Mexico City, March 15, 2024

Written view: Fundación Semillas de Vida
Dispute: Mexico - Measures related to genetically modified corn

Introduction

Pursuant to Article 31.11: Rules of Procedure for Panels, section (e) of the United States-Mexico-Canada Agreement (USMCA) and Article 20 of the Rules of Procedure for Chapter 31 (Dispute Settlement) concerning the submission of written views by Non-Governmental Entities of the USMCA, Fundación Semillas de Vida, A. C. submits this Written View in the context of the dispute *Mexico - Measures Relating to Genetically Modified Corn* (MEX-USA-2023-31-01). This View is made pursuant to the Panel's grant of leave to Semillas de Vida, A.C. to present the legal and factual issues described in the accepted request.

I. Health Impacts of MBA Consumption in the Mexican Population

Lack of scientific evidence on the innocuousness of MBA consumption in Mexico

Corn is the basis of the Mexican population's diet, and its consumption levels are exceptional in the world. According to the Food and Agriculture Organization of the United Nations (UNFAO), Mexico consumes 1024.83 kilocalories of corn per person per day[1] (FAOSTAT, 2021), ranking second in the world, just below Malawi. This figure is expressed in an annual *per capita* intake of 196.4 kilograms of white corn alone, which represents a consumption of more than 500 grams per day (SAGARPA, 2017, p. 2), without taking into account the figure for consumption of native corn of various colors that sustain the diets of our country's farming communities.

In contrast, in the United States of America (USA) the consumption figure barely reaches 92.21 kilocalories of corn per person per day (FAOSTAT, 2021). Based on the above figures, the mathematical ratio between the food consumption of corn in the USA and Mexico is 1:11, which shows that the risks of food consumption of Genetically Modified Corn (GMC) or Corn from Agricultural Biotechnology (MBA, from now on) are not comparable in the populations of the two disputing countries involved in the *Dispute over measures related to genetically modified corn.*

Both in paragraph 1 of the Introduction, as well as in Section B, Genetic Engineering, of section II, Statement of Facts, of the U.S. Initial Written Submission, this disputing party presumes to present the body of scientific research that confirms the safety of transgenic corn that has been commercialized for human and animal consumption, in addition to stating to explain the benefits

[1] The kilocalories consumed per person per day correspond to the indicator of food energy supply of the UNFAO statistics.

of genetic engineering and its established safety record. However, none of the documents referred to corresponds to the scientific evidence that the products in conflict (especially in the case of MBA for human consumption) study the health risks to the Mexican population, given their high consumption of corn, for which the risk assessments to which MBA is subjected in the U.S. are not applicable.

In this sense, the scientific studies made under the consumption conditions of the US population are not valid for the Mexican population, and therefore the U.S. protection levels do not correspond to the protection levels required for Mexico. The fact that the U.S. presents them as supporting item is an act of discrimination, since it is not correct to use their studies in different population. Consequently, risk analysis assessments should take into account factors such as chronic consumption levels, both at the level of daily intake and over a lifetime, as well as differentiated impact levels that take into account the different health, gender, and nutritional status of the Mexican population. None of the sources used in the original U.S. initial written submission refers to a risk analysis study with the above characteristics. In paragraph three, it states that "Mexico has allowed the import and sale of transgenic corn [...] for decades without any adverse effects on human life or health", but does not support this assertion with any risk analysis study or subsequent effects from the consumption of MBA. On the contrary, in its Exhibit USA-73, it cites a report by the National Academies of Sciences, Engineering and Medicine that acknowledges the difficulty of detecting long-term health or environmental effects from the use and consumption of genetically engineered foods (*Genetically Engineered Crops*, 2016). In absence of sufficient evidence contemplating the aforementioned criteria, we may assert that there is no guarantee of innocuousness.

In addition to this lack of scientific evidence, in the set of documentary evidence cited we can find serious conflicts of interest and lack of scientific rigor, with a bias of selective referencing of sources generated by the seed industry itself, as will be discussed in the following section.

