GMO Corn, México, and Coloniality

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ABSTRACT

Genetically modified (“GMO”) corn germinates legal controversies in México. Since 2013, Mexican courts have temporarily suspended GMO corn because it threatens biodiversity. In the Colectividad del Maíz lawsuit, courts have prohibited México from issuing commercial GMO permits while the litigation continues. Companies like Monsanto need these permits to sell GMO seeds. Corn is the most essential food item for millions of Mexicans and is central to Mexican culture. Mexicans wait for Colectividad del Maíz’s resolution, siding with biodiversity or GMOs. This Article describes scientific GMO controversies and analyzes biosecurity, class-action, and international environmental law. It argues that this corn fight feeds larger moral questions about biotechnology and México’s sovereignty. Courts and policy makers respond to these controversies with their sovereign powers. Decolonial theory shows how assumptions about economics, law, and ideology rooted in historical colonial structures—“coloniality”—shape these responses. This Article illustrates the significance of coloniality to how the government responds to GMOs, at a time when GMO safety is increasingly questioned in México and elsewhere.

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I. INTRODUCTION

A dispute over genetically modified organism (GMO) regulations set the table for an intense legal battle over corn, México’s most sacred food item.¹ Since the 2013 lawsuit Colectividad del Maíz, courts have ordered the Mexican government to stop issuing commercial permits for GMO corn.² GMOs are created by inserting the genetic material of one

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² Nota Informativa, Acción colectiva contra la autorización de la liberación para comercializar maíz transgenico DGCS/NI: 41/2013, 14-10-2013 (Mex.) [hereinafter Nota
organism into another organism. A trial court issued this order soon after the filing of a demanda colectiva, a procedure that is similar to a class action. The Colectividad sued México’s secretary of agriculture along with foreign seed companies, arguing that there has been an unauthorized release of GMO corn that puts México’s biodiversity at serious risk. The secretary approves commercial permits needed to test and sell GMO seeds in México. For over six years, the Colectividad, government agencies, and seed companies, including Monsanto and Pioneer-Dupont, have been in litigation over demandas colectivas, injunctive orders, and other measures to monitor GMO farming. Despite rulings from appellate courts and an anticipated decision from México’s highest court, the Suprema Corte de Justicia de la Nación (SCJN), this corn fight implicates many more issues, such as

Informativa]. The US Department of Agriculture describes this dispute as a “legal stalemate,” with “no timeline” for an end, after “activists” filed a class action on July 5, 2013. It reports that in September of 2013, a judge ordered a stop of experimental and commercial planting of GMO corn. It adds that, since then, biotechnology companies, public-sector biotechnology researchers, and field trials for GMO corn have indeed stopped. FOREIGN AGRIC. SERV., GAIN MX8050, MEXICO: AGRICULTURAL BIOTECHNOLOGY ANNUAL: UNCERTAIN FUTURE FOR MEXICAN AGRICULTURAL BIOTECHNOLOGY 4 (2018), https://apps.fas.usda.gov/newgainapi/api/report/downloadreportbyfilename?filename=Agricultural%20Biotechnology%20Annual_Mexico%20City_Mexico_10-30-2018.pdf [https://perma.cc/L5DG-BHQZ] [hereinafter GAIN MX8050].


4. For the sake of simplicity, this Article refers to the collective as the Colectividad and the dispute as Colectividad del Maíz. The Colectividad is a collective that was formed by fifty-three persons in order to submit a demanda colectiva to stop the Mexican government from authorizing permits to plant GMO corn. For the details on this collective entity, see Adelita San Vicente & Ana Ruiz Díaz, Colectividad Demandante, DEMANDA COLECTIVA MAÍZ, http://demandacolectiva.maiz.mx/wp/quienessomos [https://perma.cc/GAL5-FQWL] (last visited Mar. 30, 2020). For a description of demandas colectivas en México, see infra Part IV. (Colectividad del Maíz is also referred to as Colectiva del Maíz or Acción Colectiva del Maíz).

5. The Colectividad provides its demanda (complaint) online. See Demanda Contra el Maíz Transgenico, DEMANDA COLECTIVA MAÍZ (July 5, 2013), http://demandacolectiva.maiz.mx/wp/demanda-contra-el-maiz-transgenico [https://perma.cc/DJH6-7XLX]. Its periodic updates are also online. See Demanda Informes, DEMANDA COLECTIVA MAÍZ (July 5, 2013), http://demandacolectiva.maiz.mx/wp/demanda-informes [https://perma.cc/RXF3-QXP8].

6. See Angélica Enciso L., Sin Respuesta de Sagarpa y Semarnat, Acción Colectiva Contra Transgénicos, JORNADA (Mar. 28, 2019), https://www.jornada.com.mx/2019/03/28/sociedad/036n1soc# [https://perma.cc/8RMU-TGU3]. The demanda specifically listed the secretary of agriculture, the secretary of the environment and natural resources, and companies with pilot and experimental GMO corn authorizations, such as Semillas y Agroproductos Monsanto, Monsanto Comercial, Dow Agrociences de México, Pioneer-Dupont, and Syngenta Agro. Demanda Contra el Maíz Transgenico, supra note 5.

biodiversity, food security, and international sovereignty. It shows how postcolonial economics, politics, and ideology frame México’s sovereign struggle with biodiversity.

Many Mexicans actively oppose GMO corn because México has a long tradition of growing genetically diverse corn. GMO corn genomes travel easily, even if unintentionally, and alter the genetic structure of non-GMO corn plants known as landraces. This creates multiple levels of danger, including impacts on the genetic structure of landraces and environmental, agricultural, and socioeconomic impacts. Because of this, the Colectividad argues that México’s biodiversity in corn requires legal protection. México is the “center of origin” for corn, a scientific designation recognizing where the grain was first cultivated. It is also a “center of diversity” for corn, a scientific

8. For a brief description of how these court rulings impact the environment and food security, see Susan Burns, Mexican Courts Are Bigger than Agricultural Giant, Monsanto Mexico: 52 YEAR REV. 643 (2018). For their impact on sovereignty, see infra Part V. Scholars Joel Wainwright and Kristin Mercer place controversies about GMO corn in the context of debates about scientific proof, the socioeconomic challenges for corn farmers, and the relations between the United States and México. They identify critiques of GMOs operating on six scales, specific to genes, organisms, farmer households, landscape, culture, and morality. Joel Wainwright & Kristin L. Mercer, Transnational Transgenes: The Political Ecology of Maize in Mexico, in GLOBAL POLITICAL ECOLOGIES 412, 414–16 (Richard Peet et al. eds., 2011).


11. In Spanish, landrace corn is maíz nativo or maíz criollo. ELIZABETH FITTING, THE STRUGGLE for MAIZE: CAMPESINOS, WORKERS, and TRANSgenic CORN in the MExican COUNtrysidE 40 (2010).

12. There are five levels of danger: recombinant transgenes, including genes that codify plant proteins and the ordering for these; the sequencing of these transgenes in the host plant for which its morphology and physiology depend; the environmental context where these plants are grown; the agricultural impacts in locations where GMOs are released; and the socioeconomic impacts of GMO plots. See Elena R. Álvarez-Buylla et al., Incertidumbres, Riesgos y Peligros de la Liberación de Maíz Transgénico en México, in El Maíz en Peligro ante los Transgénicos 113 (Elena Álvarez-Buylla & Alma Piñeyro-Nelson eds., 2013).

13. The Colectividad aims to protect landraces that make up 75 percent of the corn plots in México, the rights of campesino farmer families, 70 percent of the population that lives in poverty, and the health of all Mexicans whose principle food staple is corn. It adds that GMO corn would subject Mexicans to pesticides and GMO transgenes in their diet. See Mercedes, Tres Años de Protección Jurídica a las Siembras de Maíz, VIA ORGÁNICA (July 7, 2016), https://viaorganica.org/tres-anos-de-proteccion-juridica-las-siembras-de-maiz [https://perma.cc/K3GL-FLWV].

designations for locations with extreme species diversity. Impressively, nearly sixty corn landraces grow in México. For centuries, Mexican farmers have maintained this biodiversity on milpas, small plots with a variety of corn plants, beans, and squash. On varied terrain, milpas nurture plant strains that adapt to drought, pests, soil conditions, and climate change. With this diversity, farmers develop new corn varieties. Because of this, México is the world’s largest, most diverse, and oldest living genetic resource for corn.

Corn is extremely significant in Mexican culture. For millions of Mexicans, corn symbolizes respect for the earth and a connection to indigenous civilizations. Corn is the most widely consumed crop in México, used in tortillas, tamales, huaraches, sopes, totopos, pulque, tostadas, pozole, and much more. Its landraces do not grow on

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 definitions and histories, and México’s classifications for corn, see Luz María Mera Ovando & Cristina Mapes Sánchez, El Maíz. Aspectos Biológicos, in ORIGEN Y DIVERSIFICACIÓN DEL MAÍZ 19, 23–27 (Takeo Ángel Kato Yamakake et al. eds., 2009).


17. For a description of how milpa plots grow different types of corn to preserve biodiversity, see Alejandro Nadal, Mexican Corn: Genetic Variability and Trade Liberalization 1 (El Colegio de México Programa Sobre Ciencia, Tecnología y Desarrollo, Working Paper No. 1-06, 2000).


24. Landrace corn, because of sensory varieties, is preferred for certain Mexican dishes. See Rojas-Barrera et al., supra note 9, at 21303. It is grown on particular lands and at times is
industrial farms. Instead, they grow on small plots with an emphasis on reserving seeds for the future. *Maíz* is the Spanish term for corn, while “corn” and “maize” generally refer to the same thing in English—that is, the plant *zea mays*.25 This Article uses the terms “maíz,” “maize,” and “corn” interchangeably.

Despite this rich corn heritage, México is highly sensitive to global corn markets.26 Corn is the most widely grown crop in the world.27 Corn farmers and corn advocates fear that biodiversity will be threatened if seed companies plant GMO corn on a commercial scale in México.28 The country could be subject to foreign-owned biotechnology to maintain genetic diversity.29 This anxiety comes after economic reforms displaced national corn production two decades ago. Previously, corn was the largest source of rural employment.30 Additionally, México is not self-sufficient in corn.31 This became painfully obvious with the “tortilla crisis” in 2008, when a spike in global demand led to soaring prices for corn in México.32 The country continues to import a great deal of corn and processed corn products.33 The majority of this imported corn is from the United States and is GMO corn.34 The main use for imported GMO corn is animal feed.35

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27. Corn is grown in at least 164 countries, with a total production of over one billion metric tons. *Crop: Maize, supra* note 19.


29. See infra Section III.C; Pífeyro-Nelson, supra note 1, at 96–97.

30. See O’Leary, supra note 21; GAIN MX8050, supra note 21, at 6.

31. See O’Leary, supra note 21; GAIN MX8050, supra note 21, at 6.


34. See Rojas-Barrera et al., supra note 9; García, supra note 33.
In México, GMO corn products are legal, but planting GMO corn is not legal. But any commercial planting of GMO corn requires permit approvals from the secretary of agriculture, which have been suspended by court order since 2013. Consequently, GMO corn is the subject of intricate legal wrangling and public controversies. In Colectividad del Maíz, the plaintiff also sued México’s environmental agency and permit applicants—the seed companies Monsanto, Dow, Pioneer-Dupont, and Syngenta. The Colectividad seeks to stop all commercial planting of GMO corn, heavily relying on measures implementing the precautionary principle. Based in international law, the precautionary principle allows states to employ actions to stop biosecurity or environmental harms, even in the absence of scientific evidence of their negative impact. The source of this principle is a state’s international sovereignty.

36. See GAIN MX8050, supra note 2, at 4, 6.
37. See id.
38. See id. at 4.
39. See, e.g., Angélica Enciso L., Falta al Próximo Gobierno Decidir Sobre Transgénicos, JORNADA (July 13, 2018), https://www.jornada.com.mx/ultimas/politica/2018/07/13/falta-al-proximo-gobierno-decidir-sobre-transgenicos-3272.html [https://perma.cc/L4K3-8TF2]. For descriptions of Mexico’s biotechnology regulations and different agency roles, see GAIN MX8050, supra note 2, at 7–9. The secretary’s prior name was the Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (SAGARPA). This was the name used for the better part of the developments in this Article. Recently, the secretary changed its name to Secretaría de Agricultura y Desarrollo Rural (SADER). Carolina Gómez Mena, Sagarpa Pasa a Ser Sader, JORNADA (Dec. 3, 2018), https://www.jornada.com.mx/2018/12/03/politica/007n1pol [https://perma.cc/8RG2-4BSJ]; Marco Campos, SAGARPA Changes Name to SADER, PRODUCE BLUE BOOK (Feb. 15, 2019), https://www.producebluebook.com/2019/02/15/sagarpa-changes-name-to-sader [https://perma.cc/ZL5D-64CM#modal]. For the policies described in this Article, SAGARPA and SADER encompass the same authority, even though government documents and sources may refer to different names. For the sake of simplicity, this Article refers to both SADER and SAGARPA as the “secretary of agriculture.”

40. The complaint specifically listed the secretary of agriculture, secretary of the environment and natural resources, and seed companies. Demanda Contra el Maíz Transgenico, supra note 5. They are still identified as litigants. Enciso L., supra note 39. Since the lawsuit began, there has been significant corporate consolidation of seed companies. Bayer merged with Monsanto, ChemChina merged with Syngenta, and Corteva was created from the Dow and Pioneer-Dupont merger. For simplicity, this Article uses the names most common in court documents and news analyses in México—that is, Monsanto, Dow, Pioneer-Dupont, and Syngenta. For a description of these mergers, see infra note 148.

41. See Enciso L., supra note 6.
42. There are many international formulations of the principle. This Article refers to the precautionary principle in the international law applied to biosafety, which includes biotechnologies like GMOs. Specifically, the Cartagena Protocol on Biosafety adopts the precautionary principle in principle 15 of the Rio Declaration on Environment and Development. See Cartagena Protocol on Biosafety to the Convention on Biological Diversity, pmbl., Jan. 29, 2000, 2226 U.N.T.S. 208, 39 I.L.M 1027 [hereinafter Cartagena Protocol]. Principle 15 states,
At initial glance, the lawsuit focuses on administrative procedures and agriculture permits, but its ultimate result shapes Mexican sovereign authority. Both sides point to different legal doctrines to support dueling positions. The Colectividad argues that there has been an unauthorized release of GMO corn, inconsistent with México’s biosecurity regime, the *Ley de Bioseguridad de Organismos Genéticamente Modificados* (LBOGM). Courts agreed to suspend permits for GMO corn while the legal dispute proceeds. The precautionary principle incorporated in the LBOGM, the UN Convention on Biological Diversity (CBD), and the Cartagena Protocol on Biosafety (the “Cartagena Protocol”) support these suspensions. Meanwhile, pro-GMO interest groups argue that the suspensions are illegal. They contend the Colectividad’s standing, the constitutionality of demandas colectivas, and the legality of pretrial court orders. They continue to make these arguments in the SCJN. In addition, the LBOGM may protect seed companies and GMOs from permit suspensions. A potential argument for seed companies is that the LBOGM protects them from permit suspensions, since they have

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44. See id. at art. 9.IV.  


