

U.S.–Mexico GM Corn Trade Dispute

Stephen Devadoss, William Hall, and Jeff Luckstead

JEL Classifications: F13, F14

Keywords: Economic losses, GM corn import ban, Trade dispute

The United States is the leading corn producer in the world, and Mexico is the largest and reliable export market for U.S. corn. In December 2020, Mexican President López Obrador issued a decree to phase out the use of genetically modified (GM) corn for human consumption by the end of January 2024 (Obrador, 2023; Garrison and Barrera, 2023). According to this decree, Mexico would ban GM corn imports to safeguard human health, maintain self-sufficiency and food sovereignty, preserve biodiversity and a healthy agricultural environment, and protect native corn.

Mexico's announced import ban on GM corn for human consumption will eliminate the use of transgenic corn in dough and tortilla preparation. Further, Mexico will phase out GM corn used in producing any products intended for human consumption, thus eventually barring the use of GM corn in animal feed and manufacturing of food products (Vejar and Rosenweig, 2023). The United States objects to Mexico's import ban of U.S. GM corn on the grounds that the ban lacks scientific merit and constitutes a USMCA (United States–Mexico–Canada Agreement) violation (USTR, 2023c). The Office of the US Trade Representative (USTR) held consultations with Mexico under the terms of the USMCA sanitary and phytosanitary (SPS) measures (USMCA, 2020a). However, even after these consultations and negotiations, Mexico did not revoke its decree to curb bioengineered corn imports, leading to this trade rift becoming a contentious issue between the two countries. Consequently, the U.S. government called for setting up a dispute settlement panel to examine the legality of Mexico's import ban of U.S. corn (USTR, 2023a). The solution to this trade discord hinges on the rulings of this panel.

Unless resolved, these trade tensions between the two countries could escalate into a bigger trade conflict, given that the total bilateral trade between the two countries exceeded \$779 billion in 2022, with U.S. exporting goods worth \$325 billion and Mexico exporting goods valued at \$454 billion (U.S. Census Bureau, 2023a). The purpose of this article is to (i) discuss U.S.

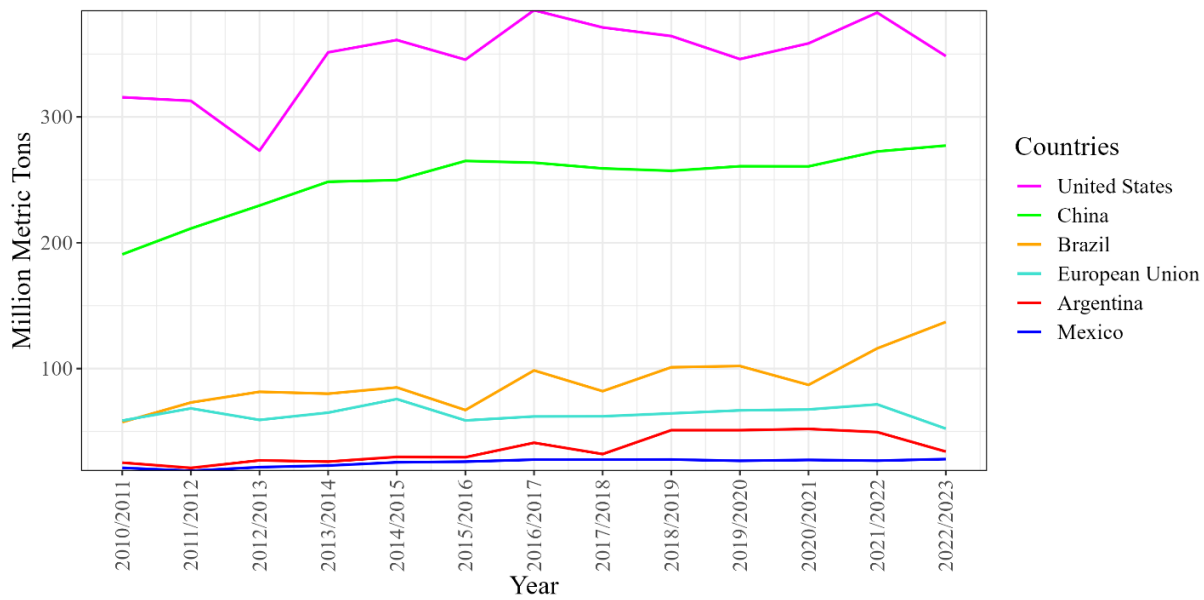
corn production and export from a global market perspective, (ii) present a timeline of this trade dispute, (iii) highlight the significance of the Mexican market for U.S. corn, (iv) review the scientific evidence on any health risks involved in GM corn consumption, (v) assess the motives behind Mexico's ban on GM corn imports, and (vi) provide an economic assessment of this trade conflict.