Conflict of Interest and Lack of Scientific Rigor in the Evidence of the U.S. Initial Written Submission

Regarding the health effects of MBA, the U.S. Initial Written Submission states in paragraph 17 that "modern biotechnology" has benefits for human health and the environment. Subsequent paragraphs refer to outside documents that purport to justify this claim. Such references are biased and have a clear conflict of interest, since in many cases they come from the same companies that are developing genetically modified organisms.

This is the case of the reference to Norman Borlaug, cited in paragraph 17 of the U.S. Initial Written Submission, who worked between 1942 and 1944 for E.I. Dupont, now Corteva Agriscience, a company that, together with Bayer-Monsanto, controls more than half of the sales of corn, soybean, and cotton seeds in the United States (USDA, 2023a).

In paragraph 22, the U.S. Written Submission also cites a study that has allegedly developed an MBA that can produce up to 10% more crop than other varieties. The reference provided by the United States is a report from the journal *Science* (Stokstad, 2019) that highlights in its first paragraph that, although proponents of genetic engineering have promised that modern biotechnology would help meet global food demand, in reality many genetically modified varieties have been developed to be resistant to pesticides and herbicides, such as glyphosate, the study reads, but "scientists have not had much success with increasing the varieties' growth" (*Ibid*.), as well as crops. Although this study apparently achieves a 10% increase in crop, it involves people like Jeff Habben or Jingrui Wu, plant physiologists for Corteva Agriscience.

In the same paragraph, the report includes a reference to a multi-year project in Brazil in which MBA seeds were provided to farmers that resulted in an eight-fold increase in crops ("Prospera - O Futuro Mais Fértil", *no source*). The report states that the study was funded by Corteva Agriscience, Yara Brasil, a subsidiary of the Norwegian synthetic fertilizer company, and Massey Ferguson, a U.S. farm machinery company.

In paragraph 32, the submission also justifies the use of genetically modified organisms with figures collected by the International Service for the Acquisition of Agri-biotech Applications (ISAAA) on the number of hectares planted by farmers in 29 countries, including 24 developing countries (paragraph 32, p. 12). The submission fails to mention that ISAAA's work has been funded by companies such as Bayer, CropLife International, BASF, the Bill and Melinda Gates Foundation or Corteva Agriscience, among others (ISAAA, 2024)).

From a scientific standpoint, the U.S. argument in its initial written submission that MBAs have higher yields must be backed up by studies that prove that an increase in yield is caused by the inserted genetic modification. In fact, Rizzo et al. (2022) found that 48% of the increase in yields in three Nebraska regions where corn is produced in Lower Niobrara, Tri-Basin, and Upper Big Blue, Nebraska, is associated with climatic trends on decadal scales, 39% with agronomic improvements, and only 13% with genetic factors.

Likewise, in the United States, increased herbicide application has led to the emergence of 166 herbicide-resistant "weed" species as of 2016, which in turn requires more frequent applications at higher doses (Lu et al., 2022). Thus, the U.S. also fails to prove the food safety and environmental benefits stated in its Initial Written Submission.

Inseparability of MBA corn from herbicides such as glyphosate and its adverse health effects

In the U.S. Initial Written Submission, the word glyphosate appears virtually only when referring to the full name of the *Decree Establishing Various Actions on Glyphosate and Genetically Modified Corn* (hereinafter "Decree"). However, there is an unbreakable link between MBA and herbicides such as glyphosate; 2,4-D, glufosinato; jicama; and others of the aryloxyphenoxypropionate (FOP) group, MBA’s tolerance is due to their genetic modification, and several of these herbicides have been classified as highly hazardous pesticides. The discussion of pesticide risks associated with MBA is avoided by the United States in its Initial Written Submission.

As noted in Exhibit 113 of said Initial Written Submission, Article 54 of the Codex Alimentarius states: "Some recombinant-DNA plants may have traits (e.g. herbicide tolerance) that may indirectly determine the possible accumulation of pesticide residues, altered metabolites of such residues, toxic metabolites, contaminants or other substances that may affect human health. The innocuousness assessment should take this potential accumulation into account" (FAO, 2003); this is the case with MBA.

