. In addition, as part of traditional practices, farmers move seed from year to year by exchanging and experimenting with their own seed or that of others from the same locality or from different regions.

104. In the early 2000s, the presence of transgenes was detected in native corn varieties in the State of Oaxaca. This study suggested that transgenes from GM corn had been introduced into local varieties, possibly through cross-pollination.[95] This raised concerns in the Mexican government to avoid possible contamination of native varieties.

105. In light of this concern, evaluation of the presence of transgenes in Mexican native corn has continued through molecular techniques that analyze the genetic composition of corn populations and identify any traces of foreign genetic material. As a result, several investigations have confirmed the presence of transgenes in various regions of Mexico. [96]

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[93] It is important to note that at this stage the grain has been found to be a viable seed capable of germinating. *See*, Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Corn grain commercialized in Mexico as a potential disperser of transgenic events*", 2021, Revista Fitotecnia Mexicana, p. 252 and 258. **MEX-087**. Ayala-Angulo, M., González, E. J., Ureta, C., Chávez-Servia, J. L., González-Ortega, E., Vandame, R., ... & Piñeyro-Nelson, A., "*Local and Regional Dynamics of Native Corn Seed Lot Use by Small-Scale Producers and Their Impact on Transgene Presence in Three Mexican States Plants*", 2023, pp. 13-14. **MEX-088**.

[94] Dyer, G., Serratos-Hernández, J., Perales, H., Gepts, P., Piñeyro-Nelson, A., Chávez, A. Salinas-Arreortua, Yúñez-Naude, A., Taylor, J. and Álvarez-Buylla, E. (2009). "*Dispersal of transgenes through corn seed systems in Mexico"*. PLoS One, p. 2. **MEX-089**.

[95] Quist, D., Chapela, I., "*Transgenic DNA introgressed into traditional corn landraces in Oaxaca*", 2001, Mexico, Nature, p. 541. **MEX-090**.

[96] Delgado-Valerio, P., Ramón-Amadom A., Piñeyro-Nelson, A., Álvarez-Buylla, R., Ayala-Angulo, M., Molina-Sánchez, A., "*Presence of transgenic sequences in tortilla dough from urban and rural towns of the Meseta Purépecha, Michoacán, Mexico*", 2022, Revista Fitotecnica Mexicana, pp. 289-291. **MEX-091**; Ureta, C., González, J., Piñeyro-Nelson, A., Couturier, S., González-Ortega, E., and Álvarez- Buylla, E.,

106. For example, in 2009 a report concluded, through a model of transgene dispersal in Mexico, that the flow of transgenes is favored by the exchange and introduction of seed by farmers. Specifically, the results of this research indicate that GM corn from the United States is a cause of transgene contamination in native corn in west-central Mexico.[97] These conclusions have been confirmed by recent studies.[98]

107. Given the findings of transgenes in native corn, regulation of the introduction of improved seeds has been suggested as a suitable protection measure.[99] Since there is no process to control cross-pollination, Mexico has implemented regulatory instruments to protect native varieties from GM corn varieties, as explained in the Section on V.E *infra*.

3. Report of the Commission for Environmental Cooperation

108. Under the North American Agreement on Environmental Cooperation, the Commission for Environmental Cooperation (CEC) was created to contribute to the conservation, protection and improvement of the North American environment through cooperation and citizen participation, which continues its work based on the Agreement on Environmental Cooperation between the Governments of the United Mexican States, the United States of America and Canada.[100]

"*A data mining approach gives insights of causes related to the ongoing transgene presence in Mexican native corn populations*", Agroecology and Sustainable Food Systems, 2023, pp. 203-205. **MEX-092**.

[97] Dyer, G., Serratos-Hernández, J., Perales, H., Gepts, P., Piñeyro-Nelson, A., Chávez, A. Salinas-Arreortua, Yúñez-Naude, A., Taylor, J. and Álvarez-Buylla, E. "*Dispersal of transgenes through corn seed systems in Mexico*", 2009, PLoS One, p. 2. **MEX-089**.

[98] Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Corn grain marketed in Mexico as a potential disperser of genetically modified events*", 2021, Revista Fitotecnia Mexicana, p. 252. **MEX-087**.

[99] Rendón-Aguilar, B., Bravo-Avileza, D. & Rocha-Munivea, M., "*Temporal dynamics of transgenic sequences detected in native corn varieties in their center of origin*", 2019, Revista Mexicana de Biodiversidad, p. 9. **MEX-093**; Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Corn grain marketed in Mexico as a potential disperser of genetically modified events*", 2021, Revista Fitotecnia Mexicana, p.258. **MEX-087**.

[100] North American Agreement on Environmental Cooperation between the Government of Canada, the Government of the United Mexican States, the Government of the United States of America and Canada. **MEX-094**.

109. The CEC, at the request of various representatives of civil corporation,[101] issued a report in 2004 analyzing the effects of transgenic introgression on native corn varieties in Mexico. The report did not consist of detecting GM corn in Mexico per se, however, it analyzed the likely effects of current and future uses of GM corn compared to non-GM corn production on the genetic diversity of landraces and wild relatives of corn, agricultural and natural biodiversity, human health, social values and cultural identity.

110. This report pointed out the differentiating context of corn cultivation in Mexico vis-à-vis the United States or Canada. In other words, rural Mexico is distinguished from the agricultural sector of our trading partners by factors such as poverty, large portions of the population dependent exclusively on agriculture for their income and food security, and a considerable indigenous population.[102] On this last point, it is even acknowledged that "[t]he diversity of corn in Mexico is maintained primarily by local and indigenous farming communities."[103]

111. The report also acknowledged that economic pressures related to corn agriculture in Mexico and corn imports into Mexico from the United States would cause peasants and small farmers to abandon the use of native corn varieties.[104] This is because in the United States, after harvesting corn, GM corn is not labeled, separated or differentiated from non-GM corn.[105]

112. In view of this fact, transgenic introgression can occur when farmers in rural communities plant and store imported GM grains together with grains of native corn; or when growing native corn near a GM corn crop.[106] Therefore, it is important to establish measures to eliminate or reduce

[101] This report was requested by 21 indigenous communities in Oaxaca and three Mexican environmental groups -Greenpeace Mexico, the Mexican Center for Environmental Law (Cemda) and the Union of Environmental Groups (Ugam)- supported by more than 90 organizations and institutions from the three NAFTA member countries. Secretariat Report of the Comission for Enviromental Cooperation. *Corn & Biodiversity. The effects of transgenic Corn in Mexico*, 2004, pp. 6 and 8. **MEX-095**.
[102] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 14. **MEX-095**.
[103] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 18. **MEX-095**.
[104] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. pp. 16-17. **MEX-095**.
[105] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 16. **MEX-095**.
[106] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 16. **MEX-095**.

the damage caused to native corn by transgenic introgression. This is part of Mexico's objectives with the policies adopted and actions taken on GM corn.

113. The main conclusions of the Report, which are still valid, are as follows:

- Corn has important cultural, symbolic and spiritual values for most Mexicans, which is not the case in Canada and the United States. The risk assessment of GM corn in Mexico is necessarily tied to these values. […] The risk assessment of GM corn in Mexico is inextricably linked to the central role of corn in Mexican history and culture, including the belief and value systems of indigenous communities.[107]
- Mexico consumes an enormous amount of corn, unlike any other country in the world, so special consideration must be given to approved and future transgenes. This, in addition to the use of pharmaceuticals and industrial compounds not suitable for human and animal consumption in food crops, poses a health risk of great magnitude, which is intensified in a vegetable produced by open pollination such as corn.[108]
- The GM corn commercial planting moratorium policy was affected by the unauthorized cultivation of unlabeled and unseparated imported GM corn in the United States.[109]

114. For its part, the CEC recommended, inter alia, the following:

- That Mexico strengthen "the moratorium on commercial planting of transgenic maize by minimizing the imports of living transgenic maize from countries that grow transgenic maize commercially."[110]
- Preserving the genetic diversity of native Mexican corns.[111]
- Urgently investigate the implications of the consumption of GM corn in large quantities, as is the case in Mexico.[112]

[107] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 23. **MEX-095**.
[108] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 20. **MEX-095**.
[109] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 25. **MEX-095**.
[110] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 27. **MEX-095**.
[111] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 28. **MEX-095**.
[112] Secretariat Report of the Commission for Environmental Cooperation. "*Corn & Biodiversity. The effects of transgenic Corn in Mexico"*. 2004. p. 30. **MEX-095**.

115. Accordingly, Mexico has designed various measures to mitigate the damage caused to native corn, with a view to preventing and mitigating transgenic introgression and avoiding irreversible future damage.

4. Global Corn Project

116. In 2006, the Mexican Government, through the National Commission for the Knowledge and Use of Biodiversity (CONABIO, by its Spanish acronym), initiated the project "Compilation, generation, updating and analysis of information about the genetic diversity of corn and its wild relatives in Mexico" (Global Corn Project or PGM, by its Spanish acronym), which was planned and implemented based on Article 86 of the Law on Biosafety of Genetically Modified Organisms ("Law of Biosafety"). The purpose of the PGM was to gather information so that SEMARNAT and SAGARPA (now SADER), with the participation of experts, could determine the centers of origin and genetic diversity of corn in Mexico,[113] as well as to keep this information updated.

117. The PGM's lines of action were: *i)* generation of a document on centers of origin and genetic diversity of corn;[114] *ii)* computerization of the main national collection of corn and teocintle in Mexico;[115] and *iii)* knowledge of the diversity and current distribution of native corn and its wild relatives through collection projects.[116]

118. From these last two lines of action, databases emerged that as of 2010 integrated 24,057 records, of which 22,931 corresponded to native corn, 599 of teocintles and 527 to records of maicillo (Tripsacum) species. In 2017, a new database for native corn was integrated with 25,861 records, of which 25,094 included geographic coordinates,[117] thus demonstrating that Mexico has a great diversity in terms of corn. The PGM made it possible to compile and update information

[113] Regions currently harboring populations of the wild relatives of the species in question. *See*, DOF. *Agreement on the determination of Centers of Origin and Centers of Genetic Diversity of Corn*, November 2, 2012. **MEX-008**.
[114] The document resulted in the publication of the book "Origin and diversification of corn. An analytical review".
[115] Stored in the Genetic Resources Unit of the Germplasm Bank of the Experimental Field of the Valley of Mexico (CEVAMEX) of the National Institute of Forestry, Agriculture and Livestock Research (INIFAP).
[116] There were ten specific projects dedicated to the collection of most of the agricultural areas where native corn is grown in Mexico.
[117] CONABIO, *Global Native Corn Project*. **MEX-097**.

to determine that there are 64 corn breeds or varieties in Mexico, 59 of which are native. The results of the PGM are publicly available.[118]

D. Evidence on the impacts of genetically modified corn and glyphosate

1. Impacts of GM corn

119. Far from there being a consensus on the safety of GMOs, scientific evidence points to different negative effects on health, native corn and the environment, derived from the cultivation and consumption of GM corn.

120. As indicated *supra*, Mexico is distinguished by the way and quantity in which corn is consumed, a fundamental food for the diet of its population and culture, since the annual per capita consumption of corn is approximately 123.47 kg, the highest in the American continent. According to 2021 FAO data, Mexico, compared to the United States, consumes corn and its products in a proportion 10 times higher.[119] Thus, any effect related to the consumption of GM corn has to take into account this special consideration.

121. Based on the above, it has been stated that GMOs require special attention, since the toxicity of GM corn would be especially high based on the consumption patterns of the Mexican population, warranting a public policy response.[120] This also applies in the case of the production of certain pharmaceuticals and industrial compounds, unfit for human and animal consumption, which entail unique risks to human health.[121]

122. Transgenes in GM corn can potentially generate negative genetic and physiological changes in conventional corn. Due to the fact that gene flow can occur between genetically modified and conventional (native and hybrid) corn, the risk of introducing GM corn into Mexico increases considerably. The presence of genetically modified sequences, derived from transgene flow or introgression (fixation) of transgenes, can potentially affect the physiological

[118] CONABIO, *Global Native Corn Project*. **MEX-097**.
[119] FAO. *Food Balances* (2010-), 2022, FAOSTAT. **MEX-040**.
[120] CCA. (2004). "*The Effects of Transgenic Corn in Mexico"*. Report of the Secretariat of the Commission for Environmental Cooperation, p.20. **MEX-095**.
[121] CCA. (2004). "*The Effects of Transgenic Corn in Mexico"*. Report of the Secretariat of the Commission for Environmental Cooperation, p. 30. **MEX-095**.

characteristics of native corn related to the proportion and amount of total proteins produced in plants.[122]

a. Impacts of GM corn on native corn varieties and wild relatives

123. Corn is a cross-pollinated plant, *i.e.*, that it is pollinated from one plant to another through the wind. Since they belong to the same species, corn varieties can cross-pollinate without restrictions, facilitating the exchange of genes between them. The same occurs between corn and teocintle, due to their close relationship.[123] The ease of gene exchange between corn varieties allows for the transfer of transgenes. In addition, traditional seed management practices of Mexican farmers are unintentionally linked to the presence of transgenes.

124. Farmers often save corn seeds from the previous agricultural cycle and exchange them among themselves, which generates the genetic diversity of this crop.[124] This dynamic of seed exchange among farmers allows gene flow between different corn varieties within a community, as well as in other communities.[125] Thus, in this open seed system, the flow and impact of introduced transgenes is difficult to predict.[126]

125. It is important to note that corn seed is obtained from the same kernels on the cob after drying. It is for this reason that the planting of GM corn brings with it a series of risks for native

[122] Álvarez-Buylla, E., & Piñeyro-Nelson, A. "*Corn at risk from genetically modified crops. A comprehensive analysis of the case of Mexico*" [2013], Chapter 4: Incertitude, risks and dangers of the liberation of transgenic corn in Mexico, Collection Debate and Reflection, p. 131. **MEX-098**.
[123] H. Vázquez-Cardona, "*Design of a community biosafety scheme in the presence of transgenic corn: a case study in San Agustín Montelobos, Oaxaca* ", 2023, Universidad Nacional Autónoma de México, p. 31. **MEX-099**.
[124] Dominique Louette; André Charrier; Julien Berthaud. "*In Situ conservation of maize in Mexico: Genetic diversity and Maize seed management in a traditional community*", 1997, p. 36. **MEX-100.**
[125] Ayala-Angulo, M., et al. "*Local and Regional Dynamics of Native Maize Seed Lot Use by Small-Scale Producers and Their Impact on Transgene Presence in Three Mexican States*", 2023, Plants, p. 2. **MEX-088**.
[126] Piñeyro-Nelson, A et al. "*Transgenes in Mexican maize: molecular evidence and methodological considerations for GMO detection in landrace populations*", Molecular ecology vol. 18,4 (2009), pp. 750-751. **MEX-101**.

corn due to the flow of transgenes. Several technical-scientific studies have found genetically modified sequences (transgenes) in native corn.[127] The following stand out:

- In 2001, the first study detecting the presence of transgenes in native corn varieties was published, in which a high level of gene flow from industrially produced corn to native varieties in remote areas of our country was found, despite the moratorium on the planting of GM corn imposed in Mexico in 1998.[128]
- In 2009, evidence was found that the transgenes persisted or were reintroduced at detectable levels in some localities in the same areas studied in the above-mentioned study, at least until 2004.[129]
- In 2017, the presence of transgenic sequences was identified in corn samples, both obtained in the field and in markets and stores in a community in Oaxaca.[130]
- In 2018, transgenes were found to be present in native corn from locations in Mexico City, Michoacán, Oaxaca, Chiapas, and Veracruz, areas of high diversity for corn.[131]
- In 2023, another study found the presence of transgenes in different varieties of native corn in Oaxaca.[132] In addition to the flow of transgenes into native corn, the flow of transgenes into teocintle - the wild relative of corn - has also been documented.[133]

126. GM corn brings with it impacts resulting from the presence of transgenes on native corn varieties, as well as on their wild relatives. The presence of transgenes alters the amount of proteins produced in different parts of the corn plant and at different stages of its development, which

[127] Serratos Hernández, J. A., "*Biosafety and the spread of transgenic corn in Mexico*", 2009, Revista Ciencias, p. 140. **MEX-086**.
[128] Quist, D. and Chapela, I., "*Transgenic DNA introgressed into traditional maize landraces in Oaxaca, Mexico*", Nature, 2001, p. 542. **MEX-090**.
[129] Piñeyro-Nelson, A et al. "*Transgenes in Mexican maize: molecular evidence and methodological considerations for GMO detection in landrace populations*", Molecular ecology vol. 18,4 (2009), pp. 750-751. **MEX-101**.
[130] Agapito, S., López, F. R., Mallah, N., Abou, G., Trtikova, M., Nodari, R. O. and Wickson, F. (2017). "*Transgene flow in Mexican maize revisited: Socio-biological analysis across two contrasting farmer communities and seed management systems*. Ecology and Evolution", pp. 9467-9468. **MEX-102**.
[131] Álvarez-Buylla, E. (2018). *Monitoring the presence of transgenic sequences in corn crops in priority sites in Mexico*. Instituto Nacional de Ecología y Cambio Climático, p. 5. **MEX-103**.
[132] Vázquez-Cardona, H. (2023). "*Design of a community biosafety scheme in the presence of transgenic corn: a case study in San Agustín Montelobos, Oaxaca*". Universidad Nacional Autónoma de México, p. 83. **MEX-099**.
[133] Lohn, A.F., Trtikova, M., Chapela, I. et al. "*Transgene behavior in genetically modified teosinte hybrid plants: transcriptome expression, insecticidal protein production and bioactivity against a target insect pest*". Environ Sci Eur, 2021, p. 8. **MEX-104**.

affects the plant's functions.[134] The presence of transgenes also affects physiological processes such as photosynthesis,[135] and can ultimately lead to the loss of an important function in the development of native corn.[136] In turn, introgression - that is, the fixation of transgenes in the DNA of native corn and teocintles[137]- can result in changes at different genetic levels, in the alteration of plant functions and in the development of herbicide resistance.[138]

127. The transfer of transgenes into native corn can lead to the genetic erosion of corn, that is, to the loss of the diversity of this species, which puts at risk one of the most important genetic reservoirs in the world.[139] In addition, gene flow from GM corn to native corn can have impacts on the organisms that depend on these varieties and on the ecosystems in which they are grown, and can even result in the loss of biodiversity.[140] In fact, from the time Bt corn was first planted, it was known that Cry proteins, with insecticidal characteristics, are not specific to insect pest species, but can eliminate other insects that feed on them.[141]

128. Several studies have demonstrated the toxicity of Cry proteins in target insects for the technology that are considered pests, *e.g.*, of the orders Lepidoptera (butterflies and moths), Diptera (flies and mosquitoes), Coleoptera (beetles and weevils), Hymenoptera (wasps and

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[134] Álvarez-Buylla, E., & Piñeyro Nelson, A. (2009). "*Risks and dangers of GM corn spread in Mexico*". Ciencias, p. 88. **MEX-105**.

[135] Benevenuto RF, Agapito-Tenfen SZ, Vilperte V, Wikmark OG, van Rensburg PJ, Nodari RO. "*Molecular responses of genetically modified maize to abiotic stresses as determined through proteomic and metabolomic analyses"*. PLoS One. 2017, p. 15. **MEX-106**.

[136] Álvarez-Buylla, E., & Piñeyro Nelson, A. (2009). "*Risks and dangers of GM corn spread in Mexico"*. Ciencias, p. 87. **MEX-105**.

[137] Richard G. Harrison, Erica L. Larson, "*Hybridization, Introgression, and the Nature of Species Boundaries, Journal of Heredity"*, p.796. **MEX-107**.

[138] Le Corre, V., Siol, M., Vigouroux, Y., Tenaillon, M. I., and Délye, C. (2020). "*Adaptive introgression from maize has facilitated the establishment of teosinte as a noxious weed in Europe*". Proceedings of the National Academy of Sciences, pp. 25621-25622. **MEX-108**.

[139] Tobón-Niedfeldt, W., Mastretta-Yanes, A., Urquiza-Haas, T., Goettsch, B., Cuervo-Robayo, A. P., Urquiza-Haas, E. & Koleff, P. "*Incorporating evolutionary and threat processes into crop wild relatives conservation*", Nature communications, 2022, p.2. **MEX-109**.

[140] Diana Pilson and Holly R. Prendeville, "*Ecological Effects of Transgenic Crops and the Escape of Transgenes into Wild Populations*", Annual Review of Ecology, Evolution, and Systematics, 2004, p. 151-155. **MEX-110**.

[141] Liu, D. (2009). "*Design of gene constructs for transgenic corn. Methods in molecular biology"* (Clifton, N.J.), p. 7. **MEX-111**.

bees)[142] and nematodes;[143] as well as in crayfish (Orconectes rusticus).[144] Studies have shown that non-target organisms can also be affected.[145]

b. The impacts of GM corn on human health

129. To date, evidence shows that the impacts of GM corn on human health continue to increase, among them, there are certain irrefutable impacts: *i)* negative effects on human health; *ii)* unintended consequences at the epigenetic level; *iii)* horizontal transfer of antibiotic resistance transgenes; and *iv)* deficiencies in nutritional quality.

(1) Adverse human health effects

130. GM crops of Bt corn were adopted for commercial planting in the United States, with no evidence on the safety or lack of toxicity of GMOs.[146] However, since 1999, it had been shown that exposure to Bt sprays could cause allergic skin sensitivity and the induction of antibodies (immunoglobulins), or both.[147]

131. Currently, Bt transgenes are still listed as toxic or allergenic for humans.[148] Effects have also been attributed to them including immunogenicity;[149] induction of oxidative stress in the liver

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[142] Schnepf, E., Crickmore, N., Van Rie, J., Lereclus, D., Baum, J., Feitelson, J., Zeigler, D. R., & Dean, D. H. (1998). "*Bacillus thuringiensis and its pesticidal crystal proteins"*. Microbiology and molecular biology reviews, p. 775. **MEX-112**.

[143] Wei, J. Z., Hale, K., Carta, L., Platzer, E., Wong, C., Fang, S. C., & Aroian, R. V. (2003). "*Bacillus thuringiensis crystal proteins that target nematodes"*. Proceedings of the National Academy of Sciences of the United States of America, p., 2764-2765. **MEX-113**; Höss, S et al. "*Effects of transgenic corn and Cry1Ab protein on the nematode, Caenorhabditis elegan*", Ecotoxicology and environmental safety vol. 70,2 (2008), pp. 338-339. **MEX-114**.

[144] Linn, M.D., Moore, P.A. (2014) "*The Effects of Bt Corn on Rusty Crayfish (Orconectes Rusticus) Growth and Survival"*. Arch Environ Contam Toxicol, p. 440. **MEX-115**.

[145] Bøhn, T., Rover, C. M., & Semenchuk, P. R. (2016). "*Daphnia magna negatively affected by chronic exposure to purified Cry-toxins"*. Food and Chemical Toxicology, p. 138. **MEX-116**.

[146] Domingo. J. L., "*Health Risks of GM Foods: Many Opinions but Few Data*", Science, 2000, p. 1. **MEX-117**.

[147] Bernstein IL, Bernstein JA, Miller M, Tierzieva S, Bernstein DI, Lummus Z, Selgrade MK, Doerfler DL, Seligy VL. "*Immune responses in farm workers after exposure to Bacillus thuringiensis pesticides. Environ Health Perspect*", 1999, p. 580. **MEX-118**.

[148] Robinson, C., Antoniou, M., and Fagan, J. (2015). "*GMO Myths and Truths: A Citizen's Guide to the Evidence on the Safety and Efficacy of Genetically Modified Crops and Foods*", Chelsea Green Publishing, pp. 128-144. **MEX-119.**

[149] Vázquez RI, Moreno-Fierros L, Neri-Bazán L, De La Riva GA, López-Revilla R. "*Bacillus thuringiensis Cry1Ac protoxin is a potent systemic and mucosal adjuvant"*. Scand J Immunol. 1999, p. 583. **MEX-120**;

of mice;[150] selective hematotoxicity and a significant reduction in bone marrow cell proliferation that demonstrated cytotoxic effects.[151] In addition, the Cry1Ac protein is capable of inducing anaphylaxis (i.e., severe allergic reactions). However, the gene expressing this protein has been inserted into several GM events that have been approved for human consumption.[152]

132. In 2017, the discussion around GM corn became an even more complex issue when the presence of transgenes and glyphosate in industrialized foods derived from this type of corn became evident. Suggesting a correlation between the presence of genetically modified sequences and traces of glyphosate in foods made from GM corn.[153] This has led to a cascade of studies showing the health effects of GM corn (in relation to glyphosate) (see Section V.D.2 below). At the same time, adverse microscopic and molecular effects of some GM foods on different organs or tissues have been reported, especially in GM events of insect-resistant corn. Among the most relevant findings on the effects of diets with GM Bt corn events are the following:

- In experiments with rats, the results evidenced affectations in the immune, neuroendocrine and hepatorenal systems, all this with diets based on a very low level of GM protein.[154] Significant variations in growth were also observed. Subsequent studies detected impairments in the hematopoietic system.[155] As well as

Jarillo-Luna A, Moreno-Fierros L, Campos-Rodríguez R, Rodríguez-Monroy MA, Lara-Padilla E, Rojas-Hernández S. "*Intranasal immunization with Naegleria fowleri lysates and Cry1Ac induces metaplasia in the olfactory epithelium and increases IgA secretion"*. Parasite Immunol. 2008, pp. 31 y 36. **MEX-121**.

[150] Shaban NZ, Helmy MH, El-Kersh MA, Mahmoud BF. "*Effects of Bacillus thuringiensis toxin on hepatic lipid peroxidation and free-radical scavengers in rats given alpha-tocopherol or acetylsalicylate"*. Comp Biochem Physiol C Toxicol Pharmacol. 2003, pp. 405-406, 412. **MEX-122**.

[151] Mezzomo BP, Miranda-Vilela AL, Freire IdS, Barbosa LCP, Portilho FA, et al. (2013) "*Hematotoxicity of Bacillus thuringiensis as Spore-crystal Strains Cry1Aa, Cry1Ab, Cry1Ac or Cry2Aa in Swiss Albino Mice"*. J Hematol Thromb Dis, pp. 1-2, 7. **MEX-123**

[152] Santos-Vigil KI, Ilhuicatzi-Alvarado D, García-Hernández AL, Herrera-García JS, Moreno-Fierros L. "*Study of the allergenic potential of Bacillus thuringiensis Cry1Ac toxin following intra-gastric administration in a murine model of food-allergy"*. Int Immunopharmacol. 2018, pp. 185-186, 194. **MEX-124**.

[153] González-Ortega, E., Piñeyro-Nelson, A., Gómez-Hernández, E., Monterrubio-Vázquez, E., Arleo, M., Dávila-Velderrain, J., Martínez-Debat, C. and Álvarez-Buylla, *E. "Pervasive presence of transgenes and glyphosate in maize-derived food"*, Agroecology and Sustainable Food Systems, 2017, p. 14. **MEX-125**.

[154] Seralini GE, Cellier D, de Vendomois JS. "*New analysis of a rat feeding study with a genetically modified maize reveals signs of hepatorenal toxicity"*. Arch Environ Contam Toxicol. 2007;52:596–602. p. 601. **MEX-126**.

[155] De Vendômois JS, Roullier F, Cellier D, Séralini GE. "*A comparison of the effects of three GM corn varieties on mammalian health"*. Int J Biol Sci. 2009, pp.717-718. **MEX-127**.

histopathological,[156] histochemical,[157] organ and body weight[158] and serum biochemical values can influence the characteristics of the gastrointestinal tract, profoundly altering its function and structure.[159]

- Regarding the studies in salmon, affectations associated with an immune response were detected.[160] As well as a less efficient use of feed, it also appeared to enhance oxidative cellular stress in the distal intestine in immunosensitized fish,[161] which is linked to various chronic diseases such as diabetes and cancer.[162]
- In the case of male pigs, fed GM Bt corn (MON810) in the short term, there was a higher feed intake than control pigs.[163] They were also less efficient at converting feed to gain and their kidneys tended to be heavier than those of the control pigs. Another investigation, in this case long-term, showed that the transgenic diet was associated with different gastric and uterine disorders.[164]
- The publication of a wide-ranging report on effects in German cows fed with the first commercially released GM Bt corn in Europe (expressing tolerance to the herbicide

[156] El-Shamei, Z. S., A.A. Gab-Alla, A. A. Shatta, E. A. Moussa & A. M. Rayan. (2012). "*Histopathological Changes in Some Organs of Male Rats Fed on Genetically Modified Corn (Ajeeb YG*)". Journal of American Science, pp. 684-685, 692. **MEX-128**.

[157] Oraby, Hanaa; Kandil, Mahrousa; Shaffie, Nermeen; and Ghaly, Inas (2015) *"Biological impact of feeding rats with a genetically modified-based diet*" Turkish Journal of Biology: Vol. 39: No. 2, Article 11, pp. 265, 267, 270, 272. **MEX-129**.

[158] Kiliçgün, H., C. Gürsul, M. Sunar & G. Gökşen. (2013). "*The Comparative Effects of Genetically Modified Maize and Conventional Maize on Rats"*. J Clin Anal Med, p. 37. **MEX-130**.

[159] M.A.A. Ibrahim, E.F. Okasha, "*Effect of genetically modified corn on the jejunal mucosa of adult male albino rat"*, Exp Toxicol Pathol (2016), pp. 5, 8-9. **MEX-131**. Zdziarski, I.M., Carman, J.A. and Edwards, J.W. (2018) "*Histopathological Investigation of the Stomach of Rats Fed a 60% Genetically Modified Corn Diet"*, Food and Nutrition Sciences, p. 14. **MEX-132**.

[160] Sagstad A, Sanden M, Haugland O, Hansen AC, Olsvik PA, Hemre GI. "*Evaluation of stress- and immune-response biomarkers in Atlantic salmon, Salmo salar L., fed different levels of genetically modified maize (Bt maize), compared with its near-isogenic parental line and a commercial suprex maize"*. J Fish Dis. 2007, pp. 201,210-211. **MEX-133**.

[161] Gu J, Krogdahl Å, Sissener NH, Kortner TM, Gelencser E, Hemre GI, Bakke AM. "*Effects of oral Bt-maize (MON810) exposure on growth and health parameters in normal and sensitised Atlantic salmon, Salmo salar" L*. Br J Nutr. 2013, pp. 1408-1409, 1421. **MEX-134**.

[162] Mesnage- Robin, Z-Sarah, Tenfen-Agapito, VilperteV-inicius, Renney-George, Ward- Malcolm, Séralini-Gilles Eric, O-Nodari Rubens and N-Antoniou, Michael (2016). "*An integrated multiomics analysis of the NK603 Roundup-tolerant GM maize reveals metabolism disturbances caused by the transformation process*". Nature, pp. 1, 5 and 10. **MEX-135**.

[163] Walsh MC, Buzoianu SG, Gardiner GE, Rea MC, Ross RP, Cassidy JP, Lawlor PG. "*Effects of short-term feeding of Bt MON810 maize on growth performance, organ morphology and function in pigs"*. Br J Nutr. 2012, pp. 364, 367-368. **MEX-136**.

[164] Carman, J. A., et al. (2013). "*A long-term toxicology study on pigs fed a combined genetically modified (GM) soy and GM maize diet. Journal of Organic Systems"*, pp. 38, 52. **MEX-137**.

glufosinate, insect resistance and antibiotic resistance) led to the withdrawal of this GM corn from the market in 2002, when a mortality peak occurred.[165]

133. Also relevant is a study in which the cytotoxic effects of stacked Bt and HT events, in which glyphosate residues were present, proved that Cry1Ab (a protein present in several GM corn events) caused cell death at 100 parts per million and above, triggering necrosis and apoptosis, at doses well below agricultural dilutions.[166]

134. On the other hand, detrimental effects of GM Bt corn producing Cry1Ab have occurred without the need for ingestion, e.g.:

- Immunogenicity and allergenicity from inhalation of pollen and plant debris from GM Bt corn (MON810), as well as exposure to purified Cry1Ab proteins (isolated in the laboratory).[167]

135. Finally, a recent systematic review of studies conducted in animals and humans on the consumption of GM foods reported minor illnesses in one human crossover trial and, within the 204 animal studies, 59.46% reported 22 adverse effects (out of 37), of which 16 were reported as serious adverse effects (mortality, tumors or cancer, significant low fertility, decreased learning and reaction capacity, and some organ abnormalities). The adverse effects were related to GM foods involving 5 GM corn events.[168]

136. For these reasons, it is possible to point out that GM corn has negative impacts on health, an issue reinforced by the existence of a link between GM corn and herbicides, from the popularity in the commercialization of multi-stacked corn with events such as herbicide resistance.

(2) Unintended consequences at the epigenetic level

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[165] Glöckner, G. & G-É. Séralini. (2016). "*Pathology reports on the first cows fed with Bt176 maize"* (1997–2002). Scholarly J. Agric. Sci., pp. 1, 5-7. **MEX-138**.

[166] Mesnage R, Clair E, Gress S, Then C, Székács A, Séralini GE. "*Cytotoxicity on human cells of Cry1Ab and Cry1Ac Bt insecticidal toxins alone or with a glyphosate-based herbicide"*. J Appl Toxicol. 2013, pp. 2-3. **MEX-139**.

[167] Monica Andreassen, Elena Rocca, Thomas Bøhn, Odd-Gunnar Wikmark, Johnnie van den Berg, Martinus Løvik, Terje Traavik & Unni Cecilie Nygaard (2015) "*Humoral and cellular immune responses in mice after airway administration of Bacillus thuringiensis Cry1Ab and MON810 cry1Ab-transgenic maize"*, Food and Agricultural Immunology, pp. 522, 531, 534-535. **MEX-140**.

[168] Shen, C., Yin, XC., Jiao, BY. et al. "*Evaluation of adverse effects/events of genetically modified food consumption: a systematic review of animal and human studies"*. Environ Sci Eur 34, 8 (2022), p. 7. **MEX-141**.

137. There are mechanisms that can modify the evolutionary structure of individuals within a population, such as gene flow, which is the transfer of genes from one population to another.[169] Altering the genetic material of any species will have an effect on the way in which species evolve.

138. The results of various comparative investigations of GM corn have documented several instances of undesirable modifications at the epigenetic level, resulting in: *i)* significant disparities in the content and chirality (specific three-dimensional structure) of amino acids,[170] *ii)* differences in the production of metabolites, which participate in metabolic pathways unaffected by the genetic modification,[171] *iii)* unequal modulations in energy metabolism and redox homeostasis (balance of cellular reactions) and presence of allergenic protein in GM corn,[172] *iv)* increased production of molecules with free radical activity (glyphosate resistance),[173] and vi) metabolic difference.[174]

139. These, and any modification of the genetic material of any species, have an enormous and possibly irreversible effect on the way it evolves.[175] For example, the expression of new proteins can trigger allergic reactions whose effects are not estimated in comparative analysis.[176]

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[169] Futuyma, D. J. (2013). "*Evolution"*. Third edition. Sunderland, Massachusetts U.S.A, Sinauer Associates, Inc. Publishers, pp. 2-3. **MEX-142**.

[170] Herrero, M., E. Ibañez, P. J. Martín-Álvarez and A. Cifuentes (2007). "A*nalysis of Chiral Amino Acids in Conventional and Transgenic Maize*" Anal. Chem 79, pp. 5076-5077. **MEX-143**.

[171] Levandi, T., C. Leon, M. Kaljurand, V. García-Cañas and A. Cifuentes (2008). "*Capillary Electrophoresis Time-of-Flight Mass Spectrometry for Comparative Metabolomics of Transgenic versus Conventional Maize*". Anal. Chem, pp. 6329-6330, 6335. **MEX-144**.

[172] Agapito-Tenfen, S.Z., M.P. Guerra, R.O. Nodari & O. Wikmark. (2020*). "Untargeted Proteomics-Based Approach to Investigate Unintended Changes in Genetically Modified Maize Used for Food and Feed Purposes"*. Preprints, pp 1-2, 6. **MEX-145**.

[173] Mesnage, R., Agapito-Tenfen, S. Z., Vilperte, V., Renney, G., Ward, M., Séralini, G. E., and Antoniou, M. N. (2016). "*An integrated multi-omics analysis of the NK603 Roundup-tolerant GM maize reveals metabolism disturbances caused by the transformation process"*. Scientific Reports, p. 10. **MEX-135**.

[174] Benevenuto, R. F., H. J. Venter, C. B. Zanatta, R. O. Nodari & S. Z. Agapito-Tenfen. (2022). "*Alterations in genetically modified crops assessed by omics studies: Systematic review and meta-analysis"*. Trends in Food Science & Technology, pp. 332-334. **MEX-146**.

[175] Giraldo, P. A., Shinozuka, H., Spangenberg, G. C., Smith, K. F., & Cogan, N. O. I. (2021). "*Rapid and Detailed Characterization of Transgene Insertion Sites in Genetically Modified Plants via Nanopore Sequencing"*. Frontiers in plant science, *pp.7-8. **MEX-147**.

