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Growing Hopes, Dry Negotiations: *Mexican and U.S. Avocado Industries at the Age of Free Trade Agreements and Climate Change*

***Esperanzas crecientes, negociaciones secas:
Las industrias mexicanas y estadounidense del
aguacate en la era del Tratado de Libre Comercio
y el cambio climático***

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Growing Hopes, Dry Negotiations: Mexican and U.S. Avocado Industries at the Age of Free Trade Agreements and Climate Change

Esperanzas crecientes, negociaciones secas: Las industrias mexicanas y estadounidense del aguacate en la era del Tratado de Libre Comercio y el cambio climático

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Abstract: This article explores how Michoacán and California's avocado growers navigated the North American Free Trade Agreement's (NAFTA) negotiations and how they responded to its ratification after 1994. Although NAFTA is the reference in time for this narrative, the article focuses on the environmental changes in Michoacán and California instead of the trade negotiations to accentuate international agreements' impacts on concrete ecologies and vice versa. NAFTA presupposed the termination of trade barriers between Mexican and U.S. markets. Nonetheless, it was not enough for the U.S. Department of Agriculture (USDA) to lift a quarantine on Mexican avocados imposed in 1914 due to an alleged plague affecting the fruit. However, when California faced severe climatic difficulties to increase or even maintain its avocado yields while Michoacán proved to

have a propitious pest-free ecological context for the avocado tree to thrive, the USDA concluded a period of over 80 years of domestic protectionism of the avocado market. To grasp how the avocado industries in Michoacán and California responded to volatile times both in transnational trade and environmental change in the late twentieth century, this article mostly recurses to oral and written records of growers on both sides of the border. Interviews with growers and people connected to the avocado industry in Michoacán, as well as growers' annual meeting minutes in California, aided in uncovering the anxieties of adjusting to the integration of markets in times of neoliberal globalization and climate change.

Keywords: Avocado, NAFTA, pests, Michoacan, California

Resumen: El artículo explora cómo los productores de aguacate de Michoacán y California sortearon las negociaciones del TLC en 1994. Aunque el TLC es la referencia en tiempo, el artículo se centra en los cambios ambientales en Michoacán y California en lugar de las negociaciones diplomáticas con el fin de acentuar la incidencia de los tratados internacionales en contextos ecológicos concretos y a la inversa. El TLC suponía la eliminación de barreras al comercio entre México y Estados Unidos. Aun así, el Departamento de Agricultura de Estados Unidos (USDA) no permitió la entrada de aguacates mexicanos debido a una cuarentena impuesta en 1914 por una supuesta plaga. No obstante, cuando California enfrentó severas dificultades ambientales para incrementar o mantener su producción mientras Michoacán gozaba de un contexto ecológico libre de plagas y favorecedor para la producción de aguacates, la USDA dio fin a más de 80 años de proteccionismo doméstico. Para comprender cómo las industrias aguacateras de Michoacán y California respondieron a tiempos volátiles en comercio internacional y cambio ambiental a finales del siglo veinte, este artículo recurre a registros orales y escritos de productores a ambos lados de la frontera. Entrevistas con productores y gente relacionada con la industria en Michoacán, así como las minutas de las reuniones anuales de productores en California ayudan a descubrir las ansiedades de ajustarse a la integración de mercados en tiempos de globalización neoliberal y cambio climático.

Palabras clave: Aguacate, TLC, plagas, Michoacán, California

For centuries, people across different regions in Latin America selected, planted, grew, exchanged, and ate crops like tomatoes, chocolate, and beans; crops that are now considered staples in worldwide cuisines. The Columbian Exchange that characterized the late fifteenth and following centuries accelerated the propagation of food plants that were domesticated originally in the Andean region and the cultural area of Mesoamerica.¹ The avocado is one of those.²

Although for centuries avocado's place in people's meals and mouths paled when compared to other foods native to the Americas that rapidly became very popular worldwide, like maize or potatoes, the late twentieth century and early 2000s was a turning point for this fruit. Guacamole, avocado toasts, and avocado oil are now relatively easy to find everywhere. Despite the fruit's increasing global popularity, no place compares to the United States' extraordinary craze for avocados in the early twenty-first century. In 2001 a person in the United States ate

¹ I use Alfred Crosby's term of "Columbian Exchange" to describe the widespread transfer of plants and animals, among many other things, between the Americas and Afro-Eurasia since the late fifteenth century. See Alfred W. Crosby, *The Columbian Exchange: Biological and Cultural Consequences of 1492*, Contributions in American Studies ; No. 2 (Westport: Greenwood Pub-Co, 1972); Charles C. Mann, *1491: New Revelations of the Americas before Columbus*, 2nd Vintage books ed (New York: Vintage, 2011).

² María Galindo-Tovar, Nisao Ogata-Aguilar, and Amaury Arzate-Fernández, "Some Aspects of Avocado (Persea Americana Mill) Diversity and Domestication in Mesoamerica," *Genetic Resources and Crop Evolution* 55, no. 3 (2008): 441–50.

almost a kilo of avocados per year on average. Fifteen years later, in 2016, that figure had tripled.³ Although Florida, Hawaii, and mainly California, grow avocados, the United States does not produce enough of this fruit to cover its domestic demand. In fact, around 80 percent of the 2016 avocados in the United States were provided by the leading global producer, Mexico.⁴ In 2016, the global production of avocados was almost 6 million tons, and Mexico grew 1.9 of them. In a distant second place, the Dominican Republic grew 600,000 tons, and the United States, in 11th place, produced 125,000 tons of avocados.⁵ In this sense, the United States, the second major consumer country of avocados in the world, relies almost entirely on the major avocado producer-and consumer, Mexico.

Although the appetite for avocados in the United States is quite recent and the connection between the fruit's production in Mexico and its consumption in the United States consolidated after the North American Free Trade Agreement (NAFTA) in 1994, the linkages between Mexico's and U.S. avocado industries

³ Figures obtained with information from Skyler Simnitt and Catherine Weber, "Fruit and Tree Nuts Outlook: March 2022," Situation and Outlook Report, Economic Research Service (Washington, D.C.: United States Department of Agriculture, March 30, 2022), 24.

⁴ Simnitt and Weber, 24.

⁵ Estimates based on Food and Agriculture Organization of the United Nations. *FAOSTAT Statistical Database*. [Rome]: FAO, 2016. Accessed on July 21, 2022. The exact figures of avocado production in tonnes in 2016 are as follows: World's production 5,722,758; Mexico's 1,889,354; Dominican Republic 601,349; and the United States 125,237.

extend back in time since the early twentieth century. Albeit the U.S. Department of Agriculture (USDA) quarantined Mexican avocados in 1914 due to an alleged pest on the avocado tree, Californian growers frequently visited Mexico and Central America to collect different avocado strains' budwood. Back home, growers bred new varieties better fitted to the Californian ecological context using the Latin American budwood. In the 1920s, a mail carrier and amateur horticulturist in Southern California, Rudolph Hass, crossbred avocado varieties from Guatemala and Mexico in his backyard. Hass stumbled upon a new strain when a Mexican *Fuerte* graft failed, and the rootstock grew up in its place.⁶ The tree prevailed over the grafted *Fuerte* budwood and eventually yielded the fruit that has today become global. Due to its taste, size, hard skin and, more importantly, large yields, the *Hass* is the most commercialized avocado variety around the world.

In the mid-twentieth century, when California's avocado industry consolidated as the dominant grower in the United States, Mexican growers and agronomists established connections with Californian farmers. As a result of those relationships, growers, returned migrant workers, and bureaucrats from Mexico introduced the Californian *Hass* variety to Michoacán in the 1950s and gave shape to a robust avocado industry that only

⁶ Frederic Rosengarten, *Wilson Popenoe: Agricultural Explorer, Educator, and Friend of Latin America* (Lawai, Kauai, Hawaii: National Tropical Botanical Garden, 1991), 58.

three decades later became the world's powerhouse of avocado production. There is no doubt that NAFTA and the rapidly increasing appetite for avocados in the United States urged the USDA to lift the quarantine on Mexican avocados despite Californian farmers' protests. Still, the quarantine was maintained for three more years, and even then, the USDA only partially lifted it. It was California and Michoacán's ecological contexts that finally ended the protectionist measure in 2007.

This article explores how Michoacán and California's avocado growers navigated NAFTA's negotiations since the late 1980s and how they responded to its ratification after 1994. Despite the fact that NAFTA is the reference in time, this article focuses on the environmental changes instead of the trade negotiations to accentuate how international agreements do not occur in a material vacuum. Although NAFTA presupposed the integration of Mexican and U.S. markets, it was not enough for the USDA to lift the quarantine on Mexican avocados in the United States. Nonetheless, when California faced severe climatic difficulties to increase or even maintain its avocado yields while Michoacán proved to have a propitious ecological context for the avocado tree to thrive, the USDA ended over 80 years of domestic protectionism in the avocado market.

Scholars have discussed different aspects of both Californian and Michoacán's avocado industries. These works have shed light on how Michoacán consolidated as the Mexican avo-

cado industry's bastion.⁷ Economists have also explained how Michoacano avocado business people, in participation with state and research institutions, created a system of innovation that has positioned Michoacán as the global powerhouse of avocado production.⁸ Similarly, anthropologists in the United States have discussed U.S. growers' role in shaping their industry in 1930s California and marketing a fruit that in the early twentieth century was mostly unknown in the domestic market.⁹ This article aims to establish a clear connection between both industries to show the mechanisms of the global food complex through the lenses of avocado production. Moreover, it pursues to prove how Michoacán's and California's ecological contexts have largely determined the nature of Mexican and U.S. growers' relations that turned highly competitive by the late twentieth century.

Anthropologists in Michoacán have also analyzed how the avocado industry has changed local relations of power in

⁷ For the formation of Michoacán's avocado industry in the 1950s, see Daniel Hernández Palestino, "Arbol afuera. Estudio sobre la diversidad sociocultural del arbol del aguacate" (Zacatecas, México, Universidad Autónoma de Zacatecas "Francisco García Salinas," 2003).