U.S. and Mexican Corn Market

The United States is the leading producer of corn, followed by China, Brazil, European Union, Argentina, and Mexico (Figure 1). In 2022/2023, the United States produced 350 million metric tons, while Mexico produced 28 million metric tons. The United States has grown transgenic yellow corn since the mid-1990s, which now comprises more than 93% of total production (Williams et al., 2022). Although this yellow corn is used primarily for animal feed, ethanol, beverages, and processed food, it is also utilized as an input for many other products, including textiles, cosmetics, shampoo, medicines, tires, footwear, construction, and paper (Burzawa, 2023). Most U.S. white corn production is not transgenic corn. By contrast, it has been illegal to cultivate genetically modified corn in Mexico for the past 25 years (Swanson and Qiu, 2023).

Figure 2 plots the top six export markets for U.S. corn. Until 2019, China imported a limited volume of U.S. corn, but China has since increased its imports of U.S. corn and averaged 14 million metric tons per year over the 3-year period between 2020 and 2022. The recent surge in Chinese corn imports could be largely to substitute for sorghum, of which China drastically reduced its imports during the U.S.–China trade war. By contrast, Mexico is a steady market for U.S. corn exports, importing an average of 15.6 million metric tons annually over the same period. By this measure, Mexico is the leading importer of U.S. corn, and its imports have steadily increased over the years, albeit with some ups and downs. Therefore, loss of Mexico's corn market would significantly affect the entire supply chain of the U.S. corn industry. Other significant export markets for U.S.

Figure 1: Top Six Corn Producing Countries in the World



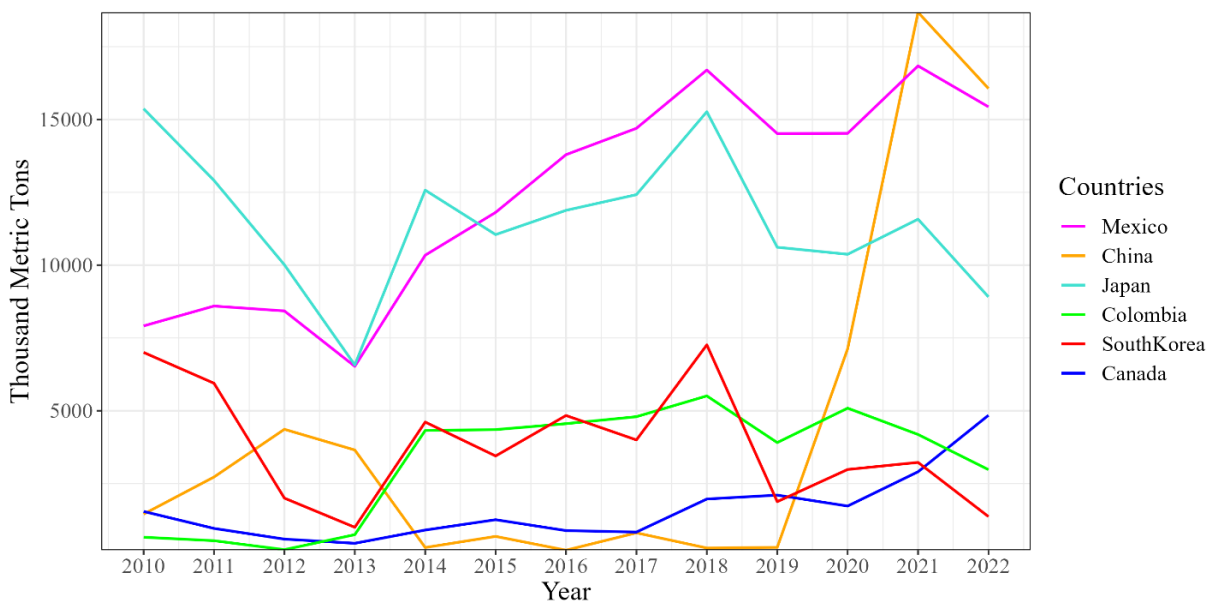
Source: USDA-FAS (2023b).