46. Cartagena Protocol, supra note 42.  


48. Demanda Colectiva Maíz, Décimo Segundo Informe Semestral, FACEBOOK (July 5, 2019), https://www.facebook.com/ExpedienteMaiz/posts/238025125567444?__xts__%5B0%5D=68.ARCiPH9pSx7F9oVoPxA7GL133xl111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111111
rights as intellectual property (IP) owners under the North American Free Trade Agreement (NAFTA); its expected revision, the US-México-Canada Agreement (USMCA), and World Trade Organization (WTO) agreements.

At first, Colectividad del Maíz appears to only affect administrative procedures and agriculture permits, but the Colectividad’s focus on using courts to regulate GMO corn may shape México’s sovereign authority. This Article makes three arguments about Mexican biodiversity protections: (1) current Mexican regulations support GMO farming, prioritize economic interests, and discourage GMO controls; (2) a demanda colectiva provides a means to employ precautionary-principle measures to protect landrace corn; and (3) by forcing a decision between biodiversity protections or approval of GMO permits, such collective lawsuits can shape México’s sovereignty. To support these arguments, this Article relies on the “critical legal” perspective on international law and on “decolonial theory.”

49. As described in Part III, international legal agreements may limit México’s option for precaution. NAFTA protects investors from the United States and Canada from regulatory measures amounting to expropriation. See North American Free Trade Agreement art. 1110(1), Dec. 17, 1992, 107 Stat. 2057, 32 I.L.M. [hereinafter NAFTA] (prohibiting government measures that “indirectly nationalize or expropriate an investment”). Additionally, NAFTA chapter 17 requires that México provide a series of IP protections consistent with international treaties. See id. art. 1701(2).


51. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) has been argued to provide protection for GMO corn seed companies in México. See Kathleen McAfee, Corn Culture and Dangerous DNA: Real and Imagined Consequences of Maize Transgene Flow in Oaxaca, 2 J. LATIN AM. GEOGRAPHY 18, 32–33 (2003).

52. Food-system scholar Timothy Wise presents the “core” issues in the lawsuit as about protecting corn’s biodiversity. See Wise, supra note 10, at 178.


54. For introductory descriptions of decolonial theory, see COLONIALITY AT LARGE: LATIN AMERICA AND THE POSTCOLONIAL DEBATE 2 (Mabel Moraña et al. eds., 2008) [hereinafter COLONIALITY AT LARGE]. Professors Anjali Vats and Deidré A. Keller explain the value of using
perspectives examine how economics, politics, and ideology shape sovereign authority over biodiversity and foreign interests. Decolonial theory emphasizes the influence of colonialism on postcolonial economics, political authority, and belief systems—an effect which is known as “coloniality.”

The GMO corn fight demonstrates how sovereignty may be interpreted as a national right to protect biodiversity or as a governmental justification for economic rights for foreign actors. International, environmental, and demanda colectiva legal doctrines frame this debate. While the fight is over México’s market for corn, the ideological contest is over the safety of GMOs and México’s sovereign authority to employ precautionary measures to protect biodiversity. Analyzing this corn fight from a critical perspective, this Article illustrates the shape sovereignty takes over biodiversity and foreign economic interests.

This Article proceeds as follows. Focusing on economics, Part II describes the critiques and justifications for GMO corn. Parts III and IV present the laws and regulations governing GMO corn in México. Part III identifies the gaps in biosecurity regulations and the incentives created for GMO farming that have allowed foreign companies to become the most significant GMO actors in México. Part IV describes recent legal developments—namely, Colectividad del Maíz litigation and changes in México’s GMO and biosecurity policies. Part V explains how coloniality currently operates in México. It describes what is at stake in the resolution of Colectividad del Maíz: sovereignty will protect either biodiversity or GMOs. Coloniality helps identify the law’s


55. This paraphrases coloniality’s “matrix of power.” See infra Section V.A. For the sake of simplicity, this Article uses the term “coloniality” as a shorthand for the decolonial concept of “coloniality of power.” Coloniality operates with four domains over economics, authority, patriarchy, and subjectivity and knowledge. For definitions of “coloniality” and its approach examining economics, authority, patriarchy, and belief systems, see COLONIALITY AT LARGE, supra note 54, at 2, 6 n.11; Walter D. Mignolo, Introduction: Coloniality of Power and De-Colonial Thinking, 21 CULTURAL STUD. 155, 155 (2007).

56. This Article provides a description of recent GMO corn developments and México’s biosecurity framework and an examination of how these two issues help shape México’s sovereignty. This Article does not attempt to analyze all of the relevant law in the Colectividad del Maíz dispute—that is, the agency determinations, litigation developments, or constitutional law inquiries. Instead, it provides the legal and biotechnology contexts relevant to explain the significance of GMO corn debates. When the dispute ends, a more detailed examination of the legal doctrine would be possible. This Article refers to a great deal of scholarship from a variety of scientific disciplines, and from the science and technology studies field, by noting their conclusions without questioning their methods or findings.
normative role in framing the corn fight. Part VI contextualizes the economics and ideological contests implicit in Colectividad del Maíz.

II. A GENE REVOLUTION CULTIVATES FEARS FOR BIODIVERSITY AND CORN

Conceptual and scientific innovations in biotechnologies produced GMOs. During the second half of the last century, a “green revolution” increased agricultural productivity, especially in the Global South, with farms benefitting from research, business organization, and industrial technology. After the green revolution came a “gene revolution”—the introduction of GMOs. A GMO is created when the genetic material of one organism is inserted into another organism to add desirable traits to a crop, such as pest resistance or herbicide resistance. GMO technologies are referred to by different names in English and in Spanish. GMOs are just one set of biotechnology techniques used to change the cellular makeup of organisms. GMO techniques differ from plant breeding, since the latter focuses on the whole plant, while GMOs isolate genetic material to alter plant growth.

GMO technologies were developed in the 1980s and have been made available commercially since the 1990s, but they vary in

57. For introductory descriptions of coloniality and decolonial theory, see COLONIALITY AT LARGE, supra note 54; Mignolo, supra note 55; Aníbal Quijano, Coloniality and Modernity/Rationality, 21 CULTURAL STUD. 168, 170 (2007).
59. The green revolution, which came after the mechanical revolution, chemical revolution, and hybrid revolution, helped farmers with mechanization, land conditions, and seed development, respectively. In the second half of the twentieth century, the green revolution brought these developments to “less developed” countries, with México first and then Asia. See FELICIA WU & WILLIAM BUTZ, THE FUTURE OF GENETICALLY MODIFIED CROPS 3 (2004).
60. Environmental anthropologist Glenn Davis Stone explains that the terms “genetic modification” and “genetic engineering” refer to the same thing, “transgenic” also refers to GMOs, and “recombinant DNA” is the original and most exact term. See Glenn Davis Stone, The Anthropology of Genetically Modified Crops, 39 ANN. REV. ANTHROPOLOGY 381, 382 n.1 (2010).
62. In English, GMO technology is also called “genetically engineered,” “transgenic,” or “recombinant” DNA; it can be abbreviated as “GM” or “GE.” See, e.g., FITTING supra note 11, at 29 (describing some of these techniques). In Spanish, GMOs are referred to as transgénico, organismo genéticamente modificado, or organismo modificado genéticamente.
63. See Stone, supra note 60, at 381–82.
popularity across the globe. The United States leads the world in area devoted to GMO planting, and, along with Brazil, Argentina, Canada, and India, accounts for over 90 percent of GMO planting. Many GMO crops are grown commercially, including soybeans, corn, cotton, and canola. One example of GMO corn is Bt corn. In Bt corn, genes from the bacteria *Bacillus thuringiensis* (Bt) are inserted into the corn genome, which allow the corn plant to produce a protein that selectively kills insect pests for corn plants, like the corn borer.

Governments exercise their sovereign authority to develop GMO policies. Whether GMO consumption is harmful to humans is an open question that government regulators must address. US food-safety and biosecurity regulators generally find that GMOs are substantially equal to traditional plants. Many scientific studies conclude that

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68. See *id.*

69. See *id.*

GMOs are safe for consumption,71 but many do not.72 Some studies argue that GMO corn is not substantially equivalent to landrace corn.73

In light of the scientific disagreement, two generally competing perspectives on how to regulate GMOs have developed: substantial equivalence74 and precautionary principle.75 The precautionary principle supports a state’s prohibition on an activity even if scientific evidence is inconclusive or incomplete.76 The precautionary principle functions as a government choice, sourced in sovereignty, to respond to GMO harms. Professor Rebecca Bratspies explains that the precautionary principle, which developed in response to the substantial equivalence approach of US regulators, provides states a means to prevent harms.77 The principle has a long history of inclusion in


72. For a brief summary of the position that there is no scientific consensus on GMO safety, signed by over three hundred scientists, see Angelika Hilbeck et al., No Scientific Consensus on GMO Safety, 27 ENVTL. SCI. EUR. (2015). Toxicologist José Domingo provides periodic reviews of scholarly literature to argue there is no consensus on the safety of GMOs. See José L. Domingo, Safety Assessment of GM Plants: An Updated Review of the Scientific Literature, 95 FOOD & CHEMICAL TOXICOLOGY 12 (2016); José L. Domingo & Jordi Giné Bordonaba, A Literature Review on the Safety Assessment of Genetically Modified Plants, 37 ENVTL. INT’L 734 (2011).


74. Bratspies, Some Thoughts on the American Approach to Regulating Genetically Modified Organisms, supra note 70, at 406.


76. After comparing a series of international agreements and protocols, Professor John S. Applegate reports on four elements in the many variations of the precautionary principle. They regard the triggering by harms, the timing between trigger and response, a state’s regulatory response, and how to address uncertainty. See John S. Applegate, The Taming of the Precautionary Principle, 27 WM. & MARY ENVTL. L. & POL’Y REV. 13, 17–20 (2002).

77. See generally Bratspies, Trail Smelter’s (Semi)Precautionary Legacy, supra note 70.
environmental and biosecurity treaties in international law. Professor John S. Applegate describes the CBD in 1992 as a “turning point” for the principle. Since then, domestic courts in Canada, France, India, and Panama have referred to the principle. As the primary treaty addressing biosafety and biodiversity, the Cartagena Protocol in various instances refers to the precautionary principle. The precautionary principle is often presented as the European perspective. Historically, the United States has opposed the precautionary principle. During negotiations for the Cartagena Protocol, the United States and Australia opposed the precautionary principle while various developing countries called for its inclusion.

The United States typically favors the substantial equivalence approach, which attempts to craft regulations based on risks that can be quantified. Substantial equivalence requires proof that the risks can be quantified prior to implementing regulation. Consequently, precautionary measures are rare with substantial equivalence. Practically speaking, judges, regulators, and policy makers examine scientific proof of the harm. Whether to regulate a potentially useful technology in light of unknown risks animates the dynamic between the two approaches, precautionary principle and substantial equivalence. While precautionary-principle supporters generally worry about environmental or safety harms, substantial-equivalence
proponents view the principle as halting progress and relying on irrational decisions.88

There are many arguments in support of GMO agriculture,89 and some have ceaselessly called for the cultivation of GMO corn in México since GMO corn was first developed.90 Scientific studies doubt that GMO transgenes, from GMO corn, spread to corn landrace plants and repeatedly find that GMO corn increases productivity.91 GMO corn generally makes the sowing, maintaining, irrigating, and harvesting processes easier and produces larger and more predictable yields. Furthermore, because the plant can defend itself from pests and is tolerant of herbicides, less labor is needed.92 Ultimately, this can make growing GMO crops more profitable than the traditional growing of non-GMO crops. All of these benefits have led some to herald GMOs as the key to achieving food sufficiency and combatting food insecurity.

Critics argue that there is no scientific consensus that GMOs are safe93 and that claimed advantages from GMOs are overstated or untrue.94 Environmental anthropologist Glenn Davis Stone explains

88. Professor Alessandra Arcuri describes this debate and emphasizes that critics often focus on extreme and inaccurate versions of the principle and have myopic faith in science. She argues that critics misplace their focus and should instead view the precautionary principle as an opportunity to improve the understanding of science by regulators. See Alessandra Arcuri, Reconstructing Precaution, Deconstructing Misconceptions, 21 ETHICS & INT’L AFF. 359, 359 (2007).
89. See Stone, supra note 60, at 383.
93. See Hilbeck et al., supra note 72.
94. See DOUG GURIAN-SHERMAN, UNION OF CONCERNED SCIENTISTS, FAILURE TO YIELD: EVALUATING THE PERFORMANCE OF GENETICALLY ENGINEERED CROPS (2009). Non-GMO corn is argued to produce enough corn for México and could offset import dependency, if it had public support. See Fernández, Wise & Garvey, supra note 24.
that some evidence suggests that increases in crop yields claimed to be caused by GMOs in the United States and India may be exaggerated, since increases in productivity may be caused by other factors. He adds that GMO crops have resulted in increased use of glyphosate because weeds have become resistant to the herbicide.

Scientific studies also point to a variety of negative impacts from GMO farming. Research shows that pests build a resistance to toxins in GMO corn and other GMO crops. Moreover, GMO crops have been found to have negative impacts on nontarget species, which refers to animals other than the targeted pests. GMO plant scientists argue that GMO seeds, including corn, do not provide the purported benefits for GMO farming, given the cost of GMO seeds, their environmental impacts, and the demands created by irrigation and needed record keeping.

Law plays a central role in GMO debates. Legal doctrines find GMOs to be safe and support their increased use, while ignoring the biodiversity or socioeconomic harms they create. Basically, GMOs are protected by enforceable property rights under either IP or international trade regimes. In general, not just in México, seed companies depend on IP and contract-law regimes for GMO technologies to succeed. This began with US Supreme Court decisions and legislation in the 1980s and 1990s that provided the legal basis for GMO technology to benefit from patent protection.