A large amount of MBA is herbicide-resistant [2]. Specifically, in 2023, 91% of corn planted in the USA was HT (herbicide-tolerant) (USDA, 2023b). From this corn, the vast majority of

[2] In paragraph 31 of its Initial Written Submission, the U.S. states that corn is the crop with the highest number of approved "events", most of which combine insect and herbicide resistance traits. Likewise, Mexico presents in its Initial Written Submission, paragraph 162, that 65% of the MBA events approved in the USA is herbicide tolerant and 42% are glyphosate-tolerant, which is expressed in the fact that 90% of the authorizations to import and commercialize MBA in Mexico, from 1995 to 2018, are related to glyphosate-tolerant events.

seeds are resistant to glyphosate, and after 2018 to others such as 2,4-D or jicama (Brookes & Barfoot, 2020), implying that the MBA imported from the United States to Mexico can only be understood as inseparable from glyphosate and its health risks.

Contrary to the argument that HT seeds reduce the amount of herbicides applied, "two-thirds of the total volume of glyphosate applied in the United States from 1974 to 2014 has been used in the last 10 years" (Benbrook, 2016). The increased use of glyphosate has negative impacts on consumer health. Scientific studies have found that glyphosate damages organs, nervous and reproductive systems, lungs and liver (Altamirano *et al*., 2018; Cuhra *et al*., 2015; Kumar *et al*., 2014; Mesnage *et al*., 2017; Roy *et al*., 2016; Tang *et al*., 2020), in addition to evidence of its probable carcinogenicity (Xu *et al.*, 2019). Also, a recent *Endocrine Society* report on the current state of the science identifies glyphosate as one of the chemical substances that alter the functioning of the endocrine system, creating hormonal imbalances of great concern (Gore, *et al*., 2024, pp. 41-44).

In Mexico, the presence of glyphosate has been found in foods that are made with MBA (González-Ortega *et al*., 2017). Although the biosafety of these and other foods is commonly measured through maximum permissible limits, it is necessary to take into account that these limits are defined in a differentiated manner; for example, in the United States the maximum glyphosate limit for corn foods is 5 mg/kg, while in Canada it is 3 mg/kg and in the European Union is 1 mg/kg.

In the same sense, Vicini et al. (2021) point out that the maximum permitted limits are limits for the use of synthetic substances, but inadequate in terms of public health, since they do not take into account the rest of the foods that people commonly ingest. Therefore, the measurement of glyphosate in urine is much more reliable for toxicology studies, as it expresses the total amount of glyphosate that has been ingested and is present in the human body, with the long-term effects.

Studies to measure glyphosate in urine have found a significant prevalence in the urine of food consumers, not only of directly exposed farmers: In Mexico, Lozano-Kasten et al. (2021) found that the urine of infants in rural communities contains glyphosate even at times of the year when consumption levels of corn products are high and when parents do not apply the herbicide on their plots[3].

Krüger et al. (2014) found that glyphosate levels are significantly higher in people with a conventional diet in which genetically modified products are present than in people with an organic diet. Likewise, they found that people with a chronic disease also have higher glyphosate levels in urine than the healthy population. This is partly because glyphosate residues cannot be removed by washing and remain stable during cooking, freezing, drying and food processing.

Despite the detection of glyphosate in urine samples and its higher prevalence in populations with chronic diseases, "the amount of glyphosate ingested by consumers has been systematically underestimated by the model used by regulatory agencies around the world" (Grau *et al*., 2023). Mexico is a country with a high prevalence of chronic diseases (a situation that is very possibly associated with the change in diet experienced from the signing of NAFTA in 1994)[4], a factor that should be considered when analyzing the impacts of glyphosate

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[3] Other examples are as follows: in the United States, Ospina et al. (2022) found the presence of glyphosate in 81.2% of the samples analyzed, with significantly higher concentrations in those with a high consumption of cereals; in France, Grau et al. (2022) detected the herbicide in 99.8% of the samples analyzed.