⁸ María de la Luz Martín Carbajal, "La formación histórica del sistema de innovación de la industria del aguacate en Michoacán," *Tzintzun. Revista de Estudios Históricos*, no. núm. 63 (June 2016): 268–304.

⁹ For the early stages of California's avocado industry and marketing see Jeffrey Charles, "Searching for Gold in Guacamole: California Growers Market the Avocado, 1910-1994" in Philip Scranton and Warren James Belasco, *Food Nations: Selling Taste in Consumer Societies*, Hagley Perspectives on Business and Culture (New York: Routledge, 2002).

specific communities.¹⁰ This article enlarges the conversation on campesino power dynamics at the local level, discussing the global trends that cross campesino communities and how rural people and landscapes redirect and redefine global processes too. In the United States, anthropologists have analyzed the corporations and associations that have shaped a transnational avocado industry both in California and Michoacán since the mid-twentieth century.¹¹ This work supports and extends this research by including the environmental changes that have redefined human action on both sides of the border.

To grasp how the avocado industries in Michoacán and California responded to volatile times both in transnational trade and environmental change in the late twentieth century, this article mostly recurses to oral and written records of growers on both sides of the border. Interviews with growers and people connected

¹⁰ Eunice Herrera Aguilar, “Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purépecha” (Doctorado en Antropología Social, Zamora, Michoacán, México): [Morelia, Michoacán, México], El Colegio de Michoacán, 2017).

¹¹ Lois Stanford, “Constructing ‘Quality’: The Political Economy of Standards in Mexico’s Avocado Industry,” *Agriculture and Human Values* 19, no. 4 (December 2002): 293–310; Lois Stanford and Julie A. Hogeland, “Designing Organizations for a Globalized World: Calavo’s Transition from Cooperative to Corporation,” *American Journal of Agricultural Economics* 86, no. 5 (2004): 1269–75; Lois Stanford, “Ejidal Organizations and the Mexican State: Confrontation and Crisis in Michoacán,” *Urban Anthropology and Studies of Cultural Systems and World Economic Development* 23, no. 2/3 (1994): 171–207.

to the avocado industry in Michoacán, as well as growers' annual meeting minutes in California, aided in uncovering the anxieties of adjusting to the integration of markets in times of neoliberal globalization and climate change.¹²

“Prior to the development of the orchards, the hills were covered with pine trees.”¹³ **Michoacán before NAFTA**

A neoliberal economic model became dominant in most of late-twentieth-century Latin America. In the late 1980s, the Mexican state went through a series of readjustments that concluded the protectionist agricultural policies that characterized the twentieth century. The state liberalized exports, privatized state companies, deregulated the market, and reconfigured the subsidies system.¹⁴ The country also adopted international trade agreements like the General Agreement on Tariffs and Trade in 1986 and NAFTA in 1994, and it became a member of the Organization for Economic Cooperation and Development the same year. By implementing and joining these international

¹² In most cases, I used the real names of growers in Michoacán and California. I have resorted to the use of pseudonyms in the case of three brothers who grow avocado in Tingüindín to make them unidentifiable as they shared financial information about their avocado orchard that might put them at risk.

¹³ Leonard Francis, “Mexico-Is It Really What We Hear?,” in *California Avocado Society Yearbook*, vol. 77 (Los Angeles: California Avocado Society, 1993), 60.

¹⁴ Herrera Aguilar, “Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purépecha,” 17.

treaties and organizations, the state aimed to increase export-led productivity.¹⁵

The neoliberal model in agricultural production demanded a series of land reforms too. Throughout the twentieth century, the ejido was a form of collective land use protected by the 1917 Constitution. That changed in 1991 during the presidency of Carlos Salinas de Gortari when Congress passed a constitutional reform to article 27 that allowed and promoted collective lands' privatization and ended the state's intervention to expropriate and redistribute lands. This way, the Mexican state concluded the Revolution's agrarian reform. The constitutional reform, effective by 1992, removed all legal restrictions to acquire, sell, and transfer, by any means, property rights over land use in ejidos and communal lands to create agricultural industries of efficient dimensions.¹⁶ The reform was not paralleled with public credits or subsidies to production; on the contrary, crop's prices formerly protected by the state, were aligned with those of the international market. These changes effectively left Mexican small-size producers adrift.

A series of legal instruments facilitated the transition from communal or ejido lands to properties with identifiable private rights of use. Federal programs like *Programa de Certificación de Derechos Ejidales y Titulación de Solares* (PROCEDE. Ejido

¹⁵ Herrera Aguilar, 17.

¹⁶ Gobierno Provisional República Mexicana, "Constitución Política de Los Estados Unidos Mexicanos." (1917).

Rights Certification and Communal Lands Titling Program) and *Programa de Certificación de Derechos Comunales* (PROCECOM. Communal Rights Certification Program) were designed to assign land use rights to 31,054 agrarian centers in Mexico.¹⁷ Before the designation of private rights over communal or ejido lands, the community members had to reach at least 51 percent of the total votes in a general assembly. PROCEDE-PROCECOM certificates were not private property titles. Even when the community members divided their communal or ejido lands into smaller fractions allocated to individuals, the community still owned the lands, and the community members with exclusive rights over specific lots were not allowed to sell them to any person out of the community.¹⁸

The reform to Constitutional Article 27 and PROCEDE-PROCECOM had two effects in the Meseta Purhépecha. In the first place, the reforms legalized a series of irregular forms of land appropriation practiced since the 1970s and 1980s when the avocado belt began to expand in Michoacán. Medium-size farmers from the neighboring Valley of Apatzingán rented communal or ejido's lands from campesinos in the Meseta to grow avocados. In some cases, they paid a risible compensation. Due to the reforms,

¹⁷ María I. Hernández Santos et al., "The Certification Program of Ejido Rights and Titles of Urban Lots (PROCEDE): Its Impact in Fresnillo, Zacatecas, Mexico," *Agrociencia* 40 (2006): 250.

¹⁸ Herrera Aguilar, "Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purhépecha," 160.

these farmers formalized their land-use rights by registering their agreements in PROCEDE-PROCECOM. Secondly, the reforms also enabled foreign companies to initiate commercial activities in the Meseta Purhépecha. Although most of these companies bought lands from private landowners, the landlords agreed to sell their estates because they knew they could access communal and ejido lands in the most productive regions to grow avocado in the Meseta. Because of these reforms, U.S. companies like Calavo de México and Mission de México opened packinghouses in Uruapan.¹⁹

Although PROCEDE-PROCECOM forbade allotting economic resources to ejidos or communal lands with fruit trees plantations, it did not prevent the flourishing of avocado orchards in Michoacán soon after the 1992 constitutional reform.²⁰ According to Michoacán's Secretary of Agriculture and Rural Development in 2017, Francisco Huergo Maurin, the changes are easy to track in the top avocado grower municipalities: Uruapan, Tancítaro, Salvador Escalante, and Nuevo Parangaricutiro.²¹ In

¹⁹ This information was obtained through the interviews I had with growers from Michoacán from 2019 to 2022. In several cases, growers mentioned that they initially grew avocados in *huertas* they rented from ejidatarios since the 1980s or that they knew about ejidos that were renting their lands even before the 1992 constitutional reform.

²⁰ Anexo Concepto de Apoyo A4. Plantaciones Forestales Comerciales, Secretaría del Medio Ambiente y Recursos Naturales, "Reglas de Operación del Programa ProArbol" (2011), 7.

²¹ Huergo Maurin cited in Notimex, "Michoacán, líder mundial en producción de aguacate," *El Economista*, June 25, 2017, online edition, sec. Nacional.

1994, just two years after the constitutional reform, Michoacán had almost 400 thousand hectares of forests. Three years later, in 1997, that area had reduced to 224 thousand hectares.²² One of the municipalities with the most dramatic woodlands reduction was Salvador Escalante, which in only three years, from 1994 to 1997, lost 85 percent of its woodlands.²³ The remarkable exemptions to the accelerated deforestation in the 1990s Meseta Purhépecha were Nuevo San Juan Parangaricutiro and Tancítaro. [See Table 1]

Table 1.
Michoacán’s Forests, 1994-1997

Michoacán’s Woodlands (Hectares)			
	1994	1997	% Change
Michoacán	396,136	224,413	-43.3%
Nuevo San Juan Parangaricutiro	12,027	14,637	21.7%
Salvador Escalante	17,407	2,522	-85.5%
Tancítaro	1,401	1,858	32.6%
Uruapan	18,033	4,557	-74.7%

Sources: “Michoacán. Resultados Definitivos,” VII Censo Ejidal, 1994, and “La Producción Forestal en la Meseta Purhépecha en el Estado de Michoacán,” 1997 by INEGI.

²² INEGI, “Michoacán. Resultados Definitivos,” VII Censo Ejidal (Aguascalientes, Ags.: Instituto Nacional de Estadística y Geografía, 1994).

²³ INEGI, “La Producción Forestal en la Meseta Purhépecha en el Estado de Michoacán” (Aguascalientes, Ags.: Instituto Nacional de Estadística y Geografía, 1997).

San Juan's uncommon capacity to grow avocados while simultaneously preserving the woodlands is an extraordinary feat achieved by multiple causes: the community's members' active involvement in corporate and state governance and the effectiveness of the community to obtain funding. When people from San Juan Parangaricutiro relocated near Uruapan due the Parícutín's eruption in the 1940s, a group of sanjuanenses founded Nuevo San Juan's forestry company in 1988, *Aprovechamientos Forestales de la Comunidad Indígena de Nuevo San Juan Parangaricutiro*. These men obtained a loan seven years earlier, in 1981, from the *Celulosa y Papel de Michoacán*, a paper company that agreed on the loan for significant discounts on the wood they received from the indigenous company.²⁴ The *Instituto Nacional de Investigaciones Agrícolas, Pecuarias y Forestales* (INIFAP. National Institute of Agriculture, Livestock and Forestry Research), in collaboration with Nuevo San Juan community members, designed a program for agricultural development to manage more than 4,600 hectares to cultivate fresh produce with *Celulosa's* loan.²⁵ In parallel, since the early 1980s, Nuevo San Juan forestry company strengthened its relations with the ruling *Partido Revolucionario Institucional* (PRI. Institutional Revolutionary Party). The more resources the company obtained

²⁴ Herrera Aguilar, "Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purépecha," 83.