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95. Stone, supra note 65.
96. Id.
97. See Aaron J. Gassmann et al., Field-Evolved Resistance by Western Corn Rootworm to Multiple Bacillus thuringiensis Toxins in Transgenic Maize, 111 PNAS 5141, 5141 (2014); Andreas Lang & Eva Vojtech, The Effects of Pollen Consumption of Transgenic Bt Maize on the Common Swallowtail, Papilio machaon L. (Lepidoptera, Papilionidae), 7 BASIC & APPLIED ECOLOGY 296, 296 (2006).
98. Anthony D. Burd et al., Estimated Frequency of Nonrecessive Bt Resistance Genes in Bollworm, Helicoverpa zea (Boddie) (Lepidoptera: Noctuidae) in Eastern North Carolina, 96 J. ECON. ENTOMOLOGY 137, 137 (2003); Jian-Zhou Zhao et al., Different Cross-Resistance Patterns in the Diamondback Moth (Lepidoptera: Plutellidae) Resistant to Bacillus thuringiensis Toxin Cry1C, 94 J. ECON. ENTOMOLOGY 1547, 1547 (2001).
100. See G.C. Rótolo et al., Time to Re-Think the GMO Revolution in Agriculture, 26 ECOLOGICAL INFORMATICS 35, 35 (2015).
101. For a description of the history of the evolution of IP rights since the 1980s in the United States, the permitting of patent protections for living organisms, the placing of license limits on farmers, and IP rights’ significance to the biotechnology industry, see Boyd, supra note 64, at 36–48.
102. Stone, supra note 60, at 385.
Even though there are many criticisms of GMO crops, this Article focuses on criticisms arising from business interests, biodiversity perspectives, and corn-specific reasons. A major business complaint of GMOs comes from the practice of single-use seeds. For GMO crops, growers must use seeds that are bought with a license, which often requires them to be used for only one year. The grower cannot store or save the seeds. Agrochemical companies, like Monsanto, Dow, Pioneer-Dupont, and Syngenta, place these limits for many reasons, including to protect their intellectual property; maintain uniform planting conditions; and ensure compliance with the needed inputs, like fertilizer, irrigation, pesticides, and herbicides. GMO farming only succeeds as monocrop agriculture—in other words, when only one crop is grown on a farm.

In México, farmers have many complaints about seed licenses and single-use requirements. They worry that national regulations do not include a provision for unintentional breach of patent license. Traditionally, Mexican farmers save leftover seeds for plants with desirable traits. Because farmers can only license GMO seeds, they lose the flexibility to save those leftover. There is significant legal liability for saving seeds, and seed companies utilize aggressive legal strategies to ensure compliance. In 2002, there were criminal penalties for storing GMO seeds, which created additional fear. Another business complaint is that GMO farming is expensive, with high costs spent on the actual seeds, required inputs like herbicides, large amounts of water, and needed mechanization.

In México, corn farmers often avoid GMO corn for these reasons. Doctor Alma Piñeyro-Nelson explains that corn farms in México are generally small parcels and grow many crops with few chemical inputs, while in the United States GMO corn relies on monocrop farms, large plots, extensive mechanization, petrochemical fertilizers, and pesticides, and thus has more water needs. This is problematic since it necessitates large-scale planting, which may be

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103. Emphasizing geography, seed reuse, seed flows, and seed mixing, researchers Mauricio Bellon and Julien Berthaud explain how corn farmers in México are susceptible to GMO contamination. See Bellon & Berthaud, supra note 64, at 5–7.
104. Piñeyro-Nelson, supra note 1, at 97; Stone, supra note 60, at 384.
105. Piñeyro-Nelson, supra note 1, at 97.
107. Fernández, Wise & Garvey, supra note 24, at 8.
108. Piñeyro-Nelson, supra note 1, at 96.
impossible given terrain limitations or land costs in México.\textsuperscript{109} Monocrop farming is susceptible to higher risks since only one kind of plant is grown and any infestation or other negative condition can impact the whole harvest.\textsuperscript{110} Growing only one crop over a sustained period also depletes the soil of nutrients.

In the past few years, policy makers and courts have found harms with GMO farming because of the toxic effects of needed inputs for this kind of farming. Usually these are from herbicides. The most common example is glyphosate, which is sold by Monsanto as the product RoundUp.\textsuperscript{111} Monsanto sells GMO seeds as “RoundUp Ready.” Since GMO seeds are engineered to withstand these chemicals, herbicides are needed and are heavily used to attain GMO farming’s full productivity. Studies point to problems from glyphosate use in farming. Weeds build a resistance to the herbicide, and farms must increasingly use more glyphosate.\textsuperscript{112} The resulting “superweeds” pose larger environmental problems.\textsuperscript{113} These harms, along with many more, motivate scientists to increasingly explain that there is no consensus on the safe use for glyphosate-based herbicides.\textsuperscript{114}

Recent court verdicts against Monsanto because of the herbicides’ toxic impact on humans have brought the glyphosate controversies to public light.\textsuperscript{115} Previously, the International Agency for

\textsuperscript{109}. See \textit{id.} at 96–97 (elaborating the industrial agricultural scheme of larger regions like the United States and its incompatibility with the smaller, diversified systems commonly found in México).

\textsuperscript{110}. See \textit{id.} at 96 (defining monocrop farming).

\textsuperscript{111}. For a description of glyphosate’s history, increased usage, and the law’s role in stimulating consequential debates between regulators and policy makers, see Alessandra Arcuri, \textit{Glyphosate}, in \textit{INTERNATIONAL LAW’S OBJECTS} 234 (Jessie Hohmann & Daniel Joyce eds., 2018).

\textsuperscript{112}. See Charles M. Benbrook, \textit{Impacts of Genetically Engineered Crops on Pesticide Use in the U.S. – The First Sixteen Years}, 24 ENVTL. SCI. EUR. 24, 24 (2012) (“Moreover, the impacts of these traits on U.S. pesticide use trends are substantial and obvious, especially in recent years as a result of the growing number and geographical spread of glyphosate-resistant (GR) weeds.”);

\textsuperscript{113}. See Carmen Bain et al., ‘Superweeds’ or ‘Survivors’? Framing the Problem of Glyphosate-Resistant Weeds and Genetically Engineered Crops, 51 J. RURAL STUD. 211, 219 (2017) (“In the current context, farmers are compelled to implement more environmentally harmful on-farm practices to kill resistant weeds, such as increased tillage and the use of more toxic herbicides.”).


Research on Cancer of the UN World Health Organization found glyphosate to be probably carcinogenic.\textsuperscript{116} Its toxicity has been found to spread to humans who consume GMO products.\textsuperscript{117} Furthermore, Piñeyro-Nelson links consumption of GMO corn to dangers for embryo development based on an accumulation within the human body.\textsuperscript{118}

GMOs also raise concerns related to biodiversity.\textsuperscript{119} A study conducted between 2002 and 2007 confirms that there has been a loss of genetic diversity in corn landraces throughout México because of GMOs.\textsuperscript{120} Previously, this had been undetected because of methodological biases in prior research.\textsuperscript{121} This is consistent with prior studies on corn in México finding irreversible impacts with GMO transgenes on landrace corn\textsuperscript{122} and finding GMO farming management practices insufficient to protect landraces.\textsuperscript{123}

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{118} See Piñeyro-Nelson, \textit{supra} note 1, at 98.
\item \textsuperscript{119} For a description of the diversity of Mexican corn races, their evolution and maintenance by humans, and their agricultural benefit, see Bellon & Berthaud, \textit{supra} note 64, at 4–5. Professor Kathleen McAfee summarizes many of the negative impacts on biodiversity for GMO corn in México, including “transfer of genetic capacities” from GMO crops, those crops “out-compet[ing] and displac[ing]” non-GMO crops, loss of unique landrace genetic traits, transgenes traveling further than claimed, harm to useful predators like butterflies, and damage to soil microbes. McAfee, \textit{supra} note 51, at 20–21; \textit{see also} Fernández, Wise & Garvey, \textit{supra} note 24, at 22.
\item \textsuperscript{120} George A. Dyer et al., \textit{Genetic Erosion in Maize’s Center of Origin}, 111 PNAS 14094, 14094 (2014).
\item \textsuperscript{121} \textit{See id.}
\item \textsuperscript{122} Antonio Turrent-Fernández et al., \textit{Propuesta de Cotejo de Impacto de la Acumulación de Transgenes en el Maíz (Zea mays L.) Nativo Mexicano [Evaluation Proposal of Possible Impact of Transgene Accumulation in Mexican Maize Landraces]}, 43 \textit{Agriciencia} 257, 258 (2009).
\item \textsuperscript{123} See Daniela Soleri & David Cleveland, \textit{Transgenic Maize and Mexican Maize Diversity: Risky Synergy?}, 23 \textit{Agric. & Hum. Values} 27, 28 (2006).
\end{enumerate}
\end{footnotesize}
GMO corn pollen can travel easily and unintentionally for as far as one or two miles away.\textsuperscript{124} Pollen is typically carried by wind or insects. Corn is an open-air pollinating crop, making it easily susceptible to DNA mixing with GMO corn.\textsuperscript{125} GMO growers try to contain any genetic spread by ensuring that their plots are not surrounded by crops that can be contaminated. Independent of open-air pollen, GMO plant genomes can mix with landrace plants during transport as well.\textsuperscript{126}

Limiting where GMO crops are physically planted and what flora surrounds them, these controls are strictly implemented and monitored during the experimental and pilot phases of regulatory approval. But during the commercial phase, controls are less rigorous. Seed companies have said that they cannot control where seed grains travel or end up, which adds to the call for precaution for GMO corn.\textsuperscript{127}

The concern for biodiversity is that corn GMO genomes definitely interact with landrace corn.\textsuperscript{128} Because landrace corn plants can be altered with such ease, it is feared that their genetic traits—which may help them adapt to drought, climate, terrain, and soil change—will be lost.\textsuperscript{129}

In México, the scientific community and the general public became deeply attuned to these issues after an unauthorized release of GMO corn in 2001 caused significant public controversy.\textsuperscript{130} At that time, GMO corn seeds were not approved in the country.\textsuperscript{131} México had a de

\begin{itemize}
\item \textsuperscript{124} For a description of how corn’s open pollination makes it vulnerable to transgenes, see Piñeyro-Nelson et al., supra note 14, at 751.
\item \textsuperscript{125} See ANTAL ET AL., supra note 21, at 5; Fernández, Wise & Garvey, supra note 24, at 22.
\item \textsuperscript{126} Piñeyro-Nelson, supra note 1, at 97; cf. Rojas-Barrera et al., supra note 9, at 21302.
\item \textsuperscript{128} See Fernández, Wise & Garvey, supra note 24, at 22.
\item \textsuperscript{129} Id.
\item \textsuperscript{130} Since the 1970s, scientists had warned that Mexican landrace genomes were vulnerable. See Christophe Bonneuil, Jean Foyer & Brian Wynne, Genetic Fallout in Bio-Cultural Landscapes: Molecular Imperialism and the Cultural Politics of (Not) Seeing Transgenes in Mexico, 44 SOC. STUD. SCI. 901, 907 (2014).
\item \textsuperscript{131} Laura Vargas-Parada, GM Maize Splits Mexico, NATURE (July 1, 2014), https://www.nature.com/news/gm-maize-splits-mexico-1.15493 [https://perma.cc/L3BM-UERU]. Pro-GMO interests tried to persuade agriculture authorities against the moratorium. These efforts benefitted from publication in prestigious international journals, while justifications for the moratorium did not. See Bonneuil, Foyer & Wynne, supra note 130, at 907–08. For a summary of the moratorium, how it complied with CBD objectives, and its elimination, see Lizy Peralta & Catherine Marielle, La Protección Oficial del Maíz Frente los Transgénicos: Una Simulación de
facto moratorium, refusing to approve any experimental cultivation of
GMO corn due to fear of open pollination. That year, the prestigious
journal *Nature* published findings from UC Berkeley scientists Ignacio
Chapela and David Quist that corn landraces in Oaxaca contained
evidences of genetic material from GMO corn. It is expected
that someone brought seeds to Oaxaca and landraces were then
penetrated by proteins that only came from GMO corn. This sparked
enormous controversy in México. The government appeared unaware
or negligent, claiming there was no genetic mixing. Experts in
biotechnology and related fields refuted the conclusions, arguing that
the tests were insufficient.

After this, *Nature* discounted the findings from 2001, claiming that the scientific tests were not consistent with its
standards. The whole experience left many doubting that scientific experts or regulators would objectively listen to any criticisms of
GMOs.

In response, Mexican nongovernmental organizations sought
impartial and objective examination from the Commission for
Environmental Cooperation (CEC), a multilateral entity created by
NAFTA. In 2004, the CEC issued an extensive report on GMO corn
and biodiversity confirming many of the findings from Chapela and
Quist. Moreover, the report examined risks to genetic diversity,
impacts on natural ecosystems, health effects, and social and cultural
effects. As an independent entity, the CEC’s position only added to

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134. Bonneuil, Foyer & Wynne, supra note 130, at 908. For a description of the controversy in México—in the journal, with Chapela and Quist’s own colleagues, and for the biotechnology field, see McAfee, supra note 51, at 23–24. The controversy also exemplifies how DNA-centered analysis marginalizes perspectives emphasizing bioculture, gene flow, and biodiversity. See Bonneuil, Foyer & Wynne, supra note 130, at 917–18.


138. See McAfee, supra note 135, at 149.


140. For specifics of report, see McAfee, supra note 135, at 149, 152.
the concerns of GMO skeptics. México has been criticized for quickly passing GMO regulations, specifically the LBOGM in 2005, to avoid implementing the CEC’s recommendations for precautionary measures.

What ensued, and continues, is debate about the scientific support for these claims, including the quality of research methods, purported evidence, and actual consensus about GMO safety. Seeking peer-reviewed international journal attention, scientists from México and the United States published articles confirming or refuting the GMO presence, years after Chapela and Quist’s findings. In 2004, Piñeyro-Nelson and others confirmed that transgenomes were present in the locations Chapela and Quist initially reported on. They emphasized that different molecular and sampling methodologies can lead to contrasting detection results.

Doubts persist in México about whether agrochemical and biotechnology fields will ever acknowledge proof that GMO corn alters landrace genomes. Historian Christophe Bonneuil describes how the methodologies and lab focus of the fields overlook evidence that landrace genomes could be transgressed. Moreover, scientists debate whether the socioeconomic and cultural effects of GMO corn should be examined. The CEC report noted the significance of these factors in addition to biodiversity impacts.

Mexican criticism of GMO corn persists and has become more pervasive. Out of this context, GMO corn litigation began in 2013. The Colectividad del Maíz case centers on the impacts to biodiversity from GMO corn. But, as described, there are many other criticisms of GMO corn.

This Article builds on the criticism that foreign companies produce GMO corn seeds. As described in Parts IV and V, these foreign interests greatly influence México’s options for biodiversity regulation. The Colectividad sued foreign-owned seed companies Monsanto, Dow, Pioneer-Dupont, and Syngenta, which are regarded as US, German, Swiss, or Chinese companies. With the companies setting the terms

141. For how the LBOGM regulates GMOs, see infra Sections III.A and III.B.
142. See WISE, supra note 127.
143. See Bonneuil, Foyer & Wynne, supra note 130, at 909.
144. See Piñeyro-Nelson et al., supra note 14, at 750.
145. See id.
146. See Bonneuil, Foyer & Wynne, supra note 130, at 912.
147. See McAfee, supra note 135, at 155 (reporting on scientific studies published from 2005 to 2006).
148. This Article uses these company names since they are the most common references in court documents and in the news. But, recently Monsanto, Dow, Pioneer-Dupont,
of seed use, requiring toxic inputs, and determining what scientific evidence can detect biodiversity harms, GMO corn is viewed with a high degree of suspicion in México. There is much criticism of how, on the global stage, such a small number of corporations own GMO technology, set the legal terms of seed and glyphosate use, employ aggressive litigation against farmers and sustainability advocates, and shape international trade agreements and national regulations in their favor.149

In sum, since the advent of GMO technologies in the 1990s, corn in México has become highly vulnerable to foreign actors. These susceptibilities are the result of México's position as a center of origin and center of diversity for corn, biological factors of landrace corn, the economics of corn farming, and GMO seeds controlled by foreign companies. As described below, the gene revolution in farming occurs in a political-economic context that is specific to the moment while following historic trends. Legal doctrine also plays a vital role in framing the ultimate result.

