



Accounting for Taste

Export Bananas, Mass Markets, and Panama Disease

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In an article published in *BioScience* in 1996, ecologists Gregory S. Gilbert and Stephen P. Hubbell described the agroecological impact of Panama disease, a fungal pathogen (*Fusarium oxysporum* f. *cubense*) that infected export banana farms in the American tropics during the early twentieth century: "At least 100,000 acres of bananas were destroyed and abandoned. Facing bankruptcy, banana companies were forced to move into virgin forest for new plantings in order to escape the ravages of disease. Eventually, disease-resistant varieties came into common use and Panama disease is no longer a major commercial threat."¹

The authors' view of the damage caused by the pathogen echoed earlier assessments made by scientists and industry officials.² Gilbert and Hubbell's discussion of Panama disease, embedded in a broader study of plant diseases and tropical forest conservation, draws an important and often-neglected connection between the abandonment of diseased banana farms and the accelerated clearing of lowland tropical forests. Unfortunately, the ecologists stopped short of exploring the historical process—the "eventually" part—that led to the adoption of new varieties. As a result, they missed a chance to consider the significance of this process for those concerned with the conservation of biological diversity.

The export banana trade in the Americas formed around a single variety: Gros Michel fruit (*Musa acuminata*) dominated U.S. markets between the 1890s and 1960. Gros Michel bananas were large, aesthetically pleasing, and shipped well. However, the plants proved to be highly susceptible to pathogens, including *Fusarium oxysporum* f. *cubense*. Beginning in the 1890s, the pathogen spread throughout virtually every export-banana-growing region in Latin America and the Caribbean. The dynamic created by the epidemic accelerated rates of deforestation in humid, lowland tropical regions, destabilized local economies, and indirectly heightened the incidence of malaria among plantation workers.³ Panama disease prompted both the British colonial government and the United Fruit Com-

pany to establish banana-breeding programs during the 1920s with the shared goal of developing a disease-resistant export banana. Although researchers identified disease-resistant varieties as early as 1910, the U.S. banana companies that dominated the export trade did not begin to replace the Gros Michel until the late 1950s.

This essay seeks to explain why the major fruit companies operating in Central America and the Caribbean delayed in converting to Panama disease-resistant varieties for nearly fifty years. I argue that the industry's response to the epidemic is best understood by focusing on the interactions between the banana's biology, the agroecology of tropical monocultures, and the structures, actors, and discourses that shaped international mass markets. In order to do so, I utilize an analytical framework inspired by two distinct yet complementary approaches to doing environmental history: agroecology and the study of commodity flows.

In recent years, growing numbers of U.S. environmental historians have taken up Donald Worster's call for writing agroecological history. By paying close attention to the dynamic interactions between farms and their surrounding environments, researchers such as Steven Stoll and Douglas Sackman have provided new insights about both agroecological change and the quotidian experiences of cultivators and farm workers in California. Beyond the United States, historians of Africa, Asia, and Latin America (sometimes but not always influenced by Worster) also have started to examine the relationship between cropping systems, ecology, and social change.⁴ Steve Marquardt's recent article on Panama disease in Central America demonstrates how the epidemic compelled the powerful United Fruit Company to alter its production practices and abandon plantations throughout Central America. The author draws the provocative conclusion that Panama disease was "an unlikely environmental locus of resistance to corporate agriculture's will to power."⁵ While I agree with Marquardt's point that the dynamic and unpredictable pathogen undermined corporate control, his narrative downplays the extent to which mass markets helped to define the historical importance of the epidemic.

The connection between expanding U.S. mass markets for tropical commodities and tropical deforestation has been well documented in Richard Tucker's *Insatiable Appetite*.⁶ For Tucker, mass markets are important primarily because they stimulated increases in production that in turn accelerated rates of resource use in the tropics. However, consumer appetites for bananas were not only "insatiable," they also tended to be selective: Throughout the twentieth century, market definitions of "fruit quality" exerted a strong effect on production techniques and shaped the magnitude of the Panama disease problem by narrowing the range of viable solutions. Lawrence Grossman's study of contract banana growers in the Windward Islands provides a perceptive analysis of how market quality standards play a crucial role in shaping agribusiness.⁷ The political ecology framework employed by Grossman integrates local environmental conditions, labor process, and market structures in order to explain the trajectory of contemporary banana production in the Caribbean. Because Grossman is primarily interested in understanding what contract growing can tell us about "globalization," his study is situated in the late-twentieth-century, "post-Gros Michel" era of banana production. By tracing the emergence of quality standards for Gros Michel fruit in the late nineteenth century,

I reveal the historical roots of the production-consumption dynamic described by Grossman.

Panama disease then, cannot be explained entirely in terms of local agroecological processes. The complex relationship between pathogen, plant host, and environment shaped the epidemic, but so too did the cultural, economic, and social processes that gave rise to mass markets for bananas. Consequently, environmental historians of agricultural commodities should be rooted in the soil while directing their gaze toward often-distant market places. William Cronon's *Nature's Metropolis* serves as an important model for following commodity flows from rural production areas to urban centers of trade and consumption. He demonstrates how nineteenth-century commodity markets shaped people and ecosystems in the United States by focusing on the Chicago-based brokers and manufacturers who bought, traded, and processed grains, livestock, and timber.⁵ In contrast to the products examined by Cronon, however, bananas did not undergo value-added processing and/or extended periods of storage prior to being consumed. As a result, shippers, fruit jobbers, and retailers were primarily concerned about fruit weights, perishability, and aesthetic qualities, including color, flavor, and texture. In order to explain how U.S. mass markets shaped banana production, we have to follow the commodity flow beyond the brokers who dominate Cronon's mass markets in order to account for the taste of North American fruit eaters. In other words, we have to lend agency to the consuming masses.

In the process of reinterpreting the historical significance of Panama disease, this article raises two points that are relevant to the broader study of consumption-environment dynamics. First, historical narratives are intellectually valuable because they lend content to otherwise empty typologies (e.g. "consumers" and "mass markets") by revealing the interplay between structures, human agency, and historical contingency. Second, the history of export bananas reveals a central paradox of nineteenth- and twentieth-century agriculture: The transformation of plants into mass commodities involved a simultaneous appropriation of, and reduction in, biological diversity.

Gros Michel Bananas and the Shaping of a Mass Market

As late as the mid-1870s, bananas remained something of a novelty in most of the United States. Consumption surged in the 1880s, and continued to rise until the onset of World War I. Between 1892 and 1911, U.S. banana imports increased from 12 million bunches to nearly 45 million bunches.⁹ Several kinds of bananas reached U.S. markets in the 1880s including the red, fig, strawberry, and apple varieties, but by the early twentieth century, Gros Michel fruit made up the bulk of U.S. imports.¹⁰ The Gros Michel entered the historical record in the 1830s, when Jean Pouyat, a planter born in the French colony of San Domingue (Haiti), noticed the plant growing on the island of Martinique. Pouyat reportedly introduced a single specimen to his coffee plantation in Jamaica. Over the course of the next thirty years, Gros Michel plants diffused throughout the island where they became known

as the “Martinique banana,” or the “banana Poutyat.”¹⁴ From the Caribbean, the variety spread to Central America and beyond. In 1892, Colombian officials arranged to import Gros Michel from Jamaica. Traders and migrant workers undoubtedly helped to spread the variety via unofficial routes as well. By the 1890s, thousands of mostly small-scale producers cultivated Gros Michel all along the Caribbean coast of Central America.¹⁵

Banana-eaters in the United States gave the Gros Michel high marks for its flavor, aroma, and peel color, but frequent references to other varieties found in turn-of-the-century cookbooks and popular magazines suggest that aesthetic qualities alone cannot account for its dominant market position.¹⁶ The success of Gros Michel also reflected the interests and perceptions of shippers. Early traders relied on wind-powered schooners to haul bananas from tropical production zones to northern latitude markets. In the American trade, the fruit bunches traveled “naked” with only minimal padding; “climate control” was limited to a few vents. Consequently, shippers sought a banana variety that could best withstand the rigorous journey from farm to market. Gros Michel plants produced large bunches of fruit that grew in nested hands that did not protrude from the stem at severe angles. This bunch shape, along with the fruit’s relatively thick, bruise-resisting peel, made the variety an excellent one for the export trade. In addition, the ripening period of Gros Michel fruit was long enough to reduce the likelihood that a shipment would reach its destination in an overripe condition. This last factor was crucial during the era when schooners dominated the trade, but it continued to be vital even as larger, faster steamships replaced wind-powered vessels.

In addition to promoting a single variety, shipping agents graded fruit bunches by the number of hands, the fullness of the individual fruits, and the outward appearance of the peels. As late as the 1880s, a fruit bunch of seven or more hands was considered a “first,” meaning that it received the highest going market price. Bunches with six or fewer hands were second or third grade fruit for which growers generally received less money. By the 1890s, shippers such as the Boston Fruit Company were raising the standard “bunch count” to eight and nine hands, a shift that favored varieties such as the Gros Michel that tended to produce high bunch counts when grown under favorable agroecological conditions. Increasingly, fruit graders discounted and/or rejected seven- and six-hand bunches particularly during seasonal lulls in demand. Fruit bunches with scars, bruises, or other blemishes were also subject to discounting and outright rejection.