corn include Japan, with exports hovering around 12 million metric tons; Colombia, South Korea, and Canada are smaller export markets for U.S. corn.

Figure 3 presents U.S. total and white corn exports to Mexico over the period 2010–2022. Of total U.S. corn exports to Mexico, on average, yellow corn accounts for about 95% and white corn accounts for 4%. A trend line regression of U.S. total corn exports to Mexico showed a strong, positive trend, signifying the importance of Mexican market for U.S. corn. By contrast, U.S. white

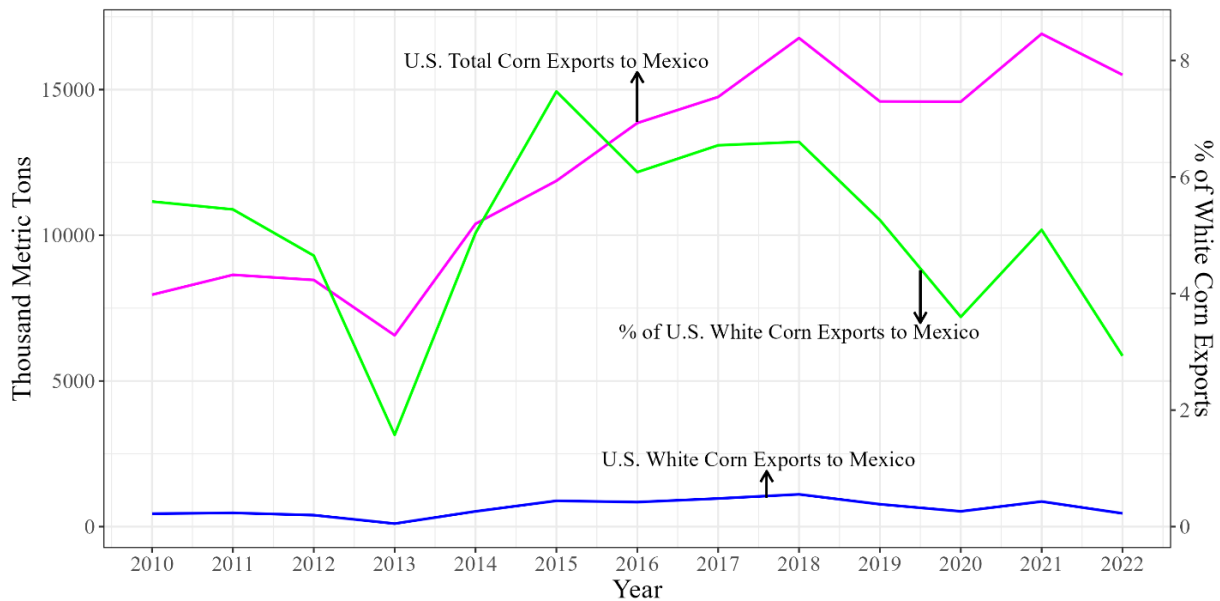
corn exports varied between 1.6% and 7.5% of U.S. total corn exports. The reason for limited U.S. white corn exports is because Mexico predominantly grows non-GM white corn and is largely self-sufficient (Barrera, 2023). Any uptick in Mexico’s white corn imports is attributed to production shortfalls due to weather variability. Tortillas and other food staples are traditionally prepared in Mexico with nontransgenic white corn. Most Mexican imports of U.S. yellow corn are used for livestock and poultry feed, but some are also used for manufacturing cereals, sauces, and syrup.