[4] From the signing of NAFTA, overweight and obesity in Mexico began to increase rapidly (Jacobs and Richtel, 2017), the dimension in Mexico of these chronic diseases has become evident, since more than 70% of the adult population is overweight and obese and there is an epidemiological emergency for diabetes.

consumption on its population. Therefore, the presence of glyphosate in corn foods, consumed at high levels in Mexico, may affect consumers in Mexico in a way that is exceptional in the world. Paragraph 41 of the U.S. Initial Written Submission indicates that the U.S. Environmental Protection Agency (EPA) evaluates the potential risks posed by pesticide residues, referring to Exhibit USA-83. This exhibit shows how EPA regulates the amount of pesticide residues that may remain in and on food based on data on what foods and in what amounts people consume, collected through the National Health and Nutrition Examination and Surveys (NHANES). The HNAES oversees the health and nutritional status of children and adults living in the United States, so this evidentiary item does not analyze potential risks to the corn consumption levels of the Mexican population.

The greater the proportion of that amount comes from MBA, the more people will be exposed to the herbicide. Since 91% of the corn planted in the U.S. is HT, it may be inferred that a large majority of the GM corn exported to Mexico contains traces of glyphosate. This evidence, which has emerged after the approval of the use of MBAs associated with the harmful health effects of glyphosate, makes it pertinent to apply precautionary measures in Mexico.

II. Impacts of the MBA on biocultural heritage and the environment

Corn is not only the basis of food, but also the cultural pillar of the Mexican people. The biocultural heritage associated with corn in Mexico is made up of the genetic diversity of 64 breeds (59 of which are native) that have been domesticated, conserved and adapted to different environmental conditions, which has made it possible to plant and diversify corn in the 32 Mexican states.

Therefore, Mexico is the center of origin of corn, a geographical area where there is a maximum of cultivated variety, where it is still cultivated in large quantities of territory and where the wild relatives of the domesticated variety coexist (Vavilov, 1926). It is also a center of constant diversification, which implies that the corn breeds planted in Mexico, with their associated agricultural and cultural practices, are the basis for the preservation of corn genetic diversity.

According to Harlan (1975), the domestication to which human beings subject wild varieties is key to their diversification, since by incorporating them into their environment, they adapt them according to their preferences, which generates a gradual genotypic and phenotypic evolution. In this sense, the preservation of this genetic diversity is the result of the permanent work of sowing, selection, conservation and experimentation of the farming and indigenous communities of Mexico.

These communities have inherited from generation to generation, for about ten thousand years, knowledge and agricultural practices that have allowed the evolution of corn varieties and their adaptation to each local cultural and natural environment. Therefore, we can assert that the genetic wealth of corn in Mexico is inseparable from the permanent work of local and indigenous farming communities, constituting a central component of the biocultural heritage of our country.

The plant life that integrates this biocultural wealth has been affected by the importation of MBAs, since genic flow has been detected, particularly transgenic introgression in native corn varieties in several states of the Republic. Since 2001, the presence of MBA was found in Oaxaca, which was confirmed by the Ministry of Environment and Natural Resources (SEMARNAT) in Oaxaca and Puebla (Quist & Chapela, 2001). Also, as mentioned in the previous section, the presence of transgenes in tortillas, tortilla chips, cereals, snacks and flours has been proven. After these first findings, it has been shown that these studies are not an isolated fact, but a widespread problem, which is linked to the importation of MBA as a live grain and which results in its illegal presence in the fields of Mexico and also in tortillas, the main form of corn consumption in this country (SAGARPA, 2017, p. 2).

This illegal presence of MBAs may irreversibly alter the diversity that allows and will allow Mexico and the world to cope with climate change. The diversity of native corn varieties is not only a sample of the different combinations of genes, but the result of farming practices that preserve and enrich it cycle after cycle. It is also a reservoir that serves the rest of the world, allowing farmers in other regions to adapt to different, changing and, in a scenario of global climate change such as the current one, erratic environments. These varieties have a high capacity to tolerate different forms of biotic and abiotic stress. In this sense, native varieties are "open, dynamic and decentralized genetic systems" (Bellón, 2008) that allow the human species to have the adaptive capacity to deal with an unpredictable and uncertain climate for the future[5].