The tendency to define and standardize product quality lay at the heart of the commodification process. Late-nineteenth-century correspondence between Andrew Preston, an executive of the Boston Fruit Company (the predecessor of United Fruit), and his buying agents in Jamaica reveals the former’s concerns with maintaining quality in a competitive market place: “[T]he time is past when importers can make a profit on thin and ordinary fruit . . . and I trust our Jamaica people will keep it in mind at all times.”¹⁷ In a subsequent letter, Preston acknowledged that his emphasis on quality was causing tension within the company but he refused to lower his standards: “I presume your people [in Jamaica] think we are disposed to criticize your selections but we are driven to it by the power of competition—

naturally our best customers want the best fruit and I assure you we find it difficult to hold them with fruit of poorer quality than our competitors offer them. It is very plain to my mind that the successful company of the future is the one that controls the growing of its own fruit."¹⁵

By integrating production, shipping, and marketing, Preston believed that a company could more effectively regulate both the quantity and quality of the fruit reaching U.S. markets and thereby reduce the financial risks associated with trading a highly perishable commodity. In 1899, Preston helped to transform his vision into reality by playing a central role in the formation of the United Fruit Company. For the next sixty years, the fate of United Fruit (and the entire export banana trade) would be entwined with that of the Gros Michel—the variety around which most early twentieth-century U.S. shippers, distributors, retailers, and consumers formed their notion of what constituted “a banana.”

Corporate Monopolies and the Consuming Masses

In 1913, the United States Senate Finance Committee proposed a duty on banana imports, reasoning that the fruit fit the definition of a “luxury good.” When word of the proposed “banana tax” became public, a number of organizations representing importers, retailers, and consumers protested on the grounds that the banana was the “poor man’s fruit.” The editors of *The New York Times* opposed the proposed duty, arguing that if bananas could be considered a luxury, they were an “exceptional kind,” because nearly everyone could afford to buy them: “Cheap starch and sugar in finer combination are hardly to be found in the vegetable kingdom, and the wonderful extension of the banana trade that has marked recent years has been nothing less than a national blessing.”¹⁶ In a subsequent commentary, the paper’s editors noted that bananas often retailed at lower prices than apples. They exhorted the nation’s apple growers to adopt the methods of the “trusts” that “have brought exotic products within the reach of those who cannot eat domestic fruits because they are dear and inaccessible.”¹⁷ By 1913 per capita banana consumption in the United States exceeded twenty pounds; only apples were consumed in greater quantities.¹⁸

The methods of the “trusts” combined mass production, vertical integration, and monopoly control over vital transportation infrastructure and fruit distribution. In a story that has been told by numerous authors, the United Fruit Company acquired and/or purchased a controlling interest in eighteen other shipping firms during the first decade of the twentieth century. In 1911, United Fruit sold its interests in three companies not under its direct management in an effort to placate U.S. government officials who were increasingly concerned about its business practices.¹⁹ But the process of vertical integration continued apace in the 1920s. In Central America, United Fruit and its main competitors—Standard Fruit and Cuyamel Fruit—used their economic muscle to gain political favors by hiring influential lobbyists, providing loans to cash-strapped governments, and, on more than one occasion, backing armed insurgents and/or military governments.²⁰

In return for agreeing to build and operate railroads, the fruit companies secured access to vast amounts of soil, timber, and water resources in addition to enjoying exemptions from import duties on construction materials, machinery, and other items, including consumer goods, used by their operations. Small-scale producers persisted in most growing regions, but by the 1910s, the three U.S. companies and their subsidiaries controlled hundreds of thousands of hectares of land on which they planted bananas, sugarcane, and forage. In 1926, United Fruit controlled around 650,000 hectares of land including 70,000 hectares of active banana plantations in the Caribbean and Central America.²¹ The fruit companies also financed the construction of hundreds of kilometers of railroad; employed tens of thousands of people; and operated stores, hospitals, schools, radio stations, breweries, and banks.

However, so much has been written about the so-called “banana republics” that it is easy to forget that the fruit companies’ power came as much through their control over shipping and distribution in the United States as it did through their extensive land acquisitions in the tropics. United Fruit’s “Great White Fleet” of steamships became a symbol of the company’s power. In 1912, the company’s subsidiaries owned forty-one ships and chartered several others. By 1930, the company possessed more than seventy ships; its principal competitor, the Cuyamel Fruit Company, owned thirteen vessels. Kepner and Soothill’s meticulously documented 1936 study explained how United Fruit’s shipping fleet, combined with its control over railroads and port facilities, enabled the company to squeeze out would-be competitors by giving preference to bananas produced on its own farms. The company also benefited from the fact that its ships were virtually always guaranteed two-way cargoes: Ships carried bananas from the tropics and returned with construction materials and/or merchandise — often imported duty-free — that would be sold in company commissaries. The company’s vertical integration translated into rising wealth: Between 1913 and 1920, United Fruit’s profits increased sixfold to 33 million dollars; in 1930, its net worth exceeded 200 million dollars.²²

Although the fruit companies did not control railroads in the United States, they created subsidiaries that handled fruit distribution and wholesaling. In 1900, United Fruit executives established the Fruit Dispatch Company with offices in key ports and railroad centers, including Boston, Chicago, Kansas City, New York City, Pittsburgh, and Richmond.²³ By 1925, Fruit Dispatch had offices in more than fifty U.S. and Canadian cities. During the first third of the century, company representatives traveled with the rail shipments in order to ensure proper storage conditions and line up sales en route. For example, when United Fruit steamers reached New Orleans, workers transferred the bananas from ships to boxcars that were hauled through the Mississippi Valley by the Illinois Central Railroad.²⁴ During the journey, Fruit Dispatch representatives would line up sales with brokers and wholesalers via telegraph. In Fulton, Kentucky, fruit cars would be rerouted based on the location of the buyer. Fruit Dispatch employees also maintained an eye on the temperature of the boxcars. The development of ventilated railcars, along with icing and warming stations, enabled fruit to be transported throughout the calendar year to increasingly distant locations, including Vancouver, Canada.

But the technological and organizational capacity to deliver large shipments of bananas does not explain entirely the increase in banana consumption. The banana's comparatively low retail price brought it within the reach of all but the most impoverished. Margaret Byington's 1910 study of households in the steel-making town of Homestead, Pennsylvania, found that food was the single greatest expense in mill workers' family budgets. However, even a "thrifty" housekeeper could at least occasionally afford bananas.²⁵ In 1917, the Commissioner of the New York City Department of Health stated that the banana was "used in almost all racial and social groups in this city," a claim supported by a study that examined the diet of a poor, African-American woman living in New York City.²⁶ A national marketing survey done in 1929 documented banana consumption among workers and low-income households in New England, the South, and the Midwest.²⁷ Ironically, the intrinsic perishability of bananas helped to bring them within the reach of lower-class consumers because bruised, overripe, or otherwise "inferior" fruit was sold at reduced prices.

Changing ideas about both women's roles and nutrition also shaped early twentieth-century eating patterns in the United States. For working-class women, putting food on the table was a time-consuming activity. Byington noted that she invariably found the wives of Homestead's mill workers in their kitchens where they were "busy preparing for the ever recurring meal."²⁸ Given the labor demands placed upon women possessing neither servants nor electric appliances, it seems reasonable to assume that inexpensive and ready-to-eat foods such as bananas were viewed favorably by those charged with shopping and meal preparation. Women's domestic work also provides an important context for understanding the banana's popularity among the increasingly urbanized middle classes of the early twentieth century. Harvey Levenstein has argued that the declining availability of servants compelled middle-class professionals to alter both their diets and the meanings ascribed to elaborate meal preparation.²⁹ The mass production of processed foods changed cooking practices and potentially reduced labor demands on middle-class women. For example, a 1928 article in the *Ladies Home Journal* marveled at the availability of processed foods such as bagged tea and canned grapefruit "ready for the hurried commuter's breakfast."³⁰ As early as 1910, advertisements for ready-to-eat breakfast cereals depicted what would become a quintessential U.S. breakfast combination of bananas, boxed cereal, and milk.³¹ At a time when more women left the home to pursue jobs as teachers, office workers, and retailers, the popularity of bananas is not surprising; unlike domestically grown fruits, they could be consumed virtually year round without any need for labor-intensive (or value-added) preservation methods such as canning or drying.