²⁵ Herrera Aguilar, 60.

by federal funding, the stronger its political support for PRI. The company's managerial body and the Nuevo San Juan municipal government are so aligned that now, implicitly, they have become one. Based on the anthropologist Eunice Herrera Aguilar's findings, it is common practice to hold a management position in the company and then an appointment in the pueblo government to return to the corporate governance later.²⁶ These economic and political resources probably prevented the accelerated deforestation experienced in neighboring zones. The forestry company rapidly grew, and now in parallel to the sawmill, it also grows avocados and peaches in limited areas.

Tancítaro's initial effectiveness to preserve its forested lands is a different case. Although as the ejido census shows the pueblo did not cede their woodlands to grow avocado in the 1990s, now it is one of the most deforested municipalities in Michoacán. Dr. Netzahualcóyotl Gutiérrez, a physician serving Tancítaro and neighboring towns since the 1970s to 2010, founded the first avocado growers' cooperative in the pueblo. According to Dr. Gutiérrez, before the 2000s only medium-size growers established avocado orchards in their private lands. Ejidatarios from Tancítaro began to clear their forests at an accelerated pace until the early 2000s, when Michoacán was allowed to ship avocado to the United States.²⁷

²⁶ Herrera Aguilar, 185.

²⁷ Netzahualcóyotl Gutiérrez. Interview. By author. July 2021.

The 1990s neoliberal framework promoted the production of export-led food commodities in Mexico. Michoacán's environmental suitability to eventually become a serious contender in the production of avocados for the international market was probably unanticipated to many around the world but not to their Californian competitors. Until 1997, Californian growers were the leading suppliers of avocados to the U.S. market. Before NAFTA, Californians continually discussed the risks for their industry if Michoacán shipped avocados to the United States. Some Californian avocado growers even traveled to Mexico to see the state of Michoacán's avocado production and report back to their fellow Californian farmers.

In May 1993, just a year before Mexico, the United States and Canada signed NAFTA, Leonard Francis, the California Avocado Society (CAS) Research Coordinator, visited Michoacán. In his own words, "there was an urgency to make this trip. Mexico produces five times what we in California do on the average, and it has at least three times our acreage. Tales of Hass acreage producing up to 40,000 pounds per acre needed to be documented and the reasons or the methods for such high production determined.²⁸ At Francis' visit, Mexico's avocado acreage was double the total acreage of the United States, Israel, South Africa, and Australia combined.²⁹ On his trip, Francis only visited Michoacán and

²⁸ Francis, "Mexico-Is It Really What We Hear?," 59–60.

²⁹ Francis, 60.

Mexico City. The former was due to its large avocado production and the latter because it was the country's most prominent distribution place. In 1993 only 16 Mexican states grew avocados commercially, but Michoacán produced around 83 percent of the national total.³⁰ Mexico's average production was 6.4 tons/ha. Michoacán's was a ton higher, 7.4 tons/ha, and some orchards even grew more than 25 tons/ha.³¹

The dominant avocado variety in the Purhépecha landscape was the *Hass* already, amounting to 95 percent of the state's acreage.³² In Uruapan, Francis saw that "orchards filled every valley, covered almost every hilltop. Prior to the development of the orchards, the hills were covered with pine trees. There is still a tremendous acreage of pines."³³

In meetings with Michoacano growers, Francis learned about the process of diversity loss in terms of the avocado varieties that were grown in Michoacán. He reported that "at least 90% of the acreage is in *Hass*. *Fuerte* and *Criollos*, the native avocados, make up the other 10%".³⁴ Francis also found out that, unlike in California, frosts are as usual in Michoacán's avocado belt nor as severe.

³⁰ Salvador Sánchez Colín and Martín Rubi Arriaga, "The Current State of Avocado Cultivation in Mexico," in California Avocado Society Yearbook, vol. 78 (Los Angeles: California Avocado Society, 1994), 77.

³¹ Sánchez Colín and Rubi Arriaga, 77.

³² Sánchez Colín and Rubi Arriaga, 76.

³³ Francis, "Mexico-Is It Really What We Hear?," 60.

³⁴ Francis, 60.

In the early 1990s, when the negotiations for NAFTA were taking place, Californian growers became the strongest advocates to maintain in effect the quarantine on Mexican avocados imposed by the USDA since 1914. As the foundation for the quarantine was a supposed plague of fruit fly on the Mexican avocados, Francis assessed this situation in his visit to Michoacán. Back in California, he reported that Mexican officials from the Secretary of Agriculture and avocado growers in Michoacán explained to him that weevils were Michoacán's most threatening pest, and even they were occasional in the western state. "As I am not an entomologist," Francis said, "I can only report here what was told to me."³⁵

Francis left a detailed description of Michoacán's avocado cultural practices right before NAFTA's ratification. The tone of his report unveils a clear intention to establish a comparison between the solid Californian avocado industry and its nascent peer in Michoacán. Francis discussed cultural practices, the use of agrochemicals, rainfall levels, labor costs, and even the consumption of avocados in the domestic market. According to Francis' accounts, in 1993, Michoacano avocado growers sprayed commercial fertilizer formulas of nitrogen, potassium, and phosphorus.³⁶ However, he added that only a few growers applied fertilizers according to nutritional analysis but based on

³⁵ Francis, 62.

³⁶ Francis, 62.

their own estimations.³⁷ Fortunately for Michoacanos, he said, one of the most critical inputs to grow avocado, water, came from the sky; probably 80 percent of the irrigation in the orchards at the time. Many of the poorer groves survived on rainfall only. Even today, local growers maintain that in some regions like Tancítaro, the largest avocado grower municipality in Michoacán, “farmers do not have to irrigate their orchards. Rainfall is enough.”³⁸ According to Salvador Sánchez Colín, a leading figure promoting avocado production in Mexico who was General Director of the National Commission of Fruticultura, CAS Director at Large in Mexico, and founder of CICTAMEX, a research center on avocado breeding in Estado de México, the quality of water in most production zones in Michoacán is free of salts and minerals, which reduces crop’s damage. In most cases, water originated from springs, creeks, and rivers.³⁹

The CAS Research Coordinator also compared Michoacan’s labor costs with those of California. “Labor is plentiful. We envision their labor costs as being very minimal.⁴⁰ Michoacano cutters were paid around 22 dollars per day of labor on average and general laborers in the orchards made eight to

³⁷ Sánchez Colín and Rubi Arriaga, “The Current State of Avocado Cultivation in Mexico,” 76.

³⁸ Vázquez, Martín. Interview. By author. February 15, 2019.

³⁹ Sánchez Colín and Rubi Arriaga, “The Current State of Avocado Cultivation in Mexico,” 76.

⁴⁰ Francis, “Mexico-Is It Really What We Hear?,” 62.

ten dollars per day.⁴¹ Comparatively, in California, laborers were paid 50 to 60 dollars per day on average.⁴² In addition to lower costs of irrigation and labor, Michoacano growers had another significant advantage. Unlike U.S. consumers who ate 1.5 to 2 pounds (less than a kilo) of avocados per capita in 1993, Mexicans consumed 15 pounds per capita (7 kilos). “And this [was] without any consumer promotion on advertising.”⁴³

The following year, in 1994, that number increased. In a speech at the CAS Annual Meeting, Sánchez Colín informed that Mexicans consumed 10 kilos per year on average (22 pounds). “No other country even reaches half of the internal consumption in Mexico,”⁴⁴ he said.

Labor in Michoacán was cheaper than in California, not only in the groves but also in the inputs needed to move the crop. In the 1990s, before shipping avocados to the United States, Michoacanos could sell around a thousand homemade wood crates per week to avocado packinghouses in Peribán.⁴⁵ The families did not directly agree to a contract with the packinghouses but with an intermediary. As making crates took place in the households,

⁴¹ Francis, 62.

⁴² Francis, 62–63.

⁴³ Francis, 63.

⁴⁴ Sánchez Colín and Rubi Arriaga, “The Current State of Avocado Cultivation in Mexico,” 77.

⁴⁵ Herrera Aguilar, “Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purépecha,” 58.

the intermediary did not invest in a place of work, machinery, or a salary. Numerous family units could work for three different intermediaries simultaneously. Women and children played a significant role in providing this labor. Although male family members participated too, most of them worked in the orchards while the rest of the family members, even the elders, did the crates. The *patrón* gave the workers wooden pieces, cloves, and packinghouse stickers. Initially, the crates were made of pine wood. As deforestation in the Meseta accelerated, they began to use other types of wood like the native “urika,” until the plastic crates replaced the wooden ones in the early 2000s.⁴⁶ Now the crates are done in mechanized workshops with all-male workers.

In 1994, the influential Mexican agronomist and public servant, Salvador Sánchez Colín, appeared at the CAS annual meeting to ease Californian anxieties about competition by arguing that receiving Mexican avocados in those months that California was not in harvesting season could actually aid expanding the U.S. avocado market benefiting growers on both sides of the border. Colin assured that “despite its prominence in production and the existence of more than ten export firms, Mexico is a modest exporter. It only exports a marginal part of its production, equivalent to two percent of the annual average between 1991 and 1993.”⁴⁷

⁴⁶ Herrera Aguilar, 58–59.

⁴⁷ Sánchez Colín and Rubi Arriaga, “The Current State of Avocado Cultivation in Mexico,” 78.

When Sánchez Colín was delivering his speech in California, the Secretary of Agriculture had been for four years negotiating with the USDA's Animal and Plant Health Inspection Service (APHIS) to ship Mexican avocados to the United States. As the country's largest grower, Michoacano avocados received most of the attention. To comply with the phytosanitary standards required by the APHIS, the Secretary of Agriculture's Plant Health Department created a State Committee in Michoacán. At its formation, the Committee worked in collaboration with the Universidad Michoacana de San Nicolás de Hidalgo's Agrobiology School to inform growers on the agricultural practices they ought to implement to comply with U.S. standards.⁴⁸

Michoacano growers faced several economic restrictions due to the costs of adjusting their practices to grow avocado according to the USDA standards, but, unlike growers in California, their ecological context was greatly favorable for avocado cultivation. Climate conditions and access to water were becoming an increasing concern in California. The possibility of lifting the quarantine on Mexican avocados due to a free trade agreement, the fulfillment of the phytosanitary criteria by the Michoacano industry, and the adverse climatic conditions raised agitation in CAS Annual Meetings since the early 1990s.