III. MÉXICO’S BIOSECURITY LAW INCENTIVIZES GMO FARMING

A series of legal instruments provide GMOs the governmental support needed to capitalize on the economic gains and scientific innovations of this technology. This Part describes this specifically relating to corn in México. The LBOGM is a biosecurity regime that regulates GMOs on its face while also placing a series of hurdles for any precautionary measures. With this, foreign seed companies have become the most significant actors in GMO permit requests in México,
and the Mexican government rarely denies their petitions to release GMO seeds.

A. The LBOGM Regulates GMOs and Refers to Precautionary Principles

In 2005, México passed comprehensive GMO regulations pursuant to its constitution, its status as a party to the Cartagena Protocol, and international law on biodiversity. Referred to as the LBOGM, this law created the central framework for regulating GMOs in México. The LBOGM’s primary objective was to simplify biosecurity regulations and meet CBD requirements after a de facto moratorium was placed on GMOs in 1999.


151. See Gutiérrez González, supra note 23, at 99. This includes Constitución Política de los Estados Unidos Mexicanos, CPEUM, Diario Oficial de la Federación [DOF] 05-02-1917, últimas reformas, DOF 10-02-2014 (Mex.), art. 73(XVI)(4a) (providing Congress power to adopt measures); art. 4 (affirming a right to live in an environment adequate for human development); art. 4, ¶ 5 (stating it is a human right to have a right to a clean and healthy environment and its enjoyment); art. 1 (stating that liability is created for whoever is responsible for environmental damage and deterioration).

152. See Gupta & Falkner, supra note 106, at 33.


154. For a basic description of this framework, government agency responsibility, permit application process, and legal norms, the USDA issues an annual report on biotechnology in México. See GAIN MX8050, supra note 2, at 1. For a more detailed summary of this, LBOGM legislative history, and its process for devising new regulations, see Juan Antonio Herrera Izaguirre et al., Mexico’s Environmental Law in the GMO Era, 1 MEX. L. REV. 121, 140–55 (2008).

The Cartagena Protocol is the main international treaty addressing GMOs.\textsuperscript{156} The protocol sets up an international framework for the safe transfer, handling, and use of GMOs; the protocol attempts to avoid adverse effects on conservation and biodiversity, including risks to humans and risks from the cross-border movement of GMOs.\textsuperscript{157} During the negotiation of the Cartagena Protocol, Global South states and pro-GMO states heavily debated to what extent this international agreement should limit GMO technologies.\textsuperscript{158} Various Global South states insisted that the protocol include the precautionary principle.\textsuperscript{159}

The Cartagena Protocol includes a precautionary principle specific to biotechnology in article 10:6.\textsuperscript{160} It asserts that states may take “socio-economic considerations” and concerns over biodiversity into account to employ precautionary measures.\textsuperscript{161} Specifically, it says that a “[l]ack of scientific certainty due to insufficient relevant scientific information and knowledge . . . shall not prevent [a country] from [rejecting transgenic imports].”\textsuperscript{162} Despite these articulated powers, states will likely have to justify their precautionary measures with “sound science.”\textsuperscript{163}

México has a unique relationship with the Cartagena Protocol regime, following its norms\textsuperscript{164} with limited effect. It is the only North American country to agree to the protocol.\textsuperscript{165} After this, México had to implement its own national law on the matter.\textsuperscript{166} At that time, the country did not yet have any laws or regulations specifically addressing

\textsuperscript{156} Specifically, the protocol addresses “living modified organisms.” Cartagena Protocol, \textit{supra} note 42, art. 3(k). The protocol came after the call in the CBD. See \textit{id.} art. 19, ¶ 3. The protocol was signed by 103 countries and was supported by pro- and anti-GMO positions, despite the United States not agreeing to it but being heavily involved in its negotiations. See Applegate, \textit{supra} note 76, at 63, 63 n.209. For a description of the protocol’s protracted debate and opposition by the United States and other pro-GMO countries, see McAfee, \textit{supra} note 51, at 30.

\textsuperscript{157} For the basics of the protocol and its relationship to Mexican law, see GUTIÉRREZ GONZÁLEZ, \textit{supra} note 23, at 65, 97, 183.

\textsuperscript{158} See Sumudu Atapattu, \textit{The Significance of International Environmental Law Principles in Reinforcing or Dismantling the North-South Divide}, in \textit{INTERNATIONAL ENVIRONMENTAL LAW AND THE GLOBAL SOUTH} 102 (Shawkat Alam et al. eds., 2015).

\textsuperscript{159} See Meyer, \textit{supra} note 84 (describing the efforts of the “African Group,” Peru, Thailand, and Venezuela).

\textsuperscript{160} Cartagena Protocol, \textit{supra} note 42, at 8.

\textsuperscript{161} \textit{Id.} art. 26.

\textsuperscript{162} \textit{Id.}

\textsuperscript{163} See McAfee, \textit{supra} note 51, at 31.

\textsuperscript{164} See GUTIÉRREZ GONZÁLEZ, \textit{supra} note 23, at 65, 65 n.146 (reporting that the protocol entered into force on September 11, 2003, and was published in México’s Diario Oficial de la Federación on October 28, 2003).

\textsuperscript{165} See \textit{ANTAL ET AL.}, \textit{supra} note 21, at 17.

\textsuperscript{166} See GUTIÉRREZ GONZÁLEZ, supra note 23, at 65.
biotechnology. Despite this, it is argued that a series of legislative and political delays after the protocol opened México to GMO corn. In particular, the LBOGM was implemented five years after the Cartagena Protocol was agreed to, and scientific studies on GMO corn risk were not widely published until 2009. Moreover, the major responsibility to regulate GMOs has been left to the secretary of agriculture, and not environmental authorities.

While the LBOGM refers to the precautionary principle specific to GMOs, it is criticized as being insufficient. The law includes the power to designate protections for center of origin and center of diversity, as well as the power to designate GMO-free zones. These are consistent with Cartagena Protocol norms. Mexican corn experts characterize the LBOGM as privileging support for biotechnology while excluding or minimizing input from ecologists, anthropologists, and environmental scientists. They explain that the LBOGM simplified regulation in order to attract biotechnology investments, following a long line of neoliberal reforms. Because of this perception, the LBOGM is often called La Ley Monsanto, meaning “Monsanto’s law.”

As described below, there are four main criticisms to the LBOGM: its discretionary nature, its exceptions from precautionary protections, the corn regime’s limited scope, and its conflicting objectives.

167. See Álvarez-Buylla et al., supra note 12, at 15.
169. See Reglamento de la Ley de Bioseguridad de Organismos Genéticamente Modificados (RLBOGM), art. 9.IV, Diario Oficial de la Federación [DOF] 18-03-2005, (Mex.).
170. Id. arts. 86–88.
171. Id. art. 90.
172. See Gutiérrez González, supra note 23, at 41, 41 n.66 (noting that the same definition of biodiversity is used in CBD art. 2 and LBOGM art. 3.XIII).
174. See José-Antonio Serratos-Hernández & Alejandra Celeste Dolores Fuentes, Bioseguridad y Conservación del Maíz Nativo en México, in ÉL MAÍZ EN PELIGRO ANTE LOS TRANSGÉNICOS, supra note 173, at 249, 266.
176. Seven criticisms of the law include the competing objectives of regulation and promotion of GMOs, the limited public participation in its creation, that there are no precautionary-principle mechanisms, the fact that GMO and landrace corn cannot coexist with open-air pollination, the GMO industry’s position serving as regulator and promoter of GMOs, that there are no mechanisms to avoid conflict of interests, and that no liability mechanisms are provided as required by the Cartagena Protocol. See ANTAL ET AL., supra note 21, at 22.
On its face, the LBOGM contains substantive regulation for corn and controls harms from GMO cultivation. Precautionary measures are provided for in article 9:IV.\textsuperscript{177} Scholar Alicia Gutiérrez González argues that these measures reflect the precautionary principle under the Rio Declaration on Environment and Development (the “Rio Declaration”) and the WTO Agreement on the Application of Sanitary and Phytosanitary Measures.\textsuperscript{178} The secretary of agriculture reviews and approves or denies any permits for GMO planting that request experimental, pilot, and commercial plots.\textsuperscript{179} For each permit, it conducts risk assessment on a case-by-case basis.\textsuperscript{180} Gutiérrez González criticizes that the LBOGM does not define what a risk is.\textsuperscript{181} She adds that the LBOGM does not allow for a lack of knowledge to support a finding of a risk.\textsuperscript{182} The diversity and origin criteria, specifically needed for corn protection, were never precisely defined by the LBOGM when it was passed in 2005.\textsuperscript{183} The LBOGM mandates a specific regimen to protect corn.\textsuperscript{184} These regulations were not issued in 2005, and, after a great deal of public controversy, they were only issued in 2009.\textsuperscript{185} Given the political and controversial nature of any GMO corn regulation, Mexican presidents have been hesitant to announce specifics of the corn regime.\textsuperscript{186}

\section*{B. The LBOGM Regime Has Four Significant Weaknesses}

The first criticism of the LBOGM is that its precautionary measures are discretionary. Article 9:IV articulates precautionary reservations, but it lacks any explicit guidance on what measures can be taken or from where its authority is derived.\textsuperscript{187} It does not mention any specific international treaty, Mexican law, or customs.\textsuperscript{188} The

\begin{itemize}
  \item \textsuperscript{177} LBOGM, \textit{supra} note 43, art. 9:IV.
  \item \textsuperscript{178} See Gutiérrez González, \textit{supra} note 23, at 118 (referring to principle 15 of the Rio Declaration and articles 5:6 and 5:7 of the WTO Agreement).
  \item \textsuperscript{179} LBOGM, \textit{supra} note 43, art. 13:III.
  \item \textsuperscript{180} Id. art. 61:I.
  \item \textsuperscript{181} Gutiérrez González, \textit{supra} note 23, at 124.
  \item \textsuperscript{182} Id. at 125.
  \item \textsuperscript{183} See Antal et al., \textit{supra} note 21, at 22.
  \item \textsuperscript{184} LBOGM, \textit{supra} note 43, art. 2:XI.
  \item \textsuperscript{186} See Mexican Biosafety, \textit{supra} note 150, at 13.
  \item \textsuperscript{187} See Gutiérrez González, \textit{supra} note 23, at 118–19 (referring to the contrast between the Rio Declaration principles on the one hand and LBOGM article 9 precautionary principle and article 63 risk assessments on the other hand).
  \item \textsuperscript{188} LBOGM, \textit{supra} note 43, art. 9:IV.
\end{itemize}
Cartagena Protocol only states that “potential adverse effects” warrant precaution, while other treaties include more specific harms to employ precaution. Mexican experts have criticized the LBOBM’s precautionary protections as discretionary since the law limits state powers to what is “in accord with [México’s] capacities.”

A second critique is that the LBOGM specifically carves out an important exception to precautionary-principle measures. It states that any precaution must “take into account international obligations” to which México has agreed. Landrace corn advocates fear that a lack of guidance and compliance with other international obligations open the door to exceptions. A potential argument for the government or the seed companies is that México’s international economic obligations preempt precautionary measures. This could arguably be for investors from NAFTA, from WTO trade in services or goods, or for trade in GMO patents under the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). Similar obligations are anticipated soon. The USMCA is expected to provide new legal protections in the form of trade in biotechnology and intellectual property for plant varieties.

The third criticism is that the special corn regime does not provide enough protection for corn biodiversity in México. The LBOGM’s specific corn regimen was delayed and not issued until 2009. It is seen as insufficient for various reasons. A key component of this regime is that it lists what geographic locations mandate protection from GMO farming. A complaint is that these regulatory maps divide locations as “center of origin” or “center of diversity,” suggesting that


191. See LBOGM, supra note 43, art. 9:IV.

192. International legal agreements may limit México’s ability to take precautionary measures. NAFTA protects investors from the United States and Canada from regulatory measures amounting to expropriation. See NAFTA art. 1101(1), Dec. 17, 1992, 107 Stat. 2057, 32 I.L.M. (prohibiting state parties from “indirectly nationaliz[ing] or expropriat[ing] an investment”). Specifically, NAFTA chapter 17 requires that México provide a series of IP protections consistent with international treaties. See id. art. 1701(2). Moreover, TRIPS has been argued to provide protection for GMO corn seed companies in México. See Kathleen McAfee, Corn Culture and Dangerous DNA: Real and Imagined Consequences of Maize Transgene Flow in Oaxaca, 2 J. LATIN AM. GEOGRAPHY 18, 32–33 (2003).

193. See discussion infra notes 253–61 and accompanying text.

194. See Olivé et al., supra note 173, at 320. For an explanation of center of origin and center of diversity, see Ovando & Sánchez, supra note 14, at 19, 23–27.
only one type of protection can be extended.195 Specifically, critics argue that the criteria for center of origin and center of diversity in LBOGM articles 86 and 87 are insufficient to meet the LBOGM’s objectives.196 Furthermore, critics argue that the Mexican regulations resulting in these maps for corn were prepared without public input.197 The secretary of agriculture only solicited input from the biotechnology industry. This excluded participation from differing scientific opinions, corn farmers, and concerned members of the public.198 Food advocates complained about how requirements of public notice and comment were ignored.199 Likewise, the legislative and regulatory process approving the corn regime was argued to be lacking procedural transparency.200 Lastly, critics argued that the maps for the corn regime did not specifically identify where landrace corn was grown.201

Moreover, there have been repeated delays in the implementation of the corn regime.202 LBOGM corn regime regulations were not issued until 2009, four years after the LBOGM referred to them in 2005. The corn origin and corn diversity regulatory maps were not issued until 2012, three years after the regulations. Amid these delays, the secretary of agriculture began issuing experimental GMO corn permits in 2009.203 With these regulatory delays, many scientists

196. See id. at 95.
198. See Olivé et al., supra note 173, at 320.
199. See Dorbecker et al., supra note 197, at 271; Peralta & Marielle, supra note 131, at 445.
200. See Dorbecker et al., supra note 197, at 273.
202. For descriptions of the corn regulation publication, draft proposals, and center of origin map controversies, see FOREIGN AGRIC. SERV., GAIN MX1100, MEXICO: MAPPING MEXICAN CORN AND IMPLICATIONS FOR BIOTECH DEVELOPMENT (2011); FOREIGN AGRIC. SERV., GAIN MX2055, MEXICO: BIOTECH CORN FACED MORE HURDLES IN MEXICO 2 (2012); FOREIGN AGRIC. SERV., GAIN MX2051, MEXICO: AGRICULTURAL BIOTECHNOLOGY ANNUAL: MEXICO CAUTIOUSLY MOVES FORWARD WITH BIOTECHNOLOGY (2012); FOREIGN AGRIC. SERV., GAIN MX2082, MEXICO: CENTERS OF ORIGIN FOR CORN PUBLISHED IN FEDERAL REGISTER (2012).
see precautionary measures as the only way to protect landrace corn from GMO pollination risks.\textsuperscript{204}

The fourth criticism is that the LBOGM has conflicting objectives: both to regulate and to encourage GMOs. Specifically, it states that it aims to regulate GMO agriculture and its environmental impacts.\textsuperscript{205} This regulatory goal conflicts with the law’s other objective to support research of GMOs. The objective to support research should exist in México’s law on science and technology and not specifically in the LBOGM regulation framework.\textsuperscript{206} One example of environmental regulation’s secondary status is the limited authority allotted to the secretary of the environment and natural resources for overseeing environmental regulation. This agency does not issue permits or review petitions for them; its regulatory role is confined to consulting individuals and companies in the permit process. In this light, the permit emphasizes biodiversity and the environmental objectives less than perceived agricultural needs.