[176] Bushey DF, Bannon GA, Delaney BF, Graser G, Hefford M, Jiang X, Lee TC, Madduri KM, Pariza M, Privalle LS, Ranjan R, Saab-Rincon G, Schafer BW, Thelen JJ, Zhang JX, Harper MS. "*Characteristics and safety assessment of intractable proteins in genetically modified crops"*. Regul Toxicol Pharmacol, 2014, pp. 154-155. **MEX-148**.

(3) Horizontal transfer of antibiotic resistance transgenes

140. On the one hand, it is important to consider that in most species the transfer of genetic information occurs only vertically, that is, from one generation to another; but, exceptionally, most of all in unicellular species, specifically bacteria and archaea, the flow of genetic information can occur both vertically and horizontally.[177] On the other hand, all this genetic material acquired horizontally or vertically is exposed to various mechanisms that alter the genetic composition of individuals within a population, in an unpredictable manner.[178]

141. The main source of alteration in the composition of the genetic material is mutation, *i.e.*, random changes in the sequence of the genetic material. These changes or mutations can have three potential effects on the carrier organisms: *i)* that the mutation confers some advantage to the individual carrier and, therefore, increases the number of individuals carrying the change; *ii)* that the change causes a negative effect and therefore the individual carrier is eliminated from the population or, in the best case, is less likely to leave offspring; and *iii)* that the change is neutral within the population, *i.e.* has no apparent advantage or disadvantage.[179]

142. The ecological-evolutionary consequences of species that are capable of acquiring new genetic material involve changes in ecological interactions. In the specific case of transgenesis, one of the dangers associated with the production of genetic modifications, warned by the scientific community for decades, is the probable propagation of DNA fragments from a GMO to the recipient cells of another organism of an unrelated species through horizontal gene transfer.[180]

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[177] Burmeister A. R. (2015). "*Horizontal Gene Transfer. Evolution, medicine, and public health"*, 2015(1), pp. 193-194. **MEX-149**.

[178] Boto, L. (2009). "*Horizontal gene transfer in evolution: facts and challenges"*. Proceedings of the Royal Society B: Biological Sciences. 2009, pp. 823-824. **MEX-052**.

[179] Futuyma, D. J. (2013). "*Evolution"*. Third edition. Sunderland, Massachusetts U.S.A, Sinauer Associates, Inc. Publishers, p. 5. **MEX-142**.

[180] Nielsen KM, Daffonchio D (2007) "*Unintended horizontal transfer of recombinant DNA. In: Traavik T, Ching LL (eds) Biosafety first: holistic approaches to risk and uncertainty in genetic engineering and genetically modified organisms"*. Tapir Academic Press, Trondheim, p.1. **MEX-150.** Álvarez-Buylla, E. (2004). "*Ecological, Biological and Agrobiodiversity Aspects of the Impacts of Transgenic Corn"*. For the Secretariat of the Commission for Environmental Cooperation of North America. As part of the Article 13 Initiative: Corn & Biodiversity: The Effects of Transgenic Corn in Mexico, pp. 11-13. **MEX-151**

143. The genetic constructs introduced into plant cells are, in addition to genes coding for insect resistance or herbicide tolerance, antibiotic resistance marker genes (GMRA). The GMRA in GM plants intended for food production have been questioned for safety reasons, as they could be transferred and spread to bacteria in the gastrointestinal tract (GIT).[181] Acquired antibiotic resistance may compromise the therapeutic value of relevant antibiotics used for the treatment of pathogenic microorganisms.[182]

144. Studies have detected DNA related to genetically modified crops in livestock species.[183] Others have shown that ingested fragments of the CaMV-35S (cauliflower mosaic virus) virus promoter were incorporated into the blood, liver and brain tissues of experimental rats and that the mean total transfer of genetically modified sequences increased significantly with increasing duration of the feeding period.[184]

145. At the international level, there is a record of 161 approved GM events with antibiotic resistance, several of which are edible plants, including corn with 34 events.[185]

146. In addition, since 2013, robust scientific evidence (over 1000 human samples from four independent studies) have shown that DNA fragments large enough to carry genes from food can avoid degradation and enter the human circulatory system. Furthermore, studies in animals (trout,

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[181] Rizzi A, Raddadi N, Sorlini C, Nordgard L, Nielsen KM, Dafonchio D (2012) "*The stability and degradation of dietary DNA in the gastrointestinal tract of mammals: implications for horizontal gene transfer and the biosafety of GMOs"*. Crit Rev Food Sci Nutr 52, pp. 142–143, 153-154. **MEX-152**.

[182] WHO (World Health Organization). 2007. "*Critically important antimicrobials for human medicine: Categorization for the development of risk management strategies to contain antimicrobial resistance due to nonhuman antimicrobial use"*. Report of the second WHO expert meeting, Copenhagen, 29–31 May 2007, pp. 3-5. **MEX-153**.

[183] Nadal A., De Giacomo M., Einspanier R., Kleter G., Kok E., McFarland S., Onori R., Alain Paris, Mònica Toldrà, Jeroen van Dijk, Jean-Michel Wal, Maria Pla. 2018. "*Exposure of livestock to GM feeds: Detectability and measurement"*, Food and Chemical Toxicology, pp. 22-30, 66-77. **MEX-154**.

[184] Oraby HA, Kandil MH, Hassan AAM, Al-Sharawi HA. 2014. "*Addressing the issue of horizontal gene transfer from a diet containing genetically modified components into rats tissues"*. Afr J Biotechnol, pp. 4410, 4415-4416. **MEX-155**. Oraby, H.AS., Aboul-Maaty, N.AF., Al-Sharawi, H.A. et al. 2022. "*Horizontal transfer of antibiotic resistance genes into microflora and blood cells in rats fed on GM-diet"*. Bull Natl Res Cent 46, pp.11-12. **MEX-156**.

[185] ISAAA. (s/f). "*GM Events with Antibiotic resistance. International Service for the Acquisition of Agri-biotech Applications"*, pp. 1-9. **MEX-157**.

goats, pigs and mice) fed GMO diets support this idea, which means that these fragments have been found in the digestive tract and leukocytes.[186]

(4) Nutritional quality deficiencies

147. GM corn, in addition to being inextricably linked to agrotoxins such as glyphosate and glufosinate-ammonium (included in the technological package for planting), have inferior nutritional quality. In fact, GM corn has reduced levels of protein, fiber and antioxidants compared to native corn varieties.[187] Since they come mostly from commercial hybrid lines of corn, they have a lower amount of phenolic compounds and anthocyanins and, therefore, a lower antioxidant capacity.[188]

148. GM corn has demonstrated marked disparities in its levels of macronutrients, micronutrients and essential minerals compared to native corn.[189] These discrepancies could translate into a significant decrease or even the absence of nutraceutical properties (pharmaceutical alternative with physiological benefits) beneficial to health in the case of consumption of GM corn.

149. As noted *supra*, intensive GM crop farming systems are intended to produce large quantities of ultra-processed foods. When observing that the main destination of GMOs is the production of ethanol, animal feed and to generate inputs for the food industry in order to produce fructose syrups and edible oils to be used as ingredients in the production of foods of very low

[186] Spisák S, Solymosi N, Ittzés P, Bodor A, Kondor D, Vattay G, Barták BK, Sipos F, Galamb O, Tulassay Z, Szállási Z, Rasmussen S, Sicheritz-Ponten T, Brunak S, Molnár B, Csabai I. *"Complete genes may pass from food to human blood"*. PLoS One. 2013, p.2. **MEX-158**.
[187] Chávez, C., Virgen-Ortiz, J. J., Serrano-Rubio, L. E., Martínez-Téllez, M. A., & Astier, M., "*Comparison of nutritional properties and bioactive compounds between industrial and artisan fresh tortillas from corn landraces*", 2020, Current Research in Food Science, pp.189-190. **MEX-044**.
[188] De la Parra, C., Serna Saldivar, S. O., & Liu, R. H. "*Effect of processing on the phytochemical profiles and antioxidant activity of corn for production of masa, tortillas, and tortilla chips*, 2007, Journal of Agricultural and Food Chemistry, p. 4182. **MEX-049**.
[189] Colín-Chávez, C., Virgen-Ortiz, J. J., Serrano-Rubio, L. E., Martínez-Téllez, M. A., & Astier, M., "*Comparison of nutritional properties and bioactive compounds between industrial and artisan fresh tortillas from maize landraces*", 2020, Current Research in Food Science, pp.189-193. **MEX-044**.

nutritional quality,[190] it is a myth that GMOs make it possible to supply the population with healthy food.[191]

150. The impact of these ultra-processed foods on the Mexican diet is alarming, since Latin America is the fifth largest seller of ultra-processed products worldwide[192] and Mexico is the largest seller of ultra-processed beverages.[193]

151. None of the above is addressed by the United States in its Initial Written Submission, therefore Mexico has the need to address these issues in this Initial Written Submission.

c. Effects of GM corn and its technological package on biodiversity and the environment

152. The toxicological effects of glyphosate generate various problems for the diversity of species. Among these effects are the following:

- Reproductive effects in rats and mice and fish.[194]
- Affectations on the survival, development and behavior of bees.[195]
- Growth retardation in organisms such as algae and other aquatic animals.[196]
- Inhibition of hatching in sea urchins.[197]

[190] Steven A. Abrams, Jaclyn Lewis Albin, Philip J. Landrigan. Committee on nutrition, council on environmental health and climate change. (2023). "*Use of Genetically Modified Organism (GMO)-Containing Food Products in Children. Pediatrics"*, pp. 1, 3, 6-8. **MEX-068**.

[191] Miguel A. Altieri & Clara I. Nicholls (2020) "*Agroecology and the reconstruction of a post-COVID-19 agriculture"*, The Journal of Peasant Studies, pp. 4-5. **MEX-069.**

[192] Baker, P., Machado, P., Santos, T., Sievert, K., Backholer, K., Hadjikakou, M., Friel, S., Russell, C., Huse, O., Bell, C., Scrinis, G., Worsley, A., Friel, S. and Lawrence, M. (2020). "*Ultra-processed foods and the nutrition transition: Global, regional and national trends, food systems transformations and political economy drivers"*. Obesity Reviews, pp. 1,6. **MEX-159**.

[193] Matos, R.A., Adams, M., Sabaté J. (2021). "*Review: The consumption of ultra-processed foods and non-communicable diseases in Latin America"*. Frontiers in Nutrition, p. 4. **MEX-160**.

[194] *See* section V. D.5.

[195] *See* section V.D.2.c.

[196] Gill, J. P. K., Sethi, N., Mohan, A., Datta, S., and Girdhar, M. (2018). "*Glyphosate toxicity for animals"*. Environmental chemistry letters, 2018, pp. 1-6. **MEX-161**.

[197] Asnicar, D., Cappelli, C., Sallehuddin, A. S., Maznan, N. A., & Marin, M. G. (2020). "*Effects of glyphosate-based and derived products on sea urchin larval development"*. Journal of Marine Science and Engineering, p. 10. **MEX-162**.

- In tilapia: histopathological changes in gills, affectations in liver and kidney, as well as alterations in sexual activity and metabolic and cellular distortions.[198]
- Affections in the immune system of crabs, affecting their survival and reproduction.[199]
- Chronic affections in birds such as quails.[200]
- Affections in some species of reptiles that affect their mass and temperature.[201]
- Toxic effects on crayfish (Orconectes rusticus), due to exposure in streams close to GMO cultivars, with a 31% lower survival rate.[202]

2. Impacts of GM corn and glyphosate

153. The United States has gone to great lengths to avoid mentioning glyphosate in this dispute, to the extent that this herbicide is not even mentioned in the Request for Consultations, nor in the Request for Establishment of a Panel, much less in the Initial Brief of the United States, despite the fact that it was addressed by Mexico in the consultation process.

154. The situation is striking, considering that one of the objectives of 2023 Decree is to transition from the use of glyphosate to other alternatives and "sustainable and culturally adequate alternatives that allow the preservation of agricultural production and are safe for human health, the country's biocultural diversity and the environment, free of toxic substances that represent […] hazards".[203]

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[198] Frontera, J. L., Vatnick, I., Chaulet, A., and Rodríguez, E. M. (2011). "*Effects of glyphosate and polyoxyethylenamine on growth and energetic reserves in the freshwater crayfish Cherax quadricarinatus (Decapoda, Parastacidae)"* Archives of Environmental Contamination and Toxicology, p. 597. **MEX-163**.

[199] Yang, X., Song, Y., Zhang, C., Pang, Y., Song, X., Wu, M., and Cheng, Y. (2019). "*Effects of the glyphosate-based herbicide roundup on the survival, immune response, digestive activities and gut microbiota of the Chinese mitten crab, Eriocheir sinensis. Aquatic Toxicology"*, p. 11. **MEX-164**.

[200] Ruuskanen, S., Rainio, M., Gómez-Gallego, C., Selenius, O., Salminen, S., Collado, M. and Helander, M. (2020). "*Glyphosate-based herbicides influence antioxidants, reproductive hormones and gut microbiome but not reproduction: A long-term experiment in an avian model"*. Environmental Pollution, pp. 5-6. **MEX-165**.

[201] Carpenter, J. K., Monks, J. M., and Nelson, N. (2016). "*The effect of two glyphosate formulations on a small, diurnal lizard (Oligosoma polychroma)"*. Ecotoxicology, pp. 4-6. **MEX-166**.

[202] Linn MD, Moore PA. "*The effects of bt corn on rusty crayfish (Orconectes rusticus) growth and survival"*. Arch Environ Contam Toxicol., 2014, p. 436. **MEX-115**.

[203] Decree 2023, Article 4. **MEX-167**.

155. Glyphosate is the most widely used herbicide in the world. It was introduced to the market in 1974, with "Roundup" being the best known formula and brand name in the market. Since then, several companies have created different variants of herbicides based on glyphosate (HBG).[204]

156. 90% of glyphosate is used in agricultural activities. It is a systemic herbicide that is applied not only in the early stages of the life cycle of plants, but also during germination or at later stages. Because it can cause the death of herbaceous species, such as bushes and even trees, in agriculture it is applied to eliminate plants that have not even grown, either in or around the agricultural plot (*e.g.* weeds).[205]

157. There are five major issues surrounding glyphosate and GM corn that the Panel should consider: *i)* the relationship between glyphosate and GM corn; *ii)* the health risks caused by glyphosate and GM corn with tolerance to certain herbicides; *iii)* the risks faced by the environment caused by glyphosate; *iv)* the damage caused to Mexico's native corn by the transgenic introgression resulting from GMcorn; and *v)* the damage to the biocultural richness of peasant communities and Mexico's gastronomic heritage.

[204] Generally speaking, HBGs are created with mixtures of various formulations, which can be divided into two groups. First, HBGs with "active" ingredients, which are added to be toxic against the plant species that the herbicide promises to eliminate. Second, HBGs with "inert" ingredients (also called "adjuvants"), which are added to the formulation to enhance the effect of the active ingredient. The main degradation product of glyphosate is aminomethylphosphonic acid (AMPA), which has a higher persistence and mobility in water bodies and soils compared to glyphosate, which has also been shown to have negative health and environmental effects. Valavanidis, A., "*Glyphosate, the Most Widely Used Herbicide. Health and safety issues. Why scientists differ in their evaluation of its adverse health effects*", 2018, pp. 1-3. **MEX-168**. Qian, T. *et al*., "*Glyphosate exposure induces inflammatory responses in the small intestine and alters gut microbial composition in rats*", 2020, Environmental Pollution, pp. 1-2, 9. **MEX-169**. Maggi, F., la Cecilia, D., Tang, F. H. M., and McBratney, A. (2020). "*The global environmental hazard of glyphosate use. The Science of the Total Environment"*, 2020, p. 11. **MEX-170**. Mañas, F., Peralta, L., Raviolo, J., García Ovando, H., Weyers, A., Ugnia, L., Gonzalez Cid, M., Larripa I. and Gorla, N. (2009*). "Genotoxicity of AMPA, the environmental metabolite of glyphosate, assessed by the Comet assay and cytogenetic tests. Ecotoxicology and Environmental Safety"*, p.834. **MEX-171**. Bai, S.H. and Ogbourne, S.M. (2016). *"Glyphosate: environmental contamination, toxicity and potential risks to human health via food contamination"*, Environ. Sci. Pollut. Res, pp. 10-11. **MEX-172**.

[205] Buffin D. and T. Jewell, "*Health and Environmental Impacts of Glyphosate. The implications of increased use of glyphosate in association with genetically modified crops*", The Pesticide Action Reino Unido, (2001), pp. 7-8. **MEX-173**.

158. As a starting point, glyphosate is a highly dangerous pesticide and this is irrefutable.[206] Such is the case that there is an extensive list of countries in which glyphosate has been totally banned or restricted.[207] Although there are no precise figures on the volume of pesticides applied in Mexican territory, glyphosate is used in Mexico in large quantities, which has generated a serious health, environmental and even social situation. [208]

159. None of these issues are addressed by the United States in its Initial Written Submission, and Mexico therefore has the need to address these issues in this Initial Written Submission.

a. The relationship between GM corn and glyphosate

160. Since 1996, the international use of HBG has increased by 1500%, due to the commercialization and sowing of GM seeds. Experts in the field have stated that the most important aspect of the success of glyphosate has been its use in GM crops resistant to this herbicide. [209]

161. Contrary to the United States' assertion, the inherent function of GM corn is not to have a product with increased nutrients or with characteristics that preserve food security, for example, to be resistant to drought or climate change.[210] Rather, the main function of GM corn is to tolerate greater amounts of herbicides, specifically glyphosate. This means that direct consumption of GM corn results in consuming a product that has been exposed to a greater amount of an herbicide that

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[206] EPA. "*Draft National Level Listed Species Biological Evaluation for Glyphosate"*, 2020, p.3. **MEX-174.**

[207] Wisner Baum, "*Where is glyphosate banned?"*,2023. **MEX-175**.

[208] The toxicity of pesticides also generates a considerable impact on the functioning and quality of these people, which has repercussions on the economic activities and dynamics of rural populations, indigenous and peasant communities. *See* Toledo, V. M., and Barrera-Bassols, N. (2008). "*Biocultural Memory. The Ecological Importance of Traditional Wisdoms (Vol. 3)"*. Icaria editorial, pp. 194-195. **MEX-022**. Tsai, W. T. (2013). "*A review on environmental exposure and health risks of herbicide paraquat"*. Toxicological & Environmental Chemistry, pp. 204. **MEX-176**. Huang, Y., Zhan, H., Bhatt, P., & Chen, S. (2019). "*Paraquat degradation from contaminated environments: current achievements and perspectives"*. Frontiers in Microbiology, pp. 1-2. **MEX-177**. *See* Arellano-Aguilar, O. and Rendón von Osten, J., "*The Pesticide Footprint in Mexico*", 2016, p. 5. **MEX-178**.

[209] Duke, S.O. and Powles, S.B., "*Glyphosate: a once-in-a-century herbicide*", Pest. Manag. Sci. (2008), p. 322. **MEX-179**.

[210] *See* U.S. Initial Written Submission, ¶¶ 16, 20-24.

has been scientifically proven to cause serious health and environmental damage.[211] In other words, the greater the tolerance of a GMO, the greater its exposure to herbicides.[212]

162. The general trend in the management of GM crops -and particularly of GM corn- involves the use of glyphosate as the main herbicide. The following facts are proof of this.

- Of the GMO herbicide-tolerant crops, 63% are tolerant to glyphosate at the international level.[213]
- 65% of approved GM corn events in the U.S. are herbicide tolerant, and 42% are glyphosate tolerant.[214]

163. From 1995 to 2018, COFEPRIS granted 181 authorizations to import and commercialize GMOs in Mexico. Nearly half (49.7%) consist of GM corns, followed by cotton (19.8%) and soybeans (15.5%), in addition to canola, potato, alfalfa, tomato, lemon, beet and rice.[215] 67.4% are for glyphosate tolerant GM. What is relevant to consider is that, in relation to GM corn authorizations, 90% are related to glyphosate-tolerant events.[216]

Image 2:

[211] Mills PJ, Kania-Korwel I, Fagan J, McEvoy LK, Laughlin GA, Barrett-Connor E. (2017). "*Excretion of the Herbicide Glyphosate in Older Adults Between 1993 and 2016"*. JAMA, pp. 1610-1611. **MEX-180**. Lozano-Kasten, F., Sierra-Diaz, E., Chavez, H. G., Peregrina Lucano, A. A., Cremades, R., & Pinto, E. S. (2021). *Seasonal urinary levels of glyphosate in children from agricultural communities*. Dose-Response, pp.3-4. **MEX-181**. Verzeñassi, D., Vallini, A., Fernández, F., Ferrazini, L., Lasagna, M., Sosa, A. J., and Hough, G. E. (2023). *Cancer incidence and death rates in Argentine rural towns surrounded by pesticide-treated agricultural land*. Clinical Epidemiology and Global Health, p. 5. **MEX-182**.

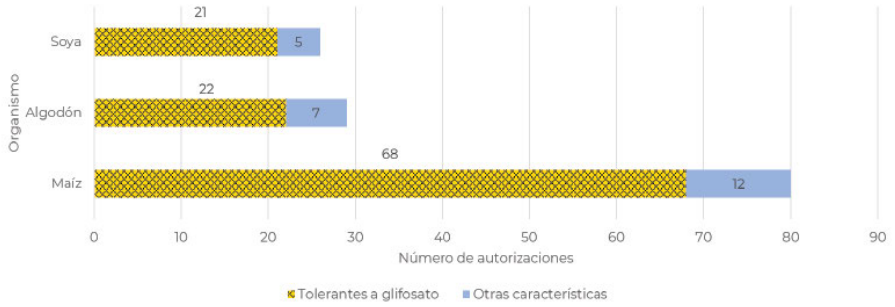
[212] *See* Section C.3

[213] ISAAA. "*GM Approval database*" (Available at: https://www.isaaa.org/gmapprovaldatabase/default.asp). **MEX-075**.

[214] USDA (2023). "*Adoption of Genetically Engineered Crops in the U.S."* (Available at: https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-u-s/). **MEX-080**.

[215] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, pp. 3-4, **MEX-085**.

[216] CONAHCYT, *"Scientific Record on Glyphosate and GM Crops*", 2020, p. 4, **MEX-085**.



Source: CONAHCYT, "Expediente científico sobre el glifosato y los cultivos GM", 2020, p. 4, **MEX-085**.

164. This means that the main function of GM corn imported into Mexico - specifically GM yellow corn - is to tolerate herbicides. As glyphosate is the most widely used herbicide in the world, human exposure to glyphosate is extremely frequent, both in rural and urban populations, in addition to the fact that glyphosate is related to products that contain, or are made from, GMOs, which is alarming because of the possible negative effects on human health of this pesticide, as will be seen *infra*.

165. Human exposure is not the only issue to consider. For example, some research has reported the presence of glyphosate in the urine of dairy cows and fattening rabbits fed GMOs, such as corn and soybeans, and also in organs and tissues of cows fed GMOs, such as intestine, liver, spleen, kidney and muscles.[217]

166. Glyphosate has also been detected in fluids (*e.g.*, breast milk, blood and urine) worldwide, in the general population of industrialized countries, with a higher prevalence in children and people in agricultural areas.[218] Several studies carried out in the three countries where GM crops

[217] Krüger. M. et. al. (2014). "*Detection of Glyphosate Residues in Animals and Humans"*. Environ Anal Toxicol 2014, pp. 3-4. **MEX-183**. Krüger. M. et. al. (2013). "*Field Investigations of Glyphosate in Urine of Danish Dairy Cows"*. Environ Anal Toxicol 2013, p. 6. **MEX-184**.

[218] Grau D, Grau N, Gascuel Q, Paroissin C, Stratonovitch C, Lairon D, Devault DA, Di Cristofaro J. Quantifiable urine glyphosate levels detected in 99% of the French population, with higher values in men, in younger people, and in farmers. Environ Sci Pollut, 2022, pp. 32889-32893. **MEX-185**.

have expanded exponentially, and which are the main exporters of GM crops worldwide (*i.e.*, the United States, Argentina and Brazil) have detected glyphosate in human fluids and excreta.[219]

167. However, the presence of glyphosate in the human body is not unique to these locations. Indeed, human exposure to glyphosate is widespread and constant, and Mexico is no exception.

- For several years, indigenous communities and NGOs have denounced to Mexican federal authorities about the clandestine cultivation of GM soy and corn seeds in the state of Campeche.[220]
- In 2017, the results of an investigation were published on the presence of glyphosate in seven agricultural communities in Campeche that exceeded internationally permitted level.[221]
- In Jalisco, studies have been conducted that have shown alerts on kidney conditions, finding glyphosate residues in 70% of the samples applied to children and adolescents.[222]
- In Yucatan, the presence of glyphosate has also been identified in coastal waters, especially in areas close to zones with a higher concentration of agricultural activities.[223]
- In Sinaloa, a state where agriculture is the main activity and there are GM cotton crops, concentrations of glyphosate were detected in the main rivers of the region. [224]

[219] Maina, L. (2015). "*Laboratory rats: twenty years of glysophate in Argentina"*. Food sovereignty, biodiversity and cultures, p. 25.**MEX-186**. Camiccia M, Candiotto LZP, Gaboardi SC, Panis C, Kottiwitz LBM. (2022). *"Determination of glyphosate in breast milk of lactating women in a rural area from Paraná state, Brazil"*. Braz J Med Biol Res, pp. 4-6. **MEX-187**.

[220] Santana R. "*Mayans denounce the planting of GM soy and corn in Hopelchén, Campeche"*, Revista Proceso, 2020. **MEX-188**. Greenpeace México. *Illegal GM planting did occur in Campeche*, 2021. **MEX-189**.

[221] Rendon-von Osten, J., and Dzul-Caamal, R. (2017). "*Glyphosate Residues in Groundwater, Drinking Water and Urine of Subsistence Farmers from Intensive Agriculture Localities: A Survey in Hopelchén, Campeche, Mexico"*. International Journal of Environmental Research and Public Health, p. 9. **MEX-190**.

[222] Sierra-Diaz, E., Celis-de la Rosa, AJ., Lozano-Kasten, F., Trasande, L., Peregrina-Lucano, A.A., Sandoval-Pinto, E. and Gonzalez-Chavez H. (2019). "*Urinary Pesticide Levels in Children and Adolescents Residing in Two Agricultural Communities in Mexico"*. Int J Environ Res Public Health,p. 5. **MEX-191**. Lozano-Kasten, F., Sierra-Diaz, E., Chavez, H. G., Peregrina Lucano, A. A., Cremades, R., & Pinto, E. S. (2021). "*Seasonal urinary levels of glyphosate in children from agricultural communities"*. Dose-Response, pp. 3-4. **MEX-181**.

[223] Arellano-Aguilar, O. and Rendón von Osten, J. (2016). "*The Pesticide Footprint in Mexico"*, pp. 26-27. **MEX-178**.

[224] Arellano-Aguilar, O. and Rendón von Osten, J. (2016). "*The Pesticide Footprint in Mexico"*, pp.22-23. **MEX-178**.

168. Based on the above, it can be easily assumed that in those places where GMOs are planted there will be the presence of potent herbicides. The situation in Mexico is particular because, although there is a precautionary measure ordered by the Federal Judiciary that prohibits the planting of GMOs in Mexico, there is clandestine planting of GMOs in the country, in addition to the excessive use of glyphosate in agricultural activities in several states of the Mexican Republic.

b. The relationship between glyphosate and GM corn and its effect on health

169. Exposure to glyphosate can be categorized under three main headings: *i*) as a consequence of direct handling of this herbicide; *ii)* through human consumption of products containing glyphosate (i.e. GMOs produced using glyphosate, and in animals, whose feed contains glyphosate); normally in higher concentrations than those used in non-GM agriculture, and *iii*) in environmental contexts, in GM crop fields.

170. In Mexico, glyphosate residues were found in 70% of the samples, regardless of whether they had direct contact with this substance or not.[225] In the following sections, the consequences of exposure to glyphosate are developed.

(1) Health effects of glyphosate exposure

171. Again, as the most widely used herbicide in the world, and even under the remote assumption that glyphosate has a low level of toxicity -which it does not- the risks associated with its exposure are extremely high. The toxicity of glyphosate and the various HBGs on the market increases significantly (up to 100 times) from the compounds contained in commercial formulations.[226] The health damage caused by exposure to glyphosate and HBG is not a minor situation:

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[225] Sierra-Diaz, E., Celis-de la Rosa, AJ., Lozano-Kasten, F., Trasande, L., Peregrina-Lucano, A.A., Sandoval-Pinto, E. and Gonzalez-Chavez H. (2019). "*Urinary Pesticide Levels in Children and Adolescents Residing in Two Agricultural Communities in Mexico"*, Int J Environ Res Public Health, pp. 5-7. **MEX-191**.

[226] Several scientific studies reveal the potential harmful effects of glyphosate and HBG on human health after prolonged exposure, generating what is known as chronic toxicity. Mesnage, R., Benbrook, C. and Antoniou, M.N. (2019) "*Insight into the confusion over surfactant co-formulants in glyphosate-based herbicides"*, Food and Chemical Toxicology, pp. 144. **MEX-192**. Benachour, N. & G-E. Séralini. (2009). "*Glyphosate formulations induce apoptosis and necrosis in human umbilical, embryonic, and placental*

- Recently, research conducted in the United States evaluated the damage caused by the use of glyphosate in agricultural activities in pregnant women, five-year-old children and young people aged 14 and 18, reaching the conclusion that exposure to glyphosate generates effects in early childhood, such as increased risk of liver disorders, and metabolic syndrome in adulthood, which can cause liver cancer, diabetes and cardiovascular diseases in the future.[227]
- It has been identified that rainwater from GM corn crops sprayed with glyphosate that eventually reaches aqueous bodies and is consumed can cause endocrine disrupting effects in humans.[228]
- Exposure to herbicides formulated with glyphosate, even at very low doses, can cause reproductive problems including miscarriages, premature births, low birth weight and birth defects.[229]
- Scientific studies show that the glyphosate molecule is a toxic substance that has multiple effects on the digestive system.[230]
- Recent studies have suggested that exposure to glyphosate is an important factor linked to the development of celiac disease (i.e., gluten intolerance).[231]
- Studies have shown kidney damage in the presence of glyphosate-based herbicide, as urine and feces are the main routes of elimination of substances.[232]

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cells". Chem Res Toxicol, p. 7-8. **MEX-193**. Heu, C., C. Elie-Caille, V. Mougey, S. Launay and Nicod, L. (2012). "*A Step Further Toward Glyphosate-induced Epidermal Cell Death: involvement of mitochondrial and oxidative mechanisms"*. Environ Toxicol Pharmacol., pp. 148-151. **MEX-194**.

[227] Although cancer is a multifactorial condition, epidemiological studies have emerged in recent years in different countries that have shown a strong association between glyphosate exposure and cancer incidence. *See* Eskenazi B, Gunier RB, Rauch S, Kogut K, Perito ER, Mendez X, Limbach C, Holland N, Bradman A, Harley KG, Mills PJ, Mora AM. (2023). "*Association of Lifetime Exposure to Glyphosate and Aminomethylphosphonic Acid (AMPA) with Liver Inflammation and Metabolic Syndrome at Young Adulthood: Findings from the CHAMACOS Study"*. Environ Health Perspect, pp. 7-8. **MEX-195**.

[228] Horn, S., Pieters, R. y Bøhn, T. (2020). *"May agricultural water sources containing mixtures of agrochemicals cause hormonal disturbances?"*, Science of The Total Environment, p. 10. **MEX-196**.

[229] Cuhra, M., Traavik, T. y Bohn, T. (2015). *"Clone- and age-dependent toxicity of a glyphosate commercial formulation and its active ingredient in Daphnia magna"*. Journal of Agricultural Chemistry and Environment, pp. 247-260. **MEX-197**. Hued, A., Oberhofer, S. y Bistoni, M.A. (2012). *"Exposure to a commercial glyphosate formulation (Roundup®) alters normal gill and liver histology and affects male sexual activity of Jenynsia multidentata (Anablepidae, Cyprinodontiformes)"*. Arch Environ Contam Toxicol, pp. 116. **MEX-198.**

[230] Tang, Q., Tang, J., Ren, X. y Li, C. (2020). *"Glyphosate exposure induces inflammatory responses in the small intestine and alters gut microbial composition in rats"*, Environmental Pollution, p. 6. **MEX-169.**

[231] Samsel, A., y Seneff, S. (2013). *"Glyphosate, pathways to modern diseases II: Celiac sprue and gluten intolerance. Interdisciplinary toxicology"*, 6(4), pp. 175-178. **MEX-199.**

[232] Gunier Gadotti, C., Oliveira, J., Bender, J., Lima, M., Taques, G.,Percio, S., Romano, M., Romano, R. 2023. *"Prepubertal to adulthood exposure to low doses of glyphosate-based herbicide increases the*

- Studies carried out in Argentina have shown that glyphosate-based herbicides produce severe cephalic malformations, alterations of the cardiac area and the embryonic trunk in amphibian and chicken embryos.[233]
- Acute effects of exposure to glyphosate include respiratory difficulties and convulsions, eye irritation, mucous membrane or skin damage, allergies, irritations and chemical burns, and may even act as a promoter of skin cancer.[234]

172. The consequences on people's health, derived from the handling of this herbicide, are notorious in agricultural workers, who are constantly exposed to glyphosate, which can even increase the risk of unintentional poisoning.[235] In other words, the risk of becoming ill from poisoning is latent in the fields during the use of this type of herbicide, where food, work tools and agrochemicals are also stored. However, the health effects of exposure to glyphosate go beyond the fields where it is used, since the presence of residues in food and water indirectly exposes consumers and entire populations.[236]

173. It is important to mention that these effects can occur even with exposure to "low doses". However, the toxicity of a substance can be acute[237] or chronic[238], depending on the dose and the

expression of the Havcr1 (Kim1) biomarker and causes mild kidney alterations". Toxicology and Applied Pharmacology, p. 467. **MEX-200.**

[233] Carrasco, A. E. (2011). *"The glysophate: is it part of a eugenic model?"* Salud colectiva, p. 130. **MEX-201.**

[234] Amerio, P., Motta, A., Toto, P., Pour, S.M., Pajand, R., Feliciani, C. y Tulli, A. (2004) *"Skin toxicity from glyphosate-surfactant formulation"*. J Toxicol Clin Toxicol, pp. 318-319. **MEX-202**. Suyatna, F. y Darmayanti, S. (2003). "*Acute eye irritation study of a mixture of glyphosate isopropylamine salt and 2,4 D-isopropylamine*". Medical Journal of Indonesia., p. 139. **MEX-203**. George, J., Prasad, S., Mahmood, Z. y Shukla, Y. (2010) *"Studies on glyphosate-induced carcinogenicity in mouse skin: a proteomic approach"*. J Proteomics, p. 956**. MEX-266**.

[235] A recent study revealed that 44% of the world's farmers suffer unintentional poisoning each year, demonstrating that pesticide poisoning has become a public health problem. *See* Boedeker, W., Watts, M., Clausing, P., & Marquez, E. (2020). "*The global distribution of acute unintentional pesticide poisoning: estimations based on a systematic review"*. BMC public health, 20(1), p.1. **MEX-204**.

[236] Pesticide residue contamination has been detected in 73% of products such as honey and vegetables, and in 90% of fruits such as apples, peaches, pears, strawberries and celery. *See* Baker, B. P., Benbrook, C. M., Groth III, E., & Lutz Benbrook, K. (2002). "*Pesticide residues in conventional, integrated pest management (IPM)-grown and organic foods: Insights from three US data sets"*. Food Additives and Contaminants, 19, p. 431. **MEX-205**.

[237] Those that occur in cases of poisoning.

[238] Long-term exposure.

time of exposure. In the case of glyphosate, both types are widely documented[239], along with proven and potential damage to human health.

174. Based on the above and on the evidence supporting the risks associated with exposure to glyphosate, Mexico considers that the ingestion of residual glyphosate and other contaminants present through the direct consumption of GM corn grain represents a serious food safety risk in Mexico. This risk is not minor and becomes an acute risk in Mexico due to the large amount of corn grain that Mexicans consume on a daily basis, mainly through the consumption of masa and tortillas. Evidently, this risk is notoriously higher than in any other country, mainly from developed countries, such as the United States and Canada, since the diet of these countries is not based on the consumption of masa and tortillas, as is the case in Mexico.

(2) The health effects of consuming GM products exposed to glyphosate

175. The relationship of glyphosate with GMOs and food is not something new, since 2017, the presence of GM sequences and glyphosate herbicide was revealed in various foods made from corn, which are widely consumed and easily accessible in Mexico. Subsequent studies have confirmed the presence of glyphosate and AMPA residues, not only in food but also in water.[240] From the above, it is confirmed that glyphosate persists in products derived from crops to which this herbicide is applied.