The banana's thick, germ resistant peel further pleased early twentieth-century public-health officials concerned about the spread of infectious diseases in densely populated urban areas. The American Medical Association published a study demonstrating that bananas, even when immersed in pathogen-laden fluids, did not absorb bacteria into their fruit pulp. The fruit thus could be given to children with confidence, "even if purchased from the pushcart in congested streets."³² Such endorsements from the increasingly influential medical establishment contributed to

the banana's status as a "nutritious and safe" food. Bananas also appealed to an increasingly important segment of consumer society: children. Although some late-nineteenth-century cookbooks warned that young children could have a hard time digesting bananas, health authorities stressed that properly ripened bananas were highly digestible.³³ By the late 1920s, marketing surveys indicated that households with children consumed more bananas than the national average.³⁴

Finally, there is the question of taste. From the late nineteenth century forward, the number of banana recipes proliferated. To judge by several turn-of-the-century cookbooks, bananas were most often featured as either a breakfast food or a sweetened dessert.³⁵ Frequently, cooks combined bananas with sugar, dairy products, and other fruits including coconut and citrus. But, the most popular form in which to eat ripened bananas—as an uncooked, fresh fruit—seldom appeared in cookbooks. Although some nutritionists, along with United Fruit's advertising department, compared the banana's nutritional content favorably to that of a potato, the practice of cooking green bananas and serving them as an unsweetened starch did not take hold in the United States. In sharp contrast to its wide array of uses in many tropical cuisines, the banana found its places in U.S. diets as a mildly sweet, non-acidic fresh "fruit." Perhaps more significantly, mass markets never emerged in the United States for canned, milled, juiced, or fermented bananas.

People in the United States also consumed the banana symbolically. The banana slipped into jokes, folk songs, street slang, and popular music where it most often evoked humor related to tropical places, immigration, and sexuality.³⁶ The cultural history of the banana is a story in its own right; here I am less interested in documenting the fruit's multiple symbolic meanings than in calling attention to the connection between the banana industry and popular images of tropical environments and peoples. English-language writers, some of whom had close ties to United Fruit, depicted the expansion of export banana production as a process of bringing modernity to "pestilential" tropical regions via industrial capitalism, medicine, and science. For example, Samuel Crowther's 1929 book, *The Romance and Rise of the American Tropics*, likened United Fruit's transformation of "otherwise useless" tropical "jungles" to irrigation projects that "reclaimed" deserts.³⁷ A contemporary of Crowther's declared that the banana industry was created "out of absolutely nothing but the bare jungle, storm-swept and miasmatic, which had been deserted probably a thousand years before the fruit companies came by the Indians who once thickly inhabited these borders of the Caribbean Sea."³⁸ The writer added that the banana trade rested on a foundation of "tropical fertility," far-sighted merchants, and "scientific experts." These twentieth-century perspectives on the export banana trade offered an unambiguously positive assessment of the wide-spread changes taking place in the lowland American tropics.

The Agroecology of Panama Disease

Not all scientific experts took a sanguine view of the ecological transformations wrought by the expansion of banana production in Central America. Biologists

Paul Standley and James Peters were among the most important critics of the industry. In 1927-28, Standley and Peters made separate visits to Tela, Honduras, probably the most active export-banana-producing region in the world at that time. Though United Fruit provided both researchers with lodging, transportation, and other logistical support, Standley and Peters expressed concerns about the loss of biological diversity that they observed.

Standley, a botanist who worked extensively in the tropics, noted that the clearing of "many square miles" for bananas had destroyed "vast" amounts of "original vegetation." He described the view from the fruit company's main railroad that ran for 64 kilometers along the right hand bank of the Ulúa River: "Practically all of the land within this area that is fit for the purpose is covered with banana plants, which, however beautiful when standing alone or in moderate quantities, become exceedingly monotonous when massed in plantations many miles in extent. Between banana plantations however are large areas unsuited for their cultivation. These consist, near the coast, of wide marshes and of densely wooded swamps which cannot, or at least have not, been drained."³⁹

He was struck by the radical reduction in plant diversity: "Where bananas are grown there is no other vegetation of interest to the botanist." In addition to the banana farms, Standley noted several pastures where cattle and draft animals grazed on Guinea grass. Although he provided no quantitative data on land use, Standley stressed the significant proportion of secondary growth, or *guaniles*: "Nearly everywhere along the whole line of the Tela Railroad, except when passing by marshes or very swampy woods, one sees nothing else but second growth and banana plantations."⁴⁰ The secondary growth consisted of "aggressive" (sun-loving) herbaceous plants not found in mature forests.

In the lower portion of the Ulúa, banana plantations were interspersed with wetlands and shallow lakes whose waterlogged soils were less than ideal for banana cultivation. As the railroad approached the Ulúa River from the east, it crossed "the most spectacular of these unused areas," the Toloa Swamp, "a shallow lake with an abundance of aquatic plants, and such a profusion of water birds as one sees only in the tropics."⁴¹ Although Standley described the difficulty of making his way through the wetlands due to thickets of prickly plants, coarse lianas, and "swarms" of mosquitoes and chiggers, he provided an extensive description of the plant diversity found in the area's wetlands.⁴² In the eyes of at least one botanist then, the "pestilential" swamps that dominated the landscapes in travel accounts of the American tropics transformed into "spectacular" ecosystems, teeming with flora and avian life.

When ornithologist James Peters visited the Ulúa region a few months later, he described the landscape in terms that closely approximated those of Standley: "There is little natural forest left within sight of the railroad."⁴³ He added that diminished rainfall in the area west of Tela inhibited the regeneration of rain forests and described the woodlands of the Ulúa valley as "scrub forest." During Peter's visit, fruit company workers started to build a canal in order to drain a large portion of the Toloa swamp, the biologically diverse landscape that had impressed Standley. Peters described the short-term ecological changes that he observed in the

area: “[M]uch of the vegetation has died off and floods have deposited large amounts of sediment, resulting in a wide expanse of mud flats interspersed with pools of stagnant water. In such situations waterfowl of all sorts abound. Never in my experience have I seen such numbers of Herons or Wood Ibises as have flocked there to feed. But it can only last for a short time, as eventually these flats and marshy areas will be completely drained and planted to bananas.”⁴⁴

Ironically, the drainage operations provided a fleeting home for waterfowl but the end product of the transformation—a banana plantation—afforded little habitat for most forms of avian life.⁴⁵ The ornithologist also visited Toloa Lagoon, where he saw Everglade Kites inhabiting a landscape of alternating marsh grasses and open areas of water. In time, much of this area also would be drained off following the construction of a canal.⁴⁶ Not surprisingly, the observations of Peters and Standley indicate that the extensive clearing of forests and draining of wetlands reduced habitat for many forms of plant and animal life.

The transformations described by Standley and Peters were by no means unique to the Ulúa valley of Honduras. Similar changes took place along the Atlantic coasts of Panama, Costa Rica, and Guatemala between 1890 and 1930. By 1926, United Fruit owned 1.6 million acres in the Caribbean and Central America, including 172,000 acres of active banana plantations.⁴⁷ Following a seven-month tour of Central American banana zones, British plant pathologist Claude Wardlaw criticized the cultivation practices he observed as little more than “the exploitation of the native fertility of virgin soil with the minimum amount of detailed treatment.”⁴⁸ He added that planting bananas in soils poorly suited for the purpose had resulted in the abandonment of farms after a short period of time, leading to the destruction of “giant forests” as workers cleared additional lands for planting.⁴⁹

The rapidly changing agroscares provided the context in which Panama disease epidemics broke out. The disease took its English-language name from the place where it was first widely observed: Banana growers on the Atlantic coast of Panama reported wilt-like symptoms as early as the 1890s. Within a decade, the disease had spread to export banana farms in Costa Rica and subsequent outbreaks occurred in Surinam (1906), Cuba (1908), Trinidad (1909), Puerto Rico (1910), Jamaica (1911), Honduras (1916), and Guatemala (1919).⁵⁰ The soil-borne *fusaria* fungi associated with Panama disease entered banana plants via root structures and traveled up vascular tissues to the leaves. Infected foliage turned yellow-brown before wilting. Severely diseased plants seldom produced healthy fruit, if they produced any at all.⁵¹ Spores released into the soil from decaying plant tissues germinated when they came into contact with the roots of neighboring plants, thereby spreading the disease in a radial pattern throughout fields. The expansion of continuously cropped Gros Michel monocultures accelerated the pathogen’s advance by sharply increasing host density on a microlevel. In addition, the movements of irrigation and drainage waters, trains, migrant workers, and roving animals all facilitated the farm-to-farm spread of the fungi.⁵²

Panama disease spread slowly yet inexorably through Gros Michel banana farms.⁵³ Some farms remained productive for years after the pathogen appeared; others were abandoned within two years of the pathogen’s arrival. As Wardlaw observed during

his tour of Central America in 1927, the abandonment of farms was less an indication of an absolute decline in output than a measure of relative productiveness: “[W]ith the larger companies, at least, when a certain low yield of fruit per acre is reached, the land is abandoned although the plantation may still be yielding quite a considerable number of bunches per acre.”⁵⁴ Yields of course, were not simply a function of the severity of Panama disease. A number of other factors, including soil fertility, drainage, and labor inputs, affected productivity. Furthermore, a poor-yielding farm might stay in production if its fruit was needed to meet market demand. The decision to abandon any given farm then, represented a calculated and studied decision based on several related, but distinct variables.

