

ABSTRACT

ROBERTS, STACY NICHOLE. *How We Have Forgotten: Chemical Strawberries and Their Archived Alternatives in the Nineteenth and Twentieth Centuries.* (Under the direction of Dr. Matthew Morse Booker.)

This thesis tracks the history of commercial strawberry production for urban markets from the market revolution of the early nineteenth century through the turn of the twenty-first century. Strawberries are currently one of the most chemically-dependent and intervened-in fresh foods on the market. Yet most Americans perceive them as natural, healthy and wholesome, a belief that belies the enormous apparatus constructed for the fruits' production. Strawberries' environmentally expensive production methods have trapped growers, horticultural scientists, and ag-business leaders in a system that is near impossible to escape. It has left them searching for solutions to a series of technological crises that threaten to undo the industry; namely, the phasing out and cancelling of important synthetic chemicals deemed necessary for successful strawberry harvests.

By delving into the archives of strawberry farming's past and teasing apart the term "industrial" into its five component elements—distant markets, division of wage labor, product standardization, expert intervention, and cooperative marketing—this project attempts to understand why and how the current method of strawberry production came about and what alternatives existed in the past. Most importantly, the following narrative demonstrates that synthetic pesticides are only a part of the problem. They comprise a technology that when plugged into an established industrial process, make that system run more efficiently. By understanding how American food production has changed over time and why farmers, scientists, and ag-business leaders chose the current path, we can make informed critiques and suggestions for how to improve the system.

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How We Have Forgotten: Chemical Strawberries and Their Archived Alternatives in the
Nineteenth and Twentieth Centuries

by
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BIOGRAPHY

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INTRODUCTION

Strawberries constitute a staple of the healthy American diet. The ubiquitous, sweet, little red fruits teeming with nutrients are consumed year-round in ice cream, salads, yogurt, and desserts, or fresh by the quart. To many, they represent wholesome, pure, unspoiled nature. Strawberries herald the coming of summer and have helped shape community gatherings for centuries. Native Americans in southeastern North America named June “strawberry month,” New England colonists relished “strawberry time,” and in what would become the state of California, “a sort of red strawberries of which they [the Natives] eat plentifully” grew wild in patches on the coastal ranges.¹ They have served as the centerpiece of religious gatherings, civic holidays, and festivals dedicated solely to the delectable fruit.

However, the strawberries one purchases in a plastic clamshell carton at the grocery store or even in a paperboard carton at the farmer’s market are one of the most input-intensive fresh fruits in the American marketplace. Current strawberry production methods entail complete sterilization of soils, vast quantities of water, endless rolls of non-reusable

¹ Ted Steinberg, *Down to Earth: Nature’s Role in American History* (New York: Oxford University Press, 2002), 16; Thomas Hutchinson, *The History of the Colony and Province of Massachusetts-Bay, Volume 1*, ed. Lawrence Shaw Mayo (Cambridge, MA: Harvard University Press, 1936), 405; William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (Hill and Wang: New York, 2003), 35; Francis Maria Picolo, “An Extract of a Memoire, concerning the Discovery of a Passage by Land to California; With a Map and Description of That Country. Presented to the Royal Council of Guadalaxara in Mexico, by Francis Maria Picolo. Taken from the Letters of the Missionary Jesuits, Printed at Paris,” *Philosophical Transactions (1683-1775)* 26 (January 1, 1753): 236, (accessed through Internet Archive, July 14, 2014, <http://tinyurl.com/picolo1702>); Stephen Wilhelm and James E. Sagen, *A History of the Strawberry: From Ancient Gardens to Modern Markets* (Berkeley: University of California, 1974), 164-165. Two types of strawberries are indigenous to California: the alpine, *Fragaria vesca*, and the beach, *F. chiloensis*. Both grew well under cultivation, according to Wilhelm and Sagen, 164-165.

and non-recyclable plastic, a deluge of toxic chemicals, and immense amounts of low-paid, manual labor to meet consumer demand. Whereas the strawberry field used to be part of a greater ecosystem that contained plants, climate, pests, disease, and applied poisons, it is now a separate, sterile space for chemicals and strawberries only. This thesis examines the history of commercial strawberry production for urban markets in hopes of understanding why and how this system came about and what alternatives existed in the past.