176. Exposure to glyphosate through consumption is not exclusive to GMOs produced using glyphosate, but can occur from the consumption of animals fed with GM corn and other GM crops. For example, different investigations have reported the presence of glyphosate in the urine of dairy

[239] Ortiz, A. (2017). "*The effects of glyphosate herbicide in Argentina: "How much GDP growth justifies cancer?"*, Desalambre. **MEX-206**. Heu, C., C. Elie-Caille, V. Mougey, S. Launay and Nicod, L. (2012). "*A Step Further Toward Glyphosate-induced Epidermal Cell Death: involvement of mitochondrial and oxidative mechanisms"*. Environ Toxicol Pharmacol, pp. 148-151. **MEX-194**.
Mesnage, R., B. Bernay and Séralini, G. E. (2013). "*Ethoxylated Adjuvants of Glyphosate-based Herbicides Are Active Principles of Human Cell Toxicity"*. Toxicology 313, pp. 4-6. **MEX-207**.
[240] Xu, J., Smith, S., Smith, G., Wang, W. and Li, Y. (2019). "*Glyphosate contamination in grains and foods: An overview"*. Food Control, p. 6. **MEX-208**.

cows[241] and fattening rabbits fed on feed made from GM corn and soybeans. As well as in organs and tissues of cows fed with GMOs,[242] indicating a possible retention in the body of the animals.[243]

177. In this sense, the main function of GM corn is to resist herbicides such as glyphosate, which in essence means that such seeds are exposed to a greater amount of herbicide. As with the scientific evidence regarding the health effects of exposure to glyphosate, there is extensive evidence regarding the health effects of consuming GMOs that were exposed to the same herbicide. In other words, the lack of safety of GM corn also derives from the fact that it has been exposed to a number of highly hazardous herbicides.

178. Current evidence concludes that glyphosate residues in food may indeed cause alterations in the gut microbiome (dysbiosis), associated with celiac disease[244], inflammatory bowel disease and irritable bowel syndrome, because opportunistic pathogens are more resistant to glyphosate compared to commensal bacteria.[245] Studies have also shown that water and animal feed contaminated with glyphosate affect intestinal microbial communities.[246]

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[241] Schrödl. W. et al. (2014). "*Possible Effects of Glyphosate on Mucorales Abundance in the Rumen of Dairy Cows in Germany"*. Curr Microbiol (2014), p.4. **MEX-209**.

[242] Krüger. M. et. al. (2014). "*Detection of Glyphosate Residues in Animals and Humans"*. Environ Anal Toxicol 2014, p.2. **MEX-183**. Schnabel, K., Schmitz, R., von Soosten, D., Frahm, J., Kersten, S., Meyer, U. & Dänicke, S. (2017). "*Effects of glyphosate residues and different concentrate feed proportions on performance, energy metabolism and health characteristics in lactating dairy cows"*. Archives of animal nutrition, pp. 13-14. **MEX-210**.

[243] Von Soosten, D., U. Meyer, L. Hüther, S. Dänicke, M. Lahrssen-Wiederholt, H. Schafft, M. Spolders, G. Breves. (2016). "*Excretion pathways and ruminal disappearance of glyphosate and its degradation product aminomethylphosphonic acid in dairy cows"*. Journal of Dairy Science, pp. 5-6. **MEX-211**.

[244] Samsel, A., and Seneff, S. (2013). "*Glyphosate, pathways to modern diseases II: Celiac sprue and gluten intolerance"*. Interdisciplinary toxicology, pp. 18-19. **MEX-199**.

[245] Barnett, J. A. & D. L. Gibson. (2020) "*Separating the Empirical Wheat From the Pseudoscientific Chaff: A Critical Review of the Literature Surrounding Glyphosate, Dysbiosis and Wheat-Sensitivity"*. Frontiers in Microbiology, p. 7. **MEX-212**.

[246] Van Bruggen, A., Finckh, M., Ritsema, C., Knuth, D., He. M., Ritsema, C., Kunth, D., Harkes, P. and Geissen, V. (2021). "*Indirect Effects of the Herbicide Glyphosate on Plant, Animal and Human Health Through its Effects on Microbial Communities"*. Frontiers in Environmental Science, pp.14-15. **MEX-213**. Qiu, S., Fu, H., Zhou, R., Yang, Z., Bai, G., & Shi, B. (2020). "*Toxic effects of glyphosate on intestinal morphology, antioxidant capacity and barrier function in weaned piglets"*. Ecotoxicology and Environmental Safety, p. 9. **MEX-214**.

179. In Mexico, the presence of glyphosate in urine was associated with chronic kidney disease, even in individuals who were not in direct contact with the herbicide.[247] Other research has shown that infants exposed to pesticide residues through food intake and glyphosate use can develop neuronal damage, diabetes, obesity and impaired lung function. The same research reports that international evidence supports that organic diets in children are successful interventions that reduce urinary levels of pesticides.[248]

180. As if that were not enough, other studies have shown that GM corn contains inferior nutritional quality compared to native corn varieties, which translates into a significant decrease - and even absence - of health-promoting properties.[249]

(3) Health effects resulting from the lack of safety of GMOs exposed to glyphosate

181. The safety of GMOs is completely illusory.[250] GMOs remain on the market without having been shown to be safe for human consumption.[251]

182. GM crops of Bt corn and HT soybeans were adopted for commercial planting in the United States,[252] with no evidence of the safety or lack of toxicity of GMOs.[253] There are even scientific

[247] Ruiz-Velazco, N. G., F. J. Lozano-Kasten, H. Guzman-Torres & A. I. Mejía-Sanchez. (2022). "*Social determinants and chronic kidney disease of undetermined origin in childhood: Its communication and understanding described by families in Lake Chapala, Mexico"*. Frontiers in Nephrology, p. 8. **MEX-215**
[248] Guzman-Torres H, Sandoval-Pinto E, Cremades R, Ramírez-de-Arellano A, García-Gutiérrez M, Lozano-Kasten F, Sierra-Díaz E. "*Frequency of urinary pesticides in children: a scoping review"*. Front Public Health. 2023, p. 8. **MEX-216**.
[249] De la Parra, C., Serna Saldivar, S. O., & Liu, R. H. (2007). "*Effect of processing on the phytochemical profiles and antioxidant activity of corn for production of masa, tortillas, and tortilla chips"*. Journal of Agricultural and Food Chemistry, pp. 4181-4183. **MEX-049**.
[250] Krimsky, S. (2015). "*An Illusory Consensus behind GMO Health Assessment"*. Science, Technology & Human Values, pp. 1, 26-27. **MEX-217**; Hilbeck, A., Binimelis, R., Defarge, N. et al. "*No scientific consensus on GMO safety"*. Environ Sci Eur 27, 4 (2015), pp. 1-5. **MEX-218**
[251] Hilbeck, A., Binimelis, R., Defarge, N. et al. "*No scientific consensus on GMO safety*". Environ Sci Eur 27, 4, 2015, pp. 1-5. **MEX-218**.
[252] USDA. (2023). "*Recent Trends in GE Adoption"* (Available at: https://www.ers.usda.gov/data-products/adoption-of-genetically-engineered-crops-in-the-u-s/recent-trends-in-ge-adoption/). **MEX-081**.
[253] Domingo. J. L. (2000). "*Health Risks of GM Foods: Many Opinions but Few Data"*. Science, pp. 1-2. **MEX-117**.

publications that have shown that GBHs of commercial brands such as *Roundup* contain toxic agents such as petroleum derivatives[254] and heavy metals.[255]

183. The clearest example is that of StarLink because it illustrates various failures in the regulatory systems that have been permissive with the use of this recombinant DNA biotechnology despite the lack of safety in consumption.[256] The license for this corn was definitively withdrawn following reports of several people reporting adverse effects from the consumption of foods containing this corn. This was followed by a review by the U.S. Centers for Disease Control and Prevention in which they concluded that it was possible that the effects were related to StarLink.[257]

184. It is noteworthy that most of the studies showing that GM foods are as nutritious and safe as those obtained through conventional breeding have been conducted by biotech or associated companies, which are also responsible for commercializing GM plants. This opens the way to a new controversy about the science of GMO risk: the conflict of interest and the involvement of biotech industry companies in scientific malpractice and manipulation of information.[258]

185. In 2012, the famous Seralini study evidenced very significant chronic renal deficiencies in rats that ingested grains grown with *Roundup* application (glyphosate-tolerant GM corn NK603). It also had results related to a high degree of carcinogenicity.[259]

186. This study was related to the so-called "Monsanto papers" that arose in relation to one of the more than 125,000 cases of lawsuits for the development of cancer known as non-Hodgkin's

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[254] Jungers G., F. Portet-Koltalo, J. Cosme & G-E. Seralini. (2022). "*Petroleum in Pesticides: A Need to Change Regulatory Toxicology"*. Toxics, pp. 13-14. **MEX-219**.
[255] Defarge N., J. Spiroux de Vendômois & G-E. Séralini. (2018). "*Toxicity of formulants and heavy metals in glyphosate-based herbicides and other pesticides"*. Toxicology Reports, pp. 160-162. **MEX-220**.
[256] Bernstein JA, Bernstein IL, Bucchini L, Goldman LR, Hamilton RG, Lehrer S, Rubin C, Sampson HA. "*Clinical and laboratory investigation of allergy to genetically modified foods*. Environ Health Perspect. 2003, pp. 1118-1120. **MEX-221**.
[257] CDC. (2001). *"Investigation of Human Health Effects Associated with Potential Exposure to Genetically Modified Corn"*. Centros de Control de Enfermedades, pp 3, 8. **MEX-222**.
[258] Domingo JL, Giné Bordonaba J. "*A literature review on the safety assessment of genetically modified plants"*. Environ Int. 2011, p.741. **MEX-223**. Antoniou, M.N., Robinson, C., Castro, I. et al., "*Agricultural GMOs and their associated pesticides: misinformation, science, and evidence*", Environmental Sciences Europe, 2023, pp. 3-12. **MEX-224**.
[259] Séralini GE, Clair E, Mesnage R, Gress S, Defarge N, Malatesta M, Hennequin D, de Vendômois JS. Republished study: "*long-term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified corn"*. Environ Sci Eur. 2014, pp. 9-13. **MEX-225**.

lymphoma[260], derived from exposure to glyphosate.[261] Through a court order, Monsanto was forced to disclose its internal communications, making public the manipulation of information and bad scientific practices.[262]

c. The relationship between glyphosate and GM corn and its impact on native varieties of corn in Mexico

187. Glyphosate used in agriculture -mainly industrial agriculture- has caused significant environmental degradation, including air and water pollution, soil depletion and the reduction of biodiversity, directly impacting the health of farming families.

188. Not only that. Since GM corn is designed to tolerate the application of glyphosate in the field, the use of this herbicide brings with it a wide range of effects on native corn varieties and the environment.

189. *First*, the use of glyphosate can cause the loss of flora associated with native corn varieties. As a broad-spectrum herbicide, glyphosate eliminates weeds, which are niches for various insects and pollinators that contribute to corn pollination.[263] Among the weeds affected by the use of glyphosate are the weeds known as arvenses -or known as quelites by the farmers-, plants used by the communities as food, or for medicinal or handicraft purposes.[264] In turn, the constant use of

[260] Zhang, L.; Rana, I.; Shaffer, R.M.; Taioli, E.; Sheppard, L. "*Exposure to glyphosate-based herbicides and risk for non-Hodgkin lymphoma: A meta-analysis and supporting evidence"*. Mutat. Res. Rev. Mutat. Res. 2019, pp. 19-20. **MEX-226**.

[261] Center, T. J. (2020). *"Monsanto's Roundup verdicts portend liability for some pesticide health damages"*. Agronomy Journal, 112(5), pp.4-7.**MEX-227.**

[262] Leland, G., Bruce, A. (2021). *"Suborning science for profit: Monsanto, glyphosate, and private science research misconduct"*. Research Policy. 2021, pp. 3-8. **MEX-228.** Internal Email Demonstrating Monsanto Ghostwriting Article Criticizing IARC for Press. No: MONGLY02063611, MONGLY02063572. BH. Baum Hedlund. **MEX-229.**

[263] Vázquez-Cardona, H. (2023). "*Design of a community biosafety scheme in the presence of transgenic corn: a case study in San Agustín Montelobos, Oaxaca*". Universidad Nacional Autónoma de México, p. 36. **MEX-099**

[264] CONABIO. "*Quelites*". **MEX-230**

glyphosate produces weed resistance to it, resulting in the application of herbicides in greater quantities and with greater potency.[265]

190. *Second*, the application of glyphosate on GM corn can also cause the loss of fauna related to native corn, such as bees and microbial diversity, which impacts soil fertility and thus prevents the proper growth of native corn.[266]

191. *Third*, the presence of glyphosate residues has shown modifications in the physiological processes of plants, which has made them more vulnerable to insect attack[267]. In other words, the application of glyphosate causes native corn to become even more exposed to insect pests.

192. Again, Mexico is the center of origin of the domestication and diversification of corn, and corn in particular is an essential component of the Mexican diet and plays a crucial role in food security. [268]

193. The above becomes relevant when considering that, in 2017, a study demonstrated the presence of GMOs and glyphosate in several foods made from corn. The result of this study showed GMOs in 82% of all foods; 30% of the GMO samples contained glyphosate residues, and 60% of the samples contained GM corn NK603, which is glyphosate tolerant.[269]

194. Despite a precautionary measure restricting the planting of GM corn in Mexico, there is a legitimate concern due to illicit plantings, resulting in GM corn being produced in Mexico, which

[265] Fernández-Moreno PT, Bastida F and De Prado R (2017) "*Evidence, Mechanism and Alternative Chemical Seedbank-Level Control of Glyphosate Resistance of a Rigid Ryegrass (Lolium rigidum) Biotype from Southern Spain"*. Front. Plant Sci., p.12. **MEX-231**.
[266] Battisti L, Potrich M, Sampaio AR, de Castilhos Ghisi N, Costa-Maia FM, Abati R, Dos Reis Martinez CB, Sofia SH. "*Is glyphosate toxic to bees? A meta-analytical review"*. Sci Total Environ. 2021, p. 8. **MEX-232**. Singh S, Kumar V, Gill JPK, Datta S, Singh S, Dhaka V, Kapoor D, Wani AB, Dhanjal DS, Kumar M, Harikumar SL, Singh J. "*Herbicide Glyphosate: Toxicity and Microbial Degradation. Int J Environ Res Public Health"*, 2020, p. 4. **MEX-233**.
[267] B. Fuchs, et al., "*Glyphosate-Modulated Biosynthesis Driving Plant Defense and Species Interactions*" (2021), Trends in Plant Science, April 2021, p. 312, **MEX-234**.
[268] De Tapia, E. M. (1997). *"The domestication of corn"*. Arqueología Mexicana, pp.5, 34-39. **MEX-235**. Kato, T. Á., Mapes, C., Mera, L. M., Serratos, J. A., & Bye, R. A. (2009). "*Origin and Diversification of Corn: An Analytical Review*". Universidad Nacional Autónoma de México, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad. México, p. 34. **MEX-001**.
[269] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, pp. 7-8. **MEX-085**.

may have been exposed to large amounts of glyphosate and other HBGs, which may eventually be used in the production of masa and tortillas.

E. Relevant aspects of the Mexican legal system to this dispute

195. The protection of existing corn varieties in Mexico, as well as the protection of the rights to health and the environment, are regulated in different legal instruments that are part of the Mexican legal system. Given their relevance, the following is a description of the national and international standards that are important for the Panel to bear in mind.

196. Likewise, since 2013 there is a precautionary measure that prevents the commercial planting of GM corn in Mexican territory, which derives from a litigation still in progress that is important to explain. In other words, in Mexico the release of GM corn into the environment is still subject to judicial control.

1. Relevant international and national legal instruments on GMOs, corn, health and the environment

197. As a starting point, the Constitution and the human rights established in international treaties are the "supreme norm" of the Mexican legal system. According to Article 133 of the Constitution and criteria of the Supreme Court of Justice of the Nation (SCJN), international treaties (*e.g.*, those on international trade) are placed hierarchically below the Constitution, and above federal and state laws.[270] Likewise, below federal and state laws are the regulations issued by the Executive Branch and other administrative norms.[271]

198. By virtue of the above, Article 4 of the Constitution establishes, *inter alia*, the human right to nutritious, sufficient and quality food; the right to the protection of health and the right to a

[270] Although in Mexico there is a hierarchy of norms according to which the Constitution is above International Agreements and federal and state laws, in 2011 a constitutional reform was approved, according to which it was determined that the human rights established on International Agreements signed by Mexico would have the same hierarchy as the Constitution itself. *See* Tesis jurisprudencial P./J. 20/2014 (10ª), "*Human rights contained in the constitution and international treaties constitute the parameter of control of constitutional regularity, but when there is an express restriction in the constitution on the exercise of those rights, the constitutional text must be followed*". **MEX-236**.

[271] As examples, one may consider Decrees, Agreements and Notices, which are administrative acts that seek to implement federal laws to guarantee their adequate application and execution by the Executive Power.

healthy environment for the development and well-being of people.[272] Likewise, the Constitution establishes the responsibility of the State to promote, respect, protect and guarantee these rights.[273]

199. In international matters, Mexico has entered into various treaties that form part of its legal system that are of utmost relevance.[274] Some of them are mentioned below:

- In 1992, Mexico signed the Convention on Biological Diversity, a treaty whose purpose is the conservation of biological diversity, its sustainable use and the fair and equitable sharing of the benefits arising from the use of genetic resources.[275]
- In 2000, Mexico signed the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, which aims to ensure an adequate level of protection from the transfer, handling and use of living modified organisms that may have adverse effects on the conservation and sustainable use of biological diversity, also taking into account risks to human health.[276]
- Mexico has been a member of the *Codex Alimentarius* Commission since 1969, and since then has adopted principles for risk analysis of foods derived from modern biotechnology of the *Codex Alimentarius.*[277]
- In 2012, Mexico signed the Nagoya-Kuala Lumpur Protocol on Liability and Redress to the Cartagena Protocol on Biosafety. This treaty is relevant because it contributes to the conservation and sustainable use of biological diversity while also taking into account risks to human health.[278]
- In 2011, Mexico signed the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, which is

[272] See CPEUM, Article 4. **MEX-237**.

[273] See CPEUM, Articles 1 and 4. **MEX-237**.

[274] In accordance with Articles 76 and 89 of the Mexican Constitution, the President of the Republic (or his designee) is the person who concludes international treaties, submitting them to the Senate for approval. Once the Senate approves the international treaty, it is published in the Diario Oficial de la Federación (the official gazette of the Mexican Government) for its entry into force. This means that if the international treaties were correctly concluded, they are incorporated into the national legal order with their entry into force. *See*, CPEUM, Articles 76 and 89. **MEX-237**.

[275] *See* Convention on Biological Diversity, Articles 1 and 3. **MEX-238** Signed on June 13, 1992 by Mexico and approved on December 13, 1992 by the Mexican Senate.

[276] *See*, Article 1 of the Cartagena Protocol, signed on March 5, 2012 by Mexico and approved on April 10, 2012 by the Senate of the Mexican Republic. **MEX-239**.

[277] *See Codex Alimentarius*, adopted by Mexico since 1969. **MEX-240**

[278] *See* Nagoya-Kuala Lumpur Protocol, Article 1. **MEX-242**. Signed on March 2012 by Mexico and approved on April 10, 2012 by the Senate of the Republic.

> relevant because it seeks fair and equitable sharing of benefits arising from the utilization of genetic resources.[279]

200. Based on this, at a constitutional and international level, Mexico's legal system establishes the obligation to preserve the right to health, access to the environment and protect its biodiversity. In addition, there are state laws that also aim to protect native corn varieties in Mexico in different federal entities.[280]

201. There are at least two federal laws that are of utmost importance in relation to corn and GMOs: the Federal Law for the Promotion and Protection of Native Corn and the Law of Biosafety of Genetically Modified Organisms ("Law of Biosafety or LBOGM").[281]

202. In 2020, the Federal Law for the Promotion and Protection of Native Corn was created, which establishes Mexico as a center of origin of corn.[282] The objectives of the Federal Law for the Promotion and Protection of Native Corn include*: i)* declaring native corn as National Food Heritage; *ii)* promoting the sustainable development of native corn; *iii)* promoting the productivity, competitiveness and biodiversity of native corn; iv) promoting the activities of native corn producers; and *v*) establishing mechanisms for the protection of native corn, in terms of its production, commercialization, consumption and constant diversification[283].

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[279] *See* Nagoya Protocol, Articles 1 and 5. **MEX-242.** Signed on February 24, 2011 by Mexico and approved on December 15, 2011 by the Senate of the Mexican Republic.

[280] For example, there are the following state laws: "Law for the promotion and protection of native corn as a food heritage of the state of Colima." (**MEX-243**); "Law for the sustainable rural development of the state of Guerrero" (**MEX-244**); "Law for the promotion and protection of creole corn as food heritage of the state of Michoacán." (**MEX-245**); "Law for the promotion and protection of creole corn as food heritage of the state of San Luis Potosí" (**MEX-246**); "Law for the promotion and protection of native corn in the state of Sinaloa." (**MEX-247**); "Law for the promotion and protection of native corn as a biocultural and food heritage of Estado de México" (**MEX-248**); "Law for the Promotion and Protection of Corn as an Original Heritage, in Constant Diversification and Food for the State of Tlaxcala." (**MEX-249**).

[281] For further context, Mexico is a federation, which means that there is a Federal Executive Branch and federal entities, united by a "federal pact" at its three levels of government (federal, state and municipal). Each federal entity has its own Executive, Legislative and Judicial Branches. Each federal entity has its own legal norms, but these local norms cannot go against the Constitution. In addition, there are matters that are exclusive to the Federal Government and others that are concurrent matters between the Federation and the states. Likewise, there are matters that are exclusively regulated by the federal entities.

[282] Federal Law for the Promotion and Protection of Native Corn published on April 13, 2020 in the DOF. **MEX-012**.

[283] *See* Federal Law for the Promotion and Protection of Native Corn, Articles 3-4, 11-13. **MEX-012**

203. Likewise, the Federal Law for the Promotion and Protection of Native Corn establishes that the Mexican State must guarantee and encourage people to have access to an informed consumption of corn and its by-products.[284] This law also seeks to preserve the conservation of traditional forms of native corn production through the creation of Community Seed Banks and promoting the sustainability of traditional systems in the areas where they are practiced.[285]

2. The Law of Biosafety and its Regulations

204. In 2005, the Law of Biosafety of Genetically Modified Organisms ("LBOGM" or "Law of Biosafety") came into force, which is a federal regulation that seeks to guarantee an adequate and efficient level of protection of human health, the environment and biological diversity, as well as animal and plant health. As part of its functions, the Law of Biosafety regulates activities related to genetic material of organisms; releases of genetically modified organisms; and the commercialization, import and export of genetically modified organisms. It also aims to prevent, avoid or reduce possible risks generated by activities related to GMOs.[286]

205. Indeed, the authorities in charge of administering and applying the Law of Biosafety, within their respective powers and competences, are SADER, SEMARNAT and the Ministry of Health.[287] There are at least seven relevant aspects of the Law of Biosafety that are important to clarify.

206. *First*, the Law of Biosafety establishes that GMOs must be authorized by the SSA, through COFEPRIS, in order to be marketed and imported into Mexico.[288] COFEPRIS authorizations are required to market GM corn grain regardless of its origin (*i.e.*, whether it is a domestic or imported product).

207. *Second*, any application submitted to COFEPRIS to obtain an authorization from COFEPRIS must be accompanied by a study on the possible risks that the GMO in question could

[284] *See* Federal Law for the Promotion and Protection of Native Corn, Article 4. **MEX-012**.
[285] *See* Federal Law for the Promotion and Protection of Native Corn, Articles 11-13. **MEX-012**.
[286] *See* Law of Biosafety, Articles 1 and 2. **MEX-250**.
[287] *See* Law of Biosafety, Article 10. **MEX-250**. U.S. Initial Written Submission, ¶ 42.
[288] For example, *see* Law of Biosafety, Articles 32, 42, 50, 55 and 91. **MEX-250**.

pose to human health, including scientific and technical information on its safety and other criteria determined in the official Mexican technical regulations.[289]

208. *Third*, in order to guarantee an adequate application of the Law of Biosafety, in 2008 the Regulations of the Law of Biosafety for Genetically Modified Organisms (Regulations of the Law of Biosafety) entered into force, which details the procedures to be followed by the authorities to evaluate the applications for authorizations and, as the case may be, to grant or deny them.

209. *Fourth*, the Regulations of the Law of Biosafety establish a special protection regime for GM corn, under which the use of native corn seeds is encouraged in strategic projects, and the competent authorities are empowered to carry out the detection, identification and quantification of genetically modified corn, as well as to eliminate, control or mitigate the presence of this genetically modified material in corn breeds, varieties and wild relatives.[290]

210. *Fifth*, the Regulations of the Law of Biosafety establish that no experimentation or release into the environment of genetically modified corn containing characteristics that prevent or limit its use or consumption by humans or animals will be allowed.[291] In addition, the Law of Biosafety Regulations state that, in the event that the authorities identify the impermissible presence of genetically modified material in breeds, varieties and wild relatives of corn, they must establish measures to eliminate, control or mitigate such presence.[292] This demonstrates that the importance of protecting corn in Mexico from being affected by GMOs has been fully established in Mexican regulations, at least since the creation of the Regulations of the Law of Biosafety.

211. *Sixth*, the Law of Biosafety establishes restriction zones for the release of GMOs known as "centers of origin and genetic diversity".[293] In essence, centers of origin are regions that harbor populations of different breeds or varieties of an organism (*e.g.* corn), which constitute a gene pool. The release of GMOs will only be allowed in centers of origin when their release will not cause a negative impact on human health or biological diversity.[294] The Law of Biosafety also

[289] *See* Law of Biosafety, Articles 92-95. **MEX-250**.
[290] *See* Regulations of the Law of Biosafety, Articles 65 to 73. **MEX-251**.
[291] *See* Regulations of the Law of Biosafety, Article 67. **MEX-251**.
[292] Regulations of the Law of Biosafety, Article 72. **MEX-251**
[293] Law of Biosafety, Articles 86-90. **MEX-250**.
[294] Law of Biosafety, Article 88. **MEX-250**.

states that GMO-free zones may be established for the protection of organic agricultural products or other community interests.[295]

212. *Seventh*, as part of the specific regulation on corn established in the Regulations of the Law of Biosafety, and based on the provisions of the Law of Biosafety itself, in 2012 the SADER published in the DOF the "Agreement on the determination of Centers of Origin and Centers of Genetic Diversity of Corn" ("2012 Agreement"). The purpose of this instrument is to establish which corn species exist in Mexico (including their "wild relatives", subspecies and varieties), as well as the location of the centers of genetic diversity of these corns.[296]

213. The 2012 Agreement was a major step forward in the protection of native corn varieties, since, according to Article 88 of the Law of Biosafety, in the centers of origin and genetic diversity, releases of GMOs other than native species will be allowed only if their release does not cause a negative impact on human health or biological diversity. The 2012 Agreement keeps its scope open as a measure to protect native corn and its wild relatives that is complementary and requires constant updating.

3. Relevant international and national legislation on food security, protection of indigenous peoples, peasant communities and Mexico's cultural heritage

214. As has already been pointed out, the protection of corn varieties has been extensively regulated in the Mexican legal system, not only for the protection of health, but also for the environmental, historical, cultural, spiritual and patrimonial relevance that it has in Mexico.

215. With regard to food security, and as mentioned above, Article 4 of the Constitution contemplates the obligation of the Mexican State to guarantee the right of every person to nutritious, sufficient and quality food. This obligation has also been recognized as "food security".[297] This is linked to Article 27 of the Constitution, which establishes that one of the

[295] Law of Biosafety, Article 90. **MEX-250**.

[296] DOF. Agreement on the determination of Centers of Origin and Centers of Genetic Diversity of Corn, November 2, 2012. **MEX-008**

[297] *See* CPEUM, Article 4. **MEX-237.**

purposes of integral and sustainable rural development is for the State to guarantee a sufficient and timely supply of the basic foodstuffs established by law.

216. These two Articles constitute, in essence, the legal basis for food security and self-sufficiency in Mexico, an obligation that is also recognized at the international level and that cannot be understood as an obligation isolated from the various instruments that make up the Mexican legal system.

217. Regarding food security and its relation to corn, the Law of Sustainable Rural Development is relevant, which provides, among others, that the State will promote policies, actions and programs in rural areas that will be considered a priority for the development of Mexico, aimed, among others, at contributing to food sovereignty and security through agricultural production.[298] In other words, the Sustainable Rural Development Law implements the provisions of Article 4 of the Constitution.

218. In addition, the Law of Sustainable Rural Development establishes the obligation to "ensure the supply of basic and strategic foods and products to the population, promoting access to the least favored social groups and giving priority to national production".[299] The Law of Sustainable Rural Development itself establishes a list of those foods that are considered, by the Mexican State, as basic and strategic. It is not surprising that, given the relationship between corn and the Mexican people, this product tops the list of basic and strategic foods.

219. Food security is also enshrined in international instruments to which Mexico is a Party. For example, Article 25 of the Universal Declaration of Human Rights incorporates the right to food as a human right. Another example is the commitments acquired under the International Covenant on Economic, Social and Cultural Rights, Article 11 of which states that the countries Parties shall take the necessary measures to "improve methods of production, conservation and distribution of food by making full use of technical and scientific knowledge, through the dissemination of the principles of nutrition and the development and reform of agrarian systems in such a way as to achieve the most efficient development and utilization of natural resources".

[298] *See* Law of Sustainable Rural Development, Article 5. **MEX-253.**
[299] *See* Law of Sustainable Rural Development, Article 178. **MEX-253.**

220. With regard to the protection of indigenous peoples and peasant communities, Mexico has the constitutional obligation to respect and guarantee the right of indigenous peoples to self-determination, which includes, among others, respect for those elements that constitute the culture and identity of these social units.[300] Therefore, regulatory provisions must be established for them to define, preserve, protect, control and develop the elements of their cultural heritage, their knowledge and traditional cultural expressions, as established in the Federal Law for the Protection of the Cultural Heritage of Indigenous and Afro-Mexican Peoples and Communities in relation to the provisions of Articles 1, 2, 4, twelfth paragraph, and 73, section XXV, of the Political Constitution of the United Mexican States and the international instruments on the subject.

221. The production, commercialization and consumption of native corn in Mexico is a cultural manifestation in accordance with Article 3 of the General Law of Culture and Cultural Rights.[301] Moreover, it is a cultural manifestation that is inevitably linked to the indigenous peoples, peasants and farmers of Mexico.[302] As an example, Mexico has recognized the property right of indigenous and Afro-Mexican peoples and communities over the elements that make up their cultural heritage, their traditional knowledge and cultural expressions[303], and has prohibited any act that threatens or affects the integrity of said heritage.[304]

222. This obligation is also recognized in international instruments to which the Mexican State is a Party. For example, Article 21 of the Pact of San José establishes the right to Individual Property, which, however, has been interpreted in relation to communal property, as a precept that

[300] Although speaking of a country community does not necessarily imply speaking of indigenous people, in Mexico it is important to point out that, due to the history and development of the country, these are groups that cannot be separated from each other.
[301] General Law of Culture and Cultural Rights, Article 3. ("The past and present material and immaterial elements inherent to the history, art, traditions, practices and knowledge that identify groups, peoples and communities that make up the nation are elements that people, individually or collectively, recognize as their own due to the value and meaning that they contribute in terms of their identity, formation, integrity and cultural dignity, and to which they have the full right to access, participate, practice and enjoy in an active and creative manner."). **MEX-254**
[302] *See* Federal Law for the Promotion and Protection of Native Corn, section VII of Article 2. **MEX-012**.
[303] *See* Federal Law for the Protection of the Cultural Heritage of Indigenous and Afro-Mexican Peoples and Communities, section, I of Article 2. **MEX-255**
[304] *See* Federal Law for the Protection of the Cultural Heritage of Indigenous and Afro-Mexican Peoples and Communities, Article 2. **MEX-255**.

"protects the right to property in a sense which includes, among others, the rights of members of the indigenous communities within the framework of communal property".[305]

223. The previous sections have pointed out the nutritional relevance of corn, and the obligation to the indigenous peoples, peasants and farmers of Mexico to protect corn, not only as the basis of their diet, but also as an essential element of their culture and identity, the right they have to conserve it and the obligation to better preserve it. However, corn is part of an element that is embedded in traditions, uses and customs throughout the country.

224. So much so, that corn has been identified in the international scenario as an essential part of Mexican culture, *e.g.*, through the recognition granted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) to Mexican cuisine in 2005, which acknowledged the importance of corn as one of the bases on which traditional Mexican cuisine is built, which today is recognized as intangible heritage of humanity, whose conservation is endangered.[306]

4. Legal proceedings against the planting of GM corn in Mexico

225. Currently, the commercial planting of GM corn is not allowed in Mexico, in accordance with resolutions issued by Mexican courts. For greater context, in 2013, a group of peasant, consumer, human rights and scientific organizations grouped together in the "Collective of Holders of the Human Right to a Healthy Environment for the Development and Welfare of People" (Collective), brought Class Action 321/2013 before the Mexican federal courts against various authorities and companies that were releasing GM corn seeds in Mexico.[307]

226. Within the Class Action 321/2013, the Collective has argued that the limits and restrictions established in the Law of Biosafety are inefficient, and the existence of genetic contamination in native corn caused by the release into the environment (voluntarily or involuntarily) of GM corn

[305] Inter-American Court of Human Rights, *Case Awas Tingni v. Nicaragua*, Judgment, August 31, 2001 (Merits, Reparations and Costs), ¶ 148. **MEX-256**.
[306] *See* UNESCO, "*Decision of the intergovernmental Committee; 5.COM 6.30*", 2010. **MEX-041**
[307] A class action is a judicial process similar to a "*class action*" in *common law* legal systems, regulated in the Federal Code of Civil Procedures, which may be initiated by certain competent authorities or by a group of citizens, either against a company or an authority that affected the rights of a group, limited to certain matters, such as consumer protection, environment and financial services.

seeds in places not permitted by the competent authorities.[308] Likewise, the Collective has argued that genetic contamination is one of the main impacts on the biodiversity of native corn species in Mexico.[309]

227. In 2013, the Collective requested within the Class Action 321/2013 a precautionary measure with the objective that, *inter alia*, the issuance of permits to release GM corn in Mexican territory be suspended. In September 2013, the precautionary measure was granted by the Mexican courts, on the basis of which it was ordered to temporarily suspend the issuance of commercial permits to release GM corn into the environment, and only to grant permits to release GM corn in experimental stages, but under judicial supervision.[310]

228. Dissatisfied, several companies filed *amparo* lawsuits against the precautionary measure granted within the Collective Action 321/2013.[311] The challenges within these *amparo* lawsuits were submitted for analysis to the Supreme Court, which in 2019 determined that it was a matter of importance and transcendence due to the fact that the matter in question was related to the protection of the environment and biological diversity in Mexico.[312]

229. Thus, on October 13, 2021, the SCJN confirmed the need to maintain the precautionary measure granted within the Class Action 321/2023 (*i.e.*, to maintain the restriction for the

[308] Ruling of the First Chamber of the Supreme Court of Mexico of October 13,2021, p. 10, ¶ 22. **MEX-257**.
[309] Ruling of the First Chamber of the Supreme Court of Mexico of October 13, 2021, p. 67, ¶ 121. **MEX-257**
[310] *See* Ruling of the First Chamber of the Supreme Court of Mexico of October 13, pp. 64-75, 173. **MEX-257**.
[311] Under the Mexican legal system, the *amparo* proceeding is a constitutional process regulated by the Constitution and the Amparo Law that may be initiated by any individual or legal entity, referred to as "*quejoso*", against acts of authority that, in their opinion, violate the human or fundamental rights provided in the Mexican Constitution or the human rights provided in the international agreements to which Mexico is a party. There is *direct amparo* (against final judgments) and *indirect amparo* (against acts of authority other than final judgments). The Collegiate Circuit Courts are competent to resolve *direct amparo* suits and the District Judges are competent to resolve *indirect amparo* suits.
[312] Pursuant to Article 107 (V) of the Constitution, the SCJN has the power of attraction, *i.e.*, it may hear a case when it considers that its intervention is necessary due to the characteristics and importance of the matter. *See*, CPEUM, section V of Article 107. **MEX-237**

commercial stage planting of GM corn in Mexico), a trial that is still ongoing and subject to judicial control, *i.e.*, subject to challenges, stages and judicial decisions.[313]

F. The evidence submitted by the United States does not prove what it alleges in its Initial Written Submission or does not constitute adequate evidence.

230. Under normal circumstances, the Respondent would not have to rule on the veracity and adequacy of the evidence submitted by the complaining Party. However, given the circumstances of this dispute, especially considering that the United States argues that Mexico's measures allegedly lack scientific basis, Mexico deems it necessary to make the following points.

231. *First*, most of the evidence provided by the United States[314] to support factual issues regarding GMOs are not even scientific publications, but mere pamphlets or internet publications that do not have the minimum scientific rigor that this dispute merits, in light of its allegations.

232. *Second*, a large number of the evidence is outdated sources, being more than 10 years old.[315] As the Panel knows, science advances at great speed, and many of these findings are already outdated.