Figure 2: Top Six Export Markets for U.S. Corn



Source: USDA-FAS (2023a).

Figure 3: U.S. Total and White Corn Exports to Mexico



Source: U.S. Census Bureau (2023b).

Timeline of the Dispute

Mexican President López Obrador issued a decree in December 2020 to phase out the use and imports of genetically engineered corn by January 31, 2024 (Obrador, 2020). In October 2021, Mexican Minister of Agriculture Victor Villalobos assured that the presidential decree would not affect yellow corn imports from the United States. However, López Obrador reversed this stance and issued another decree in November 2022 to limit imports of U.S. GM corn (Burzawa, 2023). In February 2023, Mexico altered the ban to allow imports of U.S. corn for animal feed until enough substitutes could be found to meet this demand and gradually phase out the use of bioengineered corn in all products for human consumption and animal feed (Heemstra, 2023; Vejar and Rosenweig, 2023). The United States insists that Mexico's plan to ban GM corn imports violates several provisions of the USMCA. In particular, the United States alleges Mexican policies are not based on scientific principles and international standards and that Mexican risk assessments with respect to SPS are not consistent with the USMCA; consequently, Mexico's breach of the USMCA could be viewed as a disguised trade barrier.

As the first step to resolve this dispute, on March 6, 2023, USTR requested technical consultations with the Government of Mexico under the SPS Article 19 under Chapter 9 of the USMCA (2020a). However, this consultation failed to resolve this trade conflict (USTR, 2023b). Consequently, on June 9, 2023, the USTR requested dispute settlement consultations to resolve this trade rift, and these consultations also did not

provide a path forward in voiding Mexico's ban on U.S. GM corn imports for human consumption. After exhausting all the available options under the USMCA, the U.S. government requested to establish a dispute settlement panel on August 17, 2023 to challenge Mexico's ban on U.S. GM corn on the ground that it is not based on rigorous science (USTR, 2023d). This panel will consist of five members chosen from a list of preapproved experts, with both countries choosing the chair jointly, Mexico selecting two American panelists, and the United States picking two Mexican panelists (Lawder, 2023). From the date of formation, as per Article 31.17.1 of USMCA, the panel must submit its initial report to both countries within 150 days (USMCA, 2020b). If the panel requires evidence on technical and scientific information related to human risk from GM corn consumption or environmental factors, the panel can seek expert opinions from advisory and technical expert groups. After the initial report is presented, the disputing parties will have 15 days to present their written comments (Article 31.17.3). The panel can review these comments, may further reexamine the dispute, and should submit the final report in 15 days from receiving the comments from the disputing parties (Articles 31.17.4&5). After the completion of the report and rulings by the panel, the United States and Mexico have 45 days to agree to the findings of the panel. Based on the final findings and recommendations of the panel, the resolution may call for removing the Mexican import ban. If the panel finds that Mexico's proposed policy violates USMCA and Mexico implements this policy, then Mexico has to compensate the export loss to the United States (Article 31.18.2) or face possible U.S. punitive tariffs (Article 31.19.1).

GM Corn for Human Consumption

The popularity of GM crops can be attributed to their higher yield, increased production, and greater nutritional content. Additionally, GM crops require less land, water, fertilizer, and pesticides than their nontransgenic counterparts. These advantages of GM crops can help alleviate food security issues (particularly in poor countries), meet the increased food demand of a growing world population, and tackle climate risk (Teferra, 2021).