Historically, orchard and truck crops such as almonds, apricots, cauliflower, asparagus, and strawberries have garnered high profits per acre, making them cash crops for farmers. These fruits and vegetables grow intensively, not extensively, meaning less land is needed for profitable production. A good example of this type of farming comes from what is today the very height of urbanity. In the late nineteenth century, the modern-day New York boroughs of Brooklyn and Queens led the country in market garden farming. Land rents were high, which meant farmers could only afford small acreages, but close proximity to a city with an ever-growing population and a constant fertilizer supply—manure—meant that local producers could successfully make a living cultivating fruits and vegetables for the nearby metropolis.

Commercial truck farming, so-called because crops are “trucked,” or carried to market by farmers, near cities such as Boston, Philadelphia, and New York became viable when market gardeners and individual households inside cities could no longer grow enough produce to meet demand. This shift occurred in the decades following the War of 1812, when American cities boomed in population and the young nation underwent a transformation

known as “the market revolution.” Instead of eking out a living from the land for themselves and future generations, farmers throughout the country began to plough, plant, and harvest grains and other commodities to sell in urban markets. Once the transition from subsistence to commercial farming had been made, five elements of production emerged that defined the industrial agricultural process. Those five elements were: distant markets, division of wage labor, product standardization, expert intervention, and cooperative marketing. Opposite complete industrialization was local production, which lacked all or some of these qualities.

The following story tracks commercial strawberry production from its inception through industrialization and the maturation and consolidation of the industrial system. The first chapter uses the split in agricultural thought of the early nineteenth century, “improvers” and those who moved to new lands in the South and West, to examine local fruit production in and around New York City and San Francisco. Chapter two interrogates how farmers in one rural Southern locale adopted the five elements of industrial agriculture to establish and maintain their foothold in Northern fruit markets. And chapter three explains how one state, California, used the industrial process and technological advancements to build a commercial empire, becoming the nation’s strawberry supplier in the decades after World War II.

Source bases differ for each chapter. Chapter One, “Fertilizer City: Local Strawberry Production for Nineteenth Century Urban Markets” relies heavily on newspapers, particularly the *New York Times* and *San Francisco Call*, as well as published works from the time period and histories of agriculture. Chapter Two, “From Lady Thompsons to Klondikes: Industrial Strawberry Production in Chadbourn, North Carolina” draws on manuscript and

photograph collections, in addition to town, county, and state newspapers housed at the University of North Carolina's Wilson Library. Chapter Three, "Suburban Strawberries: The Rise of California Plastics in Post-War America" constructs arguments with national newspapers, scientific journal articles, conference proceedings, U.S. Environmental Protection Agency fact sheets, and U.S. Department of Agriculture bulletins and reports. Numerous secondary and tertiary sources also inform each section.

Critical to my argument is the idea that "industrial" signifies something more than a single, monolithic entity. It constitutes a process and a continuum of elements that farmers adopt to meet their own needs. Some farmers fully industrialize and take on all the aspects of industrial agriculture—distant markets, division of wage labor, product standardization, expert intervention, and cooperative marketing. Others only use certain aspects pertinent to their time and place, as New York City's local truck farmers did in the late nineteenth century. Missing from this process is mechanization, a concept most people associate with industrial. However, as maritime historian Matthew McKenzie demonstrated in *Clearing the Coastline*, a history of the transformation of Cape Cod's nineteenth-century fishing industry, industrialization does not require machines. Pound nets catching baitfish radically changed the economy of this subsistence region, displacing hook-and-line fishermen and altering the ecology of the inshore fisheries.² Factories, smokestacks, coal, and even railroads to some extent were irrelevant to McKenzie's story. What did appear in his narrative were elements of the industrial process, distant markets and wage labor. Strawberry fields in the nineteenth

² Matthew McKenzie, *Clearing the Coastline: The Nineteenth-Century Ecological & Cultural Transformation of Cape Cod* (Hanover, NH: University Press of New England, 2010), 88-113.

century, like inshore bait fisheries, also lacked the ubiquitous cogs and gears associated with industrialization. Distant producers used railroads for transport, but local farmers adopting some of the elements of industrialization still used wagons to haul their produce to market. Furthermore, planting, weeding, and harvesting of strawberries has yet to become mechanized because of the delicate nature of the fruit. Thus, taking mechanization out of the industrial equation makes my definition more malleable and applicable to understanding the processes by which modern humans not only feed, but also clothe and house themselves.