233. *Third*, another number of evidence[316] that could be considered scientific, present an evident conflict of interest, which is demonstrated in the documents themselves, when it is pointed out that

[313] On September 28, 2023 the Twelfth District Court in Civil Matters of Mexico City issued a judgment in Class Action 321/2021. On October 5, 2023 the Collective filed an appeal against such judgment. The Appeal is ongoing.
[314] For example, Annexes USA-1, USA-7, USA-16, USA-20, USA-21, USA-24, USA-26, USA-32, USA-33, USA-35, USA-40, USA-41, USA-42, USA-43, USA-48, USA-50, USA-52, USA-54, USA-55, USA-59, USA-61, USA-63, USA-64, USA-65, USA-67, USA-68, USA-69, USA-70, USA-72, USA-73, USA-74, USA-87, and USA-116.
[315] For example, Annexes USA-14, USA-017, USA-018, USA-19, USA-22, USA-28, USA-29, USA-30, USA-31, USA-45, USA-58, USA-60, USA-61, USA-62, USA-66, USA-72
[316] For example, Annex USA-38 ("This work was support by Bayer CropScience"); USA-46 ("This work was supported by the Bayer Corporation"); USA-49, its author being Andrew Kniss. *See* GMWATCH, "*Andrew Kniss was offered money by Monsanto",* February 7, 2018. **MEX-258**. ("Kniss himself has been (http://weedcontrolfreaks.com/about/andrew-kniss/) transparent about some of his research being sponsored by agrochemical firms, though not about the specific amounts he receives from particular companies. These links to industry are generally not mentioned in the news stories. Nor have the media outlets that have uncritically quoted his views disclosed that he has personally been offered an "unrestricted gift (https://www.oneworld.nl/bedrijfslobby/zo-gaanspindoctorsmonsanto-werk/)" by Monsanto"); Regarding the Annex USA-51, see: USRTK, "*Stuart Smyth: agrichemical industry ties and funding*", 1 June 2020. **MEX-259**. ("Funders (described as "investing partners") of Smyth's research chair position

the authors are employees of companies that commercialize GMO or that they were financed by these companies. This situation undoubtedly affects the objectivity of their results.

234. *Fourth*, other documents provided by the United States have been severely criticized for their methodological deficiencies[317].

235. As the Panel will be able to corroborate, the United States, far from proving that the measures identified are not based on science, presents information lacking scientific rigor, outdated, or with conflicts of interest.

G. Trade in corn between Mexico and the United States has not been affected.

236. A relevant aspect for this dispute is the corn trade between Mexico and the United States. For this, it is important to bear in mind the existence of the two main types of corn involved: yellow and white corn. The former is mainly used for animal feed and purposes other than human consumption (*e.g.* ethanol)[318], while white corn is used for human consumption and, in particular, for the process of nixtamalization or flour production, which is used in the dough and tortilla sector.

237. Mexico is self-sufficient in white corn, but not in yellow corn. Consequently, the behavior of imports into Mexico of white corn is directly related to the domestic production, *i.e.*, if the domestic production of white corn is good, the imports of the subsequent cycle are lower.

include Bayer CropScience Canada, CropLife Canada, Monsanto Canada, the Saskatchewan Canola Development Commission (SaskCanola) and Syngenta Canada"); USA-53 ("The work described here is funded by a joint collaboration between Monsanto and BASF"); USA-71; y USA-88.

[317] For example, in the case of the annex USA-37, *see,* Contralínea*, "Transgenics, the danger coming from the United States to Mexico: Steve Mc Druker",* January 14, 2024". **MEX-260**. ("Francisco Bolivar Zapata does not represent the position of the Mexican Academy of Sciences (AMC) [...] Bolivar Zapata's book contains, page by page, fallacious reasoning [...] he makes mistakes that not even a biology student would make".); in the case of the annex USA-39, *see,* Toxin Free USA, Media Reporting on GMO Safety is Deceptive: Flawed 6,000 Study GMO Meta-Analysis Debunked, March 22, 2018. **MEX-261**. ("Numerous issues including the use of only a small number of studies, geographically limited data, biased studies, outdated studies and studies which used isogenic and near-isogenic lines that are rarely commercialized, make the data from this 'meta-analysis' and the conclusions drawn, weak and highly unreliable").

[318] USDA, "*Most corn production in U.S. and Mexico is geographically concentrated"*, 2019. **MEX-262**

238. To determine that Mexico is self-sufficient with respect to white corn, Mexico uses the so-called "Apparent Domestic Consumption" (ADC), which is determined by the following formula: national production + imports - exports.

239. Mexico's production of white corn in 2022 was [redacted], less than production in 2021, which amounted to [redacted], and represented [redacted] of the ADC in 2022, while imports and exports of white corn only represented [redacted] respectively.

240. In 2022, total imports of white corn from the United States to Mexico represented only [[redacted]].

241. It should be noted that, [[redacted]]

242. One point to note is that Mexico consumes practically all that it produces in terms of white corn, due to the fact that this type of corn is used for the production of dough and tortillas, foods that are a key part of the daily diet of Mexicans[321].

243. In Mexico, corn is the most representative crop, not only economically, but socially and even culturally. The average annual *per capita* consumption of corn per Mexican is 123.47 kg. 98.6% of Mexicans consume tortillas in their daily diet; 68% of the population eats tortillas 7 days a week; 52.9% eats at least one tortilla a day, 38% eats two tortillas a day and the remaining eats

[redacted]

[321] *See* Section A.2.b

3 tortillas.[322] These data corroborate that, unlike in many industrialized countries where white corn is used as feed for livestock and industrial processes, in Mexico, its main use is for human consumption.

244. On the other hand, the production of yellow corn in Mexico in 2022 was higher [[

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245. In 2022, total imports to Mexico of yellow corn from the United States accounted for [[

]].

246. [[

.

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247. [[

[322]

[redacted] It should be noted that, based on the information available from the USDA[325], it is not possible to determine or know if the imports to Mexico from the United States correspond to GM corn or non-GM corn.

248. Thus, it is clear that the relevant corn trade between Mexico and the United States is related to yellow corn, where the United States has been the main exporting country and whose operations have not been affected by the measures alleged by the United States identified in the Decree, since the corn referred to in 2023 Decree is the one destined for human consumption through nixtamalization or flour production, which is the one carried out in the sector known as masa and tortilla, *i.e.*, white corn, not yellow corn.

249. It is relevant to point out that the United States has not been affected to such an extent that even the imports of corn to Mexico from that country increased [[[redacted]]].

VI. DISPUTED MEASURES AND SUBJECT MATTER OF THE DISPUTE

A. The background of the 2023 Decree

250. CIBIOGEM is in charge of the National Biosafety Information System (SNIB), through which it organizes, updates and disseminates information on biosafety. Specifically, the SNIB maintains systematized information on, *inter alia*, the following:

- Harmful effects of the herbicide glyphosate;
- Risks associated with insect resistant (Bt) GM crops;
- Impacts of GM crops on pollinators and insects;
- Risks associated with GM corn;
- Socioeconomic considerations on GMOs; and,

Activities related to the special protection of corn.

[325] *See* USDA, "*Annual Grains Inspected and/or Wtd for Export by Region and COD"*, 2023 (Available at: https://usda.library.cornell.edu/concern/publications/ws859f67m?locale=en). **MEX-264**.

251. As part of the SNIB, in 2020 the "Scientific Record on Glyphosate and GM Crops" was included, which clearly describes the risks to health and native corn varieties associated with both GM corn and glyphosate. This document and the SNIB are the work behind the issuance of 2023 Decree.[326]

252. The Decree clearly states that it "regulates the use of glyphosate and genetically modified corn seeds and grains". However, in its Initial Written Submission, the United States has only identified as claimed measures "End-Use Limitation"[327] and "Gradual Substitution"[328] contained in Articles 6.2, 7 and 8 of the Decree. The United States describes these measures as those that "restricts the importation of goods from another Party" and "seeks to eliminate the importation and sale of GE corn for human consumption and animal feed". This description does not provide sufficient context to understand the nature, objectives and operation of the measures in light of their context, *i.e.*, 2023 Decree. Two elements should be clarified.

253. *First*, 2023 Decree does not prohibit the importation and sale of GM corn. Instead, 2023 Decree only regulates the use of GM corn in Mexico, regardless of whether it is domestically produced or imported. Specifically, it limits the use of GM corn grain for direct human consumption (*i.e.*, in the form of nixtamalized masa, tortillas and related foods). Indeed, the Decree clarifies that the restriction on the use of genetically modified corn in the sector known as masa and tortilla is established "without implying that no authorizations are issued for the use of genetically modified corn for animal feed or industrial use".

254. *Second*, the United States notes that the "End-Use Limitation" is reflected in Articles 6 and 7 of 2023 Decree. However, the "End-Use Limitation" is specifically provided for in the second subparagraph of Article 6.2.

[326] The SNIB is available at the following web site: https://conahcyt.mx/cibiogem/index.php/sistema-nacional-de-informacion
[327] This reference will be used throughout Mexico Initial Written Submission to refer to the measure identified by the United States as the "Tortilla Corn Ban," for the considerations described in Section VI.B *infra*.
[328] This reference will be used throughout Mexico Initial Written Submission to refer to the measure identified by the United States as a "Substitution Instruction", for the considerations described in Section VI.B *infra*.

255. It should be noted that, as the measures apply to corn grain intended for consumer end uses, the risk arises from the unintended or illegal proliferation of GM corn plants from this corn grain.

B. Text of 2023 Decree

256. 2023 Decree is based on the recognition of the human rights to nutritious, sufficient and quality food, to the protection of health and to a healthy environment for the development and wellbeing of people, as established in Article 4 of the Constitution. It also establishes Mexico's responsibility to promote, respect, protect and guarantee these human rights.

257. 2023 Decree specifies the objective and scope of the public policies undertaken by Mexico, and specifies the content and scope of the legal provisions in force.

258. One point that is relevant to highlight is that 2023 Decree establishes specific actions for the competent authorities of Mexico, *i.e.*, the agencies and entities of the Federal Public Administration, and not for individuals, which must be applied in accordance with the applicable mexican legislation.

259. Among the most relevant clarifications of 2023 Decree are the following:

- Its scope is limited only to corn.
- It establishes three categories of corn based on its use: corn for human consumption, which includes masa and tortillas -through nixtamalization-; corn for industrial use for human consumption, and corn for animal consumption.
- It limits the use of GM corn in the case of corn intended for dough and tortilla.
- It does not establish a specific timeframe for the gradual substitution of GM corn for industrial use for human consumption and for animal feed.

260. 2023 Decree establishes several measures, and not only those indicated by the United States in its Initial Written Submission. For example, 2023 Decree establishes specific actions on the use, distribution and importation of glyphosate and agrochemicals containing glyphosate as an active ingredient[329]; instructions on sustainable and culturally appropriate alternatives and practices to keep agricultural production safe for human health[330]; and specific actions for CONAHCYT.[331]

[329] Decree 2023, Article 3. **MEX-167.**
[330] Decree 2023, Article. **MEX-167.**
[331] Decree 2023, Article 5. **MEX-167.**

261. The United States has established in its Initial Written Submission two measures that are the subject of this dispute: i) the mandate for the regulatory authorities (SEMARNAT, SADER, COFEPRIS and SHCP) to revoke and refrain from granting authorizations for the use of genetically modified corn grain for human consumption, which they call as "Tortilla Corn Ban" (End-Use Limitation),[332], and ii) the instruction of the gradual substitution of genetically modified corn, which they have called "Substitution Instruction" (Gradual Substitution)[333]. Both measures have been described and characterized in an erroneous manner, for which reason it is necessary to clarify them in considerable detail.

262. Regarding the alleged "Tortilla Corn Ban", according to the United States, since Article 6 of 2023 Decree mandates Mexican regulatory authorities to revoke and refrain from granting authorizations for GM corn for human consumption, and since the Decree is mandatory for such authorities, they are prohibited from authorizing any new GE corn events for dough and tortillas.[334] This is false and only denotes the misinterpretation made by the United States on the content and scope of 2023 Decree.

263. *First*, it is important to emphasize that 2023 Decree does not establish a ban on the importation of corn into Mexico or its commercialization. In clear terms, there is no reference, tacit or express, in 2023 Decree that indicates a prohibition or restriction on the importation of GM corn into Mexico, much less on its commercialization. Therefore, the allegation of the United States that 2023 Decree "establishes an immediate ban on the importation and sale of GE corn for use in dough and tortillas"[335] is false.

264. *Second*, the United States omits an essential element in the instruction generated for the competent regulatory authorities by 2023 Decree, and therefore its conclusion is wrong. This element is that the competent regulatory authorities must carry out (revoke) or cease to carry out (refrain) the granting of permits and authorizations, in accordance with the applicable regulations. Article 6 states:

[332] U.S. Initial Written Submission, ¶¶ 57, 70
[333] U.S. Initial Written Submission, ¶¶ 58, 70.
[334] U.S. Initial Written Submission, ¶ 73.
[335] U.S. Initial Written Submission, ¶ 72.

> "The biosafety authorities, within the scope of their competence, with the purpose of contributing to food security and sovereignty and as a special measure to protect native corn, the milpa, biocultural wealth, peasant communities, gastronomic heritage and human health, in accordance with the applicable regulations:"
>
> [Emphasis added][336]

265. This implies that the revocation and abstention of permits and authorizations may only be carried out to the extent that it is so established in the national legislation, as is the case of the LBOGM. In this sense, the LBOGM establishes the possibility of suspending the effects or revoking the granted permits when there is a change in the circumstances of the activities that may influence in the result of the state of the assessment of the possible risks on which the permit was based, or when there is additional scientific information that could modify any of the conditions, limitations or requirements of the permit.[337]

266. On the other hand, the competent regulatory authorities may only refrain from granting authorizations for the use of genetically modified corn grain for human consumption, in accordance with the LBOGM. This means that authorizations will be denied in case the applications do not comply with the provisions of the LBOGM, as it has been done since the entry into force of the LBOGM (April 29, 2005), long before the publication of 2023 Decree.

267. *Third*, the United States points out that the End-Use Limitation "is reflected in Articles 6 and 7 of the 2023 Corn Decree".[338] However, the United States only characterizes this measure as the fact that the regulatory authorities "[r]evoke and refrain from granting authorizations for the use of genetically modified corn grain for human consumption"[339]. This fact only refers to what is indicated in Article 6.2 of 2023 Decree; however, this fact is part of a broader measure established in Article 6 itself.

268. The *chapeau* of Article 6 describes "a special measure" to be administered by the regulatory authorities with the purpose of contributing to food security and sovereignty and as a special measure to protect native corn, the milpa, biocultural wealth, peasant communities, gastronomic heritage and human health".

[336] Decree 2023, Article 6. **MEX-167.**
[337] Law of Biosafety, Article 69. **MEX-250**.
[338] U.S. Initial Written Submission, ¶ 72.
[339] U.S. Initial Written Submission, ¶ 57.

269. "The special measure" is composed of the following elements, which are established in three sections addressed to the regulatory authorities:

- First, "[r]evoke and refrain from issuing permits for the release of genetically modified corn seeds into the environment in Mexico."
- Second, "[r]evoke and refrain from issuing authorizations for the use of genetically modified corn grain for human consumption".
- Third, "[p]romote, in coordination with the National Council of Science and Technology, the reforms of the applicable legal ordinances, related to the object of this decree".

270. These three elements are intended to operate jointly in order to achieve the objectives set forth in Article 6 of 2023 Decree. Consequently, it is not possible to address these elements independently, as they constitute an essential part of a single measure whose objectives are clearly defined.

271. *Fourth*, under Mexican law, prohibitions on the importation of goods are established in the Law of General Taxes of Import and Export (,LIGIE), in which corn is not established as a good whose importation is prohibited[340]. Consequently, assuming without conceding that the End-Use Limitation was indeed a prohibition, based on the 2023 Decree itself, the regulatory authorities would have to act in accordance with the applicable regulations, *i.e.*, the LIGIE, which, since it does not contain a prohibition on corn, would not be applicable.

272. *Fifth*, the United States supports its position in a press release on the Corn Decree of 2023 issued on February 13, 2023 by the Ministry of Economy. This should not be accepted, since it should be taken into account that the references indicated in a press release do not constitute a valid legal interpretation regarding the content and scope of a certain legal instrument, in this case the 2023 Decree, since it is only a means of general information that, with simple and non-technical language, seeks to transmit to the general public, not specialized, a first approximation of the information it refers to.

[340] *See* LIGIE. **MEX-267**. Corn (white and yellow, respectively) is classified under tariff item 1005.90.04 and 1005.90.99. The tariff items of the goods whose importation is prohibited, indicate in the "Unit" and "Tax" columns the word "PROHIBITED", e.g. tariff item 4103.20.02 corresponding to leather and skins of turtles. This situation does not occur in tariff items 1005.90.04 and 1005.90.99.

273. Furthermore, as the Panel will be able to corroborate, the press release does not state that there is a restriction on the importation of GM corn; on the contrary, the press release states that the Decree "does not represent any effect on trade or imports".[341]

274. *Sixth*, the United States also erroneously states that the President of Mexico has "*enforced the Tortilla Corn Ban*"[342], through "multiple public statements that the Mexican government has executed agreements with tortilla producers that prohibit the use of GE corn in their products"[343], which is false. What is troubling is that the United States has not even provided evidence that Mexico has indeed "executed agreements with tortilla producers" to prohibit the use of genetically modified corn. In clear terms, the United States only seeks to decontextualize what was stated in a press conference.

275. Furthermore, as can be clearly seen in Exhibit USA-95 that the United States accompanies to its Initial Written Submission, the President of Mexico did not indicate at any time that he would establish or that there would be a ban on the importation of corn, [344] what he specifically indicated was that he was about to sign an agreement for the use of white corn in tortilla factories, an agreement that the United States does not submit, and this is simply because it does not exist. In any event, what really emerges from this statement, and which the United States acknowledges, is that it speaks of a limitation on the "use of GE corn", and not a ban on imports.

276. The Respondent cannot overlook the unfortunate way in which the United States has characterized certain statements made by the President of Mexico in his Press Conferences.[345] For the Panel's clarity, these Press Conferences are part of an informative and transparent exercise carried out by the President, under a social communication modality, with the purpose of making public knowledge of a variety of issues of general interest. In clear terms, the Press Conferences

[341] "The Decree establishing several actions regarding glyphosate and genetically modified corn is published", **USA-94**.
[342] U.S. Initial Written Submission, ¶ 77.
[343] U.S. Initial Written Submission, ¶ 77.
[344] The press conference was held on June 19, 2023, just over 4 months after the issuance of Decree 2023.
[345] *See* U.S. Initial Written Submission, ¶¶ 77, 88, 89.

are not acts that generate legal or interpretative effects, or enforce ("*enforced*") measures, as incorrectly alleged by the United States.[346]

277. *Seventh*, the United States argues that "[a]rticle 7 provides that it is the "responsibility" of "whoever uses [GE corn] in Mexico" to ensure that the corn is not used in dough or tortillas."[347] This is imprecise, as it confuses the responsibility that is established for corn for human food - which is the one used for dough and tortillas - from the one that is established for genetically modified corn for industrial use for human food. It is important to clarify that the liability referred to by the United States corresponds to genetically modified corn for industrial use for human consumption[348].

278. *Eighth*, the United States argues that the alleged "Tortilla Corn Ban" establishes "an immediate ban"[349]. This is a completely false characterization, since nowhere in 2023 Decree does it establish the immediacy of the instructions set forth therein, notwithstanding the fact that there is no prohibition on importation, as explained *supra*.

279. For all the foregoing reasons, the measure indicated by the United States cannot be classified as a "Tortilla Corn Ban". Rather, it is a measure that seeks to regulate the end use of corn for human consumption and not to establish a "prohibition" or "import restriction", therefore Mexico will refer to this measure as an "End Use Limitation".

280. On "Gradual Substitution", according to the United States, since Article 7 of 2023 Decree mandates Mexican regulatory authorities to carry out the actions leading to the gradual substitution of genetically modified corn for industrial use for human consumption, then the language of the Decree indicates that, once the substitution is completed, COFEPRIS will no longer issue authorizations to import or sellthis type of corn[350]. This is incorrect.

281. Indeed, Articles 7 and 8 of 2023 Decree address the issue of the gradual substitution of genetically modified corn for industrial use for human consumption; however, neither of these Articles establishes that, once such substitution is completed, COFEPRIS will no longer issue

[346] U.S. Initial Written Submission, ¶ 77.
[347] U.S. Initial Written Submission, ¶ 76.
[348] *See* Decree 2023, Article 7. **MEX-167.**
[349] U.S. Initial Written Submission, ¶ 72.
[350] U.S. Initial Written Submission, ¶ 79.

authorizations for the importation or commercialization of this corn. Article 7 contains the instruction for the gradual substitution and the possibility to continue issuing authorizations during the process. Article 8 establishes the basis on which this substitution must be carried out.

282. Again, it must be kept in mind that the regulatory authorities must act in accordance with the applicable legal framework, which implies that COFEPRIS will continue to issue authorizations for the importation or commercialization of this corn, as long as the corresponding applications comply with the provisions of the LBOGM. Therefore, the conclusion of the United States on this measure is incorrect.

283. The United States also relies on the February 13, 2023 press release issued by the Ministry of Economy in an attempt to support its position on this measure. However, as explained above, the Panel must reject the United States' interpretation based on this press release, as it is not a valid interpretation (much less a legal interpretation) of 2023 Decree.

C. Objectives of 2023 Decree and of the challenged measures

284. The main objective of 2023 Decree is to "establish the actions to be taken by the agencies and entities that compose the Federal Public Administration, in relation to the use, sale, distribution, promotion and import of the chemical substance called glyphosate and of agrochemicals that contain it as an active ingredient and of genetically modified corn, in order to safeguard health, a healthy environment and food security and self-sufficiency."[351]

285. However, as explained *supra*, 2023 Decree is in turn composed of various measures that break down and deepen the main objective of 2023 Decree. For example, the objective stated in Article 6 of 2023 Decree is "contributing to food security and sovereignty and as a special measure to protect native corn, the milpa, biocultural wealth, peasant communities, gastronomic heritage and human health".

286. The objective of Article 6 is of particular importance, since it establishes one of the measures in dispute identified by the United States, the Tortilla Corn Ban (Article 6.2). Therefore, it should be noted that this objective has, among others, the following characteristics:

[351] Decree 2023, Article 1. **MEX-167.**

- Protection of human health, includes: i) direct exposure to glyphosate as an agricultural chemical, and ii) protection of human health from food safety risks arising from the consumption of genetically modified corn grain.
- The protection of native corn includes the conservation and sustainable use of biological diversity with respect to native varieties and landraces of corn and Mexican corn;
- Biocultural wealth, peasant communities and gastronomic heritage encompasses: i) the conservation of biodiversity and genetic integrity of native varieties and landraces of corn and corn of Mexico as "exhaustible natural resources", when the "measures are made effective in conjunction with restrictions on domestic production or consumption of transgenic corn"; and ii) the protection of agricultural diversity, *i.e.*, the milpa, as well as the gastronomic of native varieties and landraces of corn of Mexico, including as a key ingredient of traditional Mexican foods.

287. Paragraphs 2 and 1 of Article 6 are mutually reinforcing and supportive. Article 6.1 limits the use of GM corn seeds for cultivation in Mexico. This supports the objective reflected in Articles 3, 4 and 5 of 2023 Decree, to reduce and eventually eliminate the use of glyphosate as an agricultural herbicide in Mexico. In turn, this contributes to the purposes of protecting human health not only from the risks arising from the use of glyphosate in agriculture in Mexico, but also from the risks arising from the direct and eventually indirect consumption of GM corn grain containing glyphosate, thereby supporting the purpose of protecting human health in Article 6.2 from food safety risks related to GM corn grain.

288. In addition, Article 6.2 helps support Article 6.1 by further discouraging the cultivation of GM corn in Mexico, considering that the use of such corn for direct human consumption is restricted. In turn, this supports the objective of reducing and eventually eliminating the use of glyphosate in Mexico as an agricultural herbicide associated with the cultivation of GM corn reflected in Articles 3, 4 and 5 of 2023 Decree.

289. With this, it is evident that both the measures identified in this dispute by the United States with the elements broken down in each Article of 2023 Decree must be considered and interpreted in a comprehensive manner, with the main objective of the same, in order to understand the compatibility of such measures with the USMCA.

VII. LEGAL ARGUMENTS

A. Interpretation and application of Chapter 9 of the USMCA

290. Pursuant to Article 9.1 of the USMCA, the definitions of key concepts contained in Annex A of the SPS Agreement are incorporated by reference into Chapter 9 of the USMCA. This includes, for example, the definitions of "SPS measure" (Annex A.1); "international standards, guidelines and recommendations" (Annex A.3); "risk assessment" (Annex A.4); and "appropriate level of SPS protection" (or ALOP) (Annex A.5).

291. In addition, Article 9.3.1 (b) of the USMCA states that one of the objectives of Chapter 9 is to "reinforce and build upon the SPS Agreement". Article 9.4.1 states that "[t]he Parties affirm their rights and obligations under the SPS Agreement". Mexico understands these provisions to mean that nothing in Chapter 9 of the USMCA should restrict, limit or eliminate the rights and obligations of the Parties under the WTO SPS Agreement. Mexico also understands that where the text of a provision of Chapter 9 of the USMCA mirrors the text of a provision of the SPS Agreement, WTO dispute settlement reports interpreting and applying that text may provide relevant context and appropriate guidance.

292. In Mexico's view, this approach complements what is required by Article 31.13.4, which provides that the USMCA should be interpreted "in accordance with customary rules of interpretation of public international law, as reflected in Articles 31 and 32 of the Vienna Convention on the Law of Treaties". This is the same approach used by WTO panels and the Appellate Body under Article 3.2 of the *Understanding on Rules and Procedures Governing the Settlement of Disputes.*[352]

B. The measures at issue in this dispute are more than SPS measures

293. The measures at issue in this dispute are the "End-Use Limitation" provided for in Article 6(2) of the 2023 Decree and the "Gradual Substitution" provided for in Articles 7 and 8 of 2023 Decree. Although the United States has characterized and challenged them as separate measures,

[352] Panel Report, *US — Steel and Aluminium Products* (China), ¶ 7.68. **MEX-268**, (citing: Appellate Body Report, *US - Gasoline*, pp. 19-20, **MEX-269;** *India - Patents (US)*, ¶ 46, **MEX-270;** *Argentina - Textiles and Apparel*, ¶ 42, **MEX-271.** and *US – Carbon steel*, ¶ 61. **MEX-272**.

they are part of the same instrument of measures set forth in the 2023 Decree to collectively address a number of important policy purposes in Mexico.

294. 2023 Decree has followed a lengthy process that involved the identification, examination and consideration of the harmful effects of GM corn cultivation and consumption, based on scientific principles, on: human health in Mexico; environmental health; the unique natural biodiversity and genetic integrity of native varieties and landraces of corn and their wild relatives in Mexico (collectively, "native corn"); adverse impacts on culturally vital indigenous agricultural and gastronomic traditions, farming communities, social values, cultural heritage; and cultural identity in relation to corn, dough, tortilla and related traditional foods. This process included the identification of risks to human health and native corn varieties in the public report entitled "Scientific Record on Glyphosate and GM Crops." This formed the scientific basis for 2023 Decree, complying with the provisions of the USMCA that all SPS measures must be based on scientific principles. Among the milestones in the process was also the Report of the Secretariat of the Commission for Environmental Cooperation entitled "Corn and Biodiversity. Effects of GM corn in Mexico", prepared in 2004.

295. The final recital of the preamble of 2023 Decree states that "the main purpose of these measures is to protect the rights to health and a healthy environment, native corn, the milpa, biocultural wealth, peasant communities and gastronomic heritage; as well as to ensure nutritious, sufficient and quality diet".[353] Each of these measures at issue in this dispute is designed to contribute to the achievement of these purposes, in conjunction with the other measures set forth in 2023 Decree. As discussed below, the "End-Use Limitation" has been implemented in part to begin to contribute to the achievement of these purposes, while the "Gradual Substitution" has not been implemented at all.

296. As Mexico will explain, to the extent that the "End-Use Limitation" and "Gradual Substitution" apply for SPS purposes, they are consistent with the obligations under Chapter 9 of the USMCA. But again, their scope is ultimately much broader than such SPS purposes, as they are part of a broader strategy to address the different categories of harms and risks resulting from the cultivation and consumption of GM corn in Mexico.

[353] Decree 2023. **MEX-167.**

C. The United States has not demonstrated that "Gradual Substitution" is within the scope of Chapter 9 of the MSF Agreement

297. As a preliminary matter, the United States argues that the measures at issue are subject to the obligations of Chapter 9 of the USMCA because they each meet the criteria set forth in Article 9.2 (Scope)[354]. This is incorrect.

298. Article 9.2 (Scope) of the USMCA establishes the legal standard for a measure to be subject to the obligations contained in Chapter 9 of the USMCA.

> Article 9.2: Scope
>
> This Chapter applies to all sanitary and phytosanitary measures of a Party that may, directly or indirectly, affect trade between the Parties.

299. Mexico agrees with the United States that this provision establishes the following two criteria: i) a measure complained of must fall within the definition of sanitary or phytosanitary ("SPS") measure contained in Annex A.1 of the SPS Agreement and ii) such measures "may, directly or indirectly, affect trade between the Parties".[355]

300. For the reasons set out below, Mexico does not agree with the United States that "Gradual Substitution" meets the criteria set out in Article 9.2. Moreover, in addressing these criteria, Mexico wishes to clarify the multi-factorial nature and functions of the measures at issue under 2023 Decree.

1. The definition of an SPS under Annex A.1 to the SPS Agreement

301. With respect to the first element, Article 9.1 (Definitions) of the USMCA provides that "[t]he definitions in Annex A of the SPS Agreement are incorporated into and made part of this Chapter, *mutatis mutandis*". In that sense, it is applicable to the analysis in this case. Annex A.1 states the following:

> Sanitary or phytosanitary measure - Any measure applied:

[354] U.S. Initial Written Submission, ¶¶ 82-107.
[355] In the context of WTO dispute settlement, panels have found that "the complainant must demonstrate that there is some potential or possibility for the SPS measure to exert an effect, directly or indirectly, on international trade." Panel Report, *Costa Rica — Avocados (Mexico)*, ¶¶ 7.178-7.179, **MEX-273;** Panel Report, *Korea — Radionuclides (Japan)*, ¶ 7.22, **MEX-274;** Panel Report, *EC — Hormones (Canada)*, ¶ 8.39, **MEX-275** Panel Report, *EC — Hormones (US)*, ¶ 8,36, **MEX-276;** and Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶ 7.2554. **MEX-277**

> (a) to protect animal or plant life or health within the territory of the Member from risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms or disease-causing organisms;
>
> b) to protect human or animal life or health within the territory of the Member from risks arising from additives, contaminants, toxins or disease-causing organisms in foods, beverages or feedstuffs;
>
> (c) to protect human life or health within the territory of the Member from risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests; or
>
> (d) to prevent or limit other damage within the territory of the Member from the entry, establishment or spread of pests.
>
> Sanitary or phytosanitary measures include all relevant laws, decrees, regulations, requirements and procedures including, *inter alia*, end product criteria; processes and production methods; testing, inspection, certification and approval procedures; quarantine treatments including relevant requirements associated with the transport of animals or plants, or with the materials necessary for their survival during transport; provisions on relevant statistical methods, sampling procedures and methods of risk assessment; and packaging and labelling requirements directly related to food safety.

302. In the context of WTO dispute settlement, panels must "review carefully all aspects of a measure in order to determine whether it is an SPS measure" that falls within the definition in Annex A.1.[356] Whether a measure is applied for one of the purposes listed in Annex A.1 must be determined not only from the objectives of the measure as expressed by the responding party, but also from the text and structure of the relevant measure, its surrounding regulatory context, and the manner in which it is designed and applied.[357] For any given measure to fall within the scope of one of the subparagraphs of Annex A.1, scrutiny of such circumstances must reveal "a clear and objective relationship" between that measure and the specific purpose listed in one of the subparagraphs of Annex A.1.[358]

303. A law, or a requirement contained in a law, may be considered to embody both an SPS measure and a non-SPS[359] measure. The Panel in *EC - Approval and Marketing of Biotech*

[356] Panel Report, *US — Poultry (China)*, ¶ 7.101. **MEX-278**.
[357] Appellate Body Report, *Australia — Apples*, ¶ 173, **MEX-279;** Panel Report, *Russia — Swine (EU)*, ¶ 7.194. **MEX-280**
[358] Appellate Body Report, *Australia — Apples*, ¶ 173, **MEX-279;** Report of the Special Group, *Russia — Pigs (EU)*, ¶ 7.194. **MEX-280**.
[359] Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶¶ 7.162-7.174. The Panel in this case considered that, given that the measures at issue were applied "for a number of purposes (namely to avoid various adverse effects), [...] it may conceivably be warranted to view each [...] as incorporating an

Products (DS291) considered that a requirement satisfying the condition referred to in the preceding paragraph "deemed to embody two, if not more, distinct measures which fall to be assessed under different WTO agreements."[360] To the extent that a requirement is applied for one of the purposes listed in Annex A.1, it may properly be considered as a measure to be assessed under the SPS Agreement; and to the extent that the same requirement is also applied for a purpose that is not covered by Annex A.1, it may be considered as a separate measure to be assessed under a WTO agreement other than the SPS Agreement.[361]

304. The definition in Annex A.1 of the SPS Agreement covers measures that are "aplicadas" (applied) for one of the purposes described in subparagraphs (a) through (d) of the same Annex. The English text refers to the term "*applied*", while the French text refers to the term "*appliquée*". The three terms are essentially identical in the three texts.

305. The Appellate Body has considered that: "the word "'applied'" points to the application of the measure"[362]. The term "applied" is the participle of the verb "to apply". The ordinary meaning of "apply" is "to employ, administer or put into practice a knowledge, measure or principle in order to obtain a certain effect or performance on someone or something"[363] or "to put into practice or exercise something so that it has a certain effect on something or someone".[364]

306. This interpretation is supported by the first recital of the preamble of the SPS Agreement, which is the context of the definition of an SPS measure contained in Annex A.1. In that recital

SPS measure as well as a non-SPS measure". Therefore, the Panel considered it "appropriate to analyse for each of the relevant EC approval procedures whether it is an SPS measure, and if so, whether it is an SPS measure only, or whether it may be considered to embody an SPS measure as well as a non-SPS measure." **MEX-277.** Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶¶ 7.172-7.173. **MEX-277**.

[360] Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶ 7.166. **MEX-277**.

[361] Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶ 7.165. **MEX-277**.

[362] Report of the Appellate Body, *Australia — Apples*, ¶ 172, ("the word "applied" points to the application of the measure and, thus, suggests that the relationship of the measure and one of the objectives listed in Annex A(1) must be manifest in the measure itself or otherwise evident from the circumstances related to the application of the measure. This suggests that the purpose of a measure is to be ascertained on the basis of objective considerations.") **MEX-279;** Panel Report, *Costa Rica — Avocados (Mexico)*, ¶ 7.77, **MEX-273;** and Panel Report, *Korea — Radionuclides (Japan)*, ¶ 7.25. **MEX-274**.

[363] Royal Spanish Academy, "aplicar". **MEX-281**.

[364] Dictionary of the Spanish of Mexico, "aplicar". **MEX-282**

the terms "adopting" and "enforcing" are used with respect to the same "measures".[365] Under the rules of treaty interpretation, each of these terms must have meaning and effect.[366] The use of different terms within the same Treaty text implies or infers a difference in meaning.[367]

2. The "Gradual substitution" is outside the definition of an SPS measure in Annex A.1 of the SPS Agreement

307. The definition in Annex A.1 of the SPS Agreement covers measures that are "applied".

308. As mentioned above, the "Gradual Substitution" is not an "applied" measure within the meaning of Article 9.2 of the SPS Agreement because as of today the measure has not been implemented by Mexico, [368] *i.e.,* a measurehas not been "put into practice" nor has it been "put into effect or exercised so as to have a certain effect on something or someone". Articles 7 and 8 of 2023 Decree constitute an executive order calling on "the agencies and entities of the Federal Public Administration" to "carry out the appropriate actions", at some point in the future, to facilitate the gradual substitution of GM corn for animal feed and industrial use for human food. Articles 7 and 8 are not the "appropiate actions" themselves. Those actions do not yet exist. They have not been designed, proposed, adopted or implemented, let alone "applied". When this happens at some point in the future, the text of Article 8 of 2023 Decree requires that it be done "in accordance with scientific principles and relevant international standards, guidelines or recommendations".

309. Therefore, none of the "agencies and entities of the Federal Public Administration" have "carri[ed] out the appropiate actions in order to conduct the gradual substitution of genetically modified corn for animal feed and industrial use for human consumption" as stated in Article 7 of 2023 Decree. This is why 2023 Decree has had no effect on U.S. imports of GM corn into Mexico.

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[365] SPS Agreement, Preamble ("*Reaffirming* that no Member should be prevented from adopting or enforcing measures necessary to protect human, animal or plant life or health, subject to the requirement that these measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between Members where the same conditions prevail or a disguised restriction on international trade"). **MEX-283**. [Emphasis added].

[366] Report of the Appellate Body, *Japan – Alcoholic beverages II*, ¶ 37 ("the current wording of the Article provides the basis for an interpretation that should give meaning and effect to all its terms.") **MEX-284**.

[367] *See* Panel Report, *EU — Cost Adjustment Methodologies II (Russia)*, ¶ 7.183, **MEX-285**; Appellate Body Report, *Japan – Alcoholic Beverages II*, ¶ 59, **MEX-284;** Appellate Body Report, *EC – Hormones*, ¶ 164 **MEX-286**; and Appellate Body Report, *US — Gasoline*, ¶¶ 44-45, p. 20. **MEX-269**.