However, since the introduction of GM products, the public has been concerned about possible adverse health effects arising from human consumption of genetically modified food products due to changes in nutritional content, side effects from gene transfer, potential organ damage, allergic response, production of antibiotic-resistant bacterial strains, and possible toxicity (Bakshi, 2003; Norris, 2015). Consequently, studies have recommended additional research to ensure the safety of GM food for human consumption (Bakshi, 2003; Dona and Arvanitoyannis, 2009). As a result, numerous studies have been conducted to test the human safety concerns of consuming GM products. The U.S. Food and Drug Administration (FDA) confirmed that GM food products are as safe as non-GM food products for human consumption, and some GM crops genes have been modified to improve nutritional content (FDA, 2022b). Further, GM and non-GM crops do not differ with respect to health and safety of animals; in the United States, 95% of animal feed is from GM crops (FDA, 2022a). Since 1996, 4 billion acres of GM crops have been grown, and studies have found that consumption of GM crops has posed no risk to human health or the environment (Oliver, 2014). The World Health Organization (WHO) reported that genetically modified food product consumption by people in the countries where these products are authorized is safe (WHO, 2014). The American Medical Association has concluded that independent research found that GM foods are safe for human consumption (Haspel, 2013). A review study by Norris (2015) noted that research in this area found no evidence of GM products causing adverse health effects.

Mexico further notes that the import restriction of GM corn is because it (i) prefers traditional native (non-GM) corn varieties for making tortillas and (ii) does not want U.S. GM corn to contaminate Mexican native corn, so that Mexico can maintain biodiversity for its 60 landrace varieties in corn cultivation. Mexico also argues that its ban on U.S. GM corn for tortilla preparation will not affect its imports of U.S. yellow GM corn because Mexico will continue to import GM corn for industrial uses. The United States objects to Mexico's import ban of U.S. GM corn for making flour, dough, tortillas, and other food products on the grounds that Mexico's decision is not based on science, and since the U.S. Food and Drug Administration approved GM corn for human consumption, Mexico's trade restrictions violate terms of

USMCA, which states that decisions should be based on scientific research.

Why This Flare-Up Now?

Corn trade has remained a contentious issue since the start of NAFTA in 1994 because (i) corn is a staple commodity in Mexico, where native corn has been traditionally used to make tortillas for many hundreds of years, and (ii) the United States is the world's leading corn producer and views Mexico as a huge market for its yellow transgenic corn due to a large corn-consumption base and close proximity with low transport costs. Because of large U.S. subsidies for corn production, U.S. corn farmers have a huge competitive advantage, and freer trade under NAFTA and now USMCA allowed U.S. exporters to sell at a low price, undercutting Mexican corn prices (Fanjul and Fraser, 2003). Since Mexico does not provide lavish subsidies to its farmers (many of whom are indigenous corn producers), the excess supply of U.S. corn flooding into Mexico forces many Mexican corn farmers to exit farming, creating unemployment and forcing people into poverty.

Indigenous farmers in Mexico use traditional practices to cultivate corn, which helps conserve soil and water, maintain genetic diversity, and safeguard the environment (Mega, 2018). Mexican farmers are worried that their corn crops can be infiltrated with transgenic corns' genes because cross-pollination through wind can cause GM varieties to mix with native corn. This can result in corn cultivation becoming less diverse, leading to fewer corn varieties produced by indigenous Mexican farmers. In the early 2000s, many protests broke out after local corn varieties in rural Mexican farms were contaminated with traces of transgenic corn (Medrano, 2022).

In consideration of these concerns, President López Obrador would like to promote self-sufficiency and food sovereignty for his citizens in Mexico's most staple grains and safeguard against the continued U.S. flooding Mexican markets with cheap GM corn. Consequently, the Mexican Agricultural Department wants to reduce Mexico's dependency on corn imports for feed by 30%–40% by 2024 (Tomson, 2023).

Economic Assessment

Since the United States produces one-third of the total corn production produced globally and Mexico is the leading importer of U.S. corn, the impacts of Mexico's announced import ban on GM corn will have a ripple effect in the U.S. corn industry. Research by World Perspectives (2022) showed that Mexico's possible import ban of U.S. GM corn could result in economic losses of \$13.61 billion to the U.S. corn industry, \$30.5 billion in U.S. gross domestic product (GDP), and 32,217 jobs over a 10-year period. This ban would also create a corn shortage in Mexico, increasing the price of non-GM corn by 19% over a 10-year period and causing 56,958

annual job losses, which will hurt the 55.7 million Mexicans living in poverty. Devadoss and Luckstead (2024) find that Mexico's proposed trade restrictions could cause significant reallocations of corn trade in the world market, and Mexico would incur substantial welfare loss as corn prices would increase in Mexico. Consequently, this trade conflict poses a serious food security problem and could severely affect the economic livelihood of poor Mexicans.