⁴⁸ Martín Carbajal, "La formación histórica del sistema de innovación de la industria del aguacate en Michoacán," 298–99.

“Frost! Drought! Floods! Recession! War! Take your pick.”⁴⁹

California before NAFTA

In 1990, Californian avocado growers were concerned with the variability of their crops' volumes. Looking for answers to explain what differentiated one good year from a bad one, they welcomed at the CAS meeting D.N. Zamet from the Experimental Station in Israel to discuss the effects of minimum temperatures on avocado yields. Based on Zamet's analysis of Israel's yields from 1980 to 1986, he concluded that “on average it would appear that the ten [Celsius] degree level gives a slightly better result.”⁵⁰ The purpose of informing growers about the minimum temperature for an avocado tree to thrive was, naturally, to give them a tool for estimating the cropping potential of a seedling for maximum crops in California. Zemet also emphasized that low temperatures and frosts, more than heat waves, were highly detrimental to avocado yields. Growers blamed a low harvest in 1980 on a short period of very high temperature of 45°C (114°F) in California. A similar situation occurred in 1988 with a short period of excessive heat in May. The seasons of 1987 and 1990 were both of low-volume crops too. However, in those seasons, there were no heat waves. Zemet emphasized that what the seasons of 1980, 1987, 1988,

⁴⁹ Larry Rose, “The California Avocado Nursery Situation,” in California Avocado Society Yearbook, vol. 75 (Los Angeles: California Avocado Society, 1990), 29.

⁵⁰ D.N. Zamet, “The Effect of Minimum Temperature on Avocado Yields,” in California Avocado Society Yearbook, vol. 74, Yearbook (Los Angeles: California Avocado Society, 1990), 250.

and 1990 shared besides the low volume of the crops, was that the spring season was in every case a cold one.⁵¹

In the following year, in 1991, the Brokaw Nursery owner, Larry Rose, advocated for diversifying the avocado varieties cultivated in California to cope with crop volume variability. He argued that growing different strains of avocado would probably bear more fruit as cultivars respond differently to climate fluctuations. In a very theatrical speech that emphasized also the threat of competition and pests, Rose said:

Frost! Drought! Floods! Recession! War! Take your pick. Each of these disasters has created a roller coaster effect on the planting of avocado trees in the last few years. And there is more, too. Urbanization, government regulation, the threat of foreign competition, and greater frequencies of fruit fly infestations create great uncertainty for the avocado grower.”⁵²

In this context, Rose urged growers to find a solution, at least, for the weather problem that affected avocado crops. The 1989 freeze destroyed young trees in Ventura and Santa Barbara counties.⁵³ Rose assured that, surprisingly, the *Pinkerton* variety was blooming heavily in 1992, while damaged *Hass* would not see flowers for another year. Nevertheless, Rose also admitted that making a transition from *Hass* to *Pinkerton* would have been an uphill struggle as “it takes many profitable years to fix a new

⁵¹ Zamet, 253.

⁵² Rose, “The California Avocado Nursery Situation,” 29.

⁵³ Rose, 29.

variety in an industry.”⁵⁴ The industry never did; on the contrary, in the following years, California as Michoacán kept moving to a *Hass*-only industry.

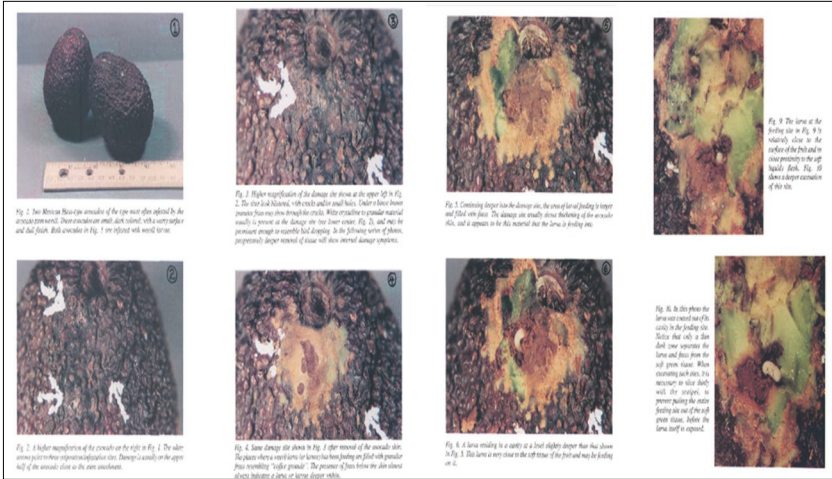
In addition to climate becoming a more alarming concern, Californian growers were still dealing with the constant threat of a pest falling to their orchards. In 1992, the APHIS Plant Protection and Quarantine Officer at El Paso, Texas, visited the Californian growers’ annual meeting to warn them of the Mexican avocado weevil larvae. In November 1989, El Paso Plant Protection and Quarantine Office intercepted *Hass* avocado from Mexico as it was still banned in the United States. Two years later, in 1991, APHIS officers found 38 larvae in 48.5 tons of Mexican *Hass* avocados on their way to be shipped to Japan. “Weevils entering the United States are certainly more numerous than stated here, since it was not possible to look closely for weevil damage on more than 20% of the avocados seized.⁵⁵ Officer Kreitner cautioned growers that “given the speed and volume of international travel, infested Mexican avocados can be moved rapidly from growing areas to possible sites of new infestation-to California, for example.⁵⁶ [See Figures 1]

⁵⁴ Rose, 29.

⁵⁵ G.L. Kreitner, “Weevils Threaten U.S. Avocado Industry. A Photoessay on Damage to Avocado Fruit by Larvae of an Avocado Weevil,” in California Avocado Society Yearbook, vol. 76 (Los Angeles: California Avocado Society, 1992), 109.

⁵⁶ Kreitner, 109.

Figures 1.
Mexican Avocados Damaged by Weevil Larvae
Images by G.G. Kreitner



Source: California Avocado Society Yearbook, vol 76 (Los Angeles, 1992)

These types of interventions encouraged Californian growers to keep lobbying in Washington, D.C., against lifting the quarantine on Mexican avocados based on the threat of importing pests with the fruit. In 1992, the California Avocado Commission's Vice President (CAC), Avi Crane, informed the avocado growers that “the time and effort our industry spent in consulting with our negotiators and Congress paid off in producing a sanitary and phytosanitary (S&P) agreement that will in and of itself not weaken the current U.S. phytosanitary quarantine on fresh Mexican avocados.”⁵⁷ According to the S&P agreement, a preamble

⁵⁷ Avi Crane, “North American Free Trade Agreement,” in California Avocado Sillares, vol. 2, núm. 4, 2023, 119-173
DOI: <https://doi.org/10.29105/sillares2.4-61>

to NAFTA, if one NAFTA country asserted that another NAFTA country's S&P measures were inconsistent with sound scientific principles, the country making the assertion had the burden of establishing the inconsistency. "This means," Crane said, "that if Mexico continues to challenge the U.S. quarantine on Mexican fresh avocados, Mexico will have the burden of establishing that there is no sound scientific reason for the quarantine."⁵⁸ As long as Californian climatic conditions permitted the state to grow enough avocados to cover the domestic demand, growers' lobbying against lifting the quarantine on Mexican avocados was effective. It is important to emphasize that although Californian crops were large enough to place avocado on the tables of houses and restaurants in the United States, the U.S. demand was still relatively limited in the early 1990s. Despite Californian growers' efforts marketing avocados in the United States since the 1930s, most consumers were still in the border states with the largest concentration of Hispanic residents.⁵⁹

Despite official Mexican efforts to persuade the USDA to lift the quarantine on the avocados imposed since 1914, NAFTA was signed and ratified by all parties in 1994 with no authorization to Mexican growers to ship their avocados to the United States.

do Society Yearbook, Yearbook 76 (Los Angeles: California Avocado Society, 1992), 147.

⁵⁸ Crane, 147.

⁵⁹ Jeffrey Charles, "Searching for Gold in Guacamole" in Scranton and Belasco, Food Nations, 143.

Nonetheless, NAFTA did slightly increase Mexico's bargaining power. With a free trade agreement in force already and based on the new S&P agreement, USDA's decision to keep the Mexican avocados quarantined without assessing the tests that Mexico could present on the fruit, could be interpreted as a protectionist measure instead of a phytosanitary one.⁶⁰

***“California growers must understand these changes and the challenges they represent.”*⁶¹ Negotiating Free Trades and Quarantines**

Mexican officials presented tests practiced by the Agrobiology School in Michoacán's agronomists that proved that the orchards were pest-free in 1993, just a year before signing NAFTA. On July 1995, the APHIS published a proposed rule and notice of public hearings in the Federal Register. The agency proposed “to amend the regulations governing the importation of fruits and vegetables

⁶⁰ Some scholars as anthropologists Lois Stanford and Daniel Hernández have argued that the Quarantine 12 was maintained for over 80 years due to the Californian growers' lobbying rather than keeping Californian groves pest-free. For more, see Stanford, “Constructing ‘Quality’: The Political Economy of Standards in Mexico's Avocado Industry”; Stanford and Hogeland, “Designing Organizations for a Globalized World”; Lois Stanford, “La globalización del aguacate” en Kirsten A. de Appendini and Guadalupe Rodríguez Gómez, eds., *La paradoja de la calidad. Alimentos mexicanos en América del Norte* (El Colegio de México, Centro de Estudios Demográficos, Urbanos y Ambientales, Programa Interinstitucional de Estudios sobre la Región de América del Norte, 2012); Hernández Palestino, “Arbol afuera.”