The result was a pattern of “uneven” agricultural expansion. In some localities, production plummeted and economies all but collapsed, even as regional exports were rising. For example, between 1920 and 1926, Standard Fruit’s Honduran exports fell from 4.5 million to 1.9 million bunches.⁵⁵ The company’s production rebounded by 1930 to 4 million bunches, but U.S. Consul Nelson H. Park commented that “only by the planting of new areas can the banana production in this district be maintained or increased.”⁵⁶ This was true elsewhere in Central America, where the U.S. banana companies increased production by creating new farms in order to offset declining yields elsewhere.⁵⁷ Ironically, this strategy helped to perpetuate the pathogen’s diffusion by repeating the cycle of agroecological change triggered by the expansion of Gros Michel monocultures. However, the practice served the companies’ short-term interests by enabling them to satisfy U.S. market demand for Gros Michel bananas.

“Housewives,” Fruit Dealers, and the Lacatan Banana

In 1925, the Fruit Dispatch Company convened a conference in Chicago that brought together representatives from all aspects of the banana business. United Fruit executives inaugurated a “Publicity Department” and launched a multimedia advertising campaign targeted at “housewives” that included recipe books, nutritional information about bananas, and billboards. Company managers based in the tropics made few overt references to Panama disease during the conference, but in a speech given before an audience of jobbers, United Fruit vice-president George Chittenden acknowledged that yields on company farms in Panama were declining. The company had two options: abandon the area and swallow a large financial loss, or “plant something else which is still a banana.”⁵⁸ Chittenden then launched into a sales pitch for a Panama disease-resistant variety known as the Lacatan whose fruit could “fool most people” into believing they were eating Gros Michel bananas. But he confessed that the variety had some drawbacks: “[T]he bunches are not very large. The nine[-handed bunch] is more occasional than otherwise. The intermediate stage between green and dead ripe is not attractive to look at. Instead of a handsome green it is a rather dull gray-green.”⁵⁹ Still, Chittenden pointed out that the high-yielding variety would enable the company to give job-

bers “a margin on which you might very easily be able to move the Lacatan banana.”

Chittenden’s words reveal the central role played by aesthetic sensibilities and market structures in shaping United Fruit’s efforts to find a substitute for the Gros Michel. How conference attendees reacted to the prospect of dealing in Lacatan bananas is unknown, but evidence suggests that the company’s initial efforts to market the variety largely failed. In the mid-1920s, United Fruit began cultivating Lacatan in Panama and possibly elsewhere.⁶⁰ In September 1928, Fruit Dispatch’s office in New Orleans received a shipment of 15,000 bunches of Lacatan, “by far the largest individual shipment” of the variety at that time. One week later, the office reported very weak demand for the variety; more than half of the shipment sold at reduced prices. In his weekly report to Boston, a Fruit Dispatch manager explained the problem: “Even those firms who are thoroughly familiar with the handling and ripening of Lacatans do not favor this variety. The consuming public, in the final analysis, are the ones who have the say as to what fruit they desire, and inasmuch as the meat of the Lacatan, even though the skin may be yellow, is not really mellow and not as digestible as the Gros Michel, unless the skin of the former has practically turned black; and in this condition the fruit is uninviting to the eye and hard to sell. There is a question whether or not we are serving the business properly in trying to force them on the market.”⁶¹

In addition to the Lacatan’s distinct flavor and texture, fruit jobbers complained about the variety’s small bunch size, “dull” ripening color, and susceptibility to a fungal rot that weakened the stems from which jobbers suspended ripening fruit. United Fruit’s two principal competitors at the time, Cuyamel Fruit and Standard Fruit, also exported Lacatan on a trial basis, but both companies reported that sales fell when Gros Michel fruit was available.⁶² However, the Lacatan’s “failure” was relative; consumers and jobbers did not so much reject the variety outright as they expressed a preference for high-quality Gros Michel fruit.

When United Fruit commissioned researchers at the Harvard Business School to conduct a marketing study in 1929, the question of disease-resistant varieties was not even addressed, a reflection of the extent to which mass market structures had closed around Gros Michel.⁶³ Discussions with fruit jobbers and retailers indicate that their understanding of “variety” was linked to the fruit’s tropical port of origin: Fruit was described as “Limóns,” “Telas,” or “Jamaicas.” Significantly, the survey’s authors concluded that consumers were “not so harsh of judgment as those who know banana quality.”⁶⁴ According to the study, nearly three-quarters of the thousands of “housewives” queried reported “never” having a problem finding fruit of acceptable quality. On the other hand, virtually all of the jobbers interviewed held strong opinions about “fruit quality,” and often complained about poor shipments. Few jobbers talked about flavors or textures; instead, they stressed the importance of bunch size, ripening color, and peel condition. One jobber described premium bananas as “clean [unblemished] fruit in nice, fat bunches.”⁶⁵ Another fruit dealer who sold primarily to A&P chain stores reported buying “select fruit” that was

bagged in the tropics because it arrived in better condition (i.e. fewer marks on the peel) than unwrapped fruit. Jobbers consistently described poor-quality fruit as “scarred” and/or “string beans.”

However, the 1929 survey also suggested that the qualities of ideal bananas varied in relation to jobbers’ perceptions of market demand. For example, Joseph Fielding, a long-time dealer in Lowell, Massachusetts, said that all the dealers in town bought seven-handed bunches of fruit because brokers charged them higher rates for eight-handed stems for which they could not get “a penny more.”⁶⁶ However, in the neighboring town of Lawrence, a jobber whose large operation serviced several chain stores sought out brokers who sold nine-handed bunches because the customers “like large fruit.”⁶⁷ Another Lawrence-based banana dealer, George Lampros, concurred with Fielding that stores retailing bananas by the pound sold seven- and eight-handed bunches at the same price, but he bought mostly eights since they “showed up better” and because “people don’t buy sevens.”⁶⁸

Different ideas about fruit quality reflected both the nature of the jobbers’ operations and the market conditions in which they operated. To judge by the data collected in 1929, fruit jobber businesses ranged widely in both size and clientele. Fruit dealers servicing working-class customers generally preferred to buy and sell “medium” and “small” bunches of bananas, while those selling to primarily middle-class clienteles preferred large, “heavy” bunches. Another important trend affecting banana markets at the time was the rise of chain supermarkets such as A&P and Kroger. Like the banana companies, chain stores depended on moving large volumes of products. They began to buy bananas directly from importing companies and often sold them at cost as a “leader” item. For self-service markets, the visual appearance of food products became all the more critical. Consequently, the quality of the banana peel, including its ripening color, was hardly a trivial matter for banana wholesalers and retailers.

Unable to find a cultivated variety that satisfied U.S. markets, both the British government and United Fruit initiated banana-breeding programs during the 1920s with the shared goal of developing a disease-resistant hybrid. Banana cultivars such as the Gros Michel posed a major challenge to breeders because the fruit pulp did not contain seeds. This created an ironic problem for researchers such as United Fruit’s J. H. Perman who noted that “this character of seedlessness naturally is the valuable feature of the fruit; but it is also the feature that retards and reduces the possibility of prompt and successful development of new types.”⁶⁹ Breeders succeeded in inducing Gros Michel plants to set seeds by fertilizing them with pollen from seeded varieties. But fertility rates were extremely low, making the process of breeding tedious, expensive, and uncertain.⁷⁰

Even when breeders succeeded in overcoming the challenges posed by the banana’s biology, they often stumbled over the same obstacles that tripped up earlier efforts to introduce Lacatan bananas. British researchers in Trinidad developed a hybrid with demonstrated resistance to Panama disease, but the fruits occasionally bore seeds, a condition deemed to be a “commercial disadvantage.”⁷¹ Experiments carried out by United Fruit researchers between 1925 and 1928 yielded fourteen varieties that produced edible, seedless fruit pulp, yet they were of little

economic value since “in no case is their quality equal to the fruits that are generally recognized by the public as ‘bananas.’”⁷² In order to be considered a success, hybrids had to possess both resistance to *F. oxysporum* and the phenotypic qualities of the Gros Michel.

In 1930, United Fruit ended its breeding experiments in Panama and transferred its *Musa* specimens to Lancetilla, the company’s experimental garden in Honduras. The decision to discontinue the breeding program reflected not only the difficulties associated with combining disease resistance and marketability in a hybrid banana, but also the company’s ability to secure access to new soil and water resources needed to continue exporting Gros Michel fruit. Of course, as Chittenden’s 1925 conference remarks suggested, the company potentially incurred significant financial losses when abandoning production units. Yet United Fruit compiled hefty earnings during the 1920s and continued to turn profits through the turbulent 1930s and 1940s. Consequently, company executives and stockholders had no compelling financial reason to replace the Gros Michel.