Transgenic introgression also puts at risk the special uses of native corn varieties in food, since each breed is linked to special food uses, given that they have irreplaceable characteristics in the preparation of traditional dishes and daily and basic consumption that represent traditional Mexican cuisine, which was declared Intangible Cultural Heritage of Humanity by the United Nations Educational, Scientific and Cultural Organization (UNESCO). With this biocultural perspective, it is clear that MBA is not equivalent to native corn and that transgenic introgression of MBA irremediably affects this cultural heritage.

It is also essential to point out that the biocultural wealth of corn also expresses socioeconomic relationships. The economic value of native breeds is related to the agricultural and cultural practices of farming and specifically indigenous communities in the country. This value is lost through the transgenic introgression of MBA, which fails to comply with one of the purposes of the USMCA, whose preamble states that: "the Parties are determined to RECOGNIZE the importance of increasing the participation of indigenous peoples in trade and investment", whose participation must be in terms of their own cultural practices, including those of stewardship of native corn. This value, estimated by shadow prices, is 10 times higher than that of the market, since corn is not only reduced to a product, but is the axis of the construction of the social fabric and the seed of culture (UNEP, 2021; Arslan and Taylor, 2008)[6].

In this context, the United States has not presented risk assessments on transgenic introgression, nor has it assumed responsibility in this regard. Without these assessments, Mexico has no information on: 1) the possible differences that exist between MBA and conventional corn, since no specific assessments have been carried out to determine these differences, 2) the effects that MBA introgression, event by event, may have on native corn and national hybrids. This is of particular concern given that these combined events affect not only the recipient organism, but also each particular environment in which they develop, completely invisible,

[5] An example of this are the Chapalote, Dulcillo del Noroeste, Tuxpeño Norteño, Cónico Norteño, Tablilla de Ocho and Gordo breeds, which stand out for their adaptation to dry weather, even in semiarid contexts, "in addition to adaptation to water deficit, these breeds provide genetic diversity in the integration of possible populations for genetic improvement "(Ruiz et al., 2013).

[6] The U.S. themselves have felt the impacts of transgenic introgression. In 2006, the U.S. Department of Agriculture detected Bayer's LL601 transgenic rice not approved for human consumption in the U.S., which had negative economic effects for U.S. rice farmers, due to a drop in prices and the closing of export markets such as Japan and Europe (FDA, 2006). The same has happened in the case of the contamination of honey with transgenic pollen in southeastern Mexico, which caused a significant reduction in its purchase and export.

but carrying the modified insecticidal functions and metabolic pathways.

After their release into the environment, the genetic combinations between the MBA and the new genetic context of native varieties, where they have never been studied before, become increasingly complex. This requires constant monitoring to detect this irreversible, unwanted, illegal presence, contrary to the rule of law. In this scenario, it is Mexico who suffers the consequences of this transgenic introgression and who assumes the risk for life, which could translate into damage to the most important basis of the milpa, culture and economy.

The arguments presented justify the adoption of precautionary measures on the risks that could never be remedied with another dispute panel or with financial compensation, and therefore may not be delayed.

III. Legality, proportionality and relevance of the precautionary approach to the MBA in Mexico

As stated above, the risk of genic flow has already occurred in Mexico and represents a danger of serious and irreversible damage to health, biocultural heritage and the environment, for which the U.S. have not presented evidence of its innocuousness in the context of the Mexican population's food consumption of corn and Mexican agricultural and cultural practices. Due to the foregoing, the application of measures with a precautionary approach, as stated in Principle 15 of the Rio Declaration, by the Mexican government in the Decree is appropriate, proportional and reasonable to address the health, environmental, social and economic risks that have been evidenced, an approach that is grounded in Mexico's international commitments and endorsed by the USMCA itself, as will be shown in this section.

Contrary to what the United States points out in its Initial Written Submission (paragraph 3), the precautionary approach to MBAs did not begin in Mexico with the Decree, nor does it respond to a change of government administration.