⁶¹ Giovanni Cavaletto, “The Mexican Avocado Industry Through the Eyes of a California Grower,” in *California Avocado Society Yearbook*, vol. 82 (Los Angeles: California Avocado Society, 1998), 53.

to allow fresh Hass avocado fruit grown in approved orchards in approved municipalities in Michoacan, Mexico, to be imported into certain areas of the United States.⁶² The APHIS considered over 300 comments received by October 1995. Most of them asserted that the research conducted by the Mexican scientists was inconclusive and did not demonstrate that *Hass* avocados are non-hosts for fruit flies. The USDA-APHIS stated that “we agree that the 1993 research was limited in scope and did not prove the Hass avocado to be a non-host for *Anastrepha* fruit flies.” However, “after considering the 1993 research and other available evidence, including interception data and past studies, we believe the Hass avocado to be a non-preferred host for *Anastrepha* fruit flies prior to harvest.” “We are confident that the phytosanitary requirements we would place on harvesting, packing, transport, and distribution, which are more extensive and redundant than those proposed by Sanidad Vegetal [in Mexico], would prevent infested Hass avocado fruit from being exported from Michoacan into the United States.⁶³

In 1997, the APHIS concluded that “Fresh Hass variety avocados (*Persea americana*) may be imported from Mexico into the United States for distribution in the northeastern United States.⁶⁴

⁶² “Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico,” Federal Register, Proposed Rules, 60, no. 127 (July 3, 1995): 4832.

⁶³ “Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico,” 34837.

⁶⁴ “Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico,” Sillares, vol. 2, núm. 4, 2023, 119-173
DOI: <https://doi.org/10.29105/sillares2.4-61>

The APHIS established certain conditions to ship avocados from Mexico to the United States. The avocados had to be grown in Michoacán only -where the Agrobiology School's experts ran the pest tests- in a certified orchard, the packinghouses must be registered in Sanidad Vegetal's export program and listed as an approved packinghouse in the annual work plan provided to APHIS. All shipments had to be accompanied by a phytosanitary certificate issued by Sanidad Vegetal confirming that the conditions specified by the APHIS had been met.⁶⁵ The avocados were exported to the United States from November to February only when California was not in the harvest season, and they were distributed in just twenty northeastern states, where Californian avocados were less consumed.⁶⁶ Finally, the APHIS specified that the avocado could be imported only if a Mexican avocado industry association representing growers, packers, and shippers, entered into a trust fund agreement with the APHIS for each shipping season. The agreement would require the Mexican avocado industry to pay in advance all estimated costs that APHIS expected to incur through its involvement in trapping, survey, harvest, and packinghouse operations.⁶⁷

Federal Register, Rules and Regulations, 62, no. 24 (February 5, 1997): 5313.

⁶⁵ "Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico," 5314–15.

⁶⁶ The U.S. states where Michoacán's avocados were first exported were Connecticut, Delaware, the District of Columbia, Illinois, Indiana, Kentucky, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and Wisconsin.

⁶⁷ "Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico,"

With this regulation, after 83 years of quarantine and three years after NAFTA's ratification, the USDA partially lifted the quarantine that prohibited Mexican avocados in the United States. It is important to emphasize that although the neoliberal framework of free trade propelled the integration of U.S. and Mexico's avocado markets, the USDA did not lift the quarantine immediately due to the resistance of Californian growers. However, California challenges of pest control, water scarcity and labor costs were proving to be significant barriers to maintain a constant supply of avocados to the U.S. consumers. In the first season, in 1996-1997, the Meseta Purhépecha shipped 681,584 tons of avocado to the United States, representing only seven percent of Michoacán's total crop that year.⁶⁸ Although around 6,000 Michoacano growers invested capital in aligning their cultural practices to the new requirements, they did not obtain the certification to ship their crop to the United States.⁶⁹ All shipped avocados came from 61 orchards in four municipalities: Uruapan, Tancítaro, Salvador Escalante, and Peribán.⁷⁰

Nonetheless, Michoacán's growers were not the only beneficiaries of Mexican avocado exports to the United States. Among the earliest exporters in Michoacán figured five

February 5, 1997, 5313–14.

⁶⁸ Hernández Palestino, "Arbol afuera," 296.

⁶⁹ Herrera Aguilar, "Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purhépecha," 40.

⁷⁰ Herrera Aguilar, 39.

Californian packinghouses that initiated operations in Uruapan in 1992 due to the land use reforms in Constitution's Article 27. Just as many medium and large-size avocado farmers took advantage of the possibility of obtaining land use rights in the most productive of Michoacán's lands, U.S. produce companies and cooperatives like Dole, Calavo, Mission, U.S. Pack, and Chiquita Banana, opened packinghouses in Uruapan to handle a share of the Mexican crop.⁷¹ Only four years after the partial entrance of avocados from Mexico to the United States, in 2001, just one of these companies, Calavo, handled approximately 33 percent of the Mexican avocado crop bounded for the United States.⁷²

Although initially only a few growers shipped avocado from Michoacán to the United States, the opening of the U.S. market for Mexican production reshaped the landscape and cultural practices of growing avocado in the Meseta Purhépecha. In 1995, *Alianza para el Campo*, the Mexican government's primary instrument to propel the rural economy, allocated, funding for avocado production in the Meseta Purhépecha for the first time by subsidizing research on plant health and innocuousness.⁷³ *Alianza's* funding came along with the promulgation in the same year of the NOM-066-FITO-1995. The NOM-066 established

⁷¹ Hernández Palestino, "Arbol afuera," 295.

⁷² Calavo Growers Inc., "2001 Calavo Annual Report," Annual Report (Santa Ana, California: Calavo Growers Inc., 2001), 19.

⁷³ Octavio Sotomayor Echenique, "Evaluación Alianza para el Campo 2006," Propuesta para el período 2007-2012, Análisis de Políticas (Mexico City: SA-GARPA, FAO, July 27, 2007), 2, <http://www.fao.org/3/bc941s/bc941s.pdf>.

the parameters to handle the avocado once it is cut from the tree and how it should be packed and transported to domestic and international markets. The regulations were designed to meet the international standards of quality in avocado culture, mainly those of the United States.⁷⁴ The federal funding and legal instruments that regulated the industry in Michoacán accelerated the avocado belt's expansion. By 2005, Michoacán's belt extended 7,752 km² (3000 mi²), representing 13 percent of the total state area. The belt was formed at the time by 20 avocado-growing municipalities, almost all located in the Meseta Purhépecha.

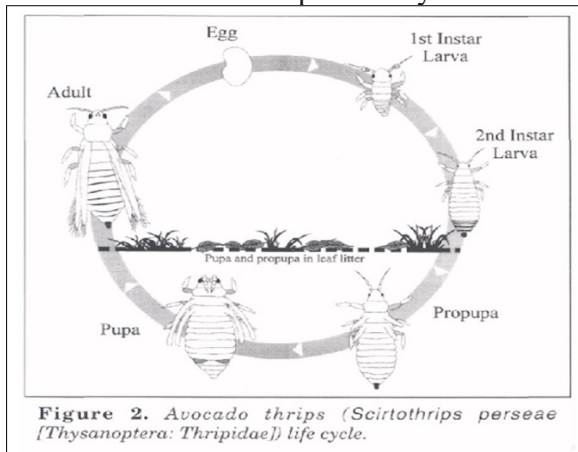
Michoacán was proving to be a productive avocado grower region worldwide. Still, or possibly because of it, Michoacano avocado's unrestricted entrance to the U.S. market year-round was not possible. Californian growers still dominated avocado commercialization west of the Mississippi River. However, by 1997 when the APHIS partially lifted the quarantine on Mexican avocados, Californian growers were battling the avocado thrips in their orchards. The insect, similar to a fruit fly, was first discovered in June 1996, damaging fruit and foliage in Saticoy and Oxnard, Ventura County.⁷⁵ U.C. Riverside Department of Entomology tested the orchards and determined that avocado

⁷⁴ Herrera Aguilar, "Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purhépecha," 39.

⁷⁵ Mark S. Hoddle and Joseph Morse, "Avocado Thrips: A Serious New Pest of Avocados in California," in California Avocado Society Yearbook, vol. 81 (Los Angeles: California Avocado Society, 1997), 81.

thrips were more closely related to *Scirtothrips* species in Latin America than species in North America.⁷⁶ Professors Hoddle and Morse traveled to Mexico in October 1997 to find the source of the pest attack.⁷⁷ The entomologists visited orchards in Coatepec Harinas, where CICTAMEX locates, and other groves in Atlixco, Puebla. In both places the team found avocado thrips.⁷⁸ [See Figure 2]

Figure 2.
Avocado Thrips Life Cycle



Source: Mark S. Hoddle and Joseph Morse, “Avocado Thrips: A Serious New Pest of Avocados in California,” in *California Avocado Society Yearbook*, 1997

Although pest control was one of the most crucial concerns for avocado growers in California, in 1997, the year that Mexico

⁷⁶ Hoddle and Morse, 81.

⁷⁷ Hoddle and Morse, 81.

⁷⁸ Hoddle and Morse, 82.

shipped *Hass* avocados to U.S. northeastern states for the first time and U.C. Riverside scientists tested orchards in Coatepec Harinas and Atlixco, anxiety about water scarcity was on the rise. Californian growers were concerned then about the cultural practices that would protect their orchards from outside pests and the irrigation measures that would allow them to maintain their crops' volumes. In addition to these anxieties about biological and climatic conditions, growers were also worried about the competitive tone pervading the domestic market.

The Mexican avocado industry was still pressing for lifting the pending restrictions on shipping avocado. Sending avocados to specific regions in the United States some months a year was good business for certified growers, and they hoped to increase profit by shipping all year round. At the end of the first season in 1998, growers received an average of .67 dollars per pound (almost half a kilo).⁷⁹ Despite the few difficult weeks when Michoacanos sent more fruit than the market could handle, the season was successful regarding cash returns. In the words of the Californian avocado grower, Giovanni Cavaletto, "In order to be competitive, California growers must understand these changes and the challenges they represent".⁸⁰

The success of the initial shipments encouraged Michoacán's growers to invest more capital towards lifting the

⁷⁹ Cavaletto, "The Mexican Avocado Industry Through the Eyes of a California Grower," 53.