If the panel rules in favor of Mexico, the adverse effects will reverberate through the entire U.S. corn industry and affect corn growers in many states. The ripple effect would also seriously disrupt corn trade in the world market. U.S. exports of about 17 million metric tons of yellow GM corn to Mexico need to be sold elsewhere. If they are sold within the United States, it would depress U.S. corn price significantly. The United States could also try to export the excess corn to other major corn-importing countries, such as China and Japan. To fill the shortage brought by Mexico's curb on U.S. transgenic corn imports, Mexico plans to import non-GM corn from Argentina and Brazil, which would cost Mexico an additional \$571 million (World Perspectives, 2022). Such reallocations will have trade implications for other corn-exporting countries. While Brazil and Argentina can gain, other corn exporters may lose their market share in some importing countries due to competition from the United States. Such is a fact of global business in a highly integrated and networked world market.

If the dispute panel finds that the Mexican proposed policy to curb imports of U.S. transgenic corn is not consistent with USMCA agreement and Mexico implements this policy, then the United States can impose retaliatory tariffs on imports from Mexico. Such a scenario could escalate to full-blown trade conflict, à la

the U.S.–China trade war, and could spell economic catastrophe for both countries. Canada has an interest in this dispute because, although it is not a significant exporter of corn to Mexico, it does export other GM products such as canola; it therefore signed on as a third party in this resolution. Regardless of whether this dispute settlement panel rules in favor of the United States, U.S. corn producers and exporters may be inclined to grow and export more non-GM white corn to Mexico and maintain a steady market for their exports.

If Mexico allows bioengineered corn for animal feed and industrial use meant for human consumption, then this dispute would involve only the small amount of U.S. GM white corn that could be imported by Mexico, which does not pose major economic disruptions between the two countries. However, this dispute needs to be resolved so it does not spill over into a bigger trade war.

Conclusions

Even though scientists have found GM corn to be safe for human consumption, the Mexican government and consumers are skeptical of GM corn. The United States maintains that Mexican biotechnology policies to ban GM corn imports are not grounded in science and not consistent with USMCA sanitary and phytosanitary measures. Mexico is the leading trade partner of the United States. A continued stalemate between Mexico and the United States in GM corn trade could escalate to a larger trade war involving bilateral trade of other significant commodities between the two countries. This conflict could provoke massive economic disruptions, similar to the Trump administration's tariff retaliation and trade war against China. Resolving this trade dispute promptly is in the best interest of both countries.