This interrogation of industrial agriculture and fruit production fits well within a rich scholarly conversation already underway. In *Larding the Lean Earth: Soil and Society in Nineteenth-Century America*, Steven Stoll provided a beautiful description of the importance of soils and the intellectual rift that developed between those who wanted to improve Eastern soils and those who wanted to plant their roots in new lands elsewhere. This dichotomy informs my first chapter and reappears in subsequent sections. Stoll's first work, *The Fruits of Natural Advantage: Making the Industrial Countryside in California*, focused primarily on orchard fruits and agricultural industrialization at the turn of the century. He argued that specializing in types of crops grown and in uses of land was the start-key of industrial processes. I agree, in part, and expand that notion into a broader framework. Cecilia Tsu's *Garden of the World: Asian Immigrants and the Making of Agriculture in California's Santa Clara Valley* delved into the race relations between people who owned farmland in California and those who actually planted and harvest strawberries and other stoop-labor crops, providing insight and context for my own story. But she did not fully explain the

actual production of berries—how they were cultivated, physically harvested, and taken to market, an aspect I address throughout. Mark Linder and Lawrence S. Zacharias's *Of Cabbages and Kings County: Agriculture and the Formation of Modern Brooklyn* supplied a foundation for my first chapter, necessary details of truck farming in New York City's vicinity, and reminded me of the utility of Johann Heinrich Von Thünen's isolated state theory (further explained in chapter one). Strawberries do not appear often in their work, perhaps because Queens and Suffolk Counties specialized on that fruit.

Other important studies that informed my arguments include anthropologist Miriam J. Wells's *Strawberry Fields: Politics, Class, and Work in California Agriculture*, which furnished a wealth of information on virtually every aspect of California strawberry growing. My juxtaposition of California with New York and North Carolina aims to provide insight into the similarities and differences regarding class relations in agricultural work across space and time. William Cronon's *Nature's Metropolis: Chicago and the Great West* studied agriculture writ large and grain, timber, and meat products specifically. Cronon portrayed the city and its hinterlands as one organic whole and contributed to my understanding of industrial food production. His explanation of Von Thünen's isolated state theory was also enormously helpful. My second chapter details the reach of Chicago's capital into the Southeast, an area not deeply incorporated into Cronon's work. Finally, other histories of agriculture provided crucial context to my chapters, including Paul Wallace Gates's *The Farmer's Age: Agriculture, 1815-1860* and Ulysses P. Hedrick's *History of Horticulture in America to 1860*.

By delving into the archives of strawberry production's past, I am attempting to find alternatives and solutions for the present. Not only are modern strawberries environmentally expensive, but the industry has become dependent on tools that are steadily being outlawed by state and federal agencies. As the conclusion will explain, the phasing out of methyl bromide, a synthetic chemical soil fumigant, has left the industry clamoring for innovative ways to deal with soil pest and disease problems. Many activists for both environmental and social issues also blame pesticides for problems in American farming, such as overproduction and the health hazards chemicals pose to field workers' and the public's health. But pesticides are only a part of the problem. They comprise a technology that when plugged into an established industrial process, make that system run more efficiently. To understand the underlying reasons why our modern food system is controlled by chemically addicted oligopolies, we must understand how American food production has changed over time and why farmers, scientists, and ag-business leaders chose the current path. Then, perhaps, we can provide informed critiques and suggestions for how to improve the system.