⁸⁰ Cavaletto, 53.

restrictions. In 2000, to disprove Californian growers' accusations of a pest of fruit flies in the Mexican avocado that impeded export to all the states north of the border, the *Asociación de Productores y Empacadores de Aguacate de México* (APEAM. Association of Avocado Exporting Producers and Packers of Mexico) funded a 7 million pesos (ca. USD 650,000.00) study to determine the host status in Michoacán of commercially cultivated and marketed avocado. Michoacán's Secretariats of Agriculture and Economy and the Mexican Ecology Institute provided supplemental funding.⁸¹ The entomologists Martín Ramón Aluja Schuneman Hofer, Francisco Díaz Fleischer, and José Arredondo tested six orchards in Michoacán located at three different altitudes above the sea level from August to October 2001, and from April to June 2002.⁸² In 2004, the scientists published their results in the Entomological Society of America's *Journal of Economic Entomology*, the world's most cited entomological journal. They explained that to determine the host status to fruit flies, it is essential to identify cultivars and their different levels of susceptibility to infestation. If cultivars are not identified, researchers may consider all cultivars as hosts to plague, leading to unnecessary quarantines, as was the case of E. W. Rust in

⁸¹ Martín Aluja, Francisco Díaz-Fleischer, and José Arredondo, "Nonhost Status of Commercial *Persea Americana* 'Hass' to *Anastrepha Ludens*, *Anastrepha Obliqua*, *Anastrepha Serpentina*, and *Anastrepha Striata* (Diptera: Tephritidae) in Mexico," *Journal of Economic Entomology* 97, no. 2 (2004): 293.

⁸² Aluja, Díaz-Fleischer, and Arredondo, 293.

1918 and G. Bush in 1957 when they concluded that avocados in general (no cultivars identified) were hosts of *Anastrepha* spp.⁸³ Therefore, Aluja, Díaz, and Arredondo tested *Hass* avocados grown in Michoacán, only. Aluja and colleagues concluded that “commercially produced *P. americana* “Hass” is not a natural host for *A. ludens*, *A. obliqua*, *A. serpentina*, and *A. striata* in Mexico.⁸⁴ They also explained where the Californian growers’ initial confusion regarding the fruit flies might have come.

The entomologists argued that there is a distinction between an artificial and a natural host. Cut fruit such as bananas, tomatoes, walnuts, squash, and bell peppers, exposed to gravid *A. ludens* females under artificial conditions (e.g., the fly is only presented with one type of fruit over a long period), can serve as “artificial hosts” for many tephritid flies. “Fruit like these can, in our opinion, only be considered artificial hosts and should not be treated as natural hosts in quarantine protocols.”⁸⁵ Of 5,200 avocados naturally attached to the tree but forcibly exposed by the scientists to the oviposition activity of 26,000 gravid, laboratory-reared, and wild *A. ludens*, *A. obliqua*, *A. serpentina*, and *A. striata* females, with a high oviposition drive, only four ended up infested by *A. ludens*, but no adults emerged.⁸⁶

⁸³ Aluja, Díaz-Fleischer, and Arredondo, 293.

⁸⁴ Aluja, Díaz-Fleischer, and Arredondo, 306.

⁸⁵ Aluja, Díaz-Fleischer, and Arredondo, 306.

⁸⁶ Aluja, Díaz-Fleischer, and Arredondo, 304.

The team also concluded that *Hass* avocados are naturally resistant to the attack of the fruit flies. “First, we note that “Hass” avocados developed hardened “calluses” around eggs that had been deposited into the pulp.” “The callus in conjunction with regenerating tissue could probably cause egg mortality by asphyxiation.” “Probably, fruit [trees] weakened by disease or drought,” as the Hawaiian trees that previous studies tested, “partially lose their ability to quickly form calluses or to regenerate damaged tissue.”⁸⁷ The Meseta Purhépecha’s ecological context proved exceptionally well-suited to grow *Hass* avocado. Not only the *topure* soil prevents the avocado tree’s root system from rotting, the abundant yearly rainfall feeds the tree with no need for sophisticated irrigation projects, and the mountainous terrain facilitates the water to flow down instead of forming puddles in the soil, but the template and stable weather is ideal for the avocado to reach maturity hanging in the tree while allowing the plant to develop calluses around invasive species’ eggs that make it less vulnerable to natural pests like the fruit fly.

A few months after the Mexican scientist’s publication, on November 30, 2004, the APHIS published an amendment to the regulations governing the importation of fruits and vegetables “to expand the number of States in which fresh *Hass* avocado fruit grown in approved orchards in approved municipalities in

⁸⁷ Aluja, Díaz-Fleischer, and Arredondo, 307.

Michoacan, Mexico may be distributed.”⁸⁸ The APHIS allowed “the distribution of avocados during all months of the year. For the first 2 years following the effective date of this rule, those avocados may be distributed in all States except California, Florida, and Hawaii [the U.S. avocado grower states]; after 2 years, the avocados may be distributed in all States. We are taking this action in response to a request from the Government of Mexico.”⁸⁹ This way, after 93 years, Mexico would be allowed to export Michoacán’s *Hass* avocados all-year round to the entire U.S. territory.

Even if Michoacano *Hass* was not a natural host for the fruit fly, Californian groves still showed an increasing presence of pests. In the 2005 CAS meeting, Mark S. Hoddle, an entomologist from U.C. Riverside, said that although historically “important pests like greenhouse thrips, avocado brown mite, six-spotted mite, and omnivorous looper, have been kept below economically injurious levels by natural enemies,” that situation had slowly been changing since 1982.⁹⁰ Based on Hoddle’s research, a conduit facilitating invasion could be the smuggling of foliage, branches with leaves, whole plants,

⁸⁸ “Mexican Avocado Import Program,” Federal Register, Rules and Regulations, 69, no. 229 (November 30, 2004): 69748.

⁸⁹ “Mexican Avocado Import Program,” 69748.

⁹⁰ Mark S. Hoddle, “Invasions of Leaf Feeding Arthropods: Why Are So Many New Pests Attacking California-Grown Avocados?,” in California Avocado Society Yearbook, vol. 87 (Los Angeles: California Avocado Society, 2004), 87.

and budwood because all these pests feed and reproduce *almost exclusively on avocado leaves*.⁹¹ U.C. Riverside funded a two-year study using molecular techniques to determine the area of origin for avocado thrips in Mexico and Central America. The mitochondrial DNA and microsatellite markers strongly indicated Coatepec-Harinas as the most likely source of the Californian population.⁹² Coatepec-Harinas is the site of a large avocado germplasm bank and breeding station. Fundación Salvador Sánchez Colín – CICTAMEX is based in Coatepec-Harinas and foreign researchers regularly visited. Therefore, the study concluded that “this donor region may be a likely source of previous avocado pest introductions.”⁹³ In other words, Hoddle’s investigation determined that, most likely, the pests affecting Californian crops were brought from Mexico, particularly the Estado de México, by U.S. scientists researching about avocado breeding instead of Michoacano avocados commercialized by growers.

El Aguacatero. Michoacán and California’s Avocado Industries after NAFTA

In face of the eminent entrance of Michoacán’s avocados to all the United States, the CAS invited to its 2005 annual meeting the Tropical Fruits Crops National Research Leader at

⁹¹ Hoddle, 66 [Emphasis added].

⁹² Hoddle, 74.

⁹³ Hoddle, 79.

the INIFAP, Samuel Salazar García, the President of the Local Agricultural Association of Avocado Growers from Uruapan in Michoacán, Luis Zamora Cuevas, and the Vice-president of the APEAM, Ricardo Vega López. The purpose was to ensure that avocados shipped from Michoacán to the United States would not bring a plague. In California, the Mexican men explained that Michoacano counties authorized to ship avocado must follow a working program established by the NOM-066 that certifies quarantine-pest-free zones.⁹⁴ Salazar, Zamora, and Vega explained to their Californian peers that orchards permitted to ship avocado to the United States were constantly tested by 16 *Juntas Locales de Sanidad Vegetal* (JLSV. Local Plant-Health Groups).⁹⁵ In the 1997-1998 season, the first year that Michoacán shipped avocados to the United States, the JLSVs certified 1,499 hectares in four municipalities as pest-free orchards. Five years later, by the 2002-2003 season, 21,597 hectares were certified in nine municipalities.⁹⁶ Until the 2003-2004 season, the JLSV and USDA tested 15 pest-free million avocados.⁹⁷ [See Table 2]

⁹⁴ Samuel Salazar García, Luis Zamora Cuevas, and Ricardo Vega López, “Update on the Avocado Industry of Michoacán, México,” in *California Avocado Society Yearbook*, vol. 87 (Los Angeles: California Avocado Society, 2005), 31.

⁹⁵ Salazar García, Zamora Cuevas, and Vega López, 32.

⁹⁶ Martín Carbajal, “La formación histórica del sistema de innovación de la industria del aguacate en Michoacán,” 293.

⁹⁷ Salazar García, Zamora Cuevas, and Vega López, “Update on the Avocado Industry of Michoacán, México,” 33.