[368] *See,* Section VI *supra*.

On the contrary, compared to 2022, U.S. imports of GM corn increased [[ ]]. COFEPRIS has even continued to issue authorizations for industrial use for human food despite the issuance of the Decree.

310. Therefore, the U.S. claim related to the "Gradual Substitution" is, at best, premature. The "Gradual Substitution" is not an "applied" measure, and therefore cannot be considered an SPS measure for the purposes of Article 9.2 of the USMCA.

311. Moreover, although 2023 Decree contemplates that "the agencies and entities of the Federal Public Administration" will carry out "appropriate actions in order to conduct the gradual substitution of genetically modified corn" at some point in the future, the Decree does not specify what those actions may be, how they may be implemented (including details and exceptions), nor when they may be implemented. As mentioned above, the "appropriate actions" have not been designed at this time, much less proposed, adopted or implemented. In Mexico's view, there is currently nothing for the United States to challenge in relation to Articles 7 and 8 of 2023 Decree. Until the "appropiate actions" have been taken, the Panel cannot assess whether such actions fall within the scope of Article 9.2 or comply with Mexico's obligations under the USMCA.

312. Notwithstanding this, the following arguments of Mexico with respect to the "Gradual Substitution" are presented *arguendo,* in case the Panel disagrees with Mexico's interpretation and considers that the "Gradual Substitution" is being "applied" for the SPS purposes listed in Annex A.1 of the SPS Agreement.

3. The measures at issue have SPS and non-SPS purposes

313. As analyzed above, the final recital of the preamble of 2023 Decree states that "the main purpose of these measures is to protect the rights to health and a healthy environment, native corn, the milpa, biocultural wealth, peasant communities and gastronomic heritage; as well as to ensure nutritious, sufficient and quality diet". The interests on this list include SPS purposes provided for in Annex A.1 and non-SPS purposes outside Annex A.1. Each of the measures at issue in this dispute are designed to contribute to these SPS and non-SPS purposes, collectively and together with the other measures established in 2023 Decree.

314. The identification of risks made by CONAHCYT, reflected in the public report titled "*Scientific Record on Glyphosate and GM Crops*", identified the following circumstances that are relevant for the analysis of the measures in dispute in the context of 2023 Decree:

- The presence of harmful GMO-associated proteins and glyphosate in corn-based foods in Mexico (*i.e.*, "more than 90% of tortillas available to Mexican families have been found to contain transgenic proteins, and three out of 10 contain glyphosate residues").[369]
- The harmful effects for human health of GMO associated proteins and glyphosate (*i.e.*, "molecules that trigger allergic reactions and free radicals that promote oxidative stress, associated with various chronic degenerative diseases such as diabetes and cancer").[370]
- The presence of transgenic sequencies in native corn plants[371], despite the fact that the planting of GM corn has been suspended in Mexico.[372]

[369] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*" (2020), p. 7, ("In 2017, a study was published that showed the presence of GMs and glyphosate in several corn-based foods in high demand and easily accessible. The products analyzed were: tortillas, flour, tortilla chips, breakfast cereals and snacks. GMs were detected in 82% of all foods, and 30% of the samples with GM events contained glyphosate and AMPA residues as well") **MEX-085**, citing González-Ortega, E., Piñeyro-Nelson, A., Gómez-Hernández, E., Monterrubio-Vázquez, E., Arleo, M., Dávila-Velderrain, J., Martínez-Debat C. y Álvarez-Buylla E. R., "*Pervasive presence of transgenes and glyphosate in corn-derived food in Mexico*", 2017). **MEX-125**.

[370] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, p. 17, **MEX-085**, citing Then, C. y Bauer-Panskus, A., "*Possible health impacts of Bt toxins and residues from spraying with complementary herbicides in genetically engineered soybeans and risk assessment as performed by the European Food Safety Authority EFSA*", 2017, **MEX-287**; Nordlee, J.A. *et al*., "*Identification of a Brazil-nut allergen in transgenic soybeans*", 1996, **MEX-288;** Herrero, M. *et al*., "*Analysis of Chiral Amino Acids in Conventional and Transgenic Corn*", 2007, **MEX-143;** Levandi, T. *et al*., "*Capillary Electrophoresis Time-of-Flight Mass Spectrometry for Comparative Metabolomics of Transgenic versus Conventional Corn*", 2008, **MEX-144;** Colín-Chávez, C. *et al*, "*Comparison of nutritional properties and bioactive compounds between industrial and artisan fresh tortillas from corn landraces*", 2020, **MEX-044;** Mesnage- Robin, Z-Sarah, *et al*., "*An integrated multiomics analysis of the NK603 Roundup-tolerant GM corn reveals metabolism disturbances caused by the transformation process*". 2016. **MEX-135;** y, Suárez G., Pérez E., y Navarro C. "*Identification of a Brazil-nut allergen in transgenic soybeans*", 2019. **MEX-289**.

[371] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops* ", 2020, pp. 6-7, **MEX-085**. citando a Quist, D. y Chapela, I.H., "*Transgenic DNA introgressed into traditional corn landraces in Oaxaca, Mexico*", 2001, **MEX-090**; Piñeyro-Nelson, A., Van Heerwaarden, J., Perales, H. R., Serratos-Hernández, J. A., Rangel, A., Hufford, M. B., Gepts, P., Garay-Arroyo, A., Rivera-Bustamante, R., & Alvarez-Buylla, E. R. "*Transgenes in Mexican corn: molecular evidence and methodological considerations for GMO detection in landrace populations*", 2009. **MEX-101**.

[372] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, pp. 4 y 17. **MEX-085**.

315. This risk identification by CONAHCYT also focused on the risks to human health and the environment from direct exposure to glyphosate in the context of agricultural activities in Mexico. These risks are addressed in Articles 3, 4 and 5 of 2023 Decree. The United States has not challenged these elements of 2023 Decree.

a. SPS purposes of the "End-Use Limitation"

316. Regarding the "End-Use Limitation", the heading or "*chapeau*" of Article 6 describes a "special measure", which will be executed by the "biosafety authorities" of Mexico, with the following purposes: "to protect native corn, the *milpa*, biocultural wealth, peasant communities, gastronomic heritage and human health".

317. This "special measure" consists of the following requirements, which are set forth in three subsections. These requirements are intended to work together to achieve the objective listed in the heading. The "End Use Limitation" is set forth in the second requirement.

> 6.1 First, the Mexican biosafety authorities"[s]hall revoke and refrain from issuing permits for the release of genetically modified corn seeds into the environment in Mexico".
>
> 6.2 Second, the Mexican biosafety authorities "[s]hall revoke and refrain from issuing authorizations for the use of genetically modified corn grain for human consumption". Pursuant to Article 2.3, "corn for human consumption" is defined as "intended for human consumption through nixtamalization or flour processing" for dough, tortilla and related foods.
>
> 6.3 Third, the Mexican biosafety authorities "[s]hall promote, in coordination with the National Council of Science and Technology, the reforms of the applicable legal ordinances, related to the object of this decree".

318. Article 6.2 establishes a restriction on the end use of GM corn grain in Mexico for direct human consumption. In applying this provision, COFEPRIS has continued to grant authorizations for GM corn grain events, although they now include the following explicit restriction on the end use, e.g., "[f]or animal feed and industrial use for human consumption: except cultivation, corn flour and nixtamalized dough". While Article 6.2 contemplates that existing authorizations for the use of GM corn for human consumption shall be "revoked", since the 2023 Decree went into effect, none of the existing authorizations have been revoked, amended or otherwise modified.

319. One of the purposes of Article 6.2 is the protection of human health. This addresses the food safety risk identified by CONAHCYT, including the presence in GM corn grain for direct

human consumption of glyphosate and GMO-associated proteins (i.e., the Cry family of insecticidal toxins and molecules in glyphosate-tolerant corn events that act as free radicals, promoting oxidative stress associated with various chronic and degenerative diseases).

320. Scientific evidence clearly establishes that these substances are harmful to human health.[373] In addition, glyphosate is a "systemic" herbicide, which means that it is absorbed and transported through plant tissues.[374] Similarly, proteins associated with GMOs are expressed by a transgenic plant, becoming part of its physical composition. Therefore, direct consumption of GM corn grain in dough, tortilla and related foods inevitably involves the ingestion of these harmful substances.

321. Given the fundamental importance of corn grain as an everyday staple food in Mexico, in the form of nixtamalized dough, tortilla and related foods, these food safety risks are more acute than in other countries. Families in Mexico would be exposed to relatively high doses of glyphosate and/or GMO-associated proteins in GM corn grain by virtue of the very high proportion of corn grain consumed directly on a daily basis in the Mexican diet.[375] These circumstances increase the magnitude of risk in Mexico and make international standards, guidelines and recommendations less relevant in determining the appropriate level of protection in Mexico.

322. The Panel in *EC — Approval and Marketing of Biotech Products* considered that a poisonous substance that is produced during the metabolism or growth of a GM crop could be considered a "toxin" within the meaning of Annex A.1 of the SPS Agreement. It also considered that proteins produced through the unintended expression of modified genes in agricultural crops could be considered "contaminants" within the meaning of Annex A.1 (b), if these proteins "infect or pollute" the food product.[376]

323. Therefore, to the extent that Article 6.2 is used to protect human health from risks arising from "contaminants" or "toxins" in GM corn grain for direct consumption through everyday foods such as tortillas, it falls within the definition of an SPS measure in Annex A.1 (b).

[373] *See*, Section V.D.2 *supra*.
[374] *See*, Section V.D.2 *supra*.
[375] *See*, Section V.A *supra*.
[376] Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶ 7.313. **MEX-277.**

324. Article 6.2 of 2023 Decree also contributes to the purpose of protecting "native corn", operating in conjunction with Article 6.1. This addresses the risks arising from transgenic introgression resulting from the propagation of GM corn plants in Mexico, which adversely affects the natural biodiversity, genetic integrity, constitution, traits and health of unique native varieties and local landraces of corn and their wild relatives in Mexico. Scientific evidence establishes that GM corn grain is "a potential route of transgene dispersal into native corn" because "imported grains are functional seeds, which retain their ability to develop and express recombinant proteins".[377]

325. Furthermore, transgenic introgression continues to be a problem in Mexico despite the moratorium on commercial cultivation of GM corn, thus additional measures are required to reinforce the appropriate level of protection.

326. Therefore, to the extent that paragraph 2 of Article 6 is applied to protect "native corn" from risks arising from the spread of "pest" GM corn plants, it falls within the definition of SPS measure in Annex A.1 (a).

b. SPS purposes of "Gradual Substitution"

327. As analyzed above, the "Gradual Substitution", provided for in Articles 7 and 8 of 2023 Decree, has not yet been applied. None of "the agencies and entities of the Federal Public Administration" has begun to "carry out the appropriate actions" to "conduct the gradual substitution of genetically modified corn for animal feed and industrial use for human consumption".

328. In addition, when applied in the future, should the relevant scientific evidence supporting such measure be insufficient, it will essentially operate as a provisional measure within the meaning of Articles 9.6.4 (c) and 9.6.5 of the USMCA, as discussed *infra*.

329. Just as the "End-Use Limitation", the "Gradual Substitution" contributes to the purposes of protecting human health and protecting native corn in Mexico.

[377] Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Corn grain marketed in Mexico as a potential disperser of genetically modified events*", 2021, pp. 251-259. **MEX-087.**

330. The human health risks arising from GM corn "for animal feed and industrial use for human consumption" are similar in nature to those arising from GM corn grain for human consumption through nixtamalization or processing into flour for dough, tortilla and related foods.

331. However, the text of Article 8 recognises that there is a need for further relevant scientific studies on "possible damages to health" resulting from "consumption of genetically modified corn" in the context of the "Gradual Substitution". While there is clear scientific evidence of the harmful effects of direct consumption of GM corn grain in corn flour, dough, tortilla and related products, more scientific evidence is needed to determine whether, and to what extent, such risks are transmitted to food products further downstream including:

- industrially processed foods made from GM corn grain (*i.e.*, corn syrup, corn starch, etc.), and
- animal products derived from livestock or fishes raised with feed containing GM corn grain.

332. This is one of the reasons why the "Gradual Substitution" has not yet been applied, and when it is applied in the future, it will be done on a *provisional* basis due to the need for scientific studies to be carried out.

333. With regard to the protection of "native corn", the risks from GM corn grain are considered to be the same regardless of the different end uses.

c. Non-SPS purposes of the measures at issue

334. Each of the measures in dispute falls within the SPS definition to the extent that they are applied to protect human health from risks arising from "contaminants" or "toxins" in foods made from GM corn grain (i.e., residues of glyphosate and transgenic proteins from the Cry family of insecticidal toxins). In addition, each of the measures also falls within the SPS definition to the extent that they are applied to protect native corn (i.e., from the spread of GM corn plant "pests" that are spread from GM corn kernels).

335. However, the measures are not simply sanitary and phytosanitary measures, but rather measures that serve a number of very important purposes that are not related to the purposes as an SPS measure, among them:

- The conservation and sustainable use of biological diversity with respect to Mexico's native and local varieties of corn and maize itself (within the meaning of Article 24.15.2 of the USMCA);
- The conservation of biodiversity and the genetic integrity of Mexico's native varieties and landraces of corn and maize as "exhaustible natural resources", where the "measures are made effective in conjunction with restrictions on domestic production or consumption of GM corn" (within the meaning of GATT Article XX(g));
- The protection of the biocultural, agricultural (i.e., milpa) and gastronomic wealth of Mexico's native and local varieties of corn, including as a key ingredient in traditional Mexican foods (i.e., the protection of "public morals" within the meaning of GATT Article XX(a)); and
- The protection and conservation of Mexico's native corn, the milpa and other traditional agricultural practices associated with the cultivation of native corn in Mexico, the biodiversity and biocultural wealth of Mexico's native corn, and the protection of peasant communities whose livelihoods depend on the foregoing interests, which Mexico considers necessary to fulfill its legal obligations to indigenous peoples (within the meaning of Article 32.5 of the USMCA).

4. Appropriate levels of SPS protection

336. An essential concept for the discussion of the measures at issue in this dispute is the "level of protection" that Mexico has determined to be "appropriate" for the SPS purposes of: (i) protecting human health from risks arising from "contaminants" or "toxins" in GM corn grain consumed directly in everyday foods such as tortillas; and (ii) protecting native corn from risks arising from the introgression of transgenic sequences into crops, avoiding environmental impacts.

337. The concept of "appropriate level of sanitary or phytosanitary protection" (or "ALOP") is defined in Annex A.5 of the SPS Agreement as the "level of protection deemed appropriate by the Member establishing a sanitary or phytosanitary measure to protect human, animal or plant life or health within its territory." The definition includes a "note" noting that "[m]any Members otherwise refer to this concept as the 'acceptable level of risk'."[378] This definition is incorporated by reference into Chapter 9 of the USMCA pursuant to Article 9.1.1.

[378]Appellate Body Report, *Australia - Apples*, ¶ 369 ("Annex A(5) to the SPS Agreement equates the appropriate level of protection with the "acceptable level of risk "). **MEX-279.**

338. It is Mexico's prerogative to set the level of protection it considers appropriate.[379] Mexico recognizes that, for the purposes of this dispute, the Panel will need to determine the "appropriate levels of protection" of the measures at issue, and that this will be done "on the basis of the totality of the arguments and evidence on the record".[380] In the context of WTO dispute settlement, a Panel will normally "accord weight to the respondent's articulation of its ALOP."[381]

339. The manner in which the measures have been designed and applied reflects the levels of protection that Mexico has deemed appropriate, taking into account all relevant circumstances.

a. Protection of human health

(1) End-Use Limitation" under Article 6.2 of 2023 Decree

340. With respect to the protection of human health against risks from contaminants and toxins in GM corn grain *consumed directly* in staple foods such as tortillas, Mexico has considered that the appropriate level of protection should seek to eliminate risks to the greatest extent possible. As discussed above, the presence of contaminants and toxins in GM corn grain, such as transgenic proteins and glyphosate, has been well documented. In addition, the adverse health effects of these contaminants and toxins have been scientifically demonstrated.[382]

341. The population in Mexico is highly exposed and vulnerable to these risks due to the amount of corn grain consumed directly on a daily basis in the form of tortillas and other foods made with nixtamalized flour and dough. Evidence shows that these foods can account for half or more of a

[379] Appellate Body Report, *Australia - Apples*, ¶ 342 ("The Appellate Body has held that it is the "prerogative" of a WTO Member to set the level of protection it deems appropriate, and has explained that the establishment of "the level of protection is an element in the decision-making process which logically precedes and is separate from the establishment or maintenance of the SPS measure "). **MEX-279.**

[380] Panel Report, *Costa Rica - Avocados (Mexico)*, ¶ 7.4, **MEX-273,** citing Appellate Body Report, *India - Agricultural Products*, ¶ 5.221, **MEX-290;** and Appellate Body Report, *Korea - Radionuclides (Japan)*, ¶ 5.24. **MEX-291**.

[381] Appellate Body Report, *Korea - Radionuclides (Japan)*, ¶ 5.24, citing Appellate Body Report, *India - Agricultural Products*, ¶ 5.221. **MEX-290**.

[382] See, *e.g.*, CONAHCYT, "*Scientific dossier on glyphosate and GM crops*," 2020, pp. 8-10 ("It has been shown that there is a correlation between the increase in more than 20 diseases (oncological, endocrine, metabolic and neurodegenerative, as well as systemic disorders) and the increase in agricultural use of glyphosate and the area planted with GM soybeans and corn in the United States."). **MEX-085.**

person's average daily calorie and protein intake in Mexico - far more than in most other countries.[383] In these circumstances, Mexico believes that a "zero risk" level of protection is not only an appropriate target, but the most appropriate.

342. From a public policy perspective, the health and well-being of people in Mexico are of utmost importance. As noted *above,* the Constitution establishes the human rights to "nutritious, sufficient and quality food", the "protection of health" and the "well-being of persons". Moreover, in the context of the WTO SPS Agreement, a Member is entitled to determine that its own appropriate level of protection is "zero risk".[384]

(2) The "GGradual Substitution" in accordance with Articles 7 and 8 of 2023 2023 Decree

343. Regarding the protection of human health from risks arising from contaminants and toxins present in GM corn grain when used for animal feed and industrial food processing, Mexico has considered that the appropriate level of protection must be balanced with realistic considerations of feasibility and adequacy of supply.

344. This is evident from the design and (non)application of the measure in dispute. To date, "Gradual Substitution" has not been implemented. When this measure is implemented in the future, it will involve "gradual substitution" of GM corn "for animal feed and industrial use for human consumption". This reflects a more "risk tolerant" ALOP.

345. In addition, the measure itself recognizes (in the text of Article 8) that further relevant scientific studies are needed on "possible health damage" resulting from the "consumption of genetically modified corn" in this context. As described above, while there is clear scientific evidence of the harmful effects of direct consumption of GM corn grain in corn flour, dough, tortilla and related products, more scientific evidence is needed to determine whether, and to what extent, such risks are transmitted to food products further downstream, including foods industrially processed with GM corn and animal products fed with GM corn.

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[383] *See,* Section V.A *above*.

[384] Appellate Body Report, *Australia - Salmon*, ¶ 125, **MEX-292.**

b. Protection of native corn

346. With respect to the protection of native corn, Mexico has considered that the appropriate level of protection should seek to mitigate the damage caused to native corn by slowing or stopping the rate of transgenic introgression. The objective is to try to limit the extent of future damage and to support efforts to reverse or eliminate existing damage, if possible.

347. Unlike the ALOP with respect to the protection of human health, there is no distinction between the ALOPs for "End-Use Limitation" and "Gradual Substitution" regarding the protection of native corn. The risks arising from the spread of "pests" of GM corn plants from GM corn grain are similar. Scientific evidence establishes that GM corn grain is "a potential route of transgene dispersal to native corn" because "imported grains are functional seeds, which retain their ability to develop and express recombinant proteins".[385]

348. The cultivation of GM corn seed represents the greatest source of risk to native corn due to the introgression of transgene sequences and, as mentioned above, the scientific community has opined that the importation of GM corn grains also represents a risk to native corn. In fact, this introgression has continued despite a moratorium on the commercial cultivation of GM corn seeds due to ongoing legal proceedings subject to judicial control. These circumstances warrant broader protection, including protection against risks arising in connection with the unintended or unwanted spread of "pest" GM corn plants from GM corn kernels for direct human consumption, animal feed or industrial food processing. In this way, the "End-Use Limitation" and the "Gradual Substitution" contribute, collectively and in conjunction with the other measures in the 2023 Decree, *i.e.*, to the protection of native corn.

349. Different ALOPs for different SPS purposes cannot be examined in isolation from each other. This is because, for example, the "zero risk" ALOP for the purpose of protecting human health from food safety risks arising from direct consumption of GM corn grain overlaps with the ALOP for the purpose of protecting native corn from risks arising from the same GM corn grain. The lower ALOP for the purpose of protecting native corn, viewed in isolation, may not correspond

[385] Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Commercialized corn grain in Mexico as a potential disperser of genetically modified events*." 2021, pp. 251-259. **MEX-087**.

to the design and application of the "End-Use Limitation." However, that should not prevent the measure from contributing to the purpose of protecting native corn while also contributing to the purpose of protecting human health in the ALOP determined by Mexico.

D. To the extent that the Panel considers that "Gradual Substitution" is an SPS measure, it is a provisional measure covered by Articles 9.6.4(c) and 9.6.5 of the USMCA

350. As analyzed above, to date, the "Gradual Substitution" established in Articles 7 and 8 of the Corn 2023 Decree has not been implemented or applied. Article 7 establishes that the "agencies and entities of the Federal Public Administration" "will carry out the appropriate actions" to carry out the gradual substitution of GM corn for animal feed and industrial use for human consumption. In form and substance, this is simply an executive order to "carry out the appropriate actions" at some point in the future. It is not the "appropriate actions" themselves, which do not yet exist. Those actions - or measures - have not yet been designed, proposed, adopted or implemented, much less enforced. As of today, the "appropriate actions" and the dates by which they will be taken remain undefined and indeterminate. The text of Article 8 states that when "gradual substitution" is implemented, it shall be "in accordance with scientific principles and relevant international standards, guidelines or recommendations".

351. Mexico submits that the claims raised by the United States against the "Gradual Substitution" are, at best, premature. Until the "appropriate actions" have been designed and/or implemented, it cannot be determined whether they are designed or implemented in a manner contrary to the relevant obligations. It cannot be assumed that the "Gradual Substitution" will invariably be inconsistent with Mexico's obligations under the USMCA. Such an assumption could lead to the unintended result of precluding or interfering with Mexico's sovereign right to design, implement and carry out regulatory actions in the public interest before such actions have been designed, implemented or carried out.

352. In the event that the Panel disagrees with Mexico and concludes that "Gradual Substitution" is in fact an SPS measure that is subject to the obligations under Chapter 9 of the USMCA, Mexico contends that it is a provisional measure that must be assessed under Articles 9.6.4(c) and 9.6.5 of the USMCA.

1. Provisional Measures under Articles 9.6. (c) y 9.6.5 of the USMCA and Article 5.7 of the SPS Agreement

353. Article 9.6.4(c) of the USMCA provides that a Party is not precluded from "adopting or maintaining a sanitary or phytosanitary measure on a provisional basis if relevant scientific evidence is insufficient". In this regard, it recognizes "the Parties' rights and obligations under the relevant provisions of the SPS Agreement".

354. Article 5.7 is the relevant provision of the SPS Agreement. It provides that WTO Members may provisionally adopt SPS measures "on the basis of available pertinent information" in cases where "relevant scientific evidence is insufficient". It further requires that, "[i]n such circumstances, Members shall seek to obtain additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time." What constitutes a "reasonable period of time" under Article 5.7 has to be established on a case-by-case basis, based upon the particular facts and circumstances of a given case, including the difficulty of obtaining the information necessary for a more objective assessment of risk and the characteristics of the provisional SPS measure.[386]

355. The Appellate Body has noted that the "cautionary principle" (also known as the precautionary principle) is reflected in paragraph Article 5.7 of the SPS Agreement.[387] It has also considered that the conditions set out in Article 5.7 "must be interpreted keeping in mind that the precautionary principle finds reflection in this provision".[388] On this, the Appellate Body has highlighted the following points which are highly relevant:

> [T]he precautionary principle indeed finds reflection in Article 5.7 of the *SPS Agreement*. We agree, at the same time, with the European Communities, that there is no need to assume that Article 5.7 exhausts the relevance of a precautionary principle. It is reflected also in the sixth paragraph of the preamble and in Article 3.3. These explicitly recognize the right of Members to establish their own appropriate level of sanitary protection, which level may be higher (i.e., more cautious) than that implied in

[386] Panel Report, *Russia - Pork (EU)*, ¶ 7.1181, **MEX-280**; Appellate Body Report, *Japan - Agricultural Products II*, ¶ 93, **MEX-293.**

[387] Appellate Body Report, *EC - Hormones*, ¶ 124. **MEX-280.** The Appellate Body also considered that the precautionary principle "is also reflected in the sixth preambular paragraph and Article 3.3" of the SPS Agreement.

[388] Appellate Body Report, *US — Continued Suspension*, ¶ 680. **MEX-294.**

> existing international standards, guidelines and recommendations. [...] [A] panel charged with determining, for instance, whether "sufficient scientific evidence" exists to warrant the maintenance by a Member of a particular SPS measure may, of course, and should, bear in mind that responsible, representative governments commonly act from perspectives of prudence and precaution where risks of irreversible, e.g. life-terminating, damage to human health are concerned.[389]

356. Article 9.6.5 of the USMCA reflects the requirements established in Article 5.7 of the SPS Agreement, establishing the following:

> If a Party adopts or maintains a provisional sanitary or phytosanitary measure if relevant scientific evidence is insufficient, the Party shall within a reasonable period of time:
>
> (a) seek to obtain the additional information necessary for a more objective assessment of risk;
>
> (b) complete the risk assessment after obtaining the requisite information; and
>
> (c) review and, if appropriate, revise the provisional measure in light of the risk assessment.

2. The provisional character of "Gradual Substitution"

357. As noted above, no action has been taken in relation to "Gradual Substitution". There has been no "substitution [...] of genetically modified corn for animal feed and industrial use for human consumption", and there is currently no administrative mechanism to begin such substitution. Furthermore, Article 8 of 2023 Decree recognizes that in this context it is necessary to carry out "relevant scientific studies". Likewise, it instructs COFEPRIS to integrate a "joint research protocol" to coordinate a study with the relevant authorities of other countries on "the possible damages to health" derived from the "consumption of genetically modified corn".

358. While there is clear scientific evidence of the harmful effects of direct consumption of GM corn grain in corn flour, dough, tortilla and related products, more scientific evidence is needed to determine whether, and to what extent, such risks are transmitted to food products further

[389] Appellate Body Report, *EC - Hormones*, ¶ 124 **, MEX-286,** cited at Appellate Body Report, *US — Continued Suspension*, ¶ 680 . **MEX-294.** Mexico acknowledges that the Appellate Body also found that "that [precautionary] principle has not been written into the SPS Agreement as a ground for justifying SPS measures that are otherwise inconsistent with the obligations of Members set out in particular provisions of that Agreement *",* and that the "the precautionary principle does not, by itself, and without a clear textual directive to that effect, relieve a panel from the duty of applying the normal (i.e. customary international law) principles of treaty interpretation in reading the provisions of the *SPS Agreement.*" (Appellate Body Report, *EC - Hormones*, ¶ 124). **MEX-286.**

downstream, including: industrially processed foods made with GM corn grain (i.e. corn syrup, corn starch, etc.), and meat and other animal products derived from livestock or fish that are raised on animal feed containing GM corn grain.

359. The above demonstrates that the "Graduated Substitution", set for in Articles 7 and 8 of 2023 Decree, is: (i) based on available relevant information on the risks to human health from the consumption of foods made with GM corn grain; and (ii) seeks to obtain the additional information necessary for a more objective assessment of this risk in the context of industrially processed foods and animal products made with GM corn grain. At this stage, the latter requirements set out in Article 9.6.5 of the USMCA and Article 5.7 of the SPS Agreement are not applicable (*i.e.*, completing the risk assessment after obtaining additional information and reviewing the provisional measure in light of this information).

360. Therefore, if the Panel determines that the "Gradual Substitution" is an SPS measure subject to the obligations of Chapter 9 of the USMCA, it has been provisionally adopted in a manner consistent with Articles 9.6.4(c) and 9.6.5 of the USMCA, Article 5.7 of the SPS Agreement and the cautionary principle, also known as the precautionary principle.

E. To the extent that the Panel determines that the measures are covered by Chapter 9 of the USMCA, the United States has not demonstrated any inconsistency

1. The "End-Use Limitation" is consistent with Article 9.6.3 of the USMCA

361. The United States argues that the "End-Use Limitation" is not based on international standards or a risk assessment and is therefore inconsistent with Article 9.6.3 of the USMCA. The United States points to certain standards of the *Codex Alimentarius* Commission on food safety and of the Secretariat of the International Plant Protection Convention ("IPPC") on plant health, which it claims are a relevant basis for the Mexican measures at issue.[390]

362. The United States is wrong. None of the standards it cites are relevant to addressing the risk posed to the Mexican population by glyphosate and GM protein residues in food, or to native Mexican corn varieties by unintended gene transfers from GM corn.

[390] U.S. Initial Written Submission, ¶¶ 108-145.

363. As discussed *above*, Mexico has adopted a "zero risk" level of protection to address risks from direct consumption of GM corn grain in dough nixtamalized, tortillas and related foods. The "zero risk" ALOP with respect to the protection of human health overlaps with the ALOP with respect to the protection of native corn. The international standards cited by the United States do not address the ALOP that Mexico considers relevant and appropriate to address risks to its population and native biodiversity.

364. Article 9.6.3 recognizes that where international standards do not meet a Party's appropriate level of protection, a Party may base its sanitary or phytosanitary measure on an assessment, as appropriate to the circumstances, of the risk to human, animal or plant life or health.

365. Panels and the WTO Appellate Body, in the context of Article 5.1 of the SPS Agreement,[391] have held that a measure is said to be "based on" a risk assessment when the results of the risk assessment sufficiently justify - or reasonably support - the SPS measure in question.[392] The requirement that an SPS measure be "based on" a risk assessment is a substantive requirement that there be a rational relationship between the measure and the risk assessment. [393]

366. The criteria for risk assessments are set out in Annex A(4) of the WTO SPS Agreement. A risk assessment - arising from the consumption of food - should include an evaluation of the potential for adverse effects on human health arising from the presence of contaminants in food, beverages or feedstuffs. Similarly, pest risk assessments should include an assessment of the entry, establishment or spread of a pest or disease within the territory of an importing Member in terms

[391] Article 9.6.3 reflects Article 5.1 of the SPS Agreement, which states that "[m]embers shall ensure that their sanitary or phytosanitary measures are based on an assessment, as appropriate to the circumstances, of the risks to human, animal or plant life or health, taking into account risk assessment techniques developed by the relevant international organizations." **MEX-283.**

[392] Appellate Body Report, *India - Agricultural Products*, ¶ 5.16 **MEX-290**; Appellate Body Report, *EC - Hormones*, ¶¶ 186 and 193 ("To the extent that the Panel purported to require that a risk assessment to establish a minimum magnitude of risk, we must note that the imposition of such a quantitative requirement has no basis in the SPS Agreement. A panel is only authorized to determine whether a given SPS measure is "based on" a risk assessment."). **MEX-286.**

[393] Appellate Body Report, *India - Agricultural Products*, ¶ 5.16, **MEX-290;** Appellate Body Report, *EC - Hormones*, ¶¶ 186 and 193, **MEX-286.**

of the sanitary or phytosanitary measures that may be applied, as well as the associated potential biological and economic consequences.

367. Panels have confirmed that "risk assessments which were carried out before these measures were adopted and by reference to risk assessments which were carried out after the measures were adopted could "sufficiently warrant", or "reasonably support", the maintenance of that measure"[394] "[I]t is of no particular importance whether a specific risk assessment which is claimed to serve as a basis for a safeguard measure was performed before or after the adoption of that safeguard measure. What matters is that the relevant risk assessment was appropriate to the circumstances existing at the time thisPanel was established."[395]

368. Importantly, Panels have clarified that "the fact that a Member has decided to follow a precautionary approach could have a bearing on a panel's assessment of whether an SPS measure is "based on" a risk assessment as required by Article 5.1. Thus [...] which follows a precautionary approach, and which confronts a risk assessment that identifies uncertainties […] or constraints, would be justified in applying (i) an SPS measure even though another Member might not decide to apply any SPS measure on the basis of the same risk assessment, or (ii) an SPS measure which is stricter than the SPS measure applied by another Member to address the same risk".[396]

369. In addition, a risk assessment must be "appropriate to the circumstances, of the risk to human, animal or plant life or health" as set forth in Article 9.6.3 of the USMCA and Article 5.1 of the SPS Agreement.

370. Panels and the WTO Appellate Body have clarified that "scientific research involving a risk assessment needs to take due account of the specific methodological difficulties presented by

[394] Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶¶ 7.3029-7.3030 and 7.3034. **MEX-277.**
[395] Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶¶ 7.3029-7.3030 and 7.3034. **MEX-277.**
[396] Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶ 7.3065, **MEX-277.**

the nature and characteristics of the specific substance and risk being assessed."[397] It also allows WTO members to assess risk on a case-by-case basis, including country-specific situations.[398]

371. As Mexico will demonstrate in the following paragraphs, Mexico conducted a risk assessment in accordance with Annex 4(A) of the WTO SPS Agreement. In addition, the risk assessment is appropriate to the circumstances of the risk to human health or life and plant life in Mexico and is based on scientific evidence in accordance with Article 9.6.8(a) of the USMCA and Article 5.1 of the SPS Agreement. The risk assessment is also consistent with Article 9.6.8(b) of the USMCA because it took into account international standards and considered that they did not exist.

372. Finally, the "End-Use Limitation" is "based" on a risk assessment. As is evident, the scientific literature establishes a clear risk to human health from the consumption of contaminants such as glyphosate residues in flour made from GM corn. The risk assessment also identified a risk to native corn varieties from the transfer of genetic traits in GM corn. Therefore, the risk assessment reasonably supports the limited and not excessive "End-Use Limitation", which is consistent with Article 9.6.3 of the USMCA.

2. Whether the measures in question are applied only to the extent necessary to protect human health and native corn under Article 9.6.6(a) of the USMCA

373. The United States alleges that each of the challenged measures is inconsistent with Article 9.6.6(a) of the USMCA because they apply more than is necessary to protect human, animal or plant life or health. For the reasons set forth below, the United States' arguments are without merit.[399]

[397] Appellate Body Report, *US — Continued Suspension*, ¶ 562 (the Appellate Body clarified that the EU was required to establish a causal link between adverse health effects and residues in beef, but was not required to isolate the contribution of growth hormone residues in beef from contributions from other sources). **MEX-294.**

[398] Panel Report, *Australia - Salmon*, ¶ 8.71. **MEX-295.**

[399] U.S. Initial Written Submission, ¶ 147 and generally ¶¶ 146-160.

a. The Legal Standard applicable to "necessary" in Article 9.6.6 (a) of the USMCA, Article 2.2 of the SPS Agreement and Article XX (b) of the GATT 1994

374. Article 9.6.6(a) states that "[e]ach Party shall ensure that its sanitary and phytosanitary measures … are applied only to the extent necessary to protect human, animal or plant life or health". This provision reflects the first requirement set out in Article 2.2 of the SPS Agreement, which states: "Members shall ensure that any sanitary or phytosanitary measure is applied only to the extent necessary to protect human, animal or plant life or health".[400]

375. In the context of WTO dispute settlement, panels and the Appellate Body have found that this requirement of Article 2.2 of the SPS Agreement "is also elaborated through the more specific obligation set out in Article 5.6."[401] In this regard, "the basic concept articulated in Article 2.2 gives meaning to Article 5.6," and these provisions "must consistently be read together."[402] Article 5.6, which requires that "Members shall ensure that such measures are not more trade-restrictive than required to achieve their appropriate level of sanitary or phytosanitary protection," is reflected in Article 9.6.10 of the USMCA. Mexico addresses the U.S. claim under Article 9.6.10 of the USMCA below.[403]

376. In the context of Article XX(b) of GATT 1994, which provides for general exceptions for measures "necessary to protect human, animal or plant life or health", the analysis of whether a measure is "necessary" requires a panel to "consider the relevant factors, particularly the importance of the interests or values at stake, the extent of the contribution of the measure to the

[400] Article 2.2 of the SPS Agreement contains three separate requirements. Panel Report, *United States - Poultry (China)*, ¶ 7.144 **MEX-278**; Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶ 7.1424, **MEX-277**. It also requires that "Members shall ensure that any sanitary or phytosanitary measure [...] is based on scientific principles and is not maintained without sufficient scientific evidence, subject to paragraph 7 of Article 5." These two requirements are reflected in Articles 9.6.6 (b) ("be based on relevant scientific principles"), and 9.6.6 (c) ("are not maintained if there is no longer a scientific basis") of the USMCA.