For More Information

- Bakshi, A. 2003. "Potential Adverse Health Effects of Genetically Modified Crops." *Journal of Toxicology and Environmental Health Part B* 6(3):211–225.
- Barrera, A. 2023, August 21. "Mexico Says it Won't Modify Decree on GM Corn Ahead of USMCA Panel." *Reuters*. Available online: <https://www.reuters.com/world/americas/mexico-says-wont-modify-decree-gm-corn-ahead-usmca-panel-2023-08-21/>.
- Burzawa, J. 2023. Infographic: Mexico, Genetically Modified Corn, and USMCA. The Wilson Center. Available online: <https://www.wilsoncenter.org/article/infographic-mexico-genetically-modified-corn-and-usmca>.
- Devadoss, S., and J. Luckstead. 2024. "Corn Trade between the United States and Mexico." Working paper, Department of Agricultural and Applied Economics, Texas Tech University.
- Dona, A., and I. Arvanitoyannis. 2009. "Health Risks of Genetically Modified Foods." *Critical Reviews in Food Science and Nutrition* 49:164–175.
- Fanjul, G., and A. Fraser. 2003. "Dumping without Borders: How U.S. Agricultural Policies Are Destroying the Livelihoods of Mexican Corn Farmers." Oxfam briefing paper. Available online: <https://policy-practice.oxfam.org/resources/dumping-without-borders-how-us-agricultural-policies-are-destroying-the-livelihoods-114471/>.
- Garrison, C., and A. Barrera. 2023, February 13. "Mexico Opens Door for GM Corn in Animal Feed, Industrial Use." *Reuters*. Available online: <https://www.reuters.com/markets/commodities/mexico-opens-door-gm-corn-animal-feed-industrial-use-2023-02-14/>.
- Haspel, T. 2013, October 13. "Genetically Modified Foods: What Is and Isn't True." *The Washington Post*. Available online: https://www.washingtonpost.com/lifestyle/food/genetically-modified-foods-what-is-and-isnt-true/2013/10/15/40e4fd58-3132-11e3-8627-c5d7de0a046b_story.html.
- Heemstra, J. 2023, February 15. "New Decree by Mexico Allows for Some GMO Corn Imports." *DRG News*.
- Lawder, D. 2023, August 17. "U.S. Escalates Mexico Corn Trade Spat with Dispute Panel Request." *Reuters*.
- Medrano, L. 2022, December 21. "The Deep Roots of Mexico's Trade Dispute with U.S. over GMO Corn." *Food & Environment Reporting Network*. Available online: <https://thefern.org/2022/12/the-deep-roots-of-mexicos-trade-dispute-with-u-s-over-gmo-corn/>.
- Mega, E. 2018. "Small Farmers in Mexico Keep Corn's Genetic Diversity Alive." *Scientific American*. Available online: <https://www.scientificamerican.com/article/small-farmers-in-mexico-keep-corns-genetic-diversity-alive/>.
- Norris, M. 2015, August 10. "Will GMOs Hurt My Body? The Public's Concerns and How Scientists Have Addressed Them." *Science in the News* blog, Harvard University. Available online: <https://sitn.hms.harvard.edu/flash/2015/will-gmos-hurt-my-body>.
- Obrador, A. 2020, December 31. *Decree Establishing the Actions to Be Carried Out by the Agencies and Entities...* Mexico City: DOF, Official Gazette of the Federation.
- . 2023, February 13. *Decree Establishing Various Actions Regarding Glyphosate and Genetically Modified Corn*. Mexico City: DOF, Official Gazette of the Federation.
- Office of the United States Trade Representative. 2023a, August 17. "United States Establishes USMCA Dispute Panel on Mexico's Agricultural Biotechnology Measures." Press Release. Washington, DC: Executive Office of the President. Available online: <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2023/august/united-states-establishes-usmca-dispute-panel-mexicos-agricultural-biotechnology-measures>.
- . 2023b. U.S. Panel Request - Mexico Biotech. Available online: https://ustr.gov/sites/default/files/2023-08/US_Panel_Request_-_Mexico_Biotech.pdf.