Boxing and the Birth of Chiquita Bananas

Between 1930 and 1960, changes in agroecosystems, international markets, and Central American political conditions provoked a transformation of banana production processes. The Great Depression brought an end to a steady rise in U.S. demand for bananas. Then, in the mid-1930s, a second epidemic hit export banana farms. Sigatoka disease swept through export banana plantations much more quickly than did Panama disease. United Fruit researchers devised an effective but expensive chemical control system that added significantly to production costs and complicated the process of abandoning unproductive farms. Between 1941 and 1944, war-related shipping restrictions further depressed the banana trade. However, the most important long-term change was the meteoric rise of Ecuador as an exporter: By the late 1950s, the South American nation had replaced Honduras as the world’s leading producer of Gros Michel fruit.⁷³ From that point forward, chronic overproduction and flat prices marked the export trade. Finally, the postwar years brought significant democratic reforms to Central America that were linked to workers’ movements that challenged the power of United Fruit and helped bring an end to a “business climate” characterized by resource subsidies, tax breaks, and labor repression.⁷⁴

Throughout this period, the fruit companies continued to abandon diseased plantations. By mid-century, United Fruit had abandoned entire divisions in Costa Rica, Honduras, and Panama. Active company divisions suffered losses as well. For example, in Honduras, United Fruit abandoned more than 12,000 hectares of land between 1939 and 1953; Standard Fruit endured annual losses of 10 to 15 percent of its productive lands in the late 1940s.⁷⁵ Facing an impending shortage of Panama disease-free soils in Honduras, United Fruit engineers developed a “flood fallow” system in which workers converted diseased soils into shallow lakebeds that were filled with water for three to eighteen months in order to “drown” the fungi. After

draining the water off, workers replanted the soils with disease-free Gros Michel rhizomes.⁷⁶ By 1953, some 5,700 hectares of land in Honduras had been flood fallowed and replanted. The labor- and capital-intensive technique demonstrated United Fruit's engineering prowess, but drove up the cost of production.

The Standard Fruit Company also experimented with flood fallowing, but the company halted the project a few years later because it lacked the capital to carry out flood fallowing on a large scale.⁷⁷ Instead, Standard Fruit began making test shipments of Panama disease-resistant banana varieties. Between 1944 and 1954, the company shipped modest quantities of a hybrid banana developed by British researchers, but the variety's small bunch size and short fingers were not enthusiastically received in U.S. markets.⁷⁸ However, company officials expressed high hopes for two Cavendish cultivars (Bout Rond and Giant Cavendish) that produced high yields of "fine, large bananas" that ripened "very nicely" with proper temperatures and exposure to ethylene gas. Ironically, one banana expert considered the Bout Rond to be botanically indistinguishable from the Lacatan.⁷⁹

But the Cavendish varieties had one major drawback: They were very susceptible to bruising. During the early 1950s, Standard Fruit's Cavendish exports suffered a high rate of rejection and discounting.⁸⁰ In 1957, the company attempted to solve this problem by building packing plants in the tropics where workers cut the fruit from its stem and packed it into cardboard boxes. After two years of trial marketing, Standard executives deemed boxed bananas "the greatest innovation in the history of the banana industry" and began commercial shipments of boxed fruit under the trade name "Cabana."⁸¹ In fact, the company's "innovation" represented a modification of packing techniques that shippers had used for decades in the Canary Islands and elsewhere. The hyperbole aside, boxed fruit marked the beginning of a new phase in export banana production and marketing.

United Fruit continued to export Gros Michel bananas through 1959, but by that point, enthusiasm for flood fallowing had waned because Panama disease was reappearing in treated soils within five years.⁸² The limited effectiveness and high costs of flood fallowing led United Fruit plant pathologist Robert Stover to conclude that banana breeding was "the only hopeful long-term approach to the solution of the banana disease problem."⁸³ Top-level management viewed the idea of replacing Gros Michel with another variety to be a desecration of "cherished quality standards."⁸⁴ But with both profits and stock prices plummeting, United Fruit's board of directors took action in late 1959, replacing long-time company executive Kenneth Redmond with Thomas Sunderland.⁸⁵ Arguing that Panama disease was costing the company millions of dollars a year, Sunderland wasted little time before calling for increased production of Cavendish-type bananas.⁸⁶

The following year, United Fruit's research department began testing various Cavendish cultivars (including Giant Cavendish, Valery, and Grand Nain) for yields, disease resistance, and shipping qualities. The company also funded a major banana-collecting expedition to South East Asia that assembled one of the world's largest collections of *Musa* varieties.⁸⁷ In the early 1960s, the company test-marketed boxed Valery bananas in Midwest markets and received favorable consumer response. An independent taste panel reportedly found both the flavor and aroma

of the Valery to be “distinctly superior” to that of the Gros Michel.⁸⁸ By 1965, United Fruit had converted nearly all of its Central American production to Valery and other Cavendish varieties.

Both major banana companies ultimately overcame the problem of Panama disease by planting banana varieties that had been cultivated for centuries in Southeast Asia. (Otto Reinking had collected Valery specimens during a 1927 trip to Saigon.)⁸⁹ Ironically, then, after decades of profiting from a production system that severely reduced plant diversity on local and regional levels in the American tropics, the fruit companies ensured their economic survival by tapping into the pan-tropical diversity of the *Musa* genus.

The Cavendish era ushered in a number of interrelated changes in production and marketing. In order both to offset increased costs associated with boxing and counter stagnant banana sales, United Fruit’s management transformed boxed Cavendish bananas into a marketing tool: “Boxing has cleared the way for developments in merchandising which have never been possible before in the banana business. We are now ready to consider changing our business from the sale of a commodity item to the sale of a branded, identifiable item, which, if adopted, will enable us to advertise *our* bananas, instead of bananas generally.”⁹⁰

In 1963, the company launched a multi-million dollar advertising campaign to promote branded bananas. United Fruit officials chose “Chiquita” for the brand name, invoking memories of the company’s immensely successful 1940s radio and print advertising campaigns that featured Miss Chiquita—a singing female icon that loosely resembled World War II movie star Carmen Miranda. The Chiquita name therefore played to consumer nostalgia at precisely the moment when United Fruit introduced a new banana variety.⁹¹ Marketing material produced for both supermarkets and glossy women’s magazines featured a blue and gold Mirandaeque icon that consisted of a woman wearing a fruit-topped hat and the phrase “this seal outside means the best inside.”⁹² By transforming the banana from a commodity to a retail product distinguishable by a brand name, United Fruit sought to create demand for a higher-priced, “premium” export banana.⁹³

The Chiquita banana campaign represented less of a sharp break in marketing strategies than an evolution of pre-existing ones that was linked to the proliferation of self-serve supermarkets in the post-war era. As early as 1950, fruit jobbers began placing colored bands bearing the name “Chiquita” around consumer-sized units of bananas in retail outlets.⁹⁴ The Chiquita brand and image redefined what constituted a quality banana by placing a heightened emphasis on features such as bunch symmetry, the fullness of individual bananas, and blemish-free peels that ripened uniformly. In order to bear the Chiquita label in 1970, bananas had to be a minimum of eight inches long and free of a long list of “defects” primarily related to the visual appearance of the fruit.⁹⁵ Standard Fruit also based its quality ratings on the number of “outward defects” and the “fresh appearance” of the peel. As one former Standard Fruit employee noted, the boxing process enabled the company to export “essentially blemish-free” fruit.⁹⁶

The changing quality standards associated with new banana varieties altered production processes in ways that created new risks for banana workers and local

environments. The banana companies significantly increased their use of nitrogenous fertilizers, irrigation waters, and pesticides in order to ensure high yields of large, unblemished fruit. Cavendish varieties were extremely susceptible to Sigatoka diseases and required heavy applications of fungicides.⁴⁷ Field workers in the 1960s applied insecticides such as Kepone and Diazinon to kill organisms that marred banana peels. Nematodes also took on a new significance as a result of the switch to Cavendish varieties; in many instances, the fruit companies turned to chemical controls, including the highly toxic DBCP, in order to lower nematode populations and boost yields. Even the microenvironments inside the cardboard boxes used to transport the thin-skinned Cavendish bananas created opportunities for fungal growth that the companies controlled via fungicides.

The Cavendish era then, brought geographical stability to the Central American export banana industry and thereby put an end (at least temporarily) to nearly half a century of shifting plantation agriculture that resulted in wide-scale deforestation of lowland tropical environments. However, Cavendish monocultures heightened the economic importance of other pathogens and pests, leading to a sharp rise in agrochemical use. The lack of monitoring programs makes it unlikely the health effects on plantation workers will ever be known. However, the use of DBCP during the 1960s and 1970s left thousands of workers sterile. The effects of agrochemical use on other organisms is similarly difficult to quantify because of a lack of field studies, but the tendency of export banana plantations to be located near rivers all but ensures that fertilizers and pesticides have entered both aquatic and terrestrial ecosystems.⁴⁸

Conclusion

For late-nineteenth-century U.S. consumers accustomed to eating fresh fruits on a strictly seasonal basis, the ability of trains and steamships to collapse time and space must have seemed magical: Fresh bananas grown in “exotic” tropical lands appeared regularly in the everyday places that constituted “home.” However, fossil fuel-age technologies could only bend—not break—biological processes. Once harvested, bananas began to age, a process that resulted in both “ripening” and “rotting.” The distinction between the two was absolutely vital to late-nineteenth-century growers and shippers who favored banana varieties that could best ensure them the opportunity to make a profit in distant market places. The needs of early shippers therefore played a crucial role in favoring Gros Michel fruit over other varieties found in the tropics. Subsequently, the structures and aesthetic sensibilities of the export trade evolved around Gros Michel in a contingent process that involved producers, distributors, and consumers. When Panama disease struck, the only solution perceived to be “viable” was to find another banana that combined the Gros Michel’s outward appearance with resistance to the pathogen when grown in monocultures. Markets in the United States therefore shaped the agroecology of banana growing by creating a truly massive demand for a very specific kind of banana.