[401] Appellate Body Report, *India - Agricultural Products*, footnote 271 at ¶ 5.15. **MEX-290.**

[402] Panel Report, *India - Agricultural Products*, ¶¶ 7.603 and 7.614, **MEX-296**; Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶ 7.1433. **MEX-277.**

[403] A finding that a sanitary or phytosanitary measure is inconsistent with Article 5.6 may give rise to a rebuttable presumption that the measure is also inconsistent with Article 2.2. Panel Report, *Russia - Pork (EU)*, ¶ 7.843, **MEX-00.0,** citing Appellate Body, *India - Agricultural Products*, ¶¶ 5.37-5.38, **MEX-00.0.**

achievement of its objective, and the degree of trade restrictiveness involved".[404] The "necessity" of a measure "has to be determined by weighing and balancing "the contribution of the measure to the achievement of the ends it pursues" and "the restrictive impact of the measure on international trade", and by a comparison between the challenged measure and possible alternatives, taking into account the importance of the interests at stake".[405]

377. The Appellate Body also "emphasized that 'the word "necessary" is not limited to what is "indispensable"'[406] To be considered "necessary", a measure need not be indispensable. However, its contribution to the achievement of the objective must be significant. This contribution must be weighed against the restrictive nature of the measure.[407]

378. Specifically in relation to Article 2.2 of the SPS Agreement, the Appellate Body considered that "[t]he establishment or maintenance of an SPS measure which implies or reflects a higher level of protection than the appropriate level of protection determined by an importing Member, could constitute a violation of the necessity requirement of Article 2.2".[408]

379. In Mexico's view, the above considerations are relevant to the interpretation and application of Article 9.6.6(a) of the USMCA in the present dispute.

380. Finally, Mexico notes that, like Article 2.2 of the SPS Agreement, Article 9.6.6(a) expressly regulates the manner in which SPS measures "are "applied".

b. With respect to its sanitary and phytosanitary purposes, the "End-Use Limitation" only applies to the extent necessary to protect human health and native corn

381. As discussed above, the "End-Use Limitation" under Article 6.2 of the Corn 2023 Decree establishes a limitation on the end use of GM corn grain in Mexico for direct human consumption

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[404] Appellate Body Report, *Brazil - Retreaded Tyres*, ¶ 178 **MEX-296**; Panel Report, *India - Agricultural Products*, ¶ 7,608**.**

[405] Panel Report, *India - Agricultural Products*, ¶ 7,609, **MEX-296** citing Appellate Body Report, *Brazil - Retreaded Tyres*, ¶ 178, **MEX-297**; Appellate Body Report, *US* - Gambling, ¶ 306-307 **MEX-298**; and Appellate Body Report, *China - Publications and Audiovisual Products*, ¶ 242. **MEX-299.**

[406] Appellate Body Report, *Brazil - Retreaded Tyres*, ¶ 141, **MEX-297** citing Appellate Body Report, *Korea — Various Measures on Beef*, ¶ 161**. MEX-360.**

[407] Appellate Body Report, *Brazil - Retreaded Tyres*, ¶ 210, **MEX-297.**

[408] Appellate Body Report, *Australia - Salmon*, footnote 166 at ¶ 213, **MEX-292.**

in the form of nixtamalized dough, tortilla and related foods. This measure is implemented, among other things, to protect human health in Mexico from risks arising from contaminants and toxins in GM corn grain (e.g., systemic glyphosate and transgenic proteins) that are consumed directly in everyday staple foods such as tortillas.

382. Mexico considers these risks to human health to be extremely serious, considering (i) the extremely high amount of corn grain directly consumed on a daily basis in the Mexican diet, specifically in the forms of nixtamalized dough, tortilla and similar foods, which is much higher than in other countries in the world, and (ii) the clear scientific evidence of the presence of contaminants and toxins in GM corn grain and their harmful effects on health. Although the United States has attempted to trivialize and dismiss this body of scientific evidence, Mexico's assessment indicates that the risks are real and of particular concern to human health in Mexico.

383. In addition, Mexico considers the interests at stake - the health and welfare of people in Mexico - to be of paramount importance. In this regard, the Mexican Constitution enshrines the human rights to "nutritious, sufficient and quality food", to "protection of health" and to "human welfare".

384. Under these circumstances, Mexico has considered that the "zero risk" level of protection is the appropriate level of protection with respect to the risks to human health arising from the *direct consumption of* GM corn grain in Mexico. In the context of the WTO SPS Agreement, a Member is entitled to determine its own appropriate level of protection as "zero risk".[409] Moreover, the Appellate Body has recognized that "responsible, representative governments commonly act from the perspectives of prudence and precaution where risks of irreversible, e.g. life-terminating, damage to human health are concerned", and the SPS Agreement specifically states that it "explicitly recognize[s] the right of Members to establish their own appropriate level of sanitary protection, which level may be higher (i.e., more cautious) than that implied in existing international standards, guidelines and recommendations".[410]

[409] Appellate Body Report, *Australia - Salmon*, ¶ 125, **MEX-292.**

[410] Appellate Body Report, *EC - Hormones*, ¶ 124, **MEX-286,** cited in Appellate Body Report, US - *Continued Suspension*, ¶ 680, **MEX-294.**

385. In its design and application, the "End Use Limitation" seeks to achieve this "zero risk" level of protection in a manner that is no more trade restrictive than necessary. The measure does not impose a ban on the importation of GM corn grain. Rather, it is designed and implemented as a domestic restriction on the end use of GM corn grain in Mexico, regardless of whether such corn grain is domestically produced or imported. Any impact the measure may have on imports is incidental to its purpose and function, which is to discourage the domestic use of GM corn grain for direct human consumption in the form of nixtamalized dough, tortillas and related foods. When only non-GM corn grain is used for this purpose, human health risks from ***direct consumption*** of GM corn grain are eliminated, thus achieving the appropriate level of protection determined by Mexico.

386. At the same time, the importation of GM corn grain continues to be allowed, including from the United States. The text of Article 6.2 of the 2023 Decree requires Mexico's biosafety authorities (i.e., COFEPRIS) to "[r]evoke and refrain from issuing authorizations for the use of genetically modified corn grain for human consumption".[411] Licenses, permits and authorizations are required to grow GM corn in Mexico, to import GM corn into Mexico and to commercialize GM corn (of any origin, domestic or imported) in the Mexican market. The authorizations issued to importers for new GM corn events simply reflect the internal end-use restrictions that apply to all GM corn kernels in Mexico.

387. Moreover, as the evidence shows, all or almost all of the corn grain imported into Mexico from the United States has historically been for use in animal feed or industrial processing of food for human consumption (e.g., starch, high fructose corn syrup, etc.). This continues to be the case. The "End Use Limitation" has not affected these imports.[412]

388. Therefore, the "End Use Limitation" applies only to the extent necessary to protect human health from the above risks at the appropriate level of protection determined by Mexico.

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[411] To date, none of the existing authorizations for GM corn have been revoked, amended or modified pursuant to Article 6.2. With respect to the cultivation of GM corn in Mexico, there has long been a moratorium on the commercial cultivation of GM corn in Mexico, and Article 6.1 of the Decree 2023 further restricts "permits for the release into the environment in Mexico of genetically modified corn seed" (meaning cultivation with GM corn seed).

[412] *See* Section V.G *supra*.

389. As previously discussed, the "End Use Limitation" also contributes to the SPS purpose of protecting Mexico's native corn from risks arising from transgenic introgression of GE "pest" corn plants into the environment.[413] However, the "zero risk" level of protection considered appropriate by Mexico for the protection of human health overlaps and overshadows the level of protection considered appropriate by Mexico for the protection of native corn. As explained above, this should not prevent the measure from contributing to the purpose of protecting native corn nor diminish its ability to contribute to the purpose of protecting human health in the ALOP determined by Mexico.

c. The "Gradual Sustitution" is not a measure inconsistent with Article 9.6.6(a) of the USMCA because it has not been applied

390. As previously discussed, the "Gradual Substitution" under Articles 7 and 8 of the 2023 Decree has not been implemented. It is simply an executive order to "take appropriate actions," at some point in the future, to facilitate the gradual substitution of GE corn for animal feed and industrial use for human consumption. Articles 7 and 8 do not constitute the "appropriate actions," which do not yet exist. Such actions (i.e. measures) have not yet been designed, proposed, adopted or implemented, let alone applied by "the agencies and entities of the Federal Public Administration". The text of Article 8 states that this will be done "in accordance with scientific principles and relevant international standards, guidelines or recommendations".

391. Therefore, no action has been taken. There has been no "substitution ... of genetically modified corn for animal feed and industrial use for human food", and there is currently no administrative mechanism to begin to carry out such substitution.

392. Mexico submits that the claims raised by the United States against "Gradual Substitution" are, at best, premature. Until the "appropriate actions" have been designed and/or implemented, it cannot be determined whether they have been designed or implemented in any manner that is inconsistent with Articles 9.6.6(a) of the USMCA. It cannot be assumed at this stage that the measures implemented by the "Graduated Replacement" will be applied beyond what is required to protect human health in accordance with the appropriate level of protection to be determined by

[413] *See,* Section VII.C.4. *supra*.

Mexico. Such an assumption could lead to the unintended result of precluding or interfering with Mexico's sovereign right to design, implement and carry out regulatory actions in the public interest, even before such actions are designed, implemented or carried out.

393. If the Panel disagrees with Mexico, and determines instead that the "Gradual Substitution" is in fact an SPS measure that is currently being applied, Mexico submits that it is a provisional SPS measure that has not yet been implemented (*i.e.*, through the "appropriate action"). Under these circumstances, the "Gradual Substitution" is not yet achieving any level of protection, let alone exceeding the level of protection that Mexico may determine to be appropriate. Moreover, it is having no trade restrictive impact. Despite the U.S. claim that "Mexico's Substitution Instruction could have a significant chilling effect on the advancement of biotechnology and bringing new GE corn products to the global marketplace", the U.S. has adduced no evidence of such an effect. To the contrary, since the 2023 Decree went into effect, the volume of yellow corn grain imported from the United States has increased.

394. Based on this, it cannot be argued that the "Gradual Substitution" is being applied beyond what is necessary to protect human health or native corn.

3. The measures are compatible with Article 9.6.7 of the USMCA

395. The United States argues that the measures in dispute are inconsistent with Article 9.6.7 of the USMCA because "Mexico did not document its risk assessment or risk management"[414] and "because the United States received no opportunity to comment on the risk assessments or the resulting risk management".[415] For the reasons set forth below, the United States' claims are without merit.

396. Article 9.6.7 of the USMCA requires each Party to "[conduct] its risk assessment and risk management with respect to a sanitary or phytosanitary regulation within the scope of Annex B of the SPS Agreement in a manner that is documented and provides the other Parties and persons of the Parties an opportunity to comment, in a manner to be determined by that Party".

[414] U.S. Initial Written Submission, ¶¶ 173 and 176.
[415] U.S. Initial Written Submission, ¶¶ 169, 173 and 176.

397. As discussed above, the risk assessment that led to the 2023 Decree was documented in the report entitled "*Scientific Record on Glyphosate and GM Crops*", analysis which was supplemented by additional studies and analysis of CIBIOGEM's SNIB (hereinafter referred to collectively as "Risk Assessment"). This document was published by CONAHCYT on its public website in August 2020.[416] CONAHCYT posted a brief description and link to the report on its public Twitter account.[417] In addition, media outlets published articles about the report. Moreover, the Risk Assessment incorporates a significant number of publicly available scientific and research articles publicly available through the SNIB. This has been part of the Risk Assessment conducted by Mexico.

398. The Risk Assessment evaluated the potential adverse effects on the health of Mexicans from the presence of contaminants, specifically residues[418] of glyphosate and GM proteins in foods made from GM corn that Mexicans commonly consume. The Risk Assessment is consistent with Annex A(4) of the WTO SPS Agreement and is appropriate to the circumstances of the risk to human health pursuant to Article 9.6.8(a) of the USMCA.

399. In addition, the Risk Assessment, pursuant to the first sentence of Annex A(4) of the WTO SPS Agreement is appropriate to the circumstances of the plant health risk pursuant to Article 9.6.8(a) of the USMCA. The Risk Assessment evaluated the likelihood of entry, establishment or spread of a pest, that is, GM corn within Mexico and the potential biological and economic consequences on native corn species and biodiversity in Mexico. Mexico considers GM corn to be a pest in cases where it grows in undesirable areas, such as native cornfields, where it can displace native varieties.[419] As a result of cross-pollination or unintended gene flow, genetic traits from GM

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[416] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, **MEX-085.**

[417] CONAHCYT México, Twitter (X) ("The Scientific Record on Glyphosate and GM Crops explains how herbicide application increased from the planting and commercialization of #corn, #cotton and #GM #soybean in the 1990s"). **MEX-300.**

[418] Footnote 4 of the WTO SPS Agreement states that a contaminant includes pesticide residue **MEX-283***; see also*, Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶ 7.316 (confirming that "the term "contaminants" in Annex A(1)(b) could encompass herbicide residues present in foods or feedstuffs, and that they may pose risks to human or animal life or health."). **MEX-277.**

[419] Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶¶ 7.244-7.245 (explaining that "a plant which grows where it is not wanted may, for that reason, be destructive, cause harm to the health of other organisms or other harm, or be troublesome or annoying […] An important implication of the view

corn are unintentionally transferred to non-target organisms, that is native corn species, resulting in changes in plant populations and negatively affecting Mexico's biodiversity.[420]

400. The Risk Assessment is consistent with Article 9.6.8(b) of the USMCA because it took into account international standards and considered that they were not relevant.

401. The relevant Measures are based on relevant scientific principles in accordance with Article 9.6.6(b) of the USMCA.

402. These issues are detailed below.

4. The Human and Plant Health Risk Assessment is consistent with Article 9.6.8 (a) of the USMCA

a. Mexico's risk assessment meets the criteria of Annex A(4) of the WTO SPS Agreement

403. The Risk Assessment evaluated the potential adverse effects on the health of Mexicans from the presence of contaminants, specifically glyphosate and GM proteins residues[421] in foods made from GM corn commonly consumed by Mexicans. The Risk Assessment is consistent with Annex A(4) of the WTO SPS Agreement.

404. The Risk Assessment examined the likelihood of entry, establishment or spread of a pest, *i.e.,* GM corn within Mexico and the potential biological and economic consequences on native corn species and biodiversity in Mexico. Mexico considers GM corn to be a pest in cases where it grows in undesirable areas, such as native corn fields, where it can displace native varieties.[422] As

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that plants growing where they are undesired may be considered as "pests" is that even a cultivated plant or crop may in some situations be or become a "pest" […] Similarly, a GM plant cultivated expressly in a particular field would not qualify as a "pest", whereas volunteer GM plants growing in fields of conventional plants might be considered to be undesirable plants and hence "pests", or "weeds", from the perspective of the farmer seeking to grow a crop other than the unwanted GM crop."). **MEX-277.**

[420] *See* Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶¶ 7.255 and 7.269. **MEX-277.**

[421] Footnote 4 of the SPS Agreement notes that a contaminant includes pesticide residues; *see also* Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶ 7.316 (confirming that "the term "contaminants" in paragraph 1(b) of Annex A could cover herbicide residues present in food or feed, and that these could pose risks to human or animal life or health.") **MEX-277**

[422] Panel Report, *EC - Approval and Marketing of Biotech Products*, ¶¶ 7.244-7.245 (explaining that "[a] plant growing where it is not wanted may [...] be destructive, cause damage to the health of other organisms or other harm, or be troublesome or annoying. [...] An important implication of the view that plants growing

a result of cross-pollination or unintended gene flow, genetic traits from GM corn are unintentionally transferred to non-target organisms, *i.e.*, native corn species, causing changes in plant populations and negatively affecting Mexico's biodiversity.[423]

b. The Risk Assessment for health is appropriate to the circumstances of the risk to human health and takes into account the available scientific evidence

405. The Risk Assessment sufficiently addresses the risks from glyphosate residues in food produced from GM corn, is appropriate to the circumstances of the risk to human health and takes into account the relevant scientific evidence. As discussed above, the concern with GM corn is its tolerance to herbicides, particularly glyphosate, which is the most widely, used herbicide in the world in the cultivation of GM corn.

(1) Risk from glyphosate exposure

406. The Risk Assessment first covers a core aspect, that is, identifying the risk to human health from exposure to glyphosate based on relevant scientific studies and literature. Specifically, the Risk Assessment took into consideration the following information:

- The analysis of glyphosate and HBGs as probable carcinogens conducted in 2015 by the "International Agency for Research on Cancer" (IARC), which belongs to the WHO, based on an extensive review of scientific literature on glyphosate.[424]
- The 2019 publication on the toxicological profile of glyphosate by the Agency for Toxic Substances and Disease Registry (ATSDR), part of the U.S. Department of Health, which indicated that there was a strong correlation between exposure to glyphosate (pure or in a commercial formulation) with the occurrence of different types

where they are unwanted may be considered to be "pests" is that even a crop or cultivated plant may in some cases be "pests" or become pests. [...] Similarly, a GM plant grown expressly in a particular field would not not qualify as a "pest", whereas volunteer […] GM plants growing in fields of conventional plants might be considered to be undesirable plants and hence "pests", or "weeds", from the perspective of the farmer seeking to grow a crop other than the unwanted GM crop"). **MEX-277.**

[423] *See Panel Report, EC - Approval and Commercialization of Biotech Products*, ¶¶ 7.255 and 7.269, **MEX-277.**

[424] IARC, "*Monograph on Glyphosate*", 2015, **MEX-301.** IARC, "*Q&A on Glyphosate*", 2016, **MEX-302**. Benbrook M., "*How did the US EPA and IARC reach diametrically opposed conclusions on the genotoxicity of glyphosate-based herbicides*?", 2019, **MEX-303.**

of cancer and other pathologies, such as the development of retardation, intestinal diseases, and liver and kidney toxicities.[425]

- The 2020 Glyphosate Toxicity Anthology, which includes 1,108 scientific studies on the effect of glyphosate on health and the environment.[426]

407. The Risk Assessment evaluated the genotoxic potential of glyphosate, including the development of different types of cancer (leukemia, melanoma, multiple myeloma, non-Hodgkin's lymphomas), as well as oral cavities, and diseases in prostate, thyroid, colon, lung, rectum, pancreas, kidney and bladder, and the potential development of metabolic and neurological diseases. The analysis cites nearly 50 studies documenting various adverse health effects due to glyphosate exposure.[427]

(2) There are risks in small dose

408. The studies collected in the aforementioned CONAHCYT and CIBIOGEM databases and other scientific literature show that, in addition to the effects caused by acute and/or chronic exposure to glyphosate, there is evidence of toxicity by glyphosate-based herbicides at low doses, *i.e.*, doses much lower than those used in most toxicity studies and which are easily found in the environment. The concept "low dose effects" refers to effects that, according to scientific evidence, occur at lower dose levels than those analyzed in standardized toxicity studies. Data and information from animal studies and human cell studies suggest that exposure to low doses of glyphosate affects hormone levels and reproductive systems, leading to endocrine disruption.[428] Several harmful effects have been reported in first-generation exposures to glyphosate and glyphosate-based herbicides, with consequences occurring in up to two subsequent generations, without subsequent generations having been exposed to this herbicide. In addition, the scientific evidence demonstrates the following:

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[425] ATSDR U.S. Department of Health and Human Services. "*Agency for Toxic Substances and Disease Registry. Toxicological Profile for Glyphosate*", 2020, **MEX-304.**

[426] Martin, E., "*Glyphosate Toxicological Anthology*", 2020, **MEX-305.**

[427] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, **MEX-085.**

[428] Vandenberg, L.N., Colborn, T., Hayes, T.B., Heindel, J.J., Jacobs, Jr., D.R., Lee, D.H., Shioda, T., Soto, A.M., vom Saal, F.S., Welshons, W.V., Zoeller, R.T. y Peterson Myers, J. "*Hormones and Endocrine-Disrupting Chemicals: Low-Dose Effects and Nonmonotonic Dose Responses*" 2012. **MEX-306**.

- *In vitro* and *in vivo* studies show that glyphosate and glyphosate-based herbicides, at low doses, can act as endocrine disruptors. Female rats and mice exposed to glyphosate prior to the age of puberty have shown alterations in the development and differentiation of ovarian follicles and uterus, which have affected their fertility.[429] In pregnant animals, the effects have been identified in F1 and F2 generation offspring, and in fish, several reproductive and epigenetic affectations have been reported that affect egg maturation, generating reproductive toxicity and compromising the dynamics of exposed populations.[430]
- A study on cells in neurological tissues in mice found that tissue exposure to low concentrations of glyphosate, such as those allowed by environmental protection authorities in drinking water, induced environmental neurotoxicities in the nervous system.[431]
- Other studies confirm that glyphosate can cause damage to the epigenomic structure (DNA methylation patterns) of organisms and that harmful effects from exposure to glyphosate herbicides can even appear after three generations. One study noted that F2 and F3 generations (great-grandchildren and great-great-grandchildren) of rats exposed to glyphosate concentrations below what is known as the "no-observable-effect-level" dose ("NOAEL", which refers to the highest dose with unobservable adverse effects), showed an increased incidence of abnormalities, such as prostate disease, obesity, kidney disease, and ovarian and birth abnormalities.[432]
- The endocrine involvement of exposure to low doses of glyphosate in humans was demonstrated by assays in MDA-kb2 cell lines that allow the detection of hormone receptor antagonists,[433] and in placental JEG3 cell lines. It was observed that exposure to glyphosate-based herbicides at concentrations below those recommended for

[429] Ingaramo, P., "*Are glyphosate and glyphosate-based herbicides endocrine disruptors that alter female fertility*?", **MEX-307**.

[430] Davico, C. E, Pereira, A.G., Nezzi, L., Jaramillo, M.L., de Melo, M.S., Müller, Y.M.R., y Nazari, E.M., "*Reproductive toxicity of Roundup WG® herbicide: impairments in ovarian follicles of model organism Danio rerio*", **MEX-308.**

[431] Masood, M.I, Mahrukh Naseem, S., Warda, A., Tapia-Laliena, M.A., ur Rehman, H., Nasim, M.J. y Schäfer, K.H., "*Environment permissible concentrations of glyphosate in drinking water can influence the fate of neural stem cells from the subventricular zone of the postnatal mouse*", **MEX-309.**

[432] Kubsad, D., Nilsson, E.E., King, S.E., Sadler-Riggleman, I., Beck, D. y Skinner, M.K., "*Assessment of Glyphosate Induced Epigenetic Transgenerational Inheritance of Pathologies and Sperm Epimutations: Generational Toxicology*," en "*Scientific Reports*", **MEX-310.**

[433] Wilson, VS, Bobseine, K, Lambright, CR, Gray, LE Jr., "*A novel cell line, MDA-kb2, that stably expresses an androgen- and glucocorticoid-responsive reporter for the detection of hormone receptor agonists and antagonists*", **MEX-311**.

agricultural application causes an alteration of aromatase activity, which is responsible for estrogen synthesis.[434]

- Laboratory studies have shown that very low levels of glyphosate, Roundup, POEA and the metabolite AMPA kill human umbilical, embryonic and placental cells.[435]

409. Scientific evidence affirms that the toxic effects of glyphosate and herbicides containing glyphosate are manifested even at low doses, mainly affecting the function of sex hormones and, therefore, generating reproductive complications in organisms exposed to these substances. Furthermore, glyphosate is the most widely used herbicide in the world.[436] This means that, even assuming that glyphosate has a low level of toxicity, the risks associated with its exposure are extremely high. This is because the risk is equivalent to the hazard multiplied by the exposure, and when exposure increases (for example, through daily consumption of flour made from GM corn), regardless of the low level of toxicity that the hazard represents, the risk also increases.

(3) Studies document the presence of GMOs and glyphosate residues in corn, corn flour and other foodstuffs

410. It is important to note that the studies compiled in the CONAHCYT database and other scientific literature confirm the presence of glyphosate as a residue in GM crops and its additional presence in foods prepared from such GM crops. This confirms that the adverse health effects posed by glyphosate exposure continue to be present in processed foods and present a tangible risk to human health. CONAHCYT reviewed, *inter alia*, the following scientific studies on the presence of residues in GM corn and foods processed from such crops:

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[434] Richard S., Moslemi S., Sipahutar H., Benachour N., Seralini G-E., "*Differential effects of glyphosate and roundup on human placental cells and aromatase*", 2005, **MEX-312.**

[435] Richard, S., Moslemi, S., Sipahutar, H., Benachour, N. y Seralini, G.E. (2005). "*Differential effects of glyphosate and roundup on human placental cells and aromatase"*. Environ Health Perspectives 113 (6):716-20. **MEX-312.** Mesnage, R., Bernay, B., Seralini, G.E. (2013). "*Ethoxylated adjuvants of glyphosate-based herbicides are active principles of human cell toxicity"*. Toxicology 313, 122–128. **MEX-207.** Benachour, N. y Seralini, G.E. "*Glyphosate Formulations Induce Apoptosis and Necrosis in Human Umbilical, Embyonic, and Placental Cells"*, p.1. **MEX-193**.

[436] Valavanidis, A., "*Glyphosate, the Most Widely Used Herbicide. Health and safety issues. Why scientists differ in their evaluation of its adverse health effects*", 2018. **MEX-168**. *See* Quian T., *et al*., "*Glyphosate exposure induces inflammatory responses in the small intestine and alters gut microbial composition in rats*", 2020. **MEX-169**.

- A 2012 study reported that HBG residues were present in glyphosate-tolerant edible plants, especially in GM corn.[437]
- In 2017, a study revealed the presence of transgenic sequences and the herbicide glyphosate in various corn-based foods, which are widely consumed and easily accessible in Mexico. The samples included staple products (tortillas, tostadas and tortilla chips) and processed products (flours, snacks and breakfast cereals). The study found that 82% of the foods analyzed contained GM event sequences, of which 30% reported the presence of glyphosate and AMPA residues. In addition, 60% of the GMO samples were found to have the glyphosate-tolerant GM corn event known as NK603.[438]
- Other studies have also detected the presence of glyphosate and AMPA residues in water, as well as in foods such as cereals (barley, oats, rye and wheat); processed products (bread, breakfast cereals, corn syrup, flour and baking mixes, wheat cakes and snacks, bran flour, soy milk, soy sources); other products (legumes and legume-based foods, peas and transgenic soybeans).[439] The presence of traces of glyphosate and its derivatives has been detected in a large number of foods, especially in cereals. In these cases, glyphosate is sprayed before the harvest period to accelerate grain drying, as well as on GM corn and soybean crops.[440] In addition, the presence of glyphosate was detected in products with corn ingredients (pancakes and corn syrup) and in those made from soybeans (soy sauce, soy milk and tofu), the authors point out that glyphosate has increased with the introduction of GM corn and soybeans and did not rule out the possibility that the products tested were made from these inputs.[441]
- Glyphosate residues in small grain crops such as oats, barley and wheat, as well as canola, flaxseed, beans, peas, lentils and soybeans, are increasing due to this growing practice of drying crops just prior to harvest.[442] According to[443] a pre-harvest preparation guide from Monsanto Company, this is considered a management

[437] Mesnage R, *et al*., "*Cytotoxicity on human cells of Cry1Ab and Cry1Ac Bt insecticidal toxins alone or with a glyphosate-based herbicide*." 2013, **MEX-139.**

[438] González-Ortega, E., *et al*., "*Pervasive presence of transgenes and glyphosate in maize-derived food in Mexico*." 2017, **MEX-125.**

[439] Xu, J., Smith, S., Smith, G., Wang, W. y Li, Y. "*Glyphosate contamination in grains and foods: An overview*". **MEX-208**.

[440] LEISA. *"Glyphosate in wheat, oats and beans",* **MEX-313**.

[441] Rubio, F., Guo, E., & Kamp, L., "*Survey of glyphosate residues in honey, corn and soy products. Journal of Environmental & Analytical Toxicology*", **MEX-314.**

[442] Gillam, C, "*FDA Tests Confirm Oatmeal, Baby Foods Contain Residues of Monsanto Weed Killer*", **MEX-315.**

[443] EWG. "*New round of EWG testing finds glyphosate in kids' breakfast foods from quaker oats, General Mills*", 2018, **MEX-316;** EWG. "*Shopper's Guide to Pesticides in Produce*", 2021, **MEX-317**.

strategy not only to control perennial weeds, but also to facilitate crop management and advance next year's crop.[444]

- Another study that compared the nutritional and elemental composition of GM soybeans, conventional soybeans and organic soybeans in the United States showed that the GM soybean samples contained a high presence of glyphosate residues, while the other two contained no glyphosate residues. In addition, the results reveal that the organic soybeans showed the healthiest nutritional profile with much more total protein, zinc and less fiber, as well as less total saturated fat.[445]
- In 2012, residue testing by the UK Food Standards Agency (FSA) found glyphosate residues in one third of the bread samples tested. The same study notes that in the United States, testing in 2011 by the US Department of Agriculture (USDA) revealed the presence of glyphosate and AMPA in 90.3% and 95.7%, respectively, of soybean samples tested.[446]
- In Canada, a scientific group analyzed 7955 food samples, finding glyphosate residues in 42.3% of the samples. The food samples included a wide variety of fresh and processed fruits and vegetables, cereals (e.g., wheat, corn, oats, barley, buckwheat, and quinoa), beverages, legumes (beans, peas, lentils, chickpeas), soy products, and children's products, as well as frozen foods and convenience foods. The study does not specify whether these products contain or are made from GMOs; however, in the case of processed foods or foods based on soy and corn, this possibility cannot be ruled out.[447] Other scientific investigations speak of the introduction of thousands of tons of glyphosate into the food chain from foods made from GMOs, such as soybeans, which are tolerant to this herbicide. [448]
- In December 2023, the American Academy of Pediatrics published a clinical report, prepared by medical specialists who are part of the Committee on Nutrition, in which they point out the close relationship between glyphosate and GMOs and warn about the quantifiable amounts of this herbicide in a wide variety of foods made from

[444] Monsanto, "*Preharvest Staging guide*", 2016, **MEX-318.**

[445] Bøhn, T., M. Cuhra, T. Traavik, M. Sanden, J. Fagan & P. Primicerio. "*Compositional differences in soybeans on the market: Glyphosate accumulates in Roundup Ready GM soybeans*." 2014, **MEX-319**.

[446] Myers, J.P., M.N. Antoniou, B. Blumberg, L. Carroll, T. Colborn, L. G. Everett, M. Hansen, P. J. Landrigan, B. P. Lanphear, R. Mesnage, L. N. Vandenberg, F. S. vom Saal, W. V. Welshons & C. M. Benbrook. "*Concerns over use of glyphosate-based herbicides and risks associated with exposures: a consensus statement*.", 2016, **MEX-320**.

[447] Kolakowski BM, Miller L, Murray A, Leclair A, Bietlot H, van de Riet JM. "*Analysis of glyphosate residues in foods from the Canadian retail markets between 2015 and 2017"*. 2020, **MEX-321**.

[448] Bøhn T, Millstone E. "*The introduction of thousands of tonnes of glyphosate in the food chain-an evaluation of glyphosate tolerant soybeans*." 2019, **MEX-322**.

GMOs that are accessible to children and adolescents and included a recommendation to consume organic foods.[449]

411. Human exposure to glyphosate is widespread and consistent, indicating a high risk of potential negative effects of this pesticide on human health.

412. For the above reasons, an adequate risk assessment consistent with Article 9.6.8(a) was performed.

c. The Risk Assessment for the impact on native varieties derived from the genetic transfer is compatible with Article 9.6.8 (a) of the USMCA

413. The Risk Assessment sufficiently addresses the risks of entry, establishment or spread of GM corn to native varieties, is appropriate to the circumstances of the risk and takes into account relevant scientific evidence.

414. As discussed above, Mexico is a country with great biological diversity (10% of the world's biological diversity) and is considered one of the centers of origin of several important agricultural crops.[450] Cases of gene transfer from GM crops, including aspects such as herbicide resistance to native corn crops, pose a risk not only to the continued survival of native varieties, but also to the way indigenous communities farm.

415. In 2001, a scientific study of the CONAHCYT database showed for the first time the presence of transgenic sequences in native corn varieties in two communities in the Northern Sierra of Oaxaca.[451] This event reaffirmed what the scientific community and the social sector, nationally and internationally, had warned as a possible consequence of the release of GM corn into the environment (intentionally, accidentally or illegally) in Mexico.

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[449] Steven A. Abrams, Jaclyn Lewis Albin, Philip J. Landrigan. Committee on nutrition, council on environmental health and climate change, "*Use of Genetically Modified Organism (GMO)", 2023.* **MEX-323**.

[450] Sanchez G., J. J., Goodman, M. M., & Stuber, C. W. "*Isozymatic and Morphological Diversity in the Races of Maize of Mexico*", 2000, **MEX-005.**

[451] Quist, D., Chapela, I., "*Transgenic DNA introgressed into traditional maize landraces in Oaxaca, Mexico*", 2001, **MEX-090**.

416. In 2004, Mexico's Commission for Environmental Cooperation ("CEC") published a study on the impact of GM corn on Mexico's ecological, biological and agrobiological biodiversity.[452] The study highlighted the importance of corroborating the presence of transgenic sequences in native corn in Oaxaca and extending the research to other States, and indicated that:

- The unintentional movement of transgenes into corn populations, both cultivated and wild, for which such genetic transformations were not designed, involves risks in two ways: the possibility of transgenes entering and persisting (introgression) in native corn landraces and other cultivated varieties, as well as in their wild relatives; and the biological consequences of this introgression.
- The scope of the impact is ecosystemic;
- Through gene flow, transgenic varieties can alter biodiversity through their effects on the environment and on other unrelated species (such as teosinte, a wild relative of corn);
- There is a negative effect on non-target organisms, especially beneficial insects, pollinators (the best known case is the impact on monarch butterfly populations) and other organisms that act as natural control of the transgenes' target "pests" targeted by the transgenes.
- There are other effects such as the possible accumulation of recombinant DNA in the environment, with ecological implications, as well as the horizontal transfer of any of the transgenic sequences into bacteria, viruses or other organisms.

417. Over the years, evidence of the unintended presence of transgenes, at low levels, has been detected in native corn populations in communities in the states of Oaxaca, Michoacán, Veracruz, Mexico City and Chiapas. These areas are known for their high diversity of native corn varieties[453]. A 2018 study reported the presence of transgenic sequences in corn crops in Oaxaca, Chiapas,

[452] Álvarez-Buylla, E. (2004). "*Ecological, Biological and Agrobiodiversity Aspects of the Impacts of Transgenic Corn"*. For the Secretariat of the Commission for Environmental Cooperation of North America. As part of the Article 13 Initiative: Corn & Biodiversity: The Effects of Transgenic Corn in Mexico. **MEX-151.**

[453] Piñeyro-Nelson, A., Van Heerwaarden, J., Perales, H., Serratis-Hernández, J., Rangel, A., Hufford, M., Gepts, P., Garay-Arroyo, Rivera-Bustamante, R., Álvarez-Buylla, E. "*Transgenes in Mexican maize: molecular evidence and methodological considerations for GMO detection in landrace populations*", 2019, **MEX-101;** González-Ortega, E., *et al*., "*Pervasive presence of transgenes and glyphosate in corn-derived food in Mexico*", 2017, **MEX-125;** INECC, Álvarez-Buylla, E.,"*Monitoring the presence of transgenic sequences in corn crops in priority sites in Mexico*. Instituto Nacional de Ecología y Cambio Climático", 2018, **MEX-103;** Fenzi, M., J. Foyer, V. Boisvert & H. Perales, "*Recalcitrant maize: Conserving agrobiodiversity in the era of genetically modified organisms. Plants, people, planet*", 2023. **MEX-324**.

Michoacán, Veracruz and Chiapas. They analyzed 1,580 samples of native corn varieties and detected the presence of transgenes in 8%.[454]

418. For the following reasons, an adequate risk assessment was performed in accordance with Article 9.6.8(a).

5. The Risk Assessment is consistent with Article 9.6.8 (b) of the USMCA

419. Article 9.6.8(b) requires that a risk assessment take into consideration the relevant guidance of the WTO SPS Committee and the relevant international standards, guidelines and recommendations of the competent international organization.

420. The WTO SPS Agreement identifies the standards, guidelines and recommendations established by the Codex Alimentarius Commission ("Codex") on pesticide food additives and contaminants.[455] In this regard, the Codex Committee on Pesticide Residues is the authority responsible for setting Maximum Residue Limits (MRL) for pesticide residues in specific foods or in groups of foods or feeds moving in international trade. [456]

421. The standards identify a list of products and the maximum residue limit of glyphosate that the products may safely contain. Glyphosate is allowed for human consumption at concentrations up to 30 mg/kg for cereals (grain), 5 mg/kg for corn (grain), lentils (dry), peas (peas, grain) and edible offal of corn, 3 mg/kg for sweet corn (cob), 2 mg/kg for beans (grain) and sugar cane.[457]

422. Existing food safety standards are irrelevant to the risks posed by pesticide residues such as glyphosate in corn flour and processed foods. Instead, Mexico has relied on existing scientific literature and studies to assess the risks to human health from the consumption of corn flour made from glyphosate-treated GM corn and glyphosate-based herbicides in formulating the "End-Use Limitation".