\section*{C. Foreign Seed Companies Capitalize on LBOGM Gaps}

Seed companies have used these regulatory gaps to gain a foothold in México. Since the LBOGM, foreign companies are the overwhelming majority of actors soliciting GMO permits for corn and other products. In August of 2017, the Centro de Estudios para el Cambio en el Campo Mexicano (CECCAM) confirmed this in a long-term study examining thirty years of GMO farming in México.\textsuperscript{207} This helps paint a picture of what is at stake beyond the commercial permits for GMO corn, whose review has been suspended for years in Colectividad del Maíz.

The study explains that nineteen commercial permits for GMO corn were submitted, but, due to the Colectividad del Maíz lawsuit, they were suspended without any denial yet.\textsuperscript{208} Specific to GMO corn, foreign farms made the most permit requests and held the majority of approvals during the thirty-year interval during which the study was

\begin{itemize}
\item \textsuperscript{204} See Álvarez-Buylla et al., supra note 12, at 155.
\item \textsuperscript{205} See LBOGM, supra note 43, art. 1.
\item \textsuperscript{206} See Serratos-Hernández, supra note 153, at 139 (referring to Ley de Ciencia y Tecnología [LCT], Diario Oficial de la Federación [DOF] 05-07-2002 (Mex.)).
\item \textsuperscript{208} See Vázquez, supra note 207, at 18.
\end{itemize}
conducted. CECCAM explains that there have been 327 requests for GMO corn permits (noncommercial), with 194 approved and 42 denied. Monsanto and Pioneer-Dupont made 70 percent of these requests. Other foreign companies making requests include Dow Agrosciences and Syngenta. Approvals have been issued for 169 experimental permits and 26 pilot permits (i.e., noncommercial). These permits would allow for plots in ten Mexican states. For non-corn GMO crops, there have been 853 permit requests. Monsanto has made 54 percent of these. So far, the Mexican government’s record is that only one out of eight permits are denied. As such, most GMO permit requests are approved by the secretary of agriculture.

IV. COLLECTIVE ACTION TEMPORARILY SUSPENDS GMO CORN

In response to the perceived weakness of the LBOGM corn regime, a demanda colectiva challenged the Secretary of Agriculture in 2013 and succeeded in having courts order precautionary controls for GMO corn since then. While the lawsuit challenges GMO regulations, given the magnitude of the biodiversity risks, it raises larger constitutional questions regarding court powers and collective action litigation. As described in Part V, these issues shape México’s sovereign authority over biodiversity.

A. With a New Collective-Action Law, the Colectividad Sues to Stop Commercial GMO Corn

México’s collective-action law opened up an avenue for landrace corn advocates by providing plaintiffs a means to seek to stop government approval for GMO permits. As mentioned, the plaintiff, the Colectividad, succeeded in having a trial court enjoin the Mexican government from approving any commercial petitions for GMO corn. On July 5, 2013, the Colectividad filed a demanda (complaint) in court, requesting that the secretary of agriculture suspend approval of

209. Id. at 12.
210. Id. at 18.
211. Id. at 12.
212. Id.
213. Id.
214. Id. at 9.
215. Id.
216. As mentioned, this Article refers to “Colectividad del Maíz” as the lawsuit and “Colectividad” as the collective, or colectiva, formed for litigation. Technically, the group and lawsuit have the same name, since the organization was only created for the lawsuit, but in order to distinguish between lawsuit and the collective, two different designations are used.
commercial permit petitions for GMO corn. The Colectividad is a plaintiff group—a collective entity similar to a class—made up of fifty-three persons and representing twenty organizations. These organizations include campesino farmers, beekeepers, artists, researchers, environmentalists, indigenous-rights advocates, and human-rights advocates. The collective formed to try to stop government approvals of GMO corn permits with the lawsuit. It updates and increases public awareness of the lawsuit through webpages, press releases, social media, and media presence. In this dispute, Monsanto applied for commercial permits to plant GMO corn in over a million and half acres in Sinaloa, a state in northern México where industrial corn farms are widespread. Along with Monsanto, seed companies Syngenta, Dow Agro Sciences, and Pioneer-Dupont are parties to the lawsuit. The primary defendant named in the complaint is the secretary of agriculture, but the secretary of the environment and natural resources and the aforementioned companies are also listed as defendants.

For over six years, this litigation has attracted international attention and concern from the Mexican public. The public sees this fight in domestic courts as a contest to validate Mexican efforts to protect biodiversity and to maintain future genetic diversity. Put simply, domestic laws set the table to legitimize precautionary measures or to disaffirm them. On its face, the dispute challenges
regulatory approval procedures, demanda colectiva rules, and court powers to enjoin government agencies. But much more is at stake.

Because of political and popular resistance to GMO corn, the presidency of Felipe Calderón did not approve commercial permits for GMO corn before it left office in December of 2012. Instead, it left the inevitable controversy for the next presidency, from another political party. Barely half a year into the Enrique Peña Nieto presidency, the Colectividad initiated a lawsuit that continues to this day.

Submitted in July of 2013, the Colectividad’s demanda alleges three basic points regarding the illegal release of GMOs, their impact on collective rights, and consequential harms to biodiversity. First, it claims that there is unauthorized release, voluntary and involuntary, of GMO corn. This takes place in locations without permitted authorizations. Second, this unauthorized release negatively impacts the human rights of conservation, sustainable use, and participation in the biodiversity of corn landraces, and it surpasses the limits set by the LBOGM. Third, agricultural biodiversity will suffer if there is large-scale release of GMO corn, as commercial permits would authorize. The complaint refers to legal norms in the Mexican constitution, Mexican procedural and environmental law, and international law.

The Colectividad took advantage of México’s collective-action law, implemented the prior year. It provides litigation rights similar to class actions in the United States. The Colectividad filed a


225. See Demanda Contra el Maíz Transgenico, supra note 5.


228. See Neal R. Marder & Andrew S. Jick, Collective Actions in Mexico: Similarities, Differences, and Implications, 13 CLASS ACTION LITIG. REP. 1213 (Oct. 26, 2012). For the basics of México’s collective-action law, see SPENCER WEBER WALLER & ANDRE FIEBIG, 2 ANTITRUST & AMERICAN BUSINESS ABROAD § 20:11 (4th ed. 2020). For how collective actions compare with class actions in the United States, see Marder & Jick, supra. For a description of how collective actions have developed since the 2012 implementation, see Adrián Magallanes & Rodrigo Barradas,
complaint as a *colectiva* “in the strict sense” for a group of individuals with indivisible rights whose rights can be identified. Created for litigation, such colectivas must be comprised of at least thirty members with shared legal claims or shared factual circumstances. Amending México’s Federal Code of Civil Procedures, the collective-action law allows complaints filed as environmental claims and consumer claims from private or public plaintiffs. For actions like *Colectividad del Maíz*, possible relief includes injunctive, declaratory, and monetary damages. The *Colectividad* has only sought injunctive relief.

Procedural rights in the collective-action law gave the *Colectividad* immediate leverage. Specifically, defendants in demandas colectivas must reply to the complaints within five days. For *Colectividad del Maíz*, this effectively required the secretary of agriculture to quickly respond in court to claims of illegal release of GMO corn. For collective actions, courts have broad powers as the litigation continues, including requiring updates to the colectiva, imposing conditions on the defendant, and requiring amended allegations. In this dispute, the *Colectividad* benefited from these specific court powers, keeping the dispute alive and halting approvals of commercial permits for GMO corn. Since the collective-action law was new at the time, with many legal issues undetermined, a great deal of the litigation focused on specific issues, such as standing for a colectiva, *amparo* (individual rights) belonging to seed companies and government defendants, and court powers in the form of injunctive actions before trials and conditions placed on the defendants. Even though these intricate legal issues feed the courtroom developments, at its heart the dispute centers around whether there was an illegal release of GMO corn in México and if commercial GMO corn farming will be authorized.

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229. See Collective Action Law, supra note 227, art. 579. This type of action is distinct from diffused collective actions and homogenous individual actions, which are also permitted in México. Id. art. 581.I–III.
230. Id. art. 578.
231. Id. art. 581.I–III.
232. Id. art. 590.
233. Id. arts. 586, 587.
234. GAIN MX3087, supra note 47.
235. For a description of how environmental-law claims would pose procedural complications for the new collective-action regime, see Vincent, supra note 47.
B. A Collective-Action Lawsuit Evolves into a Dispute About Biosecurity and Sovereignty

Over six years, the Colectividad del Maíz lawsuit has proceeded in four important stages. Their effect is to incrementally shift a dispute regarding administrative procedures and injunctive measures to a complex debate about constitutional demarcations of governmental authority. On October 13, 2013, the first step occurred when the trial court enjoined the secretary of agriculture from approving any commercial permits for GMO corn in México until a final verdict was reached in this lawsuit. Judge Jaime Eduardo Verdugo justified the injunction because there was a “risk of imminent harm to the environment,” catching immediate attention from anti-GMO advocates, seed companies, and the US Department of Agriculture.

Specifically, the court made three significant findings. First, there was an unauthorized release of GMO corn in México via unauthorized activities occurring in locations where such release was not legally permitted. Second, this release of GMO corn results in the impairment of legal rights. These rights include human rights, as well as extensive interests in conservation, sustainable use, and participation in the biodiversity of landrace corn, according to the limits and restrictions set by the LBOGM. Third, the court concluded that any commercial authorization for GMO corn would surpass LBOGM limits and impair these legal rights.

Based on these findings, it ordered the Mexican government to do three things. First, the government had to stop any action tending to authorize the release of GMO corn into the environment. Second, it was similarly ordered to stop any proceedings that would tend to authorize this GMO corn release for commercial, pilot, and experimental permits. This order had to be implemented without considering any scientific studies supporting the defendants’ likelihood of success. Consequently, this court effectively embraced precautionary-principle measures. Third, the government had to suspend the authorization of any permits for experimental, pilot, or commercial GMO corn.

The lawsuit’s second step took place on August 19, 2015, when the government won its appeal and the order was found to be

236. See Nota Informativa, supra note 2; Sustainable Pulse, Mexico Judge Orders Total Ban of GM Maize Crops over Environmental Harm, SUSTAINABLE PULSE (Oct. 12, 2013), https://sustainablepulse.com/2013/10/12/mexico-judge-orders-total-ban-of-gm-maize-crops-over-environmental-harm/#.XTItGi2ZM0q [https://perma.cc/V4BA-X2V].
237. See Sustainable Pulse, supra note 236.
238. See Nota Informativa, supra note 2.
239. Id.
inconsistent with the collective-action law.\textsuperscript{240} At this time, Monsanto sought five permits to plant GMO corn.\textsuperscript{241} The judge’s opinion reasoned that there was insufficient proof that GMOs hurt the health of consumers or the environment.\textsuperscript{242} After news of this, Monsanto announced that it planned to double its sales in México in the following five years.\textsuperscript{243}

The third step occurred on March 8, 2016, when an appeals court—the \textit{Segundo Tribunal Unitario en Materia Civil y Administrativa}—affirmed the initial trial court order, instituting precautions over GMO corn and overturning the government’s 2015 victory.\textsuperscript{244} The injunction was found legal without reviewing evidence that GMO corn is harmful or safe for the environment, effectively confirming that precautionary measures could proceed to protect biodiversity. Adding force to these safeguards, the court required monitoring and reports from the secretary of agriculture for existing experimental and pilot GMO corn permits.\textsuperscript{245} The court feared that these GMO permits allowed genomes to be released and plots to be maintained without sufficient controls. The Colectividad was permitted to monitor these existing cultivations for harms that were not just limited to genetic transfer from GMO corn, which includes the potential negative impact of glyphosate. If there were any genetic irregularities or toxic impacts, the collective could request the court to suspend these experimental and pilot permits. Although the court sustained the original injunction, it noted that a higher federal circuit court, the

\textsuperscript{240} See \textsc{Foreign Agric. Serv.}, \textit{GAIN MX5033, Mexico: Injunction Lifted for Planting GE Corn in Mexico but Still on Hold} (2015) [hereinafter GAIN MX5033].


\textsuperscript{242} \textit{GAIN MX5033, supra note} 240, at 2–3; \textit{Injunction Lifted for Planting GE Corn in Mexico but Still on Hold}, \textsc{Ag Prof.} (Sept. 1, 2015), https://www.agprofessional.com/article/injunction-lifted-planting-ge-corn-mexico-still-hold [https://perma.cc/ZCZ4-V2AN].

\textsuperscript{243} See Graham, \textit{supra} note 241.