Table 2.
Hass avocado fruit sampling performed by Michoacán’s JLSV
and the USDA, 1997-2004

Season	Sample fruit						Results
	Orchards		Packing houses		Border	Total	
	By JLSV	By USDA	Sums	JLSV+USDA	(USDA)		
1997/1998	1,026,000	129,305	1,155,305	416,700	10,440	1,582,445	Negative
1998/1999	898,221	223,250	1,121,471	210,375	16,860	1,348,706	Negative
1999/2000	982,859	384,575	1,367,434	162,375	20,070	1,549,879	Negative
2000/2001	651,514	558,300	1,209,814	171,000	17,280	1,398,094	Negative
2001/2002	937,847	678,609	1,616,456	347,475	41,250	2,005,181	Negative
2002/2003	1,795,612	954,264	2,749,876	545,591	50,490	3,345,957	Negative
2003/2004	1,785,044	1,275,738	3,060,782	816,402	71,310	3,948,494	Negative
Sums	8,077,097	4,204,041	12,281,138	2,669,918	227,700	15,178,756	Negative

Source: Salazar García, Zamora, and Vega López, “Update on Avocado Industry of Michoacán, México,” California Avocado Society Yearbook, 2005

Besides pest problems, the same year, 2005, brought more challenges to growers in California. In the CAS annual meeting, Guy Witney, CAC Director of Industry Affairs, explained that California’s climatic conditions -winter rainfalls and dry, hot summers- forced most growers to irrigate their orchards from spring until late fall or early winter.⁹⁸ However, unlike free access to water in Michoacán, water was expensive in California. Water cost irrigation varied from 900 dollars per acre-foot for municipal-supplied water in San Diego to 80

⁹⁸ Guy Witney, “California Avocado Industry,” in California Avocado Society Yearbook, vol. 88 (Los Angeles: California Avocado Society, 2005), 48.

dollars in Northern California for ground water from wells.⁹⁹ Soils presented another difficulty for avocado cultivation in California as Andosol soils do not prevail in the region, like the *topure* in the Meseta Purhépecha. Soils in the growing areas vary tremendously from coarse, shallow decomposed granite to deep, alluvial silts and clay loams. Growers had to examine their tree fertilizer program to be sure that soils have sufficient nutrients, which elevated the production costs.¹⁰⁰ Despite all these challenges, the avocado was still a commercially productive crop for California in 2007, when the first cargo from Mexico arrived in the western U.S. state.

Unfortunately for the Californian industry, the 2008 droughts put additional stress on growers. The previous year was the driest in southern California history since 1877. As the 2008 summer entered, the California Governor declared the first official statewide drought since 1991. The region's primary water wholesaler, the Metropolitan Water District of Southern California (Metropolitan), called a Water Supply Alert.¹⁰¹ Approximately 40 percent of California's water supply comes from groundwater.¹⁰² In the words of the Southern California Agricultural Water Team, "it is unlikely that California could have achieved its present status as the largest food and agricultural economy in the nation and fifth largest

⁹⁹ water from wells

¹⁰⁰ Witney, 48.

¹⁰¹ Southern California Agricultural Water Team, "Southern California Water Supply and Implications for Agriculture" (Los Angeles: Southern California Agricultural Water Team, June 10, 2008), 1.

¹⁰² Southern California Agricultural Water Team, 3.

overall economy in the world without groundwater resources.”¹⁰³ The other source of California’s water is the Sacramento – San Joaquin River Delta. Southern California also relies on the Colorado River’s water, from which the western state historically had taken more than its share and had used as much as 5.4 million acre-feet in a year.¹⁰⁴ In the late 1990s, as growth in Nevada and Arizona propelled these two states to use their full allotment, California was pressured to reduce its reliance on the Colorado River. [See Figure 5] Water scarcity, extreme climatic conditions of frosts in winter and heat waves in summer, the presence of plagues in orchards and high labor costs rapidly weakened California’s competitiveness *vis-à-vis* Michoacán’s production.

Figure 3.

California Aqueduct through a Dry Central Valley in April 2008



Source: “Southern California Water Supply and Implications for Agriculture” (Los Angeles: Southern California Agricultural Water Team, June 10, 2008)

¹⁰³ Southern California Agricultural Water Team, 2.

¹⁰⁴ Southern California Agricultural Water Team, 3.

Once the USDA lifted the quarantine on Mexican avocados allowing the fruit's distribution in all U.S. states, the avocado belt rapidly expanded throughout the Meseta Purhépecha turning woodlands into units of agricultural production and propelling diversity loss by promoting the production of a monoculture, the *Hass* avocado. Michoacano growers have built different narratives around the industry. Martín Vázquez, the oldest of three brothers who grow avocado in Tingüindín, is convinced that “the [production of] avocado does not deforest Michoacán’s woodlands; on the contrary, it reforests them.”¹⁰⁵ The brothers also claim that avocado production does not require setting up a sophisticated irrigation system as long as the grower captures rainfall, so they invested around a million pesos to set up their first *olla de riego*. Now they own three.¹⁰⁶ The *ollas* are ponds of cement built to bear rainfall or water that is subtracted from local springs. As most orchards in the Meseta Purhépecha are in hillslopes, ideally, the *ollas* are made in the highest part of the orchard, so the grower may let the water run down as needed. If not possible, the grower pumps the water up from the *olla*.¹⁰⁷

The construction of *ollas de riego* by avocado growers is a controversial topic in the Meseta Purhépecha. There is a dispute between the avocado industry and the *pueblos*. The latter argue that the avocado growers steal their water because

¹⁰⁵ Vázquez, Martín. Interview. By author. February 15, 2019

¹⁰⁶ Vázquez, Gonzalo. Interview. By author. February 15, 2019

¹⁰⁷ Fieldnotes, February 19-24, 2019

they pump it from the local springs to their orchards. Driving through the Meseta roads, one may spot signs made by people from *pueblos* denouncing local orchards diverting waterways.¹⁰⁸ Avocado growers, the staff in Uruapan's packinghouses, fair trade associations, and agencies of certification claim that "in Michoacán, growers do not take *pueblo's* water. That is why they have their *ollas* and the *ollas* capture rainfall water only."¹⁰⁹

In addition to water disputes, the erosion of the deep and porous Andosol soils, called *topure* in the Meseta Purhépecha (highly beneficial for the avocado tree root system), has also been a source of concern in Michoacán.¹¹⁰ The Vázquez brothers assure that they "have not caused *topure's* erosion. We grind all the two-centimeter diameter branches and mix them in the dirt. We do not let the soil erode because that's not good business! We need the *topure* to grow avocado. There is no better soil than *topure*. Actually, I'm thinking of buying a bigger grinder," Don Martín said, "so we can triturate bigger branches."¹¹¹ Currently, the brothers own three tractors. According to Don Martín, "these tractors are made specifically for the avocado orchards' needs."¹¹² The tractors growers use in their groves are slightly smaller, so they do not bruise the avocados hanging on trees while laborers

¹⁰⁸ Fieldnotes, January-April, 2019

¹⁰⁹ Jazmín, secretary at an association of organic avocado growers. Interview. By author. February 25, 2019

¹¹⁰ Topure means "dust" in Purhépecha.

¹¹¹ Vázquez, Martín. Interview. By author. February 15, 2019

¹¹² Vázquez, Martín. Interview. By author. February 24, 2019

prune the trees or spray the chemical pesticides. Don Martín hopes people from Tingüindín will begin to sell them soon.¹¹³

The increasing exports of avocados from Michoacán to the United States contributed to the propagation of a monoculture, the *Hass* avocado, and the standardization of the procedures to grow it in the Meseta Purhépecha. The growers' associations were among the most relevant players standardizing avocado production and commercialization. In words of the 2005 acting President of the *Asociación Agrícola Local de Productores de Aguacate* in Uruapan, Cecilio Zamora Ramos, "although there is not a training system, we inform them [avocado growers] about new techniques to grow avocado via new products, machinery and even funding trips to other avocado grower areas both in Mexico and overseas. Additionally, the associations are in constant contact with producers via telephone, at our office, through informative meetings, assemblies, by email, fax, reading *El aguacatero* [a bi-monthly bulletin], and our weekly radio broadcasts to let them know the state of the domestic and international markets, avocado prices, and weather predictions in the region.¹¹⁴ Radio broadcasts are the most used means to diffuse avocado culture information to growers in the Meseta Purhépecha. Using these transmissions, the JLSVs share irrigation and fertilization techniques, and the

¹¹³ Fieldnotes, February 20, 2019

¹¹⁴ Cecilio Zamora Ramos interviewed by Martín Carbajal, "La formación histórica del sistema de innovación de la industria del aguacate en Michoacán," 297.

avocado culture international requirements like those established by the Euro-Retailer Produce Working Group (EUREGAP), which demands innocuousness in production, environmentally sustainable practices, and labor rights for workers.¹¹⁵

Competition between Michoacanos and Californians during NAFTA's negotiations suited the economic interests of transnational companies instead of growers on either side of the border. For instance, in 2002, the most profitable since its foundation in 1924, Calavo listed its common stock on the Nasdaq National Market System, which effectively turned the cooperative of Californian growers into a transnational fresh produce company.¹¹⁶ At present, Calavo owns a packinghouse and a guacamole plant in Michoacán. In addition to the Californian crop they handle, Calavo buys fruit directly from small-size Mexican growers, which is packed for shipment to the United States and other parts of the world.¹¹⁷ In California, growers have felt displaced as the associations that were supposed to represent them became their strongest competitors.

*

In the popular discourse, markets' integration in the avocado industry is described as a competition between Mexican and U.S. producers. As anthropologist Lois Stanford argues, this

¹¹⁵ Martín Carbajal, 298.

¹¹⁶ Calavo Growers Inc., "2002 Calavo Annual Report," Annual Report (Santa Ana, California: Calavo Growers Inc., February 7, 2003), 5.

¹¹⁷ Calavo Growers Inc., "2001 Calavo Annual Report," 4, 19.

myth exacerbates tensions between Californians and Michoacano growers and suits the companies' financial interests.¹¹⁸

Growers in both countries attempted to defend their interests in the U.S. avocado market through actions that limited their counterparts' volume of fruit to sell. Californian growers called for U.S. state intervention to limit Mexican export expansion. Mexican growers called for testing their fruit to remove barriers to competition based on innocuousness. In these instances, the shipping companies simply expanded their commercial activities from existing environmentally degraded source regions to include new growing areas. California's water scarcity, plague risks, winter frosts, and Michoacán's fertile soils, abundant rainfall, and temperate weather largely determined the integration of markets in a neoliberal framework that prioritized production increase with hardly any consideration for small-scale producers in both regions. Mexico's move to privatize its agricultural sector was not accompanied by an active effort by the state to provide options for different types of growers and support the development of multiple market strategies for an important regional industry. Ultimately, small and medium-sized growers found a way to participate in the global avocado market redefining their local ecology and economy.

¹¹⁸ Lois Stanford, "Bi-national producer alliances" in Gerardo Otero, *Mexico in Transition: Neoliberal Globalism, the State and Civil Society, Globalization and the Semi-Periphery* (Black Point, Nova Scotia: London; New York: New York: Fernwood Pub; Zed Books, 2004), Kindle edition.