423. Codex MRLs are insufficient to address Mexico's level of protection. As discussed above, the population in Mexico consumes 10 times more corn products than consumers in the United

[454] CONAHCYT, "*Scientific Record on Glyphosate and GM Crops*", 2020, p.7, **MEX-085.**
[455] SPS Agreement, Annex A(3)(a). **MEX-283.**
[456] FAO/OMS. "*About the Codex Alimentarius"*, 2021. **MEX-325**.
[457] Codex Alimentarius. "*LMR of pesticides*", 2021. **MEX-326.**

States. A substantial proportion of this is whole corn grain consumed directly in the form of nixtamalized dough, tortilla and similar foods. In the United States, a larger proportion may be processed and ultra-processed corn. Therefore, in principle, the average person's exposure to dietary glyphosate from GM corn is 10 times higher in Mexico than in the United States.

424. For this reason, a Codex "consumer safe" MRL/CXL based on global averages or estimates of daily consumption of the relevant foods may not be safe for consumers in Mexico. Given that direct consumption of corn grain is so high in Mexico, and exposure to contaminants and toxins is proportionately high, a departure from Codex standards is necessary to achieve Mexico's ALOP.

425. Moreover, Codex does not even address the toxicity of proteins associated with GMOs (e.g., insecticidal toxins of the Cry family). Even if it did, the same problem described above would apply.

426. Thus, in this case, international standards and guidelines are inadequate to address the risks identified by Mexico from GM corn. Specifically, Codex does not address the risk from exposure to glyphosate residues and GM protein in foods made with GM corn.

427. The WTO SPS Agreement identifies the standards developed by the International Plant Protection Convention as relevant to plant health, but those standards do not address the risk of unintentional transfer of GM traits to native corn in Mexico, taking into account the predominant agricultural practices in Mexico (i.e., milpa and small-scale farming) and the natural biodiversity of unique native varieties and landraces of corn.

428. In the absence of guidance from international standards, Mexico conducted a rigorous risk assessment to identify the scientific evidence supporting the measures in question. As such, the Risk Assessment complies with Article 9.6.8(b) of the USMCA.

6. The "End-Use Limitation" is consistent with Article 9.6.6(b) of the USMCA.

429. The "End-Use Limitation" is also consistent with Article 9.6.6(b) of the USMCA, which requires that measures be based[458] on relevant scientific principles[459], taking into account relevant factors, including, if appropriate, different geographic conditions.

430. The measure is based on a thorough and robust review of scientific studies, data and analyses that identify risks to: *i)* human health from the consumption of foods made with GM corn and *ii)* risks to the survival of native corn varieties from the spread of GM corn varieties.

431. The measure takes into account "relevant factors to Mexico", namely the central role of corn in Mexico's economic, agricultural, dietary, gastronomic and indigenous farming traditions. It also considers the current patterns of corn consumption through tortillas in the Mexican diet, which rivals that of any other country. This fact is relevant to the assessment of the risk of pesticide residue and GM protein consumption from the continued, sustained and long-term consumption of a corn-based diet in the Mexican population.

432. The measure is designed strictly as an end-use limitation. It does not prohibit or restrict imports of GM corn. The limitation applies to both GM corn grown in Mexico and imported GM corn. The measure is tailored to the specific risk of glyphosate residues in foods made with GM corn and limits the effect of any restriction to the specific use of GM corn in the processing of flour by nixtamalization. It does not go beyond that.

433. Furthermore, the scientific evidence on the risk of displacement of native corn varieties is well documented. Therefore, the measure strictly targets the diversion and distribution of commercialized GM corn for nixtamalization, thus limiting a crucial pathway for the spread of the

[458] *See* Appellate Body Report, *EC – Hormones*, ¶ 193 (discussing the meaning of "based on" in Article 2.2 of the SPS Agreement noted that "[t]he requirement that an SPS measure be "based on" a risk assessment is a substantive requirement that there be a rational relationship between the measure and the risk assessment"). **MEX-286.**

[459] *See* Panel Report, *Japan — Apples*, ¶¶ 8.91 and 8.92 (confirming that scientific evidence or testimony can include both "direct" and "indirect" evidence. The Panel noted that "the evidence to be considered should be evidence gathered through scientific methods, excluding by the same token information not acquired through a scientific method." In addition to the fact that "indirect evidence may be scientific, even if it does not directly prove the facts."). **MEX-327.**

pest (GM corn). By restricting the use of GM corn for flour processing, the measure addresses the risk of diversion of GM corn kernels.

434. It is evident that the measure is based on relevant scientific principles and that it takes into account factors relevant to Mexico. Thus, the measure complies with Article 9.6.6(b) of the USMCA.

F. The measures at issue are consistent with Article 9.6.10 of the USMCA because they are no more trade-restrictive than necessary to achieve the level of protection that Mexico has determined to be adequate

435. The United States argues that each of the measures at issue are inconsistent with Article 9.6.10 of the USMCA because they "are more trade-restrictive than required to achieve an ALOP that Mexico has determined to be appropriate".[460] For the reasons set forth below, the United States' arguments are without merit.

1. The legal standard of "not more trade-restrictive than required" under Article 9.6.10 of the USMCA Agreement and Article 5.6 of the SPS Agreement.

436. The First sentence of Article 9.6.10 requires that "each Party shall select a sanitary or phytosanitary measure that is not more trade restrictive than required to achieve the level of protection that the Party has determined to be appropriate". This reflects the text of Article 5.6 of the SPS Agreement, which states: "Members shall ensure that such measures are not more trade-restrictive than required to achieve their appropriate level of sanitary or phytosanitary protection, taking into account technical and economic feasibility".

437. The second sentence of Article 9.6.10 of the USMCA provides that: "For greater certainty, a sanitary or phytosanitary measure is not more trade restrictive than required unless there is another option that is reasonably available, taking into account technical and economic feasibility, that achieves the Party's appropriate level of protection and is significantly less restrictive to trade". This reflects the language of footnote 3 of Article 5.6 of the SPS Agreement, which states that: "a measure is not more trade-restrictive than required unless there is another measure, reasonably available taking into account technical and economic feasibility, that achieves the

[460] U.S. Initial Submission, ¶ 185 and generally ¶¶ 185-194.

appropriate level of sanitary or phytosanitary protection and is significantly less restrictive to trade."

438. In the context of WTO dispute settlement, the Appellate Body has explained that Article 5.6 seeks to ensure that appropriate limits are placed on the trade restrictiveness of a Member's SPS measures.[461] Compliance with this requirement is tested by comparing the measure in question with possible alternative measures.[462] Thus, the legal question under Article 5.6 of the SPS Agreement is not whether the authorities of the importing country, in conducting the risk assessment, have acted in accordance with the obligations of the SPS Agreement. Rather, the legal question is whether the importing country's authorities could have adopted a less trade restrictive measure. This requires a panel to objectively assess whether an alternative measure proposed by the complainant would achieve the importing Member's appropriate level of protection.[463]

439. Three cumulative conditions must be met to establish that a measure is more trade-restrictive than necessary within the meaning of Article 5.6 of the SPS Agreement. The complainant must demonstrate by argument and evidence[464] that an alternative measure: (i) is reasonably available taking into account technical and economic feasibility; (ii) achieves the Member's ALOP; and (iii) is significantly less restrictive to trade than the contested SPS measure.[465] These elements are cumulative in nature, meaning that all three must be demonstrated to establish an inconsistency with this obligation.[466]

440. In Mexico's view, the above considerations are relevant to the interpretation and application of Article 9.6.10 of the USMCA in the present dispute.

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[461] Appellate Body Report, *Australia — Apples*, ¶ 341. **MEX-279**.

[462] Appellate Body Report, *Australia — Apples*, ¶ 363. **MEX-279.**

[463] Appellate Body Report, *Australia — Apples*, ¶ 356. **MEX-279**.

[464] It is up to the claimant to demonstrate that there is a measure that meets the three cumulative requirements.

[465] Appellate Body Report, *Korea — Radionuclides (Japan)*,¶ 5.21, **MEX-291;** Panel Report, *Costa Rica — Avocados (Mexico)*,¶ 7.1800. **MEX-273**.

[466] Appellate Body Report, *India — Agricultural Products*, ¶ 5.203, **MEX-290;** Appellate Body Report, *Australia – Salmon*, ¶ 194, **MEX-292;** Panel Report, *Costa Rica — Avocados (Mexico)*, ¶ 7.1800. **MEX-273**.

441. Mexico also recalls that the first requirement of Article 2.2 of the SPS Agreement, which requires that an SPS measure be "applied only to the extent necessary to protect human, animal or plant life or health", **"**gives meaning to paragraph 6 of Article 5", and that, therefore, these provisions "should constantly be read together".[467] The first requirement of Article 2.2 is reflected in Article 9.6.6(a) of the USMCA, which Mexico has addressed above in the relevant sections.

2. With respect to its sanitary and phytosanitary purposes, the "End-Use Limitation" is no more trade restrictive than is required to achieve the level of protection that Mexico has determined to be adequate.

442. As previously discussed, the "End-Use Limitation" under Article 6.2 of 2023 Decree establishes a limitation on the end use of GM corn grain in Mexico for direct human consumption in the form of nixtamalized dough, tortilla and related foods. This measure applies, *inter alia*, to protect human health in Mexico from risks arising from contaminants and toxins in GM corn grain (for example, systemic glyphosate and GMO-associated proteins) that are consumed directly in staple foods such as tortillas.

443. Mexico considers that these risks to human health are extremely serious, considering: (i) the very high amount of corn grain that is directly consumed on a daily basis in the Mexican diet, specifically in the forms of nixtamalized dough, tortilla and similar foods, which is much higher than in other countries of the world, and (ii) the clear scientific evidence of the presence of contaminants and toxins in GM corn grain and their harmful effects on health. Although the United States has attempted to trivialize and dismiss this body of scientific evidence, Mexico's assessment indicates that the risks are real and especially relevant to human health in Mexico.

444. In addition, Mexico considers that the importance of the interests at stake -the health and welfare of people in Mexico- is of utmost importance. In this regard, the Mexican Constitution enshrines the human rights to "nutritious, sufficient and quality food", to the "health protection" and to the "well-being of people".

445. Under these circumstances, Mexico has considered that a "zero risk" level of protection is the appropriate level of protection with respect to the risks to human health derived from the direct

[467] Panel Report, *India — Agricultural Products*, ¶¶ 7.603 and 7.614, **MEX-296;** Panel Report, *EC — Approval and Marketing of Biotech Products*, ¶ 7.1433. **MEX-277.**

consumption of GM corn grain in Mexico. In Mexico's view, it is evident in the design and application of the measure that this is the level of protection that Mexico has determined to be appropriate. Mexico recalls that, in the context of the WTO SPS Agreement, a Member is entitled to determine that its own appropriate level of protection is "zero risk".[468] Moreover, the Appellate Body has recognized that "responsible, representative governments commonly act from the perspectives of prudence and precaution where risks of irreversible, e.g. life-terminating, damage to human health are concerned", and that the SPS Agreement expressly recognizes "the right of Members to establish their own appropriate level of sanitary protection, which level may be higher (i.e., more cautious) than that implied in existing international standards, guidelines and recommendations".[469]

446. In its design and application, the "End-Use Limitation" seeks to achieve this "zero risk" level of protection in a manner that is no more trade restrictive than necessary. Importantly, the measure does not impose a ban on the importation of GM corn grain. Rather, it is designed and applied as a domestic restriction on the end use of GM corn grain in Mexico, regardless of whether such corn grain is domestically produced or imported. Any impact the measure may have on imports is, in any event, incidental to its purpose and function, which is to discourage the domestic use of GM corn grain for direct human consumption in the form of nixtamalized dough, tortilla and related foods. When only non-GM corn grain is used for this purpose, human health risks from *direct consumption* of GM corn grain will be eliminated, achieving the appropriate level of protection determined by Mexico.

447. At the same time, the importation of GM corn grain continues to be permitted, including from the United States. Most of the corn grain imported into Mexico from the United States is destined for animal feed and industrial processing of food for human consumption (for example, cornstarch, high fructose corn syrup, etc.). The "End-Use Limitation" has not affected these imports.[470]

[468] Appellate Body Report, *Australia – Salmon*, ¶ 125. **MEX-292.**

[469] Appellate Body Report, *EC – Hormones*, ¶ 124, **MEX-286,** quoted in the Appellate Body Report, *US — Continued Suspension,* ¶ 680. **MEX-294.**

[470] *See,* Section V.G *supra.*

448. Therefore, Mexico submit that the "End-Use Limitation" is not more trade restrictive than is required to achieve the level of protection that Mexico has determined to be adequate.

449. The United States has the burden of demonstrating that there are significantly less trade restrictive measures that would still achieve the level of protection that Mexico has considered adequate under the circumstances.

450. In its Initial Submission, the United States denies the existence of any "credible scientific evidence establishing any health risks," and on this basis concludes that "whatever ALOP Mexico might have set, the Tortilla Corn Ban would be more trade-restrictive than is necessary to meet it".[471] The United States suggests that "because the Tortilla Corn Ban does not achieve any ALOP, a reasonably available, less trade-restrictive alternative would be to withdraw it altogether".[472] Mexico strongly disagrees with these statements.

451. Finally, as previously discussed, the "End-Use Limitation" also contributes to the purpose of the SPS measures to protect Mexico's native corn from risks arising from transgenic introgression of "pest" GM corn plants into the environment.[473] However, the "zero risk" level of protection considered adequate by Mexico for the protection of human health overlaps and eclipses the more "risk tolerant" level of protection considered adequate by Mexico for the protection of native corn. This relationship between the two purposes should not preclude the measure from contributing to the purpose of protecting native corn while being applied for the purpose of protecting human health at the ALOP determined by Mexico (or diminish its ability to do so).

3. The "Gradual Substitution" is not inconsistent with Article 9.6.10 of the USMCA because it has not been applied

452. As discussed above, the "Gradual Substitution" under Articles 7 and 8 of the 2023 Decree has not been implemented or applied. As of today, it is an executive order to "carry out the appropriate", at some point in the future, to facilitate the gradual substitution of GM corn for animal feed and industrial use for human consumption. Articles 7 and 8 do not constitute the "appopiate actions", which do not yet exist. Such measures have not yet been designed, proposed,

[471] U.S. Initial Submission, ¶ 188.
[472] U.S. Initial Submission, ¶ 190.
[473] *See,* Section VII.C.4

adopted or implemented, much less applied by "the agencies and entities of the Federal Public Administration". The text of Article 8 states that this carried out "in accordance with scientific principles and relevant international standards, guidelines or recommendations".

453. Mexico submits that the claims raised by the United States against the "Gradual Substitution" are, at best, premature. Until the "Appropiate Actions" have been designed and/or applied, it cannot be determined whether they are designed or applied in a manner inconsistent with Article 9.6.10 of the USMCA. It cannot be assumed at this stage that the measures implementing "Gradual Substitution" will be applied in a manner than it is more trade restrictive than is required to achieve the level of protection that Mexico has determined to be adequate.

454. If the Panel disagrees with Mexico and concludes that the "Gradual Substitution" is currently applied, Mexico argues that it is a provisional SPS measure that has not been implemented (i.e., through "appropiate actions"). In these circumstances, the "Gradual Substitution" does not yet have any trade restrictive effect.

455. In addition, the measure recognizes that it is necessary to carry out "scientific studies". Article 8 mandates COFEPRIS to integrate a "joint research protocol" to coordinate a study with the competent authorities of other countries on "the possible damages to health" derived from the "consumption of genetically modified corn". While there is clear scientific evidence of harmful effects from direct consumption of GM corn grain, further scientific evidence is needed to determine whether and to what extent, those risks are transmitted to downstream food products, including: industrially processed foods made with GM corn grain (*i.e.,* corn syrup, corn starch, etc.), and meat and other animal products derived from livestock or fish raised on feed containing GM corn grain. Until additional information is gathered and a more complete risk assessment can be conducted, the appropriate level of protection will remain indeterminate. This is one of the reasons why the "Graduated Substitution" has not yet been implemented.

456. Therefore, it cannot be said that the "Gradual Substitution" is inconsistent with Article 9.6.10 of the USMCA.

G. Article 2.11 does not apply to the "End-Use Limitation" and the "Gradual Substitution", which fall within the scope of Article III of GATT 1994

457. WTO dispute settlement decisions have clarified that domestic measures, such as the "End-Use Limitation" and the "Graduated Substitution", are governed by Article III of GATT 1994 (and the equivalent provisions of the USMCA), and not by Article XI.1 (and Article 2.11.1 of the USMCA).

458. The Panel in *Canada – FIRA* explained the differences in the divergent scopes of application of Articles III and XI:1 as follows:

> … the General Agreement distinguishes between measures affecting the "importation" of products, which are regulated in Article XI:1, and those affecting "imported products", which are dealt with in Article III. If Article XI:1 were interpreted broadly to cover also internal requirements, Article III would be partly superfluous.[474]

459. The application of a measure "at the point or time of importation" is not necessarily the decisive factor in distinguishing between measures affecting the importation of products and internal measures affecting imported products.[475] "Purposive interpretation suggests rather that it is the nature of the measure as a restriction *in relation to importation* which is the key factor to consider in determining whether a measure may properly fall within the scope of Article XI:1".[476] How the measures relate to the importation of GM corn grain is secondary to their purposes and functions as domestic measures regulating the end uses of all GM corn grain in Mexico.[477]

460. A contextual and teleological interpretation[478] indicates that the measures are oriented to domestic issues and not to international trade. The measures relate to risks to human health and to native corn resulting from GM corn, regardless of where it is produced. Therefore, the measures relate rather to obligations under Article III of GATT 1994 (and the equivalent provisions of the USMCA).

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[474] Panel Report, *India —Autos*, ¶ 7.220, **MEX-328.** (in reference to the Panel Report, *Canada – FIRA*, ¶ 5.14, **MEX-329**).

[475] Panel Report, *India —Autos*, ¶ 7.260. **MEX-328.**

[476] Panel Report, *India —Autos*, ¶ 7.261. **MEX-328.**

[477] Panel Report, *India —Autos*, ¶ 7.224. **MEX-328.**

[478] Panel Report, *India —Autos*, ¶ 7.260. **MEX-328.**

H. *Arguendo, the "End-Use Limitation" and the "Gradual Substitution" are compatible with Article 2.11 of the USMCA*

461. The United States alleges that the measures at issue are inconsistent with Article 2.11 of the USMCA because they constitute prohibitions or restrictions on the importation of GM corn. For the reasons set forth below, the United States' arguments are meritless.

1. Summary

462. The measures at issue are domestic national measures aimed at mitigating the harmful effects of GM corn grain in Mexico, regardless of whether such GM corn grain is produced in the country or imported from other countries. The measures apply horizontally and equally to all GM corn grain, regardless of its origin.

463. The "End-Use Limitation" under Article 6.2 of the 2023 Decree (referred to rhetorically by the United States as the "Tortilla Corn Ban") is designed and applied to discourage the domestic use of GM corn grain for direct human consumption in the forms of nixtamalized masa, tortilla and related foods. The words "import" or "importation" do not appear anywhere in the text of this measure.

464. Rather, the text of Article 6.2 states that Mexico's biosafety authorities (*i.e.*, COFEPRIS) "[s]hall revoke and refrain from issuing authorizations for the use of genetically modified corn grain for human consumption;" [emphasis added] (which is defined as everyday Mexican staple foods made from whole corn grain). According to the Law of Biosafety and the Regulations of the Law of Biosafety, licenses and authorizations regulate the supply and commercialization of GM corn events in the Mexican market, regardless of origin. Licenses and authorizations are required to grow GM corn in Mexico,[479] to import GM corn to Mexico,[480] and to commercialize GM corn (of any origin, domestic or imported) in the Mexican market.[481]

465. Since the entry into force of the 2023 Decree in February 2023, none of the existing authorizations for GM corn have been revoked, amended or modified pursuant to Article 6.2. In addition, COFEPRIS has continued to grant GM corn authorizations to exporters in the United

[479] *See* Articles 33, 55 and 91 of the Law of Biosafety. **MEX-250**.
[480] *See* Articles 33, 55, 56 and 91 of the Law of Biosafety. **MEX-250**.
[481] *See* Articles 33, 55, 59, 91 and 97 of the Law of Biosafety. **MEX-250**.

States, which allows the importation and commercialization of GM corn for the permitted purposes of animal feed and industrial food processing.

466. As previously discussed, the "Gradual Substitution" under Articles 7 and 8 of the 2023 Decree has not been implemented. It is simply an executive order to "take "appropiate actions", at some point in the future, to facilitate the gradual substitution of GM corn for animal feed and industrial use for human food. It is not the "appropiate actions" themselves, which do not yet exist. Such actions (*i.e.*, measures) have not yet been designed, proposed, adopted or implemented, let alone applied. The text of Article 8 states that this shall be done "in accordance with scientific principles and relevant international standards, guidelines or recommendations".

467. Mexico submits that the claims raised by the United States against the"Gradual Substitution" are, at best, premature. Until the "appropriate actions" have been designed and/or implemented, it cannot be determined whether they are designed or implemented in a manner that is covered by and contrary to Article 2.11 of the USMCA. It cannot be assumed at this stage that the measures implementing the "Gradual Substitution" enforcement measures will be inconsistent with Mexico's obligations under the USMCA. Such an assumption could lead to the inadvertent result of precluding or interfering with Mexico's sovereign right to design, implement and carry out regulatory actions in the public interestbefore such actions have been designed, implemented or carried out.

2. Article 2.11 applies to measures prohibiting or restricting trade

468. Only the first paragraph of Article 2.11 is relevant to the analysis. Article 2.11.1 states the following:

> Except as otherwise provided in this Agreement, no Party shall adopt or maintain any prohibition or restriction on the importation of any good of another Party or on the exportation or sale for export of any good destined for the territory of another Party, except in accordance with Article XI of the [General Agreement on Tariffs and Trade ("GATT")] 1994, including its interpretative notes, and to this end Article XI of the GATT 1994 and its interpretative notes are incorporated into and made a part of this Agreement, *mutatis mutandis.*

469. This provision consists of an obligation subject to two exceptions. The obligation requires that "no Party shall adopt or maintain any prohibition or restriction on the importation of any good of another Party or on the exportation or sale for export of any good destined for the territory of

another Party". It is clear from the text of this provision that it regulates prohibitions or restrictions on trade in goods between the Parties.

470. The first exception states "except as otherwise provided in this Agreement," referring to the relevant provisions throughout the USMCA. The second exception states "except in accordance with Article XI of the GATT 1994," which is incorporated by reference into the USMCA "to this end". The phrase "to this end" indicates that Article XI was incorporated into the USMCA specifically for the purpose of providing exceptions to the obligation in Article 2.11.1.

3. The "End-Use Limitation" and the "Gradual Substitution" do not constitute prohibitions or restrictions "on the importation of any good"

471. In the context of WTO dispute settlement, panels and the Appellate Body have interpreted the phrase "import prohibitions [or] restrictions" in the context of Article XI:1 of GATT 1994. As for the term "prohibition", "Members shall not forbid the importation of any product of any other Member into their markets".[482] The term "restriction" is broader,[483] and implies "a limitation on action, a limiting condition or regulation."[484]

472. The text of Article 2.11.1 clearly indicates that the prohibition or restriction must relate to the importation or exportation of a good. Although the scope of "any prohibition or restriction [...] on the importation of any good" may be broad, it cannot be so broad as to cover any domestic measure regulating how products are marketed and sold within a country's territory.

473. WTO dispute settlement decisions relating to Article XI:1 of GATT 1994 provide relevant guidance. In this regard, the Panel Report on *Indonesia - Raw Materials* clarified that only prohibitions or restrictions that limit imports or exports fall within the scope of Article XI:1 of GATT 1994.[485]

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[482] See Panel Reports, *Brazil - Retreaded Tires*,¶ 7.11 **MEX-330;** *United States - Poultry (China)*, ¶ 7.454. **MEX-278.**

[483] Panel Report, *India - Quantitative Restrictions*, ¶ 5.128. **MEX-331**

[484] Dictionary of the Spanish of Mexico, restricción (translated from Spanish). **MEX-332**. Dictionary of the Spanish of Mexico, restringir. **MEX-333.**

[485] Panel Report, *Indonesia — Raw Materials*, ¶ 7.27. **MEX-334.**

474. In support of its argument, the United States cites the Panel Report in *India - Quantitative Restrictions*.[486] In that dispute, India had applied quantitative restrictions on merchandise imports for balance-of-payments reasons.[487] The IMF, which was invited to participate in the consultation phase of the dispute, described India's import restrictions as "excessive protection".[488] In that case, the Panel found that India imposed an import restriction because its import licensing regime prevented the importation of products for resale by intermediaries.[489] It should be noted that this measure specifically regulated *the importation of goods*. In contrast, the "End-Use Limitation" at issue in this dispute is a domestic measure that applies horizontally and equally to all GM corn grain, regardless of its origin. Although the "Graduated Substitution" has not been applied at all, it contemplates internal actions that will apply similarly to all GM corn grain, regardless of its origin.

475. Finally, Mexico notes that the measures have not blocked or restricted the "import process"[490] of GM corn from the United States, as a matter of fact, the imports coming from the United States to Mexico had an increase of more than [[ ]] As mentioned, COFEPRIS continues to approve authorizations for GM corn. When an authorization is issued, the importer is authorized to import any amount of GM corn into Mexico. There is no quantitative restriction on such imports. The authorization indicates that the permitted uses are "[f]or animal feed and industrial use for human food; except for cultivation, corn flour and *masa nixtamalizada*". This simply reflects the domestic end-use restrictions that apply to all GM corn in Mexico. The fact that this notation appears on a GM corn event authorization issued to an importer does not automatically convert the domestic measure for all GM corn into a prohibition or restriction on the importation of GM corn within the meaning of Article 2.11.1 of the USMCA or Article XI.1 of the GATT 1994.

[486] U.S. Initial Written Submission, footnotes 282, 286, and 295.
[487] Panel Report, *India - Quantitative Restrictions*, ¶ 5.5. **MEX-331**
[488] Panel Report, *India - Quantitative Restrictions*, ¶ 3.224. **MEX-331**
[489] Panel Report, *India - Quantitative Restrictions*, ¶ 5.142. **MEX-331**
[490] U.S. Initial Written Submission, ¶ 202.
[491]

I. The "End-Use Limitation" and the "Gradual Substitution" are measures aimed at the conservation and sustainable use of native corn varieties in terms of Article 24.15.2 of the USMCA

476. The 2023 Decree, including the "End-Use Limitation" under Article 6.2 and the "Gradual Substitution" under Articles 7 and 8 are consistent with the provisions of Article 24.15 of the USMCA regarding "Trade and Biodiversity"

477. As discussed throughout this submission, these measures contribute to an SPS goal which is to protect native corn from risks arising from the spread of "pests" from GM corn plants in Mexico, including genetic introgression and contamination that threatens the biodiversity of the native corn in Mexico. Similarly, the measures also have non-SPS objectives, aimed at conserving the biodiversity and genetic integrity of native corn in Mexico as an "exhaustible natural resource," within the meaning of Article XX(g) of the GATT 1994 (explained *infra*).

478. This biodiversity encompasses the natural genetics and phenotypic diversity of various unique and cultivated varieties in Mexico. Traditional Mexican agriculture has been developed over generations in different biomes and habitats around the country, resulting in robust genetic diversity and a wide range of colors, flavors and other characteristics important to Mexican culture, including its traditions and gastronomic heritage. This has been created by small-scale farmers who represent the majority of the national corn production. They grow almost 60 varieties and races of corn native to Mexico, forming natural genetic reserves adapted to diverse environmental conditions. This is part of the "biocultural wealth" that is expressly indicated at the end of the preamble of 2023 Decree.

479. For these reasons, the "End-Use Limitation" and "Gradual Substitution", and the 2023 Decree.considered as a whole text, are consistent with Article 24.15.2 of the USMCA.

480. This provision establishes the obligation that: "each Party shall promote and encourage the conservation and sustainable use of biological diversity, in accordance with its law or policy." This follows from Article 24.15.1, which states that the Parties "recognize the importance of conservation and sustainable use of biological diversity, as well as the ecosystem services it provides, and their key role in achieving sustainable development".

481. Thus, the measures and objectives they seek to achieve are consistent with Article 24.15.3 of the USMCA, which establishes that the Parties "recognize the importance of respecting,

preserving, and maintaining knowledge and practices of indigenous peoples and local communities embodying traditional lifestyles that contribute to the conservation and sustainable use of biological diversity".

482. The 2023 Decree explicitly states that the "the main purpose of these measures is to protect […] the milpa, biocultural wealth, peasant communities and gastronomic heritage". Taking the aforementioned into consideration, the measures contribute to the protection of culture, heritage, traditions, communities, and the identity of people of indigenous origin, in relation to the natural biodiversity of native Mexican corn and its various varieties of corn. Accordingly, and particularly in the context of Mexico's arguments on Article 32.5, Mexico considers that the measures are necessary to fulfil important obligations towards its indigenous communities.

J. Arguendo, the "End-Use Limitation" and the "Gradual Substitution" are covered by the exceptions contained in Article XX GATT (a) and (g)

483. For the reasons set forth above, the measures at issue do not violate Mexico's obligations under Articles 9.6 or 2.11 of the USMCA. The United States' allegations are based on mischaracterizations of the measures at issue. Neither the so-called "End Use Limitation" provided for in Article 6.2 of 2023 Decree nor the "Gradual Substitution" provided for in Articles 7 and 8 are "prohibitions on the importation" of GM corn from the United States.

484. Rather, the "End-Use Limitation" is a restriction on the end use of GM corn grain from any source, whether domestic or imported. As discussed in sections V.D.1 y VII.4, to the extent that the "End-Use Limitation" is applied for SPS purposes, it is based on Mexico's assessment of: (i) the risks to human health, taking into account the available scientific evidence that the consumption of GM corn could have harmful effects; and (ii) the risks to the health of native corn, taking into account the available scientific evidence that GM corn plants can spread from GM corn grain and that such pests are harmful to native varieties and local varieties of corn and their wild relatives in Mexico. However, as discussed *supra*, the "End-Use Limitation" is not simply an SPS measure. It also serves the non-SPS purposes of protecting cultural values related to Mexico's native corn and its role in traditional agriculture, indigenous communities and traditional foods: *i.e.*, "the milpa, the biocultural richness, of peasant communities and of the gastronomic heritage."

It also serves to protect the natural biodiversity of Mexico's native corn as an exhaustible natural resource.

485. The "Substitution Instruction" has not yet been implemented. When it is implemented in the future, it will also function as an end-use restriction on GM corn grain from any source. To the extent that the "Substitution Instruction" is an SPS measure, it is a provisional measure based on Mexico's assessment of the potential risks to human health and native corn, taking into account the same scientific evidence described above. With respect to human health, further scientific studies are required to determine whether the same level of risk arises from processed foods made with GM corn grain and products derived from livestock fed GM corn grain as from direct consumption of GM corn grain in dough, tortilla and related foods. However, like the "End-Use Limitation," the "Substitution Instruction" will function as more than just an SPS measure when implemented in the future, as it will also serve to protect the cultural value and natural biodiversity of Mexico's native corn.

486. Mexico's position is that none of these measures are inconsistent with Mexico's obligations under the USMCA. However, if the Panel determines that any of the measures are inconsistent with any provision of Article 9.6 or Article 2.11 of the USMCA, Mexico contends that such inconsistencies are justified under Article 32.1.1 of the USMCA.

487. Article 32.1.1. of the USMCA provides in relevant part as follows: "For the purposes of Chapter 2 (National Treatment and Market Access for Goods), [...] [and] Chapter 9 (Sanitary and Phytosanitary Measures), [...] Article XX of the GATT 1994 and its interpretative notes are incorporated into and made part of this Agreement , *mutatis mutandis*".

488. WTO Members may use Article XX as an exception to justify measures that would otherwise be inconsistent with their obligations under GATT 1994.[492] The subparagraphs of Article XX list categories of policies that WTO Members may invoke to justify the possible inconsistency of their measures with the substantive obligations of GATT 1994.[493] WTO Members

[492] Report of the Panel, US - *Tariff Measures (China)*, ¶ 7.103. **MEX-335**.

[493] Panel Report, US - *Tariff Measures (China)*, ¶ 7.103, **MEX-335** citing Appellate Body Report, *US - Gasoline*, p. 17 and Appellate Body Report, *Indonesia - Import Licensing Regimes*, para. 5.94. **MEX-336**.

have the legal right to invoke the policies listed in the subparagraphs of Article XX. to justify inconsistencies with their obligations under GATT 1994 precisely because these policies have been recognized as having an important and legitimate character.[494]

489. Article XX, paragraphs (a) and (g) state the following:

> Provided that the measures listed below shall not be applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or application of the measures by any contracting party:
>
> a) necessary to protect public morals;
>
> b) necessary to protect human, animal or plant life or health;
>
> [...]
>
> (g) relating to the conservation of exhaustible natural resources, provided that such measures are applied in conjunction with restrictions on domestic production or consumption;

490. Article XX of GATT 1994 requires a two-tiered analysis[495] First, whether the measure at issue is provisionally justified under a subparagraph of Article XX. Second, whether the application of the measure satisfies the requirements of the chapeau of Article XX. Mexico proceeds with its analysis in that order.

1. *Arguendo,* the "End-Use Limitation" and the "Gradual Substitution" are necessary measures to protect native corn, the milpa, the biocultural wealth and the gastronomic heritage of Mexico under the terms of Article XX (a) of GATT 1994

491. To justify a measure challenged under one of the subparagraphs of Article XX, a respondent Member must demonstrate that the relevant measure corresponds to the interest of that paragraph and that there is "a sufficient nexus between the measure and the interest protected".[496]

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[494] Panel Report, *US - Tariff Measures (China)*, ¶ 7.103, **MEX-335**, citing Appellate Body Report, *US - Gasoline*, pp. 22-23. **MEX-269.**

[495] Appellate Body Report, *US - Gasoline*, pp. 22-23. **MEX-269.**

[496] Panel Report, *US - Tariff Measures (China)*, ¶ 7.109, **MEX-335;** Appellate Body Reports, *EC - Seal Products*, para. 5,169, **MEX-337;** *US - Gambling*, para. 292. **MEX-298**.

492. The analysis under Article XX(a) must be approached in a comprehensive manner. [497] The first step is to determine whether the policy invoked by the respondent Member has a "public morals" objective within the meaning of Article XX(a). The next step involves an assessment of whether the measure is "designed" to safeguard that public morals objective[498]

493. The text of Article XX(a) does not provide a definition of the term "public morals". Therefore, WTO panels have relied on dictionary definitions, which refer to the word "public" as "pertaining to the people as a whole; belonging to, affecting, or concerning the community or nation"[499] and to the word "morals" as "habits of life with respect to right and wrong conduct ".[500] Accordingly, the ordinary meaning of the term "public morals " refers to " a set of habits of life relating to right and wrong conduct (i.e. social values) that belong to, affect or concern a community or a nation".[501] This notion corresponds with other panel reports that have considered the term "public morals" to denote norms of "right and wrong conduct maintained by or on behalf of a community or nation".[502]

494. The Preamble and Article Six of the Decree expressly identify food sufficiency, gastronomic heritage and support for farming communities as objectives of the measure. Mexico considers that it has a moral duty to preserve native varieties of corn and the livelihoods of communities that derive their income and livelihood from the cultivation and processing of native varieties of grains. Mexico also seeks to maintain unique gastronomic traditions associated with the use of native varieties of corn grains, which is a deep-rooted value in Mexico. The Decree contributes to this public morale objective by preventing native corn varieties and associated

[497] See Panel Report, *US — Tariff Measures (China)*, para. 7.111 and footnote 200. **MEX-335.**

[498] See Panel Report, *US — Tariff Measures (China)*, para. 7.110 **MEX-335**; *Brazil - Taxation*, para. 7.519. **MEX-342.**

[499] See Panel Report, *US — Tariff Measures (China*), para. 7.115. **MEX-335**.

[500] See Panel Report, *US — Tariff Measures (China)*, para. 7.115. **MEX-335**.

[501] See Panel Report, *US — Tariff Measures (China)*, para. 7.115-7.116. **MEX-335**.

[502] Panel Report, *US — Tariff Measures (China)*, para. 7,115 **MEX-335** (referring to Panel Reports *US - Gambling*, para. 6,465 **MEX-340;** *China - Publications and Audiovisual Products*, para. 7759, **MEX-339;** *EC - Seal Products*, para. 7,380, **MEX-338;** *Colombia - Textiles*, para. 7,299, **MEX-341;** and *Brazil - Taxation*, para. 7.520, **MEX-342**) **MEX-335**.

farming communities and gastronomic traditions from being displaced by imports of GM corn and transgenic introgression.

495. Mexico's longstanding commitment to these principles of public morality is reflected, inter alia, in the following laws:

- Articles 4 and 27 of the Constitution.[503]
- Convention on Biological Diversity signed in 1992.[504]
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity signed in 2000.[505]
- Nagoya-Kuala Lumpur Protocol on Liability and Redress signed in 2012.[506]
- Federal Law for the Promotion and Protection of Native Corn, 2020.[507]
- Federal Law of Biosafety of 2005.[508]
- Law for the promotion and protection of native corn as food heritage of the state of Colima.
- Law for the sustainable rural development of the State of Guerrero.
- Law for the promotion and protection of native corn as food heritage of the state of Michoacán.
- Law for the promotion and protection of native corn in the state of San Luis Potosí
- Law for the Promotion and Protection of Native Corn in the State of Sinaloa.