\textsuperscript{245} For analysis on the specifics of the ruling and its conditions, see Edith Martínez, \textit{¿Qué Pasa con el Maíz Transgénico en México?}, \textsc{Blog Greenpeace Mex.} (Mar. 14, 2016), https://www.greenpeace.org/archive-mexico/es/Blog/Blog-de-Greenpeace-Verde/qu-pasa-con-el-maz-transgcnico-en-mxico/blog/55865/ [https://perma.cc/7GPC-UFHU].
SCJN, or a finding of an amparo right violation could overturn this order.246

In 2017, the fourth step at the appeals court shifted the lawsuit to an inquiry about constitutional law and made it increasingly likely that the SCJN would have to resolve the brewing issues. Specifically, on November 24, an appeals court, the Primer Tribunal Colegiado en Materia Civil del Primer Circuito de la Ciudad de México (the “Primer Tribunal Colegiado”), affirmed the order from the trial court issued four years earlier. This Primer Tribunal Colegiado finding came after the SCJN denied review of Monsanto’s petition, similar to an interlocutory appeal, requesting the court to bypass a ruling by the Primer Tribunal Colegiado.247 The appeals court ruled that the injunction remained effective until the SCJN decided on the pending legal questions.248 The foreign seed companies argued in court that the ban should be lifted.249 The Colectividad presented seed company arguments as focusing on procedural matters, emphasizing what courts can or cannot examine, in order to stop the courts from reviewing the scientific evidence on GMO corn.250 Specifically, the Primer Tribunal Colegiado ruled that it lacked the competence to decide if pretrial injunctions in collective actions were constitutional.251


247. See Angélica Enciso & Gustavo Castillo, Rechaza la SCJN un Amparo de Monsanto Sobre Maíz Transgénico, JORNADA (May 12, 2017), https://www.jornada.com.mx/2017/05/12/sociedad/038n1soc# [https://perma.cc/9BZC-SJQM].


249. Barrera, supra note 248; Burns, supra note 8, at 644.


This November 2017 finding had the significant effect of placing the question squarely within a constitutional inquiry about judicial powers. Since the seed companies would inevitably appeal the Primer Tribunal Colegiado ruling, this step shifted the issue to México’s highest court. The Primer Tribunal Colegiado did not determine whether courts had the legal powers to enjoin the secretary of agriculture. In sum, during this fourth step, the appellate court and SCJN findings, along with the extended nature of the dispute, suggest that Mexican courts have had an ambivalent role in deciding whether GMO corn is safe.\(^\text{252}\) Regardless, six years after the Colectividad started its collective action, México still has not approved any commercial permits for GMO corn. This effectively evades making larger determinations in constitutional and biosecurity law. As described below, this has the effect of shaping how México’s sovereign authority is framed.

In addition to these litigation developments, the USMCA\(^\text{253}\) will adapt support for GMOs, likely requiring México to limit its options for precautionary controls. The USMCA does not directly abrogate any precautionary-principle controls in Mexican law, including the LBOGM, collective-action law, or environmental treaties. The USMCA is the first trade agreement the United States negotiated that covers trade in biotechnology, including not only GMOs but also gene editing and potential future developments.\(^\text{254}\)

The USMCA will likely lead to two important changes for GMO corn. First, USMCA chapter 3 focuses on agriculture. It states nothing specifically about corn but effectively sets up a default to support biotechnology.\(^\text{255}\) Chapter 3 increases the burden for any precautions by requiring an importing country to refute evidence from the biotechnology exporter.\(^\text{256}\) Moreover, the USMCA benefits GMO exporters by requiring México to take into account any risk assessment made by US or Canadian regulators.\(^\text{257}\) This effectively means that

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253. USMCA, supra note 50.


255. Id. art. 3.14. It explains that USMCA objectives are to encourage trade in biotechnology and to not disrupt trade in biotechnology. Id.

256. Id. art. 3.15:2, 3.15:3.

257. Id. art. 3.15:3(d).
Mexican regulators would have to defer to foreign risk assessments or similar assessment by an exporter.

Chapter 3 does not state anything specifically about the precautionary principle, but it does point to regulatory privileges for seed companies. It requires that risk management be “without unnecessary delay” and be “appropriate to achieve compliance with its laws and regulations.” As an additional benefit that disincentivizes precautionary-principle measures, chapter 3 states that the evidentiary requirements placed on importing countries, in this example México, do not apply to penalties. In this light, the USMCA tries to dissuade precautionary controls of transgene risks by requiring a series of evidentiary and procedural benefits for seed companies. But if these companies are just assigned a penalty, then they avoid the complex evidentiary debate over scientific risks. If México indeed assigns a penalty, then the GMO import is not prohibited, and the company can then just absorb the economic costs. This avoids the fear of closing the Mexican market, which has been an overwhelming complaint by the United States since 2013, and it evades any discussion of biodiversity, transgenes, or maíz nativo.

Second, in substantive terms, the trade agreement attempts to harmonize IP rights protections for plants, which would be the most direct concern for landrace corn protection. The fear is that México would need to open up its market to GMO corn because the USMCA requires IP protections for trade-in corn from the United States or Canada. The USMCA attempts to shift the requirements from that agreement to another international agreement, the 1991 version of the International Convention for the Protection of New Varieties of Plants (the “UPOV 1991”). México is a party to the prior version of this convention, which did not include most protections that GMO and biotechnology interests prefer. Maíz nativo advocates argue that UPOV 1991 dilutes needed protections by extending IP protections for plants from the current ten years to twenty or twenty-five years. Similarly, it makes seed saving and seed exchanges illegal. These are traditional and widespread practices for Mexican corn farmers. They are central to nurturing corn’s biodiversity.

In sum, these expected changes from the USMCA come after four stages of legal developments in the Colectividad del Maíz. Since

258. Id. art. 3.15.3(c).
259. Id.
2013, these stages have converted debates about GMO permits into larger questions about constitutional authority and sovereignty. When the USMCA is implemented in México, Canada, and the United States, legal support for GMO corn will adapt accordingly.

V. COLONIALITY FRAMES SOVEREIGNTY IN A CORN FIGHT

For years now, the legal dispute over GMO corn in México has remained unresolved. Since initiated in 2013, the Colectividad del Maíz lawsuit has raised a fundamental question regarding state authority. It effectively asks whether México's sovereignty gives México the authority to defend itself from perceived harms to biodiversity or whether it requires México to protect the rights of foreign economic actors. The authority to defend itself is rooted in the precautionary measures under the LBOGM and international environmental law. The obligation to protect the economic rights of foreign interests comes from the IP regime under domestic and international economic law. These questions continue traditional legal debates about when states may use their sovereign powers to protect their residents, territory, and natural resources. Historically, foreign states and military forces posed these threats. Today, irreversible damage to biodiversity poses the same threat.

To unpack this present and anticipated future issue, this Article takes two methodological steps: it identifies a “sovereign moment,” and it applies decolonial theory. First, in analytical terms, a sovereign moment illustrates how domestic laws and international authority are interpreted to confront unsettled terrain concerning national authority. Here, this includes responses to biosecurity. So far, courts have been responsible for these actions as trial proceedings continue and México’s legislature starts changing national policies on corn. In the future,

262. See Demanda Contra el Maíz Transgenico, supra note 5.
263. A sovereign moment is an event in which a state’s sovereign powers strengthen or weaken due to a change in how domestic authority and international law are interpreted. This idea is inspired by the international-law concept of the “Grotian moment.” This is when a fundamental change sparks rapid development on international-law norms. See INTERNATIONAL LAW: A CONTEMPORARY PERSPECTIVE 7 (Richard Falk et al. eds., 1985). A sovereign moment identifies how domestic authority and international law are interpreted to fortify or to weaken a state’s sovereign powers in transnational settings. See LBOGM, supra note 43.
264. See Nota Informativa, supra note 2; GAIN MX8050, supra note 2; Burns, supra note 8, at 643–44; supra Part III. The legislature recently approved a law to protect landrace corn. Its implementation is pending. Named Ley Federal para el Fomento y Protección del Maíz Nativo, it does not stop the approval process for GMO corn permits. For a description of the law, see Paola Monterrubio, Se Declara al Maíz Nativo como una Manifestación cultural de México, EL UNIVERSAL (Apr. 17, 2020), https://www.eluniversal.com.mx/menu/que-implica-la-ley-federal-para-el-fomento-y-la-proteccion-del-maiz-nativo [https://perma.cc/BP3Q-D5YV]. The law was
political remedies may lead to new regulations or policies. In this Article, the “corn fight” is shorthand. It describes the sovereign moment and uncertainty, exemplified by Colectividad del Maíz. Second, the “critical” perspective of decolonial theory demonstrates how material, normative, and ideological debates empower or weaken Mexican autonomy regarding GMOs and biodiversity.  

Painting the Colectividad del Maíz litigation as a sovereign moment identifies what is at stake and how domestic and international law work together. This takes a temporal snapshot of a complex interplay. In simple policy terms, the case is about sovereign regulation regarding biosecurity precaution and court injunctions as well as responses to perceived risks to biodiversity. Doctrinally, this addresses court roles, collective-action law, agriculture agency authority, and international law. In material and economic terms, this pits private interests, cross-border actors, and regulatory policy against each other. This encompasses seed companies, landrace corn advocates, and intermediating government entities. Each feeds into the corn fight, as the Colectividad avers that there has been an unauthorized release of GMO corn and that its rights are consequently implicated.  

A. Coloniality Shapes Economic Interests, Legal Norms, and Conceptual Assumptions

Latin American scholars use decolonial theory to examine colonial influence in the region, even though most of these states achieved independence from formal colonialism in the nineteenth century. Two relevant decolonial perspectives are that (1) colonialism is central to modernity (historically and presently), and (2) foreign actors capitalize on ideology and material reasoning to continue this influence. Decolonial theorists represent various disciplines. Their
critical descriptions look at the interplay and continued influence of colonial history, economic choices, and conceptual assumptions. For this Article, this approach illustrates that foreign powers exert influence and control over economic decisions, political authority, and ideological concepts. This helps uncover how cultural, governmental, and economic forces are not entirely separate but instead are often interrelated, reinforce each other, or depend on one another.

The notion of coloniality is defined as how foreign or global influence over a community persists after national independence, when colonialism ends. Peruvian sociologist Aníbal Quijano coined the term “coloniality,” which has become a significant frame of analysis for decolonial scholars. Coloniality identifies how Latin America is not just a residue of colonialism with a colonial past. Decolonial approaches note how there is a continuation. Importantly, in Latin America nations, global forces have exerted coloniality for over two centuries since national independence, and for more than five hundred years after colonialism began in 1492.

Coloniality emphasizes a process that persists—not a condition that ends. In response to the effects of coloniality, Latin American communities continually seek sovereignty and emancipation. This resistance continues to this day. There are many examples of this resistance in Latin American history. Indigenous people and slaves rebelled during the colonial era. Criollo (creole) and republican forces fought for independence beginning in 1810. Peasant and mestizo groups opposed liberalism during the nineteenth century. Class-based socialist mobilization continued this opposition mostly after 1910. Since 1994, social movements and identity-based organizations opposed neoliberalism. A decolonial approach notes how these examples of resistance opposed material, political, and ideological forces from abroad. As described below, a resolution favoring biodiversity for corn in México signals a reframing of sovereignty.

With a “matrix of power,” coloniality operates. It exerts control over a community in four domains: economics, authority, patriarchy,

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269. See id. at 2, 6 n.11; Quijano, supra note 57.
271. See Coloniality at Large, supra note 54, at 11, 13, 16.
273. See id. at 15–16.
274. See Quijano, supra note 270.
and subject knowledge.\textsuperscript{275} Doctor Walter Mignolo elaborates on these domains. The economics domain, for example, refers to how foreign actors appropriate land, exploit labor, and acquire natural resources.\textsuperscript{276} The authority domain regards control over institutions such as the army or the state.\textsuperscript{277} Finally, the patriarchy domain manages how gender, sexuality, and family life are experienced.\textsuperscript{278}

The subject-knowledge domain shows how knowledge is colonized. It illustrates who creates concepts. Quijano and Mignolo explain that with this domain, coloniality shapes expressions, beliefs, and references to the supernatural.\textsuperscript{279} It determines modes of knowledge by delineating who is a subject.\textsuperscript{280} A subject can produce knowledge, perspectives, images, and idea systems over resources. Simultaneously, coloniality determines who is an object and who cannot produce knowledge.

As a simple example of the subject-knowledge domain, the Spanish crown far away in Europe was able to colonize large populations in the Americas for over four centuries with the help of ideas like Christianity and mercantilism. Spain capitalized on how conceptual references were made, justified, and produced. These references framed Spain’s political, economic, and religious control over colonies. Mercantilism, imperialism, and Christianity informed local assumptions on law, family, sex, and the environment.

Coloniality ensured that indigenous communities were objects of these conceptual references. These communities did not produce how knowledge was used in economic, political, or religious systems, as subjects would. Complex belief systems that supported large civilizations and their material, political, gender, and scientific assumptions existed throughout the Americas before 1492. Incan and Aztec empires relied on ideological assumptions about commerce, government, technology, and nature. Coloniality allowed Spain to rule over this region and contain local resistance for centuries. This perspective helps identify how state power (authority), concepts (subject knowledge), and economic decisions work together.

Coloniality needs cultural and economic power to support each other. As a matrix, coloniality hides hierarchies by shifting where resistance takes places. The effect is to create multiple jurisdictions or

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{275} See \textit{id.} at 557; Mignolo, \textit{supra} note 55, at 155–56.
\item \textsuperscript{276} See Mignolo, \textit{supra} note 55, at 155–56.
\item \textsuperscript{277} See \textit{id.}
\item \textsuperscript{278} See \textit{id.}
\item \textsuperscript{279} See Quijano, \textit{supra} note 270, at 541; Quijano, \textit{supra} note 57, at 169.
\item \textsuperscript{280} See Quijano, \textit{supra} note 270, at 541.
\end{enumerate}
\end{footnotesize}
locations where opposition manifests. This is similar to the concept of intersectionality in feminist critical studies—the notion that gender, race, and class work to subordinate women. As an example of coloniality, the notion of race was created in order to divide labor classes and to accumulate capital for monarchs early in the Spanish empire. This Article isolates similar dynamics evident in GMOs, biodiversity, and intellectual property.

Coloniality currently focuses on knowledge as production. For biotechnology, knowledge or the intelligent use of capital is key to economic gain. This differs from a physical means to exploit natural resources. IP rights are used to expropriate knowledge and threaten biodiversity. In this light, colonial economic policies protect and control access to information. These protections affect a country’s foreign policies, depending on whether it is an importer or exporter of biotechnologies.

Throughout Mexican history, coloniality has had an evolving role in shaping the country’s sovereignty. From the Spanish empire to the present, coloniality has exerted its influence in economic and conceptual terms over México’s status as a colony from 1512 to 1820, its equality with other sovereign states after national independence in 1821, its state authority following the Mexican Revolution in 1910, and its market regulation during the period of neoliberalism (most obvious with NAFTA in 1994). When México was a colony, the decolonial terms were “silver” and “Christianity.” In the nineteenth century, the legal terms, liberalism, property rights, and national independence framed coloniality’s influence. After the revolution, nationalist politics and a state-driven economy shaped coloniality’s influence. Most recently, a neoliberal emphasis on market access and privatization characterizes the political economy.

For each period, coloniality confronted different legal tools and conceptual sensibilities. Specifically, coloniality framed sovereignty over territory and persons, property rights, state autonomy, and market access in the concepts of colonialism, independence, revolution, and neoliberalism, respectively. These long-term and

281. See Grosfoguel, supra note 272, at 20.
282. See id. at 10.
283. See Quijano, supra note 270, at 533–36.
284. See id. at 540.
286. See id.
287. See id. at 89.
288. See id. at 82–83.
interrelated developments exemplify the economics, authority, and subject-knowledge domains. Currently for the corn fight, coloniality confronts regulation of biodiversity threats.