This risk of genic flow has been exposed since 2004 by the Secretariat of the Commission for Environmental Cooperation (CEC). In the report *Corn and Biodiversity. Effects of transgenic corn in Mexico*, scientific research sponsored by the Mexican government confirmed that: 1) transgenes had been introduced into some traditional corn varieties in Mexico, 2) "the main likely source of the transgenes present in Mexican corn breeds is grain grown in the United States," especially noting that it enters through imports of the grain, and 3) one approach to evade and mitigate risks are "options that restrict the importation and commercial cultivation of genetically modified (GM) corn" (CEC, 2004, p. 12), precisely the action taken by the Mexican government in the Decree and prior to the Decree, as will be presented below.

In the framework of the Corn Class Action (CCA), the precautionary approach was also recognized since 2013. By court order, all permits for the release or planting of MBAs were suspended, a measure that was ratified in 2021 by the Supreme Court of Justice of the Nation (SCJN), having recognized the possibility of irreversible risks to biodiversity and the environment due to their release into the environment. Although this measure refers to planting permits, it reflects a notion of precaution in Mexico that is not new.

Although the U.S. Initial Written Submission, in paragraph 122, places the burden on Mexico to conduct a risk assessment of MBA compared to conventional corn to justify the measures taken on the first, the legal conditions for biotech companies to conduct such analyses in Mexico are in place, but they have not submitted their MBAs to the corresponding procedures.

On March 7, 2016, a federal appeals court authorized experimental and pilot plantings for scientific research purposes and with containment barriers, supervised by a federal judge and the collective plaintiff. This prerogative would allow biotech companies, the main stakeholders interested in commercializing MBAs in Mexico, to carry out studies supervised by Mexican authorities such as Semarnat, Sader and Cofepris to determine the impact of transgenes through corn consumption patterns as unique as those of the Mexican population. To date, no biotech company has applied for these permits. In the absence of risk analysis studies, the ban on MBA imports adheres to the precautionary principle.

As a reinforcement to this precautionary approach, in 2020 and before the entry into force of the USMCA, the Federal Law for the Promotion and Protection of Native Corn (FLPPNC) was published, which has as one of its objectives the establishment of institutional mechanisms for the protection of Native Corn and in Constant Diversification" declaring the protection of Native Corn and in Constant Diversification, in everything related to its production, commercialization and consumption, for which the import of MBA is a matter of regulation of this Law.

In the USMCA, the Parties recognize this principle in Articles 9.3, 9.4 and 9.6, linked to the general exceptions related to Article XX of the General Agreement on Tariffs and Trade in 1994, to protect human health and life, as well as to preserve plants. Linked to these articles, the Parties recognize in the USMCA: 1) [...] the importance of the conservation and sustainable use of biological diversity, as well as the ecosystem services it provides, and its key role in achieving sustainable development" (Article 24.15); 2) [...] the importance of respecting, preserving and maintaining the knowledge and practices of indigenous peoples and local communities embodying traditional lifestyles that contribute to the conservation and sustainable use of biological diversity. (Article 24.15); 3)"[...] that the environment plays an important role in the economic, social and cultural well-being of indigenous peoples and local communities, and recognize the importance of engaging with these groups in the long-term conservation of the environment" (Article 24.2,).

Likewise, the parties agreed in the USMCA: "[...] the importance of facilitating access to genetic resources within their respective national jurisdictions, in accordance with the international obligations of each Party" (Article 24.15). As part of such obligations, Mexico must comply with the commitments assumed in the Convention on Biological Diversity (CBD), signed in 1992 and the Nagoya-Kuala Lumpur Protocol, signed in 2012, which confers responsibilities on the conservation and sustainable use of biological diversity and the preservation of the health of its population. Mexico must also comply with the commitments of ILO Convention No. 169, to guarantee the rights of indigenous peoples to maintain, control, protect and develop their cultural heritage, traditional knowledge, traditional cultural expressions and the manifestations of their sciences, technologies and cultures, which include genetic resources, such as MBA-free native corn and associated agricultural-cultural knowledge and practices.

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RESPECTFULY

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