[503] Article 4 of the Constitution establishes the human right to nutritious, sufficient and quality food; the right to health protection and the right to a healthy environment for the development and well-being of people. Article 27, which refers to integral and sustainable rural development, requires the State to guarantee a sufficient and timely supply of the basic foodstuffs established by law.

[504] A Treaty aimed at the conservation of biological diversity and its sustainable use, among other objectives.

[505] A Treaty that aims to ensure an adequate level of protection for the transfer, handling and use of living modified organisms that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health.

[506] A Treaty that complements the Cartagena Protocol, which contributes to the conservation and sustainable use of biological diversity taking into account risks to human health.

[507] The objectives of the federal law include promoting the sustainable development of native corn, boosting the activities of native corn producers, promoting the biodiversity of native corn, among others.

[508] This law, among others, establishes a special regime for the protection of genetically modified corn, which encourages the use of native corn seeds in strategic projects, and seeks to eliminate, control or mitigate the presence of this genetically modified material in breeds, varieties and wild corn. relatives.

- Law for the Promotion and Protection of Native Corn as Biocultural and Food Heritage of the State of Mexico
- Law for the Promotion and Protection of Corn as Native Heritage, in Constant Diversification and Food for the State of Tlaxcala.

496. WTO panels have determined that the following types of policies pertain to public morals: preventing gambling by children and adolescents and protecting pathological gamblers (*US - Gambling*);[509] restricting prohibited content in cultural goods, such as violence or pornographic content, as well as protecting traditional Chinese culture and values (*China - Publications and Audiovisual Products*);[510] protecting animal welfare (*EC - Seal products*).[511] combating money laundering (*Colombia - Textiles*);[512] reducing the "digital divide" within society and promoting social inclusion (*Brazil - Taxation*);[513] and Halal protection (*Indonesia - Import Licensing Regimes*).[514] The general nature of Mexico's policy is certainly similar to those noted above. In particular, the protection of native corn varieties is similar to the protection of animal welfare in the context of agricultural products.

497. It is clear that the design, architecture and revealing structure of the Decree relates to the protection of public morals as intended by the measure. With respect to the "End-Use Limitation," the Decree serves to discourage the expanded use of GM corn for direct consumption in a manner that would displace the multiple varieties of native corn grown by Mexican farmers. Mexico has observed that the virtually unrestricted use of GM corn in the United States has led to the dominance of GM corn in the marketplace, and wishes to avoid that result in Mexico. In this regard, it is important to recognize that the legal standard for evaluating the design of the measure only requires that the measure not be "always incapable of protecting public morals".[515]

498. With respect to the necessity of the measure, the Panel must weigh and balance factors such as the relative importance of society's values, the level of restrictiveness of the measure on

[509] Panel Report, *US - Gambling*., **MEX-340.**
[510] Panel Report, *China - Publications and Audiovisual Products*, **MEX-339.**
[511] Panel Report, *EC - Seal Products*, **MEX-338**.
[512] Panel Report, *Colombia — Textiles*, **MEX-341**.
[513] Panel Report, *Brazil — Taxation*, **MEX-342.**
[514] Panel Report, *Indonesia - Import Licensing Regimes*, **MEX-343.**
[515] Panel Report, *US - Tariff Measures* (China), 7.145, **MEX-335.**

trade, the contribution of the measure to the realization of its objective, and an assessment of whether less restrictive alternatives suggested by the United States are reasonably available.[516] Of course, in this case, the United States has not proposed any alternatives.

499. The social values in question are very important in Mexico. The preservation of food sufficiency, gastronomic heritage and support for peasant communities are fundamental and crucial values in Mexico, as explained above. In addition, it has also been explained that the measure will play an important role in safeguarding both local production and gastronomic heritage from being overtaken by the preferred U.S. production methodology. At the same time, however, the design and implementation of the measure has limited effects on imports; there is no ban on GM corn imports, only an end-use restriction that, to Mexico's knowledge, has had no impact. [[ ]]

500. For these reasons, the Tribunal must conclude that the "End-Use Limitation" is covered by GATT Article XX(a) and therefore justified under Article 32.1.1 of the USMCA.

2. *Arguendo*, the "End-Use Limitation" and the "Gradual Substitution" are measures relating to the conservation of the biodiversity and genetic integrity of native corn varieties as "exhaustible natural resources "whithin the meaning of Article XX (g) of GATT 1994

501. Article XX(g) provides a general exception for measures "relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption".

502. The analysis under Article XX(g) "calls for a holistic assessment" that "must be applied on a case-by-case basis, through careful scrutiny of the factual and legal context in a given dispute", including the exhaustible natural resource concerned and the specific conservation objectives.[517] While due regard must be paid to the words used by WTO Members to express their intent and purpose, the analysis is not limited to the text of the measure at issue.[518]

[516] Informe del Grupo Especial, *US — Tariff Measures (China)*, ¶ 7.159, **MEX-335.**
[517] Appellate Body Report, *China — Rare Earths*, ¶ 5.95. **MEX-344**.
[518] Appellate Body Report, *China — Rare Earths*, ¶ 5.95. **MEX-344**.

503. The analysis to determine whether a measure is provisionally justified under Article XX(g) involves two elements: (i) whether the measures at issue relate to the conservation of exhaustible natural resources; and (ii) whether the measures at issue are made effective in conjunction with restrictions on domestic production or consumption.[519]

504. With respect to the first element, the term "conservation" in the text of Article XX (g) means "the preservation of the environment, especially of natural resources".[520] The words "relat[e] to" mean "hav[ing] some connection with, be[ing] connected to".[521] For a measure to relate to "conservation" in the sense of Article XX(g), there must therefore be "a close and genuine relationship of ends and means" between the measure and the conservation objective of the measure.[522]

505. There is no internationally agreed upon definition of "exhaustible natural resources".[523] Measures to conserve exhaustible natural resources, whether living or non-living, may fall within Article XX (g).[524] Panels and the Appellate Body have held that this term encompasses dolphins,[525] clean air, sea turtles, petroleum, and different mineral resources".[526] Further, the term "natural resources" in Article XX (g) is not "static" in its content or reference but is rather "by definition, evolutionary".[527] The term "exhaustible natural resources" therefore needs to be interpreted "in the

[519] Panel Report, *Brazil — Taxation (EU)*, ¶ 7.974. **MEX-342.**

[520] Appellate Body Report, *China — Raw Materials*, ¶ 355. **MEX-345.**

[521] Appellate Body Report, *China — Raw Materials*, ¶ 355. **MEX-345.**

[522] Appellate Body Reports, *US — Shrimp*, ¶ 136, **MEX-346;** and *China — Raw Materials*, ¶ 355. **MEX-345.**

[523] Panel Report, *China — Rare Earths*, ¶ 7.248. **MEX-347.**

[524] Appellate Body Report, *US — Shrimp*, ¶ 131. **MEX-346.**

[525] Appellate Body Report, *US — Tuna II (Mexico) (second recourse to Article 21.5 – Mexico)*, ¶ 6.287. **MEX-348.**

[526] Panel Report, *China — Rare Earths*, ¶ 7.248. **MEX-347**.

[527] Appellate Body Report, *US — Shrimp*, ¶ 130 and footnote 109 (referring to *Namibia (Legal Consequences)* p. 31, where the International Court of Justice stated that where concepts embodied in a treaty are "by definition, evolutionary", their "interpretation cannot remain unaffected by the subsequent development of law […] Moreover, an international instrument has to be interpreted and applied within the framework of the entire legal system prevailing at the time of the interpretation"). **MEX-346.**

light of contemporary concerns of the community [or] nations about the protection and conservation of the environment".[528]

506. The measures at issue relate to the conservation of a natural resource, namely Mexico's native varietals and landraces of corn and maize, including their biodiversity and genetic integrity. This biodiversity encompasses the natural genetic and phenotypic diversity of the many unique varietals and landraces cultivated in Mexico. It has been developed through generations of traditional Mexican agriculture in different biomes and habitats throughout the country, resulting in a robust genetic diversity and a range of colours, flavours, and other characteristics important to Mexican culture, traditions, and gastronomic heritage.

507. This natural resource is exhaustible because Mexico's native corn, including its natural biodiversity and genetic integrity, is under threat of loss and possibly extinction as evidenced through the transgenic contamination of native corn in Mexico.[529] The conservation objective is one of the "main purpose[s]" of the measures at issue, and it is expressly stated the 2023 Decree. The people of Mexico take the conservation of this natural resource extremely seriously, and this is demonstrated by the current class action lawsuit that has resulted in a moratorium on the cultivation of GM corn crops in Mexico.[530]

508. Surely, if dolphins[531] or an endangered species of sea turtle[532] can be considered exhaustible natural resources, so too should the unique, natural, and ancestral varieties and landraces of native corn in Mexico that face the risks of transgenic contamination, transformation, loss and extinction. The situation could be analogized to introducing a massive introduction of a transgenic livestock breed in a country without any fences, leading to transgenic contamination and loss of the natural genetic diversity of indigenous breeds through successive seasons of

[528] Appellate Body Report, *US — Shrimp*, ¶ 129. **MEX-346.**

[529] Quist, D. y Chapela, I.H. (2001). "*Transgenic DNA introgressed into traditional corn landraces in Oaxaca, Mexico*", Nature 414(6863):541-543. **MEX-090.**

[530] *See* Ruling of the First Chamber of the Supreme Court of Justice of the Nation of October 13, 2021, pp. 64-75, 173. **MEX-257.**

[531] Appellate Body Report, *US — Tuna II (Mexico) (second recourse to Article 21.5 – Mexico)*, ¶ 6.287. **MEX-348**.

[532] Panel Report, *US — Shrimp* (Article 21.5), ¶ 5.87. **MEX-349**.

interbreeding with the transgenic invaders. Plants and animals are finite resources that are vulnerable to exhaustion. This is especially true for unique natural varietals and landraces that are found only in certain habitats in the world. It is logical that they receive consideration as such exhaustible natural resources.

509. There is a close and genuine relationship of ends and means between the measure and the conservation objective of the measure because GM corn grain can be used as viable seed.[533] As a consequence, GM corn grain for consumption purposes can be diverted to the purpose of cultivating GM corn crops. There is evidence that clandestine and illegal cultivation of GM corn has been happening in Mexico.[534] This is one of the reasons why transgenic introgression remains a problem in Mexico despite the moratorium on the commercial cultivation of GM corn.

510. As Mexico explained in the context of the SPS purposes of the measures at issue, the "End-Use Limitation" under Article 6.2 of the 2023 Decree contributes to the purpose of protecting "native corn", operating in conjunction with Article 6.1 ("biosafety authorities […] Shall revoke and refrain from issuing permits for the release of genetically modified corn seeds into the environment in Mexico"). In addition, where the "Gradual Substitution" under Articles 7 and 8 is applied at some point in the future — after "the appropriate actions" have been designed, proposed, and implemented by "the agencies and entities of the Federal Public Administration" — this measure will also contribute to the same purpose.

511. In this way, the measures at issue are designed and, in the case of the "End-Use Limitation", applied in relation to the conservation of native corn. Specifically, their purposes include protecting native corn from the risks arising from transgenic introgression and contamination resulting from the intentional and unintentional spread of GM corn plants, which adversely affects

[533] GM corn grain is a "potential pathway for dispersal of transgenes to native maize" because the "imported grains are functional seeds, which retain their ability to develop and express recombinant proteins for glyphosate resistance". Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Corn grain marketed in Mexico as a potential disperser of genetically modified events*." 2021, **MEX-087.**

[534] Santana R., "*Mayans denounce the planting of GM soy and corn in Hopelchén, Campeche*", 2020, **MEX-188.** Greenpeace Mexico, "*Illegal GM planting did occur in Campeche*", 2021, **MEX-189.**

the natural biodiversity and genetic integrity, traits and characteristics, constitution, and health of the many unique native varietals and landraces of corn in Mexico.

512. The second element of the legal analysis under Article XX (g) requires that the measure relating to the conservation of native corn in Mexico must work in conjunction with restrictions on domestic production and consumption towards the conservation objective.[535] The phrase "made effective in conjunction with" requires that, when international trade is restricted, "real" and effective restrictions must also be imposed on domestic production or consumption. These restrictions on domestic production or consumption must reinforce and complement the restrictions on international trade.[536]

513. The measures at issue readily satisfy this step of the analysis. *First*, measures in Mexico restrict the domestic production of GM corn grain. In particular, there is a moratorium on the commercial production of GM corn grain in Mexico. In addition, Article 6.1 of the 2023 Decree restricts authorizations for the use of GM corn events for domestic production of GM corn crops in Mexico. Further, Articles 3, 4, and 5 of the 2023 Decree restrict the use of glyphosate, which discourages the domestic production of glyphosate-tolerant GM corn crops, encompassing the majority of GM corn events. These restrictions on the domestic production of GM corn crops reinforce and complement the restrictions on international trade.

514. *Second*, the "End-Use Limitation" under Article 6.2 of the Decree is applied as an internal measure to GM corn grain, whether domestic or imported, in a non-discriminatory manner. It restricts authorizations for the use of GE corn grain for direct human consumption in the forms of nixtamalized masa, tortilla, and related foods. Where the "Gradual Substitution" under Articles 7 and 8 is applied at some point in the future — after "the appropriate actions" have been designed, proposed, and implemented by "the agencies and entities of the Federal Public Administration" — this measure will also contribute to the same purpose.

[535] Appellate Body Report, *China — Raw Materials*, ¶¶ 356 y 360, **MEX-345.**

[536] Appellate Body Report, *China — Rare Earths*, ¶ 5.132, **MEX-344;** Appellate Body Report, *US — Tuna II (Mexico) (second recourse to Article 21.5 – Mexico)*, ¶ 7.514. **MEX-348.**

K. *Arguendo,* the "End-Use Limitation" and the "Gradual Substitution" satisfy the requirements of the chapeau of Article XX of the GATT 1994

515. In addition to being provisionally justified under subparagraphs (a) and (g) of GATT 1994, the measures also meet the *chapeau* requirements of Article XX.

516. The chapeau of Articles XX provides as follows:

> Subject to the requirement that such measures are not applied in a manner which would constitute a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, nothing in this Agreement shall be construed to prevent the adoption or enforcement by any contracting party of measures[.]

517. The chapeau of Article XX is concerned with the "manner" in which the measure is "applied".[537] "[t]he manner in which a measure is *applied* 'can most often be discerned from [its] design, ... and ... revealing structure'".[538]

518. The following three constitutive elements must be demonstrated to establish arbitrary or unjustifiable discrimination under the *chapeau* of Article XX:[539]

> (i) the application of the measure must result in discrimination;
>
> (ii) the discrimination must occur between countries where the same conditions prevail;
>
> (iii) the discrimination must be arbitrary or unjustifiable in character.

519. These elements are simply not met in this case.

520. Regarding the first element, the "End-Use Limitation" pursuant to Article 6.2 of 2023 Decree is an internal measure that applies horizontally and equally to all GM corn grain, whether domestic or imported, in a non-discriminatory manner. Any impact this measure may have on imports is incidental to its purpose and function, which is to discourage the domestic use of GM corn grain for direct human consumption in the forms of nixtamalized dough, tortilla and related

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[537] Appellate Body Report, *US — Tuna II (Mexico) (second recourse to Article 21.5 – Mexico)*, ¶ 6.270, **MEX-348;** Appellate Body Report, *US — Gasoline*, p. 26 (¶ 59); *US — Shrimp*, ¶ 115, **MEX-346;** Appellate Body Report, *Brazil — Retreaded Tyres*, ¶ 215. **MEX-297.**

[538] Appellate Body Report, *US — Tuna II (Mexico) (second recourse to Article 21.5 – Mexico)*, ¶ 6.270. **MEX-348.**

[539] Appellate Body Report, *US — Shrimp*, ¶ 150, **MEX-346;** Appellate Body Report, *US — Tuna II (Mexico) (second recourse to Article 21.5 – Mexico)*, ¶ 6.270, **MEX-348.**

foods. It applies in conjunction with Article 6.1 of the Decree, which restricts the use of GM corn seed for domestic cultivation and production of GM corn. When the "Gradual Substitution" of Articles 7 and 8 applies at some point in the future it will also be a domestic measure applicable to GM corn grain regardless of its origin. None of these measures discriminate between domestically produced GM corn and imported GM corn.

521. However, even if there were some form of discrimination within the meaning of the *chapeau* of Article XX, the second constituent element would not be met. This is because, with respect to the production and consumption of corn, the same conditions do not prevail between the United States and Mexico. The United States has adopted the cultivation of large monocultures[540] for industrial corn production.[541] In contrast, in Mexico, small farmers account for the majority of domestic corn production[542] using traditional agricultural practices[543] such as crop rotation.[544] These farmers grow nearly 60 varieties and breeds of corn native to Mexico, forming natural gene pools adapted to diverse environmental conditions.[545]

522. Corn also figures much more prominently in the Mexican diet than in the United States diet. In 2021, consumption of corn and corn products in Mexico was 10 times higher than in the United States.[546] This provides quantitative confirmation of the different and important role that corn represents for the Mexican people.

523. With respect to the third and last element, any discrimination arising from the application of the measures is neither arbitrary nor unjustifiable. The analysis of whether the discrimination is

[540] British Encyclopedia , Paper of Melissa Petruzzello "Monoculture, in agriculture, the practice of growing a single crop on a given acreage. While monoculture crops are sometimes rotated year to year, continuous monoculture, or mono-cropping, in which the same crop is grown year after year, has become one of the dominant paradigms in modern industrial agriculture", 2023, **MEX-350.**

[541] Scientific American, "*It's Time to Rethink America's Corn System*", 2013, **MEX-351.**

[542] SADER, "*Corn the crop of Mexico"*, 2020. **MEX-003**.

[543] SADER, "*Corn the crop of Mexico"*, 2020. **MEX-003**.

[544] UNESCO, "*Mexican traditional cuisine: A community, ancestral and living culture and the paradigm of Michoacán*", **MEX-042.**

[545] Sanchez G., J. J., Goodman, M. M., & Stuber, C. W. "*Isozymatic and Morphological Diversity in the Races of Corn of Mexico*", 2000. **MEX-005**. *Also see,* CONABIO, "*Corn Breeds*", 2022, **MEX-010**.

[546] FAO. "*Food Balances (2010-) [2022]*". **MEX-040**.

arbitrary or unjustifiable must be carried out taking into account the objective of the measure.[547] The application of the "End-Use Limitation" is rationally related to the relevant public policy objectives, which include the preservation of native corn and biocultural wealth, as stated in the text of the Decree. The same will be true in relation to the "Gradual Substitution" when it is applied at some point in the future.

524. Article 6.2 of 2023 Decree contributes to the purpose of protecting "native corn", operating in conjunction with Article 6.1 and the other measures of the Decree. These measures address, *inter alia*, the risks arising from the transgenic introgression of GM corn plants in Mexico, which adversely affects the natural biodiversity and genetic integrity, traits and characteristics, constitution and health of the many unique native varieties of corn in Mexico. GM corn grain is a "potential pathway for the spread of transgenes to native corn" because the "imported grains are functional seeds, which retain their ability to develop and express recombinant proteins for glyphosate resistance".[548] Consequently, GM corn grain intended for consumption can be diverted for the purpose of GM corn cultivation. There is evidence that clandestine and illegal cultivation of GM corn has occurred in Mexico.[549] This is one of the reasons why transgenic introgression remains a problem in Mexico despite the moratorium on commercial cultivation of GM corn.

525. The cultivation of GM corn seed represents the greatest source of risk to native corn from transgenic introgression. However, transgenic introgression has continued despite the moratorium on commercial cultivation of GM corn seed. These circumstances justify broader protection, including protection against risks arising from the unintended or unwanted spread of "pest" GM corn plants from GM corn kernels intended for direct human consumption, animal feed or industrial food use. In this way, it is intended that "End-Use Limitation" and "Gradual

[547] Appellate Body Report, *Indonesia — Import Licensing Regimes*, ¶ 5.98 (referring to Appellate Body Report, *Brazil — Retreaded Tyres*, ¶ 227, **MEX-297.**). **MEX-336.**

[548] Trejo-Pastor, V., Espinosa-Calderón, A., del Carmen Mendoza-Castillo, M., Kato-Yamakake, T. Á., Morales-Floriano, M. L., Tadeo-Robledo, M., & Wegier, A., "*Corn grain marketed in Mexico as a potential disperser of genetically modified events*." 2021, **MEX-087**.

[549] Santana R., "*Mayans denounce the planting of GM soy and corn in Hopelchén, Campeche*", 2020, **MEX-188**. Greenpeace Mexico, "*Illegal GM planting did occur in Campeche*", 2021, **MEX-189**.

Substitution" will each contribute in conjunction with the other measures in 2023 Decree, to the protection of native corn.

526. For the foregoing reasons, the measures in question are not applied in a manner that constitutes a means of arbitrary or unjustifiable discrimination between countries where the same conditions prevail, or a disguised restriction on international trade, within the meaning of the *chapeau* of Article XX of GATT 1994.

L. *Arguendo*, the "End-Use Limitation" and the "Gradual Substitution" are necessary measures to comply with the legal obligations for Mexican farming communities in terms of Article 32.5 of the USMCA.

527. Alternatively, assuming without conceding that the measures identified by the United States are in violation of the USMCA, they would be exempted under Article 32.5 of the USMCA.

528. Specifically, this provision states the following:

> Provided that such measures are not used as a means of arbitrary or unjustified discrimination against persons of the other Parties or as a disguised restriction on trade in goods, services, and investment, this Agreement does not preclude a Party from adopting or maintaining a measure it deems necessary to fulfill its legal obligations to indigenous peoples. [Emphasis added]

529. From the reading of this provision, it is clear that a measure may be exempted when: *i)* it is not used as a means of arbitrary or unjustified discrimination against persons of the other Parties to the USMCA, or as a disguised restriction on trade in goods, services or investment; and *ii)* it is adopted or maintained because it is considered necessary to comply with any of the legal obligations established for a Party with respect to indigenous peoples.

530. Specifically, Mexico considers that the provisions in the 2023 Decree, including the measures at issue in this dispute, are necessary to comply with Mexico's legal obligations to indigenous people in Mexico under Article 2 of the Constitution, Mexico's Federal Law for the Protection of the Cultural Heritage of Indigenous and Afro-Mexican Peoples and Communities, Article 21 of the Pact of San José (as interpreted by the Inter-American Court of Human Rights), and ILO Convention 169 on Indigenous and Tribal Peoples in Independent Countries.

531. As elaborated throughout this Brief, the measures claimed by the United States do not represent arbitrary or unjustified discrimination, nor are they disguised restrictions on trade. They do not relate to persons of the other Parties, services or investments, so much so that the United

States does not claim arbitrary or unjustified discriminatory treatment of these elements, nor do such measures constitute a disguised restriction on trade.

532. Like Article 32.5 of the USMCA, the *chapeau* of Article XX of the GATT 1994 contains the phrase "a means of arbitrary or unjustified discrimination". While the *chapeau* of Article XX is concerned with discrimination affecting goods traded "between countries where the same conditions prevail", Article 32.5 of the USMCA is concerned with "discrimination against persons of the other Parties". The 2023 Decree does not discriminate against any persons of the other Parties. Therefore, this requirement is met.

533. The *chapeau* of Article XX of the GATT 1994 also contains the phrase "a disguised restriction on international trade", which is analogous to the phrase "a disguised restriction on trade in goods" in Article 32.5 of the USMCA. In the context of WTO dispute settlement, the Appellate Body has considered that this embraces "restrictions amounting to arbitrary or unjustifiable discrimination in international trade taken under the guise of a measure formally within the terms" of the relevant exception. Thus, the kinds of considerations pertinent in deciding whether the application of a particular measure amounts to 'arbitrary or unjustifiable discrimination', … may also be taken into account in determining the presence of a 'disguised restriction' on international trade".[550]

534. Regarding the first element of the standard of this exception, the adjectives "arbitrary" and "unjustified" qualify the word "discrimination",[551] which, according to its ordinary meaning, would imply making a differentiation. This means that the differentiated treatment must not be arbitrary or unjustified. The ordinary meaning of the term "arbitrary" is "capricious, unpredictable, inconsistent"[552] Whereas "unjustified" means "[t]hat it cannot be justified".[553] In other words, if the distinction generated by the measures is logical and justified, the first element of this exception would be met.

[550] Appellate Body Report, *US – Gasoline*, p. 25, **MEX-346.**
[551] Royal Spanish Academy, discriminación. **MEX-352**.
[552] Panel Report *US — Shrimp* (Article 21.5), ¶ 5.124, **MEX-349.**
[553] Royal Spanish Academy, injustificable. **MEX-353**.

535. The Appellate Body has considered that "[o]ne of the most important factors in the assessment of arbitrary or unjustifiable discrimination is the question of whether the discrimination can be reconciled with, or is rationally related to, the policy objective" that justifies the measure at issue under the relevant exception.[554] This assessment should be made in the light of the objective of the measure.[555] In this regard, the analysis of whether discrimination is arbitrary or unjustifiable should focus on the cause of the discrimination, or the rationale put forward to explain its existence.[556] Discrimination will be arbitrary or unjustifiable when the reasons given for the discrimination "[do] not relate to the pursuit of or would go against the objective".[557]

536. The exception provided under Article 32.5 covers measures that a Party deems necessary to fulfil its legal obligations to indigenous peoples. In this regard, the final recital of the preamble of the 2023 Decree explicitly identifies the following legitimate objectives.

> the main purpose of these measures is to protect the rights to health and a healthy environment, native corn, the milpa, biocultural wealth, peasant communities and gastronomic heritage; as well as to ensure nutritious, sufficient and quality diet.[558]

537. As explained below, the following objectives are directly relevant and rationally connected to the fulfilment of Mexico's legal obligations to indigenous people: protection of native corn; protection of the milpa; protection of biocultural wealth, referring to the value of the unique biodiversity of Mexico's native varietals and landraces of native corn and maize, including to indigenous people; and protection of peasant communities (which, under Mexico's Constitution, are communities that are part of indigenous peoples). To the extent that the measures at issue discriminate against GM corn grain in pursuit of these purposes, it is because of the harmful effects of GM corn on the culture, heritage, traditions, communities, and identity of indigenous people in relation to the natural biodiversity of Mexcio's native corn and maize.

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[554] Appellate Body Report, *EC — Seal Products*, ¶ 5.303. **MEX-337**.

[555] Appellate Body Report, *Brazil — Retreaded Tyres*, ¶ 227. **MEX-297**.

[556] Appellate Body Report, *EC — Seal Products*, ¶ 5.303, **MEX-337**, citing Appellate Body Report, *Brazil — Retreaded Tyres*, ¶ 226, **MEX-297.** (referring to Appellate Body Reports, *US – Gasoline* (**MEX-269**), *US – Shrimp,* **MEX-346.** and *US – Shrimp (Article 21.5 – Malaysia),* **MEX-349**).

[557] Appellate Body Report, *EC — Seal Products*, ¶ 5.306, **MEX-337**, citing Appellate Body Report, *Brazil — Retreaded Tyres*, ¶ 227. **MEX-297.**

[558] Decree 2023. **MEX-167.**

538. Regarding the second element of the standard for this exception, it is composed of two aspects: i) that it is considered necessary, and ii) that it is to comply with an obligation on indigenous peoples.

539. The first aspect (that it is considered necessary), means that the Party invoking the exception must *consider it* necessary. That is to say, since the phrase "that it considers" is used,[559] it is an internal and exclusive analysis of that Party, so it is sufficient that, in the opinion of the Party and not of the others, the measure maintained or adopted is necessary. The second aspect (that it is necessary to comply with an obligation on indigenous peoples) is interrelated with the first, since the qualifier "necessary". In the context of Article XX(b), the Appellate Body has explained that, to be considered "necessary", the contribution of a measure to the achievement of its objective must be significant. In other words, the measure is necessary to achieve the objective. In other words, if the measures are necessary to comply with one of its obligations to indigenous peoples, the second element of this exception would be met.

540. In Mexico's opinion, the distinction is necessary to comply with its obligations to its indigenous peoples. These obligations were reflected in the text of the Decree cited *supra* when referring to "[the protection […] of native corn, the milpa, biocultural wealth, peasant communities". It should be noted that, in terms of Article 2 of the Mexican Constitution, these peasant communities are communities that are part of indigenous peoples.[560]

541. The obligations reflected in the Decree stem from the provisions of Article 2 of the Constitution, which recognizes and guarantees the right of indigenous peoples to self-determination, which includes "[p]reserving and enriching their languages, knowledge and all the elements that constitute their culture and identity".[561] Thus, it constitutes an obligation for the

[559] Contrast this language with that present in GATT Article XX referred to in Article 32.1, and the absence of the words "to consider" in that exception.

[560] CPEUM, Article 2. "Indigenous communities are those that form a social, economic and cultural unit, are settled in a territory and recognize their own authorities in accordance with their customs and traditions." **MEX-237**.

[561] CPEUM, Article 2 **MEX-237**.

Mexican State to "guarantee the protection, safeguarding and development of the cultural heritage and collective intellectual property of indigenous peoples and communities."[562]

542. One of these elements that constitute the culture and identity of indigenous peoples is precisely the protection of native corn, whose production, commercialization and consumption are recognized as a national cultural manifestation.[563] That is, the protection of native corn is a cultural manifestation that falls within the definition of "cultural heritage" of indigenous peoples provided for in the Federal Law of Protection of the Cultural Heritage of Indigenous and Afro-Mexican Peoples and Communities.[564]

543. The cultural importance of corn for indigenous peoples was even addressed in the CEC Secretariat's own report, stating that:

> Mexico is a center of origin and diversity for corn and that corn is so intrinsically linked to Mexican culture, especially that of Mexican indigenous groups.
>
> […]
>
> 1. Risk assessment of transgenic corn in Mexico is inextricably linked to the central role of corn in Mexico's history and culture, including the beliefs and value systems of indigenous people.
>
> […]
>
> Part of the Oaxacan population, especially farmers, consider that the presence of any transgene in corn constitutes an unacceptable risk to their traditional agrocultiural practices, as well as to the cultural, symbolic, and spiritual values of corn. This perceived threat is independent of the potential or actual scientifically studied effects on human health, genetic diversity and the environment.[565]

544. Therefore, measures taken to protect native corn, such as those now claimed by the United States, represent necessary actions to protect the cultural heritage of indigenous peoples, which is

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[562] Federal Law of Protection of the Cultural Heritage of Indigenous and Afro-Mexican Peoples and Communities, Article 1. **MEX-255**.

[563] Federal Law for the Promotion and Protection of Native Corn, Article 3. **MEX-012.**

[564] Cultural heritage: is the set of material and immaterial assets comprising languages, knowledge, objects and all the elements that constitute the cultures and territories of indigenous and Afro-Mexican peoples and communities, which give them a sense of community with their own identity and which are perceived by others as characteristic, to which they have the full right of ownership, access, participation, practice and enjoyment in an active and creative manner.

[565] CEC Secretariat. "*Corn & Biodiversity: The Effects of Transgenic Corn in Mexico*", 2004, pp. 6, 23. **MEX-095.** *See also* T. Á. Kato, C. Mapes, L. M. Mera, J. A. Serratos, & R. A. Bye., "*Origin and Diversification of Corn: An Analytical Review*." 2009, p. 40. **MEX-001**.

an obligation[566] that the Mexican State must fulfil before our indigenous peoples, they can be validly adopted or maintained under Article 32.5 of the Treaty.

545. Moreover, at the international level, Article 1 of the Constitution states the following:

> In the United Mexican States all persons shall enjoy the human rights recognized in this Constitution and in the international treaties to which the Mexican State is a party, as well as the guarantees for their protection, the exercise of which may not be restricted or suspended, except in the cases and under the conditions established by this Constitution.
>
> […]
>
> All authorities, within the scope of their competencies, have the obligation to promote, respect, protect and guarantee human rights in accordance with the principles of universality, interdependence, indivisibility and progressiveness. Consequently, the State shall prevent, investigate, punish and repair human rights violations, under the terms established by law. [Emphasis added]

546. The reading of the transcription of said precept demonstrates that, in Mexico, all persons enjoy the human rights of the international treaties to which Mexico is a party and the authorities have the obligation to protect them.

547. In this sense, the human right to property established in Article 21 of the Pact of San José,[567] as interpreted by the Inter-American Court of Human Rights, entails an obligation of the Mexican State to respect the cultural identity of indigenous peoples in our country, which, as explained *supra*, implies the protection of native corn.

548. Specifically, the Inter-American Court of Human Rights stated:

> The culture of the members of the indigenous communities directly relates to a specific way of being, seeing, and acting in the world, developed on the basis of their close relationship with their traditional territories and the resources therein, not only because they are their main means of subsistence, but also because they are part of their worldview, their religiosity, and therefore, of their cultural identity.
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> […]
>
> To guarantee the right of indigenous peoples to communal property, it is necessary to take into account that the land is closely linked to their oral expressions and traditions, their customs and languages, their arts and rituals, their knowledge and practices in

[566] That is also required to the National Institute of Indigenous Peoples in terms of Article 4, sections XIX and XXXVIII of the Law of the National Institute of Indigenous Peoples; and it is aligned with Article 34 of the United Nations Declaration on the Rights of Indigenous Peoples. **MEX-356.**

[567] Pact of San José, Ratified by Mexico on May 7, 1981. Decree enacting the Pact of San José. **MEX-357**.

> connection with nature, culinary art, customary law, dress, philosophy, and values. In connection with their milieu, their integration with nature and their history, the members of the indigenous communities transmit this nonmaterial cultural heritage from one generation to the next, and it is constantly recreated by the members of the indigenous groups and communities.[568]

549. On the other hand, treaties such as the ILO Convention 169 on Indigenous and Tribal Peoples[569] also contain obligations relevant for this analysis.For example, Article 2 obliges the parties to undertake coordinated action to protect the rights of these peoples, where it emphasizes that measures must promote "the full realisation of the social, economic and cultural rights of these peoples with respect for their social and cultural identity, their customs and traditions and their institutions." Precisely this is what the challenged measures sought to do.

550. In conclusion, in the alternative, the measures identified by the United States would be covered by Article 32.5 of the Treaty, since Mexico considers them necessary to comply with its domestic and international obligations *vis-à-vis* indigenous peoples.

VIII. REQUEST FOR FINDINGS AND DETERMINATIONS

551. Based on the foregoing, Mexico respectfully requests that the Panel determine that the measures identified by the United States comply with Mexico's obligations under the USMCA, specifically that:

1) The "End-Use Limitation" is compatible with the provisions of the:
    a. Article 9.6.3.
    b. Article 9.6.6. (a).
    c. Article 9.6.6. (b).
    d. Article 9.6.7.
    e. Article 9.6.8.
    f. Article 9.6.10.

[568] Inter-American Court of Human Rights, *Case Indigenous Community Yakye Axa Vs. Paraguay*, Judgement of June 17, 2005 (Merits, Reparations and Costs), ¶¶ 135, 154. **MEX-358.**

[569] ILO Convention 169 on Indigenous and Tribal Peoples, Ratified by Mexico on July 11, 1990. Decree enacting the ILO Convention 169. **MEX-359**.

g. Article 2.11.

2) The "Gradual Substitution" is compatible with the provisions of the:

a. Article 9.6.3.

b. Article 9.6.6. (a).

c. Article 9.6.6. (b).

d. Article 9.6.7.

e. Article 9.6.8.

f. Article 9.6.10.

g. Article 2.11.

3) In the alternative, that both "End-Use Limitation" and "Gradual Substitution" are excepted by the:

a. Article 32.1, with respect to Article XX (a) of the GATT.

b. Article 32.1, with respect to Article XX (g) of the GATT.

c. Article 32.5.

552. Likewise, Mexico requests the Panel to take into consideration the possibility provided for in Articles 9.20 and 31.15, to obtain information and technical advice from an expert on the matter.

TABLE OF CASES

Short Name	Large Name
Argentina — Textiles and Apparel	Appellate Body Report, *Argentina — Measures Affecting Imports of Footwear, Textiles, Apparel and other Items*, WT/DS56/AB/R and Corr.1, adopted on April 22, 1998.
Australia — Apples	Appellate Body Report, *Australia — Measures Affecting the Importation of Apples from New Zealand*, WT/DS367/AB/R, adopted on December 17, 2010.
Australia — Salmon	Appellate Body Report, *Australia — Measures Affecting Importation of Salmon*, WT/DS18/AB/R, adopted on November 6, 1998.
Awas Tingni vs. Nicaragua	Inter-American Court of Human Rights, *Case Awas Tingni vs. Nicaragua*, Judgment, August 31, 2001 (Merits, Reparations and Costs).
Brazil — Retreaded Tyres	Panel Report, *Brazil — Measures Affecting Imports of Retreaded Tyres*, WT/DS332/R, adopted on December 17, 2007, modified by the Appellate Body Report WT/DS332/AB/R.
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