This Article applies coloniality’s “matrix of power” as a methodological framework to examine how sovereignty is framed. It identifies the economic and material incentives at play, the legal instruments and doctrines that frame México’s sovereignty, and the subject-knowledge dynamics used in legal justifications. These three steps isolate coloniality’s domain over economics, authority, and knowledge and subjects, respectively. This does not apply coloniality’s patriarchy domain. Although maíz certainly functions in this domain, given the topic of the demanda colectiva, this Article focuses on the three aforementioned domains of coloniality.

B. Coloniality Frames Debates About the Environment, Food, and Biotechnology

Decolonial theory helps explain how foreign influences shape food cultures (including corn in Mexican history), environmental degradation, and biotechnology’s reliance on the law. Essentially, GMOs and other biotechnologies frame the subject-knowledge domain to favor industry needs. These technologies provide economic value when IP owners have the legal means to enforce their rights. As such, IP owners are the subjects and beneficiaries in the legal regimes of biosecurity, biodiversity, agricultural policy, and investor protections. This dynamic is reinforced when Global South states acquiesce to seed company interests instead of asserting sovereign powers to protect biodiversity.

Coloniality shapes how Latin American food culture evolves. Coloniality plays a role in determining how nature is interpreted to create food and how food is then consumed and produced. Looking at history, this normative impact is illustrated by the denigration of indigenous culinary knowledge, European customs used to judge food customs, and “fusion” cuisines appropriating food traditions more


290. See CASTRO-GÓMEZ, supra note 285, at 81–84. For decolonial analysis of intellectual property, GMOs, and biotechnology, see id. at 83–85; Vats & Keller, supra note 54, at 790–91; Mignolo, supra note 55, at 162–63.

recently. Contemporary food sovereignty movements can be described as decolonial attempts to alter how food is conceived. The goal of these movements is to make peasant and rural populations subjects in knowledge production for food and agricultural policies. This competes with policies that focus on agricultural exports and industrial farming.

In particular, economic and cultural assumptions shape corn’s historical role in Mexican society. The “tortilla discourses,” as the economic and cultural dynamics are described, push México to search for the “modern” and “foreign” to disenfranchise Mexicans from corn. Historically, corn was labeled as traditional, backward, rural, or “scientifically proven” to be the cause of México’s underdevelopment. Neoliberal economic policies favor corn market liberalization with elimination of protective tariffs, state subsidies for its production, and state-sponsored grocery stores. Publicly, this is presented as economically beneficial by eliminating expensive government regulations and by opening access to foreign investors. At more local levels, though, corn price increases effectively separate Mexican consumers from a product central to daily diets and national cuisine. This illustrates how neoliberalism treats corn within coloniality’s economic, authority, and subject-knowledge domains.

Scholars apply decolonial methods to examine the economic, political, and ideological influences contributing to environmental problems in Latin America. Anthropocentric assumptions prioritize human use of nature. Centuries of colonizing populations created lasting environmental impact. There is a problematic decoupling of cultural diversity from environmental questions. Cultural loss is intrinsic to biodiversity, since indigenous communities live in territories with intense biodiversity. There are tangible assumptions that certain communities in the Global South cannot contribute to civilized society. Centuries of damage continue from monocrop farming. These factors imply that Latin American communities are economically dependent on disrupting nature.

295. See id.
296. See id. at 51–52. In a more localized example, Doctor Arturo Escobar describes epistemology clashes in environmental debates. With Afro-Colombian communities on the Pacific coast, environmental activism confronts distinct cosmovisions (perspectives on humans in the world). Contests between development and
Law is central to coloniality’s influence on environmental problems in terms of creating and responding to these challenges. For example, in the context of mining in Colombia, coloniality capitalizes on environmental and human-rights law. It does this with national regulations working in favor of foreign interests while outlawing small-scale mining. Similarly, environmental justice in debates about environmental disasters, energy access, and biofuel in Puerto Rico, Pakistan, and the Philippines reflect decolonial struggles.

With respect to the corn fight, law provides GMO technologies the force to cross borders and succeed internationally. The agricultural benefits of GMOs do not solely explain their extensive use. Whether in the form of IP rights, international trade protections, seed licenses, or domestic regulations, law is vital to GMOs’ commercial growth. Critical IP scholars make sophisticated connections between law, biotechnology interests, and the Global South. For example, *Hoodia gordonii*, a plant used by indigenous communities in South Africa to combat hunger, was patented by pharmaceutical interests. As part of this, patent law poses Western knowledge as superior and presents science as culturally neutral. Contemporary claims of neutrality for patents and science resemble historic trends for patents in early capitalist expansion. British law in the late fifteenth century added property rights dimensions to patents—that is, the means to exclude another party’s use. Before this, patent ownership did not include this exclusionary function. Doctor Laura Foster shows how similar economic motivations fueled patenting *Hoodia*, a plant extensively known for centuries to have these properties.

Scholars also show how the biotechnology industry benefits from cross-border governance, which protects the industry’s legal benefits while disenfranchising those without IP rights from their legal claims. Biotechnology is deeply embedded in empire making. These technologies try to impose ideologies with an emphasis on individual preservation mindsets shape this. See Arturo Escobar, Territory of Difference: Place, Movements, Life, *Revista de Estudios* 376 (2008).

297. See generally Ximena Sierra-Camargo, Derecho, Minería y (Neo)colonialismo. Una Aproximación Crítica a la Regulación de la Minería de Oro a Gran Escala en Colombia, 14 Revista Operativa 161, 188 (2014).


300. See id. at 152.

301. See id. at 156.

liberties and the movement of goods and services. In India, rights-based governance explains extensive GMO use in commoditizing seeds.\textsuperscript{303} There, the language of rights allows GMO companies to enjoy legal entitlements by claiming scientific innovation. This duplicity or slyness is labeled the “cunning of rights.”\textsuperscript{304}

\textbf{C. Coloniality Molds the Corn Fight Between Protecting Biodiversity or GMO Corn}

Ultimately, \textit{Colectividad del Maíz} will result in coloniality siding between two divergent positions. Pro-biodiversity and pro-GMO perspectives wait for the courts to settle subject-knowledge dynamics. These positions protect collective rights and biodiversity \textit{or} protect IP rights in GMO corn, respectively. Eventually, the court will decide whether biodiversity or intellectual property is the proper subject in contests about GMO regulations. This sets a normative trajectory for law to follow: to protect landrace corn or GMOs.

In two steps, this Section describes how coloniality currently operates in \textit{Colectividad del Maíz} before a resolution has been reached. First, it presents the complexity of GMO corn debates in México. Myriad concerns, from scientific debates to questions about morality and technology, inform the corn fight. Second, this Section describes how three domains of coloniality—economics, authority, and subject knowledge—frame issues in \textit{Colectividad del Maíz}.

1. Debates About GMO Corn Reflect Anxieties About Humans, Technology, and Nature

\textit{Colectividad del Maíz} involves much more than suggested in its legal argumentation regarding environmental, administrative, and constitutional law. The pro-GMO view paints pro-biodiversity perspectives as irrational and impeding the purported benefits of biotechnology.\textsuperscript{305} The US Department of Agriculture exemplifies this view. In periodic reports, it describes legal, policy, news, and research trends relevant to agriculture in México. Importantly, it has cast biodiversity developments in a negative light. It has said \textit{Colectividad del Maíz} “has stymied corn research” and has “stalled public-sector biotechnology researchers.”\textsuperscript{306} It has described Mexican public

\begin{itemize}
  \item \textsuperscript{303} See RAJSHREE CHANDRA, THE CUNNING OF RIGHTS: LAW, LIFE, BIOCULTURES 165–66 (2016).
  \item \textsuperscript{304} See id. at xxv–vi.
  \item \textsuperscript{305} See Arcuri, supra note 88, at 371–74.
  \item \textsuperscript{306} See GAIN MX8050, supra note 2.
\end{itemize}
perceptions on GMOs as “cultural prejudices,” Mexican media coverage of GMO corn as “emotional,” and court rulings as “thwart[ing] the plans of biotechnology companies” and “derail[ing] work that could boost corn yields.”

These descriptions help frame how the law is applied. They reflect expected conceptual disputes between pro-GMO and pro-biodiversity perspectives. This results in a long-standing debate about the precautionary principle. The ideological clash is between claims of stopping harms and claims of stopping innovation. Since a court-ordered suspension in 2013, this framework has set the terms of reference for legal and public examinations of GMO corn.

Assumptions about how technology intervenes in nature fuel opposing positions. On its face, the lawsuit addresses what scholars Joel Wainwright and Kristin Mercer describe as GMO corn controversies at the scale of “landscapes,” which are focused on ecosystems and the environment. At this level, an inquiry examines biodiversity and how genetic diversity evolves. But, as Wainwright and Mercer explain, GMO debates simultaneously occur on five other scales, including the scales of “genes” for biotechnology, “organisms” for animals and plants, “producers” for farmer and household economics, and “culture” for maíz’s everyday significance.

This Article argues that GMO corn controversies in México can only be settled at a sixth “natural order” scale, as Wainwright and Mercer describe. This scale determines metaphysical questions about technological interventions in nature. At this scale, GMO corn’s perceived negative effects regard morality. At this level, GMO policy must decide if this technology disrupts nature and should be outlawed because of it. This differs from examining technology and its consequential impact on a genetic, organismic, socioeconomic, or cultural levels.

For the natural order scale, questions far larger than GMO permits feed the debate. For Colectividad del Maíz, landscape concerns carry legal arguments in courts, keeping the issue in legal and public

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307. See FOREIGN AGRIC. SERV., GAIN MX6044, MEXICO, AGRICULTURAL BIOTECHNOLOGY ANNUAL 2–3, 10 (2016); see also FOREIGN AGRIC. SERV., GAIN MX7053, MEXICO, AGRICULTURAL BIOTECHNOLOGY ANNUAL: RESEARCH AND REGULATION ADVANCE LEAVING AG BIOTECH AT A STANDSTILL 2, 4 (2017).

308. See Arcuri, supra note 88, at 359.

309. See Wainwright & Mercer, supra note 8.

310. See id. at 414.

311. See id. at 414–16.

312. See id.

313. See id.
discourse, but controversies remain unsettled at the other levels. Divergent opinions exist with controversies at each scale. At the gene scale, questions regard how science interprets genetic interactions. For the organisms scale, debates are unresolved regarding how genetically engineered organisms alter plant life. Similarly, landscape controversies question how these organisms, needed inputs, and monocrop farming alter the environment and animal life. For farmers, uncertainties include how socioeconomic factors impact the use of GMOs. At the cultural scale, the dispute asks if corn’s role (daily, symbolic, and spiritual) should change for Mexican society. Because of ideological clashes for each of these five scales, a lawsuit about GMO corn forces questions about natural order.

2. Questions About Farming Economics, Legal Authorities, and Concepts Frame the Corn Fight

A decolonial approach shows how conceptual concerns regarding nature and technology will resolve Colectividad del Maíz. As litigation proceeds, the GMO corn fight develops along colonially’s three domains: economics, authority, and subject-knowledge dynamics. For economic incentives, GMO interests seek to guarantee their access to Mexican commercial corn markets. This is the economic domain’s most obvious incentive. Pro-biodiversity and pro-GMO interests articulate defined and well-known positions, emphasizing scientific assumptions and claims of increased productivity.314

Coloniality’s economic domain fuels far more than just an eyeing Mexican demand. For corn in México, coloniality’s economic domain emphasizes privatized research, protects IP rights in corn seeds, and eliminates state support for domestic corn farmers. This addresses more than just corn and GMO seeds. Socioeconomic factors heavily influence how a supply and demand for GMO corn function. As an example, México has not been self-sufficient in corn since before NAFTA was enacted in 1994. Around this time, biotechnology, in its early development, had succeeded with privatized research, which has been common in the industry since then.315 This makes knowledge a commodity that benefits from legal-rights enforcement. To emphasize this, decolonial scholars explain that knowledge becomes a form

314. See Stone, supra note 60, at 384.
of economic production, much like resource extraction, commodity exports, or industrialization did in the past.\footnote{316} Doctor Santiago Castro-Gómez describes coloniality manifesting itself with knowledge as production and the intelligent use of capital, most obvious in biotechnology.

Exemplifying this domain, many Mexican farmers choose not to plant GMO corn for economic reasons. It requires monocrop farming, intensive input use, and industrial-scale planting.\footnote{317} Commercial GMO corn seeks to enter México for agricultural use, but this comes after economic displacement of small-scale farmers and elimination of price controls nationwide. Since reforms began eliminating farmer support and protective corn tariffs in 1988, this displacement has been continual. Doctor José Antonio Serratos-Hernández paints a common policy thread from economic reforms in the 1980s favoring foreign capital, to biotechnology interests urging simplified biosecurity regulations during the presidencies of Fox and Calderon from 2000 to 2012.\footnote{318} The Colectividad del Maíz dispute began after these regulatory reforms.

GMO seed companies try to displace domestic corn production and its needed labor. Doctor León Olivé explains that the LBOGM was enacted in 2005 to favor economic interests of increased production.\footnote{319} By primarily emphasizing increasing national output, the LBOGM and its corresponding framework allocated negative impacts on corn farmers. GMO seeds require different forms of production with monocrop agriculture, industrial farms, intensive input use, seeds sold by foreign companies, and single-use seeds with legal limitations intrinsic to IP rights.