I do not think that the historical importance of Gros Michel can be understood in purely functionalist terms, i.e. serving the needs of corporate capitalism. Indeed, the decision of United Fruit executives to stay with the variety even as profits eroded in the late 1950s suggests that contingent (and less tangible) factors must be taken into consideration when trying to understand the interplay between production processes and consumption practices. One crucial area that merits further investigation concerns the relationship between industry “middle men” and retail consumers. I have suggested how technological innovations, urbanization, rising wealth, changing ideas about domesticity, and discourses about nutrition set the historical contexts in which banana consumption skyrocketed, but my sources have revealed little about the meanings of consuming bananas. Fruit dealers and industry analysts (mostly men) maintained that consumers (mostly women) failed to distinguish one banana from another, but this perception should not be taken at face-value. One suspects that food shoppers, be they women or men, possessed ideas about fruit quality that may have differed from those held by shippers and jobbers, but that nonetheless shaped discourses about “quality” bananas. Environmental historians interested in consumption will need to explore the realms of social and cultural history in order to sharpen understandings of how consumer preferences reflected evolving notions of “quality,” “value,” and “desire.”

However, my point in writing this essay is not only to encourage more dialogue across sub-disciplines of the historical profession. Reinterpreting the export banana's past is important for plotting its future role in tropical agroecosystems. The relationship between people, plants, and pathogens continues to evolve in export banana-growing regions. Although Panama disease is not economically important in the American tropics at the moment, strains of fusaria capable of infecting Cavendish varieties may reach the Americas in the foreseeable future. In addition, the control of Black Sigatoka (another fungal pathogen) currently accounts for a large proportion of production costs and agrochemical use in the industry. During the 1990s, banana breeders developed varieties that demonstrated resistance and/or tolerance to Black Sigatoka, but the major fruit companies have yet to produce them for export on account of aesthetic “deficiencies.”⁹⁹ If both the plant hosts and pathogens have changed entering the twenty-first century, the dynamic between corporate power, large-scale monocultures, and mass markets remains similar to that of the previous century.

Consequently, if we accept the vivid images painted by ecologists Gilbert and Hubbell of an industry on the brink of collapse due to “the ravages of a disease” implicitly constructed as a force of nature, we run the risk of giving pathogens historical agency at the expense of people and social institutions. In so doing, we unwittingly set ourselves up to fall into future “jobs versus the environment” traps in which policy makers must choose between maintaining banana exports and protecting biological diversity. However, by viewing Panama disease and other plant epidemics as the outcomes of interactions between dynamic agroecological and social processes, we can envision a less gloomy, albeit more complex, future based on the possibilities of refashioning commodity markets to value the agro-biodiversity upon which export banana production has depended.

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Notes

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1. Gregory S. Gilbert and Stephen P. Hubbell, "Plant Diseases and the Conservation of Tropical Forests," *BioScience* 46 (1996), 104.
2. For example, one influential researcher declared that the damage inflicted by Panama disease "ranks with the half dozen most catastrophic plant diseases, comparable in importance with wheat rust and potato blight." See, Norman W Simmonds, *Bananas* (London: Longman, 1959), 367. Gilbert and Hubbell cited two standard reference works on tropical plant pathogens: H. D. Thurston, *Tropical Plant Diseases* (St. Paul: APS Press, 1954); and F. L. Wellman, *Tropical American Plant Diseases* (New Jersey: Scarecrow Press, 1972). The 100,000 acre figure was first published in a 1958 booklet issued by the United Fruit Company's Department of Research, *Problems and Progress in Banana Disease Research* (Boston: United Fruit Company, 1958). Also see, Claude W. Wardlaw, *Diseases of the Banana* (London: MacMillan and Company 1935); and Robert H. Stover, *Fusarial Wilt (Panama Disease) of the Banana and other Musa Species* (Kew: Commonwealth Mycological Institute, 1962).
3. John Soluri, "People, Plants, and Pathogens: The Eco-Social Dynamics of Export Banana Production in Honduras, 1875-1950," *Hispanic American Historical Review* 80 (2000), 463-501; and Aviva Chomsky, *West Indian Workers and the United Fruit Company in Costa Rica, 1870-1940* (Baton Rouge: Louisiana State University, 1996), 89-143.
4. See, Steven Stoll, *The Fruits of Natural Advantage: Making the Industrial Countryside in California* (Berkeley: University of California Press, 1998) and Douglas C. Sackman, "'Nature's Workshop': The Work Environment and Workers' Bodies in California's Citrus Industry, 1900-1940," *Environmental History* 5 (2000), 27-53. Scholars of Africa have been particularly active in this field. For a concise bibliography, see James C. McCann, *Green Land, Brown Land, Black Land: An Environmental History of Africa, 1800-1990* (Portsmouth, N.H.: Heinemann, 1999). Also see McCann, *People of the Plow: An Agricultural History of Ethiopia, 1800-1990* (Madison: University of Wisconsin Press, 1995) and Elias C. Mandala, *Work and Control in a Peasant Economy* (Madison: University of Wisconsin Press, 1990). For Latin America, a pioneering (and at times problematic) book is Warren Dean, *Brazil and the Struggle for Rubber* (London: Cambridge University Press, 1987). For Worster's discussion of history and agroecology, see Donald Worster, ed., *Ends of the Earth* (London: Cambridge University Press, 1991), 289-307.
5. Steve Marquardt, "Green Havoc: Panama Disease and Labor Process," *American Historical Review* 106 (2001), 49-80. Also see, Soluri "People, Plants, and Pathogens: The Eco-social Dynamics of Export Banana Production in Honduras, 1875-1950;" Charles Kepner, *Social Aspects of the Banana Industry* (New York: Columbia University Press, 1936), 19-21; Carolyn Hall, *Costa Rica: una interpretación geográfica con perspectiva*

- histórica* (San José: Editorial Costa Rica, 1984); and Pierre Stouse, "Instability of Tropical Agriculture: The Atlantic Lowlands of Costa Rica," *Economic Geography* 46 (1970): 78-97.
6. Richard Tucker, *Insatiable Appetite: the United States and the Ecological Degradation of the Tropical World* (Berkeley: University of California Press, 2000).
 7. Lawrence Grossman, *The Political Ecology of Bananas* (Chapel Hill: University of North Carolina Press, 1998). Also see, Douglas L. Murray, *Cultivating Crisis: The Human Cost of Pesticides in Latin America* (Austin: University of Texas Press, 1994).
 8. William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton, 1991).
 9. Franklin Adams, "The Banana and its Relatives," *Bulletin of the Pan American Union* 32 (1911), 845-862. Banana consumption was rising concurrently in Europe, but in terms of total imports, the European market paled in comparison to that of the United States. England, the largest European market for bananas in 1914, imported some 6 million bunches. "Al Margen de la industria bananera," *Revista Económica* 9, (1922), 650-656.
 10. The staggering number of vernacular names makes it difficult to determine just how many varieties reached U.S. markets in the nineteenth century. See Virginia Scott Jenkins, *Bananas: An American Story* (Washington, D.C.: Smithsonian Institute, 2000), 14-15; and J. E. Higgins, "The Banana in Hawaii," Hawaii Agricultural Experiment Station, Bulletin No. 7 (Honolulu: Hawaiian Gazette Company, Inc., 1904), 42.
 11. D. W. Rodriguez, *Bananas: an Outline of the Economic History of Production and Trade with Special Reference to Jamaica* (Kingston, Jamaica: The Government Printer, 1955), 11-12.
 12. In 1899, more than 1,100 banana farms existed on the North Coast of Honduras. Honduras, Junta Registradora, "Datos relativos a las fincas del banano," July 1899, ms. Archivo Nacional de Honduras, Tegucigalpa, Honduras.
 13. Jenkins, *Bananas: An American Story*, 108; and the *Boston Cooking School Magazine*, 2, no. 1 (1897), 47-48.
 14. Andrew Preston to Loren Baker, Boston, 19 December 1891, Lorenzo Dow Baker Papers, Box VI, Folder "A. W. Preston, 1891," W. B. Nickerson Memorial Room, Cape Cod Community College, Barnstable, Mass.
 15. Andrew Preston to Loren Baker, Boston, 3 June 1892, Lorenzo Dow Baker Papers, Box VI, Folder "A.W. Preston, 1892-1898."
 16. The amendment was dropped from the final version of the bill. *New York Times*, 12 July 1913. At least fourteen letters, editorials, and articles appeared in *The New York Times* between late June and September 1913 expressing opposition to the tax.
 17. *New York Times*, 26 Aug. 1913, 8.
 18. United States Department of Agriculture, Marketing Service, *Consumption of Food in the United States, 1909-1952* (Washington, D.C.: 1957), 16.
 19. Paul Dosal, *Doing Business with the Dictators: A Political History of Fruit in Guatemala, 1899-1944*. (Wilmington, Del.: Scholarly Resources, 1993), 79-81.
 20. On the companies' political power in Central America, see Charles Kepner and Jay Henry Soothill, *The Economic Empire* (New York: The Vanguard Press, 1935); Mario Argueta, *Bananos y Política: Samuel Zemurray y la Cuyamel Fruit Company* (Tegucigalpa: Editorial Universitaria, 1989); and Dosal, *Doing Business with the Dictators*.
 21. Victor M. Cutter, "Caribbean Tropics in Commercial Transition," *Economic Geography*, 2 (1926), 494.