The Meseta Purépecha's ecological context that extraordinarily favors avocado cultivation sustained the emergence of a sophisticated industry of avocado production in the twentieth century. The sector has specialized so greatly in the last thirty years with industrial and commercial infrastructure that Michoacán is the most competitive region in avocado production worldwide. Although it has become an expensive fruit, Mexicans can still afford the avocado they eat, unlike people in the Andes for the quinoa. Nonetheless, the price urbanites pay for Michoacán's avocado is not in the fruit's price tag. While consuming avocado, global citizens have also consumed around 60 percent of the Purhépecha forests, an area comparable to the island of Hawaii.¹¹⁹

The industrial production of avocado in Michoacán did not completely dispossess rural people of their lands. There is no monopolistic control of the means of production by one dominant foreign company either. Moreover, the industry has allowed thousands of rural people to possess a means of subsistence in their homelands. Nevertheless, Michoacán's avocado belt proves that the way we grow food in the present is the result of having created an unjust global food system that primarily benefits corporate intermediaries instead of growers and consumers at the cost of reducing biodiversity and increasing environmental injustice.

¹¹⁹ Global Forest Watch, "Bosques Decaen Rápidamente Para Dar Paso al Aguacate Mexicano," Global Forest Watch, Global Forest Watch Blog (blog), March 20, 2019, <https://www.globalforestwatch.org/blog/es/commodities/bosques-decaen-rapidamente-para-dar-paso-al-aguacate-mexicano/>.

Sources

- Aluja, Martín, Francisco Díaz-Fleischer, and José Arredondo. “Nonhost Status of Commercial *Persea Americana* ‘Hass’ to *Anastrepha Ludens*, *Anastrepha Obliqua*, *Anastrepha Serpentina*, and *Anastrepha Striata* (Diptera: Tephritidae) in Mexico.” *Journal of Economic Entomology* 97, no. 2 (2004): 293–309.
- Appendini, Kirsten A. de, and Guadalupe Rodríguez Gómez, eds. *La paradoja de la calidad. Alimentos mexicanos en América del Norte*. El Colegio de México, Centro de Estudios Demográficos, Urbanos y Ambientales, Programa Interinstitucional de Estudios sobre la Región de América del Norte, 2012.
- Calavo Growers Inc. “2001 Calavo Annual Report.” Annual Report. Santa Ana, California: Calavo Growers Inc., 2001.
- . “2002 Calavo Annual Report.” Annual Report. Santa Ana, California: Calavo Growers Inc., February 7, 2003.
- Cavaletto, Giovanni. “The Mexican Avocado Industry Through the Eyes of a California Grower.” In *California Avocado Society Yearbook*, 82:49–53. Los Angeles: California Avocado Society, 1998.
- Crane, Avi. “North American Free Trade Agreement.” In *California Avocado Society Yearbook*, 145–50. Yearbook 76. Los Angeles: California Avocado Society, 1992.
- Crosby, Alfred W. *The Columbian Exchange: Biological and Cultural Consequences of 1492*. Contributions in American Studies ; No. 2. Westport: Greenwood PubCo, 1972.
- Francis, Leonard. “Mexico-Is It Really What We Hear?” In *California Avocado Society Yearbook*, 77:59–65. Los Angeles: California Avocado Society, 1993.

- Galindo-Tovar, María, Nisao Ogata-Aguilar, and Amaury Arzate-Fernández. "Some Aspects of Avocado (*Persea Americana* Mill) Diversity and Domestication in Mesoamerica." *Genetic Resources and Crop Evolution* 55, no. 3 (2008): 441–50.
- Global Forest Watch. "Bosques Decaen Rápidamente Para Dar Paso al Aguacate Mexicano." Global Forest Watch. *Global Forest Watch Blog* (blog), March 20, 2019. <https://www.globalforestwatch.org/blog/es/commodities/bosques-de-caen-rapidamente-para-dar-paso-al-aguacate-mexicano/>.
- Hernández Palestino, Daniel. "Arbol afuera. Estudio sobre la diversidad sociocultural del arbol del aguacate." Universidad Autónoma de Zacatecas "Francisco García Salinas," 2003.
- Hernández Santos, María I., José S. Mora Flores, Tomás Martínez Saldaña, Humberto Vaquera Huerta, Artemio Cruz León, and José A. García Salazar. "The Certification Program of Ejido Rights and Titles of Urban Lots (PROCEDE): Its Impact in Fresnillo, Zacatecas, Mexico." *Agrociencia* 40 (2006): 249–56.
- Herrera Aguilar, Eunice. "Oro Verde a La Sombra Del Volcán: La Agroindustria Transnacional Del Aguacate y Las Transformaciones de Tenencia de La Tierra En La Sierra Purépecha." Doctorado en Antropología Social, El Colegio de Michoacán, 2017.
- Hoddle, Mark S. "Invasions of Leaf Feeding Arthropods: Why Are So Many New Pests Attacking California-Grown Avocados?" In *California Avocado Society Yearbook*, 87:65–81. Los Angeles: California Avocado Society, 2004.
- Hoddle, Mark S., and Joseph Morse. "Avocado Thrips: A Serious New Pest of Avocados in California." In *California Avocado Society Yearbook*, 81:81–90. Los Angeles: California Avocado Society, 1997.

- “Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico.” *Federal Register*, Proposed Rules, 60, no. 127 (July 3, 1995): 34832–42.
- “Importation of Fresh Hass Avocado Fruit Grown in Michoacan, Mexico.” *Federal Register*, Rules and Regulations, 62, no. 24 (February 5, 1997): 5293–5315.
- INEGI. “La Producción Forestal en la Meseta Purépecha en el Estado de Michoacán.” Aguascalientes, Ags.: Instituto Nacional de Estadística y Geografía, 1997.
- . “Michoacán. Resultados Definitivos.” VII Censo Ejjidal. Aguascalientes, Ags.: Instituto Nacional de Estadística y Geografía, 1994.
- Kreitner, G.L. “Weevils Threaten U.S. Avocado Industry. A Photo-essay on Damage to Avocado Fruit by Larvae of an Avocado Weevil.” In *California Avocado Society Yearbook*, 76:109–17. Los Angeles: California Avocado Society, 1992.
- Mann, Charles C. *1491: New Revelations of the Americas before Columbus*. 2nd Vintage books ed. New York: Vintage, 2011.
- Martín Carbajal, María de la Luz. “La formación histórica del sistema de innovación de la industria del aguacate en Michoacán.” *Tzintzun. Revista de Estudios Históricos*, no. núm. 63 (June 2016): 268–304.
- “Mexican Avocado Import Program.” *Federal Register*, Rules and Regulations, 69, no. 229 (November 30, 2004): 69748–74.
- Notimex. “Michoacán, líder mundial en producción de aguacate.” *El Economista*. June 25, 2017, online edition, sec. Nacional.
- Otero, Gerardo. *Mexico in Transition: Neoliberal Globalism, the State and Civil Society*. Globalization and the Semi-Periphery. Black Point, Nova Scotia: London; New York: New York: Fernwood Pub; Zed Books, 2004.

- República Mexicana, Gobierno Provisional. *Constitución Política de los Estados Unidos Mexicanos*. (1917).
- Rose, Larry. “The California Avocado Nursery Situation.” In *California Avocado Society Yearbook*, 75:29–30. Los Angeles: California Avocado Society, 1990.
- Rosengarten, Frederic. *Wilson Popenoe: Agricultural Explorer, Educator, and Friend of Latin America*. Lawai, Kauai, Hawaii: National Tropical Botanical Garden, 1991.
- Salazar García, Samuel, Luis Zamora Cuevas, and Ricardo Vega López. “Update on the Avocado Industry of Michoacán, México.” In *California Avocado Society Yearbook*, 87:31–44. Los Angeles: California Avocado Society, 2005.
- Sánchez Colín, Salvador, and Martín Rubi Arriaga. “The Current State of Avocado Cultivation in Mexico.” In *California Avocado Society Yearbook*, 78:75–82. Los Angeles: California Avocado Society, 1994.
- Scranton, Philip, and Warren James Belasco. *Food Nations: Selling Taste in Consumer Societies*. Hagley Perspectives on Business and Culture. New York: Routledge, 2002.
- Secretaría del Medio Ambiente y Recursos Naturales. *Reglas de Operación del Programa ProArbol* (2011).
- Simnitt, Skyler, and Catherine Weber. “Fruit and Tree Nuts Outlook: March 2022.” Situation and Outlook Report. Economic Research Service. Washington, D.C.: United States Department of Agriculture, March 30, 2022.
- Sotomayor Echenique, Octavio. “Evaluación Alianza para el Campo 2006.” Propuesta para el periodo 2007-2012. Análisis de Políticas. Mexico City: SAGARPA, FAO, July 27, 2007. <http://www.fao.org/3/bc941s/bc941s.pdf>.
- Southern California Agricultural Water Team. “Southern California Water Supply and Implications for Agriculture.” Los

- Angeles: Southern California Agricultural Water Team, June 10, 2008.
- Stanford, Lois. “Constructing ‘Quality’: The Political Economy of Standards in Mexico’s Avocado Industry.” *Agriculture and Human Values* 19, no. 4 (December 2002): 293–310.
- . “Ejidal Organizations and the Mexican State: Confrontation and Crisis in Michoacán.” *Urban Anthropology and Studies of Cultural Systems and World Economic Development* 23, no. 2/3 (1994): 171–207.
- Stanford, Lois, and Julie A. Hogeland. “Designing Organizations for a Globalized World: Calavo’s Transition from Cooperative to Corporation.” *American Journal of Agricultural Economics* 86, no. 5 (2004): 1269–75.
- Witney, Guy. “California Avocado Industry.” In *California Avocado Society Yearbook*, 88:47–53. Los Angeles: California Avocado Society, 2005.
- Zamet, D.N. “The Effect of Minimum Temperature on Avocado Yields.” In *California Avocado Society Yearbook*, 74:247–56. Yearbook. Los Angeles: California Avocado Society, 1990.