These recent changes in economic production operate like coloniality’s prior objectives. Throughout México’s history, such changes took place with law serving economic and conceptual aims. The encomienda system secured indigenous labor as the Spanish colony was founded. Later, during colonialism, mining and subsoil rights protected access to minerals. Not long ago, a series of privatizations of public services and Mexican industries changed the state’s economic role. Beginning in 1988, these neoliberal reforms emphasized markets and minimized public intervention in the economy. Each of these historic changes benefited foreign economic interests, but only after corresponding legal and conceptual support was developed. Specifically,
the encomienda system supported the empire, colonial control helped foreign interests access the subsoil, and neoliberal reforms helped access the market. Exemplifying how this domain operates currently, food-system scholar Timothy Wise describes “free trade” and NAFTA as the biggest threat to México’s corn diversity.320

Economic objectives similarly influence proposed solutions to protect corn’s biodiversity. In this regard, legal and scientific arguments are not the only way to support the Colectividad’s goals. Doctor Takeo Ángel Kato provides a comprehensive list of economic measures to protect corn’s center of origin and center of diversity, more so than the LBOGM and its corn regime.321 These include public support for research focused on landrace corn and the more than two million small-scale farmers.322 These farmers are the guardians of biodiversity. Support could include subsidies, technical assistance, and rural economic development. When the LBOGM framework was implemented in 2005 and 2009, this kind of support had been stripped away with neoliberal reforms during the prior two decades. It is perpetually debated whether to evaluate these socioeconomic factors as proposed solutions to biodiversity challenges or as harms caused by GMOs and neoliberal policies.323

For Colectividad del Maíz, legal doctrine operates as coloniality’s authority domain. Described most simply, when resolved the dispute will determine if México is a corn landrace protector, regulator of corn GMOs, or commercial market for GMO seeds. Without the lawsuit initiated in 2013, corn seed companies would be able to capitalize on LBOGM’s protections for GMO farming. As the demanda started, Monsanto doubted that its commercial GMO corn permits would be denied, since the secretary of agriculture had overwhelmingly approved prior experimental and pilot permit requests.324

Law operates as a default to protect GMO access and to bolster government support for biodiversity. The law determines whether a governmental entity uses its sovereign powers to protect biodiversity or to stop GMO permits. When litigation started, the LBOGM supported pro-GMO assumptions in the regulatory process through its default position that GMO permits were authorized and that burdens were placed on precautionary measures.325 Specifically, precaution

320. See Wise, supra note 10, at 212.
321. See Executive Summary, supra note 16, at 12.
322. See id.
323. See, e.g., id.; McAfee, supra note 135, at 149, 152.
324. See Vázquez, supra note 207.
325. See supra Part III.
required refuting three assumptions from the LBOGM: (1) GMO corn is safe, (2) GMO corn is the substantial equivalent to landrace corn, and (3) GMO corn benefits from scientific consensus regarding safety and equivalence. Court orders suspending approval of GMO corn permits since 2013 weaken the conceptual support for these assumptions. This domain could confirm one of two legal positions: benefitting pro-biodiversity or pro-GMO interest.

Without a resolution in Colectividad del Maíz, the authority domain remains unclear. The dispute proceeds, making determinations that help clarify coloniality’s authority regarding GMO corn. These include the legal actors, the scope of legal protection, institutional determination, and international autonomy. In terms of legal actors, the dispute can side with collective rights or the rights of IP owners. Early in litigation, the defendants legally challenged demanda colectiva procedures and the Colectividad’s standing. These arguments were made since the collective-action law was still new then. The Colectividad has argued that biodiversity is negatively impacted by the unauthorized release of GMO corn genomes. For six years of litigation, seed companies have argued that court-ordered suspensions infringe upon their amparo rights. Recently, seed companies have challenged scientific evidence from the Colectividad, authored by biotechnology experts and public agencies from México and the European Union, that GMOs and glyphosate increase the risk of lymphoma.

For the scope of legal protections, anti-GMO advocates argue that biodiversity is at risk, with corn’s center of origin and center of diversity impacted. This wide scope, along with the collective rights of a colectiva, emphasizes how protections have a broad reach not limited to individualized harms. Pro-GMO interests highlight how legal protections belong to an investor or to an IP owner, with their harms and procedural protections being more concrete.

Similarly, México’s biosecurity regime, the LBOGM enacted in 2005, initially excluded protecting landrace corn. When passed, the law required a corn regime, but it was not officially issued until 2009. These multiyear delays provided GMO permit applicants—for

326. See Vincent, supra note 47.
327. See Demanda Contra el Maíz Transgenico, supra note 5.
328. These arguments have been made since the beginning and continue to this this day. For recent descriptions, see Demanda Colectiva Maíz, supra note 48. For similar descriptions starting in September of 2013, see Primer Informe Semestral, DEMANDA COLECTIVA DE MAÍZ (Jan. 5, 2013), http://demandacolectivamaiz.mx/wp/demanda-informes/ [https://perma.cc/9WJX-N2BV].
329. See Demanda Colectiva Maíz, supra note 48.
330. See LBOGM, supra note 43, art. 2:XI.
example, the defendant seed companies—procedural benefits while simultaneously avoiding protection for landrace corn. This legal maneuver threatened México’s biodiversity in corn.

The institutional power to make these decisions remains undecided by this case. One position benefits corn advocates. This position is that the judiciary makes these inquiries, continues reviewing the demanda colectiva, and orders an agency to stop its reviews of applications for commercial GMO corn permits. The contraposition is that decisions on these permits and on what should be allowed belong to the executive or the legislature. This would focus on secretary of agriculture procedures or the norms provided in the LBOGM. Lastly, México’s international autonomy is to be determined here. It could conceivably point to its sovereign and police powers to regulate GMO corn and protect biodiversity, or it could interpret USMCA, NAFTA, or WTO rules to require that it stop precautionary measures.

The subject-knowledge domain points to the dispute’s most challenging determination, since it decides what concepts justify a resolution between collective or individualized values. Here, the general question pertains to whether the law’s role is to stop or permit biotechnological intervention in nature. Specifically, it examines the impacts, if any, on biodiversity from commercial GMO corn permits. This asks if México will permit widespread GMO corn farming. If the answer here sides with the Colectividad, legal reasoning would see the subject as biodiversity, identifying collective rights and harms. Alternatively, siding with seed companies and authorizing commercial permits, the subject of the legal inquiry would be individual rights and specific harms to IP owners. Determining the subject of these legal questions sets in motion a normative path for GMO regulation.

Designation of a subject leads to normative determinations, shaping whether actions are permitted or disallowed. Scientists accuse biotechnology interests of controlling access to information about the impact of GMOs. Seen in decolonial terms, this operates as a subject producing knowledge. Regarding landrace corn in México, various scientific studies emphasize the importance of how transgenes are detected. They explain that biotechnology and biodiversity perspectives use different methods. Moreover, it is argued that the biotechnology industry is not transparent about its fields and lab tests, which would support these findings. In this regard, justifications for

331. See Dyer et al., supra note 120; McAfee, supra note 135, at 155; Piñeyro-Nelson et al., supra note 14; Soleri & Cleveland, supra note 123.

332. See Arne Holst-Jensen et al., Detecting Un-Authorized Genetically Modified Organisms (GMOs) and Derived Materials, 30 BIOTECH. ADVANCES 1318, 1332–33 (2012).
GMOs try to control what information—or knowledge, in decolonial terms—can be used to examine the impacts from biotechnology.

A decolonial approach helps in clarifying what has been called the “scientization of politics.”333 Biotechnology interests try to shift public debates about GMOs to a narrow argument about science and risks. This Article contends that a decolonial examination illustrates how this debate evolves. It shows how designating a subject prioritizes a specific judgment that the law makes. This can be for the subject of collective rights and biodiversity. Alternatively, it can select the subject as IP owners with individual rights and singular harms.

If the Colectividad succeeds, commercialization of GMO corn would be stopped because of a series of assumptions focused on a collective scope versus an individualized one. Most important, biodiversity and the need to avoid harms to genetic varieties in corn plants would motivate judicial reasoning. Seen in litigation terms, a collective action—a demanda colectiva—allows for this as opposed to claims made by an individual plaintiff.334 A prohibition on GMOs would prioritize the potential injuries to biodiversity.335

The Colectividad points to harms from GMOs that impact biodiversity. This view emphasizes that nature and ecosystems suffer from changing the genetic structure of corn plants. These harms are incremental and not immediate. Were the Colectividad to be victorious, such rulings would empower the policy and legal view that biodiversity should be protected. This position is currently not the subject in the LBOGM or in US approaches to GMO regulation. Presently, regulations applied to GMOs focus on measuring risks and the equivalence of genetic engineering.336 If dispute resolution sides with anti-GMO advocates, this would suggest how regulations can shift the focus of biosecurity regulation, with an eye to the harms of genetic engineering, through commercial cultivation of a widespread crop.

This view motivates precautionary measures. Specifically, out of concern for corn's center of origin and center of diversity, widespread

334. See supra Part IV.
335. See Nota Informativa, supra note 2.
336. The LBOGM prioritizes these positions. Articles 60 to 65 delineate the secretary of agriculture’s case-by-case analysis of risks. See LBOGM, supra note 43, arts. 60–65. It also does not allow for precaution when there is a lack of scientific knowledge. See Gutiérrez González, supra note 23, at 124–25. For discussion of the substantial-eqivalence approach, see Bratspies, Trail Smelter's (Semi)Precautionary Legacy, supra note 70; Bratspies, Some Thoughts on the American Approach to Regulating Genetically Modified Organisms, supra note 70. It emphasizes risk. See Bratspies, Some Thoughts on the American Approach to Regulating Genetically Modified Organisms, supra note 70.
GMO planting would be illegal. This legal inquiry prioritizes avoiding this risk. It does this even at the cost of losing the benefits of GMOs or at the expense of individual rights belonging to GMO permit applicants.\textsuperscript{337} These risks could be avoided even without scientific certainty. Importantly, a pro-biodiversity subject would prove that there is no scientific consensus on the safety of GMOs, questioning safety for humans, plants, animals, and genetic diversity.\textsuperscript{338} Similarly, the harms attributed to glyphosate could strike a blow to this consensus as well. In sum, if legal reasoning focuses on a collective subject, then it supports a normative path that detains biotechnological interventions. In this case, it provides conceptual backing for the precautionary principle, prohibiting authorization for commercial GMO corn.

A more individualized subject would result if seed companies succeed and attain commercial GMO corn permits, with courts reversing suspensions. This would undo court orders in \textit{Colectividad del Maíz} that have been in place since 2013. In this light, legal reasoning would find that risks to biodiversity from GMO corn are merited. Here, GMOs would be found to be safe or safe enough.\textsuperscript{339} In line with the LBOGWM, it would find evidence insufficient to overcome assumptions regarding this safety. Put simply, GMOs are permitted because there are more hurdles needed for the government to pursue precautionary measures. This happens despite the precautionary principle included in the LBOGWM and international environmental law. Specific to GMO corn, biotechnology interests are blind to the negative impacts of GMOs because they prioritize productivity.\textsuperscript{340} In a similar vein, corn advocates focus on markets and productivity while placing no cost on the externalities of large corn farms, such as biodiversity, soil erosion, greenhouse-gas emission, and the dumping effect of production subsidies.\textsuperscript{341}

Emphasizing the specific subject of GMOs benefits from legal assumptions supportive of biotechnology. This includes the doctrine of substantial equivalence, contending that GMO plants are the same as non-GMO plants. These assumptions preclude examining the

\textsuperscript{337} See Bratspies, \textit{Some Thoughts on the American Approach to Regulating Genetically Modified Organisms}, \textit{supra} note 70.

\textsuperscript{338} See Hilbeck et al., \textit{supra} note 72; Domingo, \textit{supra} note 72; Domingo & Bordonaba, \textit{supra} note 72.

\textsuperscript{339} For descriptions of scientific studies finding GMOs are safe, see discussion \textit{supra} note 71 and accompanying text.


\textsuperscript{341} See Wise, \textit{supra} note 10, at 223–24.
modifications at a genetic level for plants or more widespread harms to plant diversity. Similarly, claims of scientific consensus on GMOs support this. Accordingly, courts or policy makers can side with claims of expertise. This position keeps GMO interests as the beneficiary of regulatory regimes. The LBOGM, like other such regulations, operates to prioritize GMOs versus making it a hurdle to approve them. In this regard, GMO interests capture the subject-knowledge domain.

In sum, the Colectividad del Maíz lawsuit suggests that coloniality can be reconceived along one path set by the precautionary principle, or it can continue a paradigm encouraging GMO and IP rights as protected in the LBOGM. By seeing GMOs as a subject, the legal reasoning may easily side with an economic objective of increased productivity. But if the subject is instead biodiversity or landrace corn, then legal reasoning could emphasize more long-term and more collective harms.

VI. CONCLUSION

This Article makes three arguments about GMO corn in México: (1) Mexican regulations encourage GMO farming, prioritize economic interests, and discourage GMO controls; (2) demandas colectivas provide a means to use precautionary measures to protect landrace corn; and (3) GMO litigation shapes whether Mexican sovereignty serves to protect biodiversity or protect GMO corn. Furthermore, this Article illustrates how economics, law, and belief systems working together will resolve the corn fight. This uses decolonial theory to examine coloniality’s control over the economic, authority, and subject-knowledge domains in GMO corn debates. Coloniality bolsters foreign influence over Latin American communities and shapes their sovereign responses. Coloniality’s three domains point to how Colectividad del Maíz can be resolved. In economic terms, the dispute raises significant questions regarding the socioeconomic impacts of GMO corn farming. GMOs add to neoliberal economic disruptions in rural México. When landrace farms are displaced, GMOs eliminate the human effort needed to nurture corn biodiversity. GMO farms are different, with industrial size, monocrop planting, expensive inputs, and toxic herbicides, such as glyphosate. The sovereign choice, to protect biodiversity or GMOs,
determines whether these economic impacts will happen. As Parts II and III show, the LBOGM, international trade law, and permissive regulations rely on economic reasoning that incentivizes GMO agriculture.346

In Colectividad del Maíz, coloniality’s authority domain focuses on law, determining who makes the sovereign choice. For questions of authority, legal reasoning determines whether courts or an executive agency decide.347 One position is that courts have injunctive powers provided in the collective-action law, supporting biodiversity protection. The contraposition emphasizes that the secretary of agriculture makes this decision and that the LBOGM protects GMO interests.

The subject-knowledge dynamic has the greatest potential impact to decide between protecting biodiversity or GMOs. Coloniality designates a subject that shapes how belief systems operate and how knowledge is produced.348 From this, subjects in these idea systems have greater control than nonsubjects. In Colectividad del Maíz, this dynamic effectively decides between two subjects: biodiversity or GMO corn. A court decision that biodiversity is the selected subject sides with the Colectividad and emphasizes collective rights.349 These harms are diffused among the population and territory, contemplating the future. This identifies the loss of genetic diversity and its irreversible effects. It finds legal force in the precautionary principle and in court powers. An opposing determination regards GMO corn as the selected subject, emphasizing the individual rights that permit applicants enjoy. This would be the result if courts rule for seed companies. This protects IP owners with rights provided in international trade law and the LBOGM.350 Here, the litigation and conceptual burden would be on the Colectividad, which would be required to disprove that GMOs do not negatively impact biodiversity.

In conclusion, law has an ambivalent role in the GMO corn fight. International trade law and México’s biosecurity law incentivize and protect GMO corn, while a collective legal action has temporarily succeeded in suspending commercial GMO corn. An ultimate resolution in Colectividad del Maíz requires a paradigm shift in biotechnology regulation, incorporating assumptions in economics, law, and belief systems. The concept of coloniality illustrates how México may use its sovereign authority either to protect biodiversity and landrace corn or

346. See supra Parts II, III.
347. See discussion supra notes 244, 248 and accompanying text.
348. See Quijano, supra note 270, at 533; Quijano, supra note 57, at 172–74.
349. See discussion supra notes 331–332, 337 and accompanying text.
350. See discussion supra notes 49–51, 191–92 and accompanying text.
to protect GMO interests. This decolonial perspective provides a compelling method to examine GMO regulation. This framework could be highly valuable beyond México to leaders worldwide who worry about GMO harms.