22. On the Great White Fleet, see Kepner and Soothill, *The Banana Empire*, 179-208. For United Fruit's financial status, see Dosal, *Doing Business with the Dictators*, 185.
23. Charles Morrow Wilson, *Empire in Green and Gold* (New York: Henry Holt and Company, 1947), 170.
24. The number of carloads of bananas carried between the final decade of the nineteenth century and the 1920s quintupled from some 58,313 to 304,695. Terry McMahon, "Banana Traffic on the Illinois Central Railroad," *Green Diamond* 44 (April 1997), 11. The *Green Diamond* is published by the Illinois Central Historical Society.
25. Margaret Byington, *Homestead: The Households of a Mill Town* (New York: Russell Sage Foundation, 1910), 76.
26. Haven Emerson to David Franklin Houston, U.S. Secretary of Agriculture, 14 May 1917, published in *Food Value of the Banana: Opinion of Leading Medical and Scientific Authorities* (Boston: United Fruit Company, 1917), 33.
27. Harvard University Graduate School of Business Administration, *Exhibits Presented for the Harvard Advertising Awards*, v. 8, pt. 1 "Report and Recommendations on Field Survey for the Fruit Dispatch Company," Harvard University, Baker Historical Collections, ms. div. SPGD H339a. Literary evidence indicates that bananas also reached rural regions in the United States; see for example, William Faulkner, *As I Lay Dying* (Vintage Books, 1964 [1930]).
28. Byington, *Homestead: the Households of a Mill Town*, 63.
29. Harvey A. Levenstein, *Revolution at the Table* (New York: Oxford University Press, 1988).
30. Quoted in Levenstein, *Revolution at the Table*, 163.
31. Jenkins, *Bananas: An American Story*, 105.
32. "The Banana Again," *Journal of the American Medical Association* v. 79 (1917), cited in United Fruit Company, *Nutritive and Therapeutic Values of the Banana: A Digest of Scientific Literature*, (Boston: 1936), 10.
33. For an example of fears about the fruit's indigestibility, see *The Boston School of Cooking Magazine*, 2, (1898), 299; for a refutation, see, United Fruit Company, *Food Value of the Banana: Opinion of Leading Medical and Scientific Authorities*.
34. "Field Survey for the Fruit Dispatch Company," v. 8, pt. 1, 15.
35. For recipes see, Riley M. Fletcher Berry, *Fruit Recipes* (New York: Doubleday, Page and Company, 1911); Mary J. Lincoln, *Boston Cookbook* (Boston: Little, Brown, and Company, 1900); C. F. Moritz and Adele Kahn, *The Twentieth Century Cookbook* (New York: M. A. Donohue and Company, 1898); and Hester M. Poole, *Fruits and How to Use Them* (New York: Fowler and Wells, 1890).
36. For examples and anecdotes, see Jenkins, *Bananas: An American History*, 142-176; and John Soluri, "Linking the Production and Consumption of Export Bananas, 1800-1980," in *Banana Wars: Power, Production, and History in Latin America and the Caribbean*, Mark Moberg and Steve Striffler, eds., (Durham: Duke University Press, forthcoming).
37. Samuel Crowther, *The Romance and Rise of the American Tropics* (New York: Doubleday, Doran, and Company, 1929), 221.
38. Wallace Thompson, *Rainbow Republics of Central America* (Chautauqua, N.Y.: Chautauqua Press, 1927), 185.
39. Paul C. Standley, "The Flora of Lancelilla," *Field Museum of Natural History-Botany*, 10 (1931), 12.
40. *Ibid.*, 18.
41. *Ibid.*, 12.

42. *Ibid.*, 31.
42. James L. Peters, "An Ornithological Survey in the Caribbean Lowlands of Honduras," *Bulletin of the Museum of Comparative Zoology* (1929), 398.
44. *Ibid.*, 398-399.
45. A decade earlier, the expansion of banana farms near Limón, Costa Rica, drew similar comments from observers who wrote that "very few of the forest birds frequent the banana plantations and with the destruction of the forest they recede or disappear altogether." See Frederick D. Godman and Osbert Salvin eds., *Biologia Centrali-Americana* 1 (1915), 38.
46. John Soluri, "Landscape and Livelihood: an Agroecological History of Export Banana Growing in Honduras, 1870-1975" (Ph.D. diss. University of Michigan, 1998), 113-115.
47. Victor M. Cutter, "Caribbean Tropics in Commercial Transition" *Economic Geography* 2 (1926), 494-507.
48. Claude Wardlaw, "Panama Disease of Bananas: Reports on the Banana Growing Countries of the West Indies, Central and South America," (London: HMSO, 1929), 18.
49. Claude Wardlaw, "Virgin Soil Deterioration," *Tropical Agriculture* 6 (1929), 240.
50. S. F. Ashby, "Banana Diseases in Jamaica," *Bulletin of the Department of Agriculture, Jamaica*, 2, (1913), 107; Wardlaw, *Diseases of the Banana*, 15; and Stover, *Fusarial Wilt (Panama Disease) of the Banana and other Musa Species*, 3.
51. Description of disease symptoms based on R. E. B. McKenney, "The Central American Banana Blight," *Science* 31 (13 May 1910), 750.
52. On the correlation between plant density and disease incidence, see Christopher C. Mundt, "Disease Dynamics in Agroecosystems," in C. R. Carroll, John Vandermeer, and Peter Rossett, eds., *Agroecology* (New York: McGraw-Hill, 1990), 263-299. Also see, Stover, *Fusarial Wilt (Panama Disease) of the Banana and other Musa Species*, 42.
53. The banana companies, along with small-scale growers, initially tried to control the pathogen by isolating and destroying diseased plants. However, quarantine measures at best slowed the movement of *F. oxysporum*, but they did not prevent it. United Fruit researchers tested a slew of chemical controls in addition to fertilizers and mulches but failed to find something that was feasible under field conditions. Soil analyses suggested that disease incidence was greater in poorly drained, acidic soils, but exceptions were not uncommon and researchers were unable to make reliable predictions about where and when the pathogen was most likely to make inroads. See, S. F. Ashby, "Banana Diseases in Jamaica," and John R. Johnston, *Mosaic Disease of Sugar Cane in 1923: Diseases and Pests of the Banana* (United Fruit Company: 1923), and Stover, *Fusarial Wilt (Panama Disease) of the Banana and other Musa Species*, 86-87.
54. Wardlaw, "Virgin Soil Deterioration," 247.
55. Aguan Valley Company [subsidiary of Standard Fruit] "Detail of Fruit Shipments for Years 1920 to 1930 Inclusive," Standard Fruit and Steamship Company Papers, 1901-1963, Box 5, Folder 12, Howard-Tilton Memorial Library, Tulane University.
56. Nelson R. Park, La Ceiba, "Review of Commerce and Industries, La Ceiba, for Quarter ending Dec. 31, 1928." United States Foreign Agricultural Service, Narrative Reports 1904-1939, Entry 5, Box 343, Folder "fruits." United States National Archive.
57. A 1910 report estimated that between 6,000 and 8,000 hectares of farms had been abandoned in Panama and declared that damage in Costa Rica was "even greater." McKenney, "The Central American Banana Blight," 750.
58. Fruit Dispatch Company, "Conference Report," (Chicago, 11-12 Nov. 1925), 130. A copy of this report is available at the Robert H. Stover Library, Fundación Hondureña de Investigación Agrícola (FHIA), La Lima, Honduras.