- . 2023c, March 6. “USTR Announces USMCA Technical Consultations with Mexico on Agricultural Biotechnology.” Press Release. Available online: <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2023/march/ustr-announces-usmca-technical-consultations-mexico-agricultural-biotechnology>.
- . 2023d, August 21. “What They Are Saying: U.S. Establishes USMCA Dispute Panel on Mexico’s Agricultural Biotechnology Measures.” Press Release. Available online: <https://ustr.gov/aboutus/policy-offices/press-office/press-releases/2023/august/what-they-are-saying-us-establishes-usmca-dispute-panel-mexicos-agricultural-biotechnology-measures>.
- Oliver, M. 2014. “Why We Need GMO Crops in Agriculture.” *Science of Medicine – National Review* 111(6):492–507.
- Swanson, A., and L. Qiu. 2023, March 6. “U.S. to Challenge Mexican Ban on Genetically Modified Corn.” *New York Times*. Available online: <https://www.nytimes.com/2023/03/06/us/politics/mexico-ban-us-corn.html>.
- Teferra, T. 2021. “Should We Still Worry about the Safety of GMO Foods? Why and Why Not? A Review.” *Food Science & Nutrition* 9(9): 5324–5331.
- Tomson, B. 2023. “U.S., Mexico Stalemate on GM Corn Leaves next Step to Lopez Obrador.” *Agri-Pulse*. Available online: <https://www.agri-pulse.com/articles/18805-us-mexico-stalemate-on-gm-corn-leaves-next-step-to-lopez-obrador>.
- U.S. Census Bureau. 2023a. Trade in Goods with Mexico. Available online: <https://www.census.gov/foreign-trade/balance/c2010.html>.
- . 2023b. U.S. Census Bureau Trade Data. Available online: <https://usatrade.census.gov/>.
- U.S. Department of Agriculture, Foreign Agricultural Service (USDA-FAS). 2023a. Global Agricultural Trade System Table. Available online: <https://apps.fas.usda.gov/gats/default.aspx>.
- . 2023b. Production, Supply, and Distribution Table. Available online: <https://apps.fas.usda.gov/psdonline/app/index.html#/app/advQuery>.
- U.S. Food and Drug Administration (FDA). 2022a. GMO Crops, Animal Food, and Beyond. Available online: <https://www.fda.gov/food/agricultural-biotechnology/gmo-crops-animal-food-and-beyond>.
- . 2022b. GMOs and Your Health. Available online: <https://www.fda.gov/media/135280/download>.
- United States-Mexico-Canada Agreement (USMCA). 2020a. “Chapter 9: Sanitary and Phytosanitary Measures.” In: *Agreement between the United States of America, the United Mexican States, and Canada*. Available online: https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/09_Sanitary_and_Phytosanitary_Measures.pdf.
- . 2020b. “Chapter 31, Dispute Settlement.” In: *Agreement Between the united states of america, the united mexican states, and canada*. available online: <https://ustr.gov/sites/default/files/files/agreements/FTA/USMCA/Text/31%20Dispute%20Settlement.pdf>.
- Vejar, C., and F. Rosenweig. 2023, August 31. “United States Request USMCA Panel against Mexico’s Measures on Genetically Modified Corn.” *White & Case*. Available online: <https://www.whitecase.com/insight-alert/united-states-request-usmca-panel-against-mexicos-measures-genetically-modified-corn>.
- Williams, A., C. Hutchins, S. Zahniser, and J. Beckman. 2022. *Feed Outlook: December 2022*. FDS-221. Washington, DC: U.S. Department of Agriculture, Economic Research Service.
- World Health Organization. 2014, May 1. “Food, Genetically Modified.” Q&A. Available online: <https://www.who.int/news-room/questions-and-answers/item/food-genetically-modified>.
- World Perspectives. 2022. *Consumer Price Impacts of Mexican Restrictions on GM Corn, An Economic Analysis*. Available online: https://www.bio.org/sites/default/files/2022-10/Implications_and_Consumer_Price_Impacts_of_a_Mexican_GM_Corn_Ban_Final_221003%28002%29.pdf.

About the Authors: Stephen Devadoss (stephen.devadoss@ttu.edu) is an Emabeth Thompson Endowed Professor with the Department of Agricultural and Applied Economics at Texas Tech University. William Hall (hal01282@ttu.edu) is a Research Assistant with the Department of Agricultural and Applied Economics at Texas Tech University. Jeff Luckstead (jluckstead@wsu.edu) is an Associate Professor with the School of Economics Science at Washington State University.

Acknowledgments: The authors acknowledge the Choices Editor Zhengfei Guan and an anonymous reviewer for their valuable suggestions. This work is supported by the Davis College Undergraduate Research Program at Texas Tech University and the USDA National Institute of Food and Agriculture, Agricultural and Food Research Initiative Competitive Program, Agriculture Economics and Rural Communities, grant # 2022-67023-36382.

©1999–2024 CHOICES. All rights reserved. Articles may be reproduced or electronically distributed as long as attribution to Choices and the Agricultural & Applied Economics Association is maintained. Choices subscriptions are free and can be obtained through <http://www.choicesmagazine.org>.