59. Fruit Dispatch Company, "Conference Report," 130.
60. For reports on Lacatan cultivation in Panama, see correspondence of U.S. consular officials in U.S. Foreign Agricultural Service Narrative Reports, 1904-1939, Entry 5, Box 426, Folder, "Fruits."
61. "Analysis of Weekly Market Reports," 24 September 1928, Department of Justice File 60-166-56, Box 609, U.S. National Archives.
62. On Standard Fruit's Lacatan trials, see, H. H. V. Hord, "The Conversion of Standard Fruit Company Banana Plantations in Honduras from the Gros Michel to the Giant Cavendish Variety," *Tropical Agriculture*, 43 (1966), 269-75. On Cuyamel Fruit, see Ray Fox, Puerto Cortés, 10 February 1926 "Report on Commerce and Industry for the year and quarter ended December, 1925," U.S. Foreign Agricultural Service Narrative Reports, Entry 5, Box 343, Folder, "Fruits."
63. Here I borrow the concept of "closure" from historians of technology. For a discussion and application of the term, see Wiebe E. Bijker and John Law, eds. *Shaping Technology/Building Society* (Cambridge: MIT Press, 2000).
64. The field study consisted of more than 10,000 interviews, including 8,500 consumers and 90 wholesalers. Geographical areas surveyed included Massachusetts, Georgia, Ohio, and Iowa. Harvard University Graduate School of Business Administration, *Exhibits Presented for the Harvard Advertising Awards*, v. 8, pt. 1 "Report and Recommendations on Field Survey for the Fruit Dispatch Company," Harvard University, Baker Historical Collections, ms. div. SPGD H339a.
65. Harvard University Graduate School of Business Administration, *Exhibits presented for the Harvard Advertising Awards*, v. 8, pt. 3 "Jobbers' Reports for Fruit Dispatch Company," 49.
66. *Ibid.*, 18.
67. *Ibid.*, 21.
68. *Ibid.*, 24. Also see, Fruit Dispatch Company, "Conference Report," 5-26.
69. J. H. Pernan, "Banana Breeding," *United Fruit Company Research Department Bulletin* 21 (14 Oct 1929), 1. The Stover Library at FHIA holds a copy of this bulletin.
70. For a description of one breeding experiment, see Wardlaw, *Diseases of the Banana*, 116.
71. *Ibid.*, 118.
72. Pernan, "Banana Breeding," 13.
73. Between 1950 and 1960, banana exports from Ecuador increased from 8 million stems to about 36 million. Simmonds, *Bananas*, 324.
74. On Central American politics in the post-war period, see Manuel Rojas Bolaños, "La Política," *Historia General de Centroamérica*, Hector Perez-Brignoli, ed., v. 5, 85-163. (Madrid: FLACSO, 1993). Also see, Darío Furaque, *Reinterpreting the "Banana Republic": State and Region in Honduras, 1870-1972* (Chapel Hill: University of North Carolina Press, 1996).
75. See respectively, United Fruit Company, Division of Tropical Research, *Annual Reports*, 1939-1953; and Graham S. Quate, 20 October 1948, U.S. Foreign Agricultural Service, Narrative Reports, 1946-49, Entry 5, Box 743, Folder "Fruits."
76. Stover, *Fusarial Wilt (Panama Disease) of the Banana and other Musa Species*, 96.
77. Standard Fruit Company, "Memorandum of Conference held in the board room on the afternoon of January 3, 1947, for discussion of various matters concerning our Honduras and Nicaragua Divisions," 1, Standard Fruit and Steamship Company Papers, Box 8, Folder 26, Howard-Tilton Memorial Library, Tulane University; Henry O. Muery,

- "Historical Overview," typed ms. 17 May 1984, 1. I thank José P. Sanchez for providing me with a copy of this unpublished account of Standard Fruit's research activities.
78. Hord, "The Conversion of Standard Fruit Company Banana Plantations in Honduras from the Gros Michel to the Giant Cavendish Variety," 269-275.
 79. Norman W. Simmonds, "A Survey of the Cavendish Group of Bananas," *Tropical Agriculture*, 31 (1954), 126-130. A. J. Chute, La Ceiba, to P. C. Rose, New Orleans, 6 May 1944, Standard Fruit and Steamship Company Papers, Box 8 Folder 12, Howard Tilton Library, Tulane University.
 80. Henry B. Arthur, James P. Houck and George L. Beckford, *Tropical Agribusiness Structures and Adjustments—Bananas* (Boston: 1968), 155.
 81. Joseph S. D'Antoni to All Employees, Standard Fruit and Steamship Company, 20 April 1960 (copy), Baker Business Library, Henry B. Arthur Papers, "Banana Study, Retailing and Demand 1964-5."
 82. Stover, *Fusarial Wilt (Panama Disease) of the Banana and other Musa Species*, 97.
 83. United Fruit Company, Division of Tropical Research, *Research Extension Newsletter*, 6 (November 1959), 10. I am grateful to Dr. Robert Stover for allowing me to examine his personal collection of the newsletter.
 84. See, Jesse Hobson, "Research in the United Fruit Company," typed ms., 1959, 2-3. Hobson was Director of Research for United Fruit during the 1950s; I am grateful to Eugene Ostmark for providing me with a copy of this manuscript. Also see United Fruit Company, *Annual Report 1951*, 5; and *Annual Report 1957*, 2; Arthur, Houck, and Beckford, *Tropical Agribusiness Structures and Adjustments*, 149; and Thomas P. McCann, *An American Company: The Tragedy of United Fruit* (New York: Crown Publishers, 1976).
 85. Between 1950 and 1960, United Fruit's reported net earnings fell from \$66 million to \$2 million. Share prices plummeted from \$70 to \$15 over the same period. United Fruit Company, *Annual Reports, 1950-1960*. On the appointment of Sunderland, see Arthur, Houck, and Beckford, *Tropical Agribusiness Structures and Adjustments—Bananas*, 146.
 86. Arthur, Houck, and Beckford, *Tropical Agribusiness Structures and Adjustments—Bananas*, 150.
 87. Franklin Rosales, Elizabeth Arnaud, and Julio Coto, eds., *A Tribute to the Work of Paul H. Allen: A Catalogue of Wild and Cultivated Bananas* (Montpellier, France: International Network for the Improvement of Banana and Plantain, 1999), v.
 88. Arthur, Houck, and Beckford, *Tropical Agribusiness Structures and Adjustments—Bananas*, 151.
 89. Phillip Rowe and D. I. Richardson, *Breeding Bananas for Disease Resistance, Fruit Quality, and Yield* (La Lima, Honduras: Tropical Agriculture Research Services, 1975), 7-8.
 90. Thomas Sunderland quoted in Arthur, Houck, and Beckford, *Tropical Agribusiness Structures and Adjustments—Bananas*, 151. The emphatic "our" is in the original.
 91. "United Fruit Adapts Chiquita as Brand Name," *Advertising Age*, 13 May 1963.
 92. United Fruit Sales Corporation, "Branded P.O.P Material Makes Variety of Displays." Henry B. Arthur Papers, "Banana Study, Unifruiteo info/pamphlets, 1816-1968." Baker Library, Harvard University.
 93. Arthur, Houck, and Beckford, *Tropical Agribusiness Structures and Adjustments*, 152-3.
 94. Whether individual jobbers or United Fruit initiated the marketing technique is unclear, but in the early 1950s, the company obligated jobbers to meet certain criteria before allowing them to place the Chiquita label on the bananas that they handled. In

- 1956, United Fruit reported that banded fruit was out-selling unbanded bananas. United Fruit Company *Annual Reports*, 1948-1956.
95. The list of defects included fruit blossoms adhering to the ends of fingers (i.e. individual bananas); pitting disease; bruises; malformed fingers, including "wild" fingers on cluster; fused fingers; mutilated fingers, including cuts and split peel; rots and molds; and ripe and turning fingers. United Brands, *Banana Operations Manual* (1972), VI-6. A copy of this document is available in the Stover Library, FHIA.
96. Muery, "History of Standard Research, 1950-1980," 46.
97. On the Sigatoka epidemic and its impacts, see, D. S. Meredith, "Banana Leaf Spot Disease (Sigatoka) caused by *Mycosphaerella musicola* Leach," (Kew: Commonwealth Mycological Society, 1970); Steve Marquardt, "'One Down': Parakeets, Pesticides, and Unions in the Central American Banana Industry," paper presented at the First Annual Conference of the American Society for Environmental History, Tacoma, Washington, 16 March 2000; Soluri "Landscape and Livelihood," 325-380; and Ramón Amaya Amador, *Prisión verde* (Tegucigalpa: Editorial Universitaria, 1990 [1950]).
98. Interestingly, when popular concern about pesticide use was growing throughout much of the world, the export banana industry was greatly expanding its use of agrochemicals. For discussions of pesticide use on banana plantations, see Philippe Bourgois, *Ethnicity at Work: Divided Labor on a Central American Banana Plantation* (Baltimore: Johns Hopkins University Press, 1989); Soluri, "Landscape and Livelihood," 381-431; and Lori Ann Thrupp, "Sterilization of Workers from Pesticide Exposure: The Causes and Consequences of DBCP-induced Damage in Costa Rica and Beyond," *International Journal of Health Services* 21 (1991): 731-757.
99. For an up-to-date assessment of plant pathogens and banana breeding, see David R. Jones, ed., *Diseases of Banana, Abacá, and Enset* (New York: CABI Publishing, 2000).