CHAPTER 1—FERTILIZER CITY: LOCAL STRAWBERRY PRODUCTION FOR NINETEENTH CENTURY MARKETS

The term pre-industrial often conjures up notions of a simpler time without machines, cities, cars, pollution, or endlessly advancing technologies. Food grew locally and without the chemicals employed today. Before the machines, people ate fresh fruits and vegetables, cooked their own food, and lived happily with their families on self-sufficient farms in a bucolic landscape. This image represents a longed-for past—the romantic rift between the post-industrial world and everything that came before. Myths of this sort tend to conflate change and time, among other things, and the pre-industrial world comes to be regarded as ageless and eternal, never changing until the advent of darkness in the form of a machine.

Historians know that such nostalgia is rife with error and riddled with illogic. Not only does the agrarian fantasy misrepresent reality, but it affects the way people live their lives in the present. Furthermore, people's definition of when the pre-industrial world ended changes with new generations and different cultural ideas. In this thesis, I do not use the term "pre-industrial." I discuss local food production for urban markets and a continuum of industrialization, meaning that even small farms serving only one market could adopt elements of industrial agriculture. Cities in the United States entered a period of massive growth starting in the 1820s that intensified through the end of the century. The building of canals and linking of Western and Southern farms to urban markets on the East Coast induced what historian Charles Sellers called "the market revolution." Though most scholars

understand industrial agriculture to have originated in the latter decades of the nineteenth century, profound changes swept American farming well before. What, then, did actual nineteenth-century farming look like? How did food production change over the course of the century?

To answer these questions, definitions are in order. To claim something is “industrial” necessitates knowing what the word means. Often it is equated with machines, but machines are not all that industrialism entailed. Industrial has two linked meanings in this thesis. The first refers to the revolution in work that occurred in the United States after the Civil War. The second pertains to how new industrial processes applied to agriculture. Rapid urban growth drastically increased the food requirements of cities, transforming the agricultural sector. As railroads and the later invention of refrigerated railcars allowed long distance food shipment, local urban producers responded to increased competition by intensifying their own methods.

Following environmental historian Ted Steinberg, I define industrial using five principles: distant markets, division of wage labor, product standardization, expert intervention, and cooperative marketing. A case study elaborating these labels follows in chapter two, but I will provide some clarification here. For this thesis, local food production entails farms or gardens whose primary outlet is one, nearby, urban center. Distant markets, then, entail strawberry farms that served more than one urban center because of new transportation technologies that allowed their efforts to succeed. Division of wage labor signifies the separation of specific tasks of strawberry production (planting, weeding,

harvesting, transporting, and selling, among others) and the payment of wages for some, if not all, the different jobs. Product standardization implies fewer and fewer varieties, shapes, and sizes of strawberries sold, leading to uniformity in the marketplace. Expert intervention means the importance of and reliance on scientific expertise to solve problems that the Progressive era heralded. And cooperative marketing refers to the voluntary association of commodity growers to promote their product and handle industry-wide problems such as labor shortages and regulation. Together these five factors resulted in a national strawberry industry that provided fruit to urban centers in far-flung locales.

Nineteenth-century local food production lacked all or certain parts of this process. But that does not mean machines were absent from strawberry production or that changes and technological advances in farming failed to occur. Following John Perkins, I define technology as knowledge by which people use environmental resources in order to satisfy material wants and needs.³ The work of Justus von Liebig and his concept of “scientific farming” in the 1840s radically changed the way farmers approached their fields, as did widespread soil exhaustion in the American East and South. Furthermore, the types of crops planted and agricultural labor differed by region in significant ways over the course of the 1800s.

Local strawberry production for nineteenth-century urban centers emerged from new agricultural ideas, farmers’ increasing market-orientation, the geographic expansion of truck farms, and new agricultural technologies. As an intensive crop with a short shelf life,

³ John H. Perkins, *Insects, Experts, and the Insecticide Crisis: the Quest for New Pest Management Strategies* (New York: Plenum Press, 1982), 1-49, 210-231.

strawberries on the Eastern seaboard represented the “improver’s” land ethic: a crop that demanded heavy investment and upkeep of soils instead of the abandonment and constant westward movement of many nineteenth-century American farmers.⁴ However, strawberries for urban markets also grew abundantly in the Santa Clara Valley of California, revealing the split in agricultural thought that developed in the early 1800s and reified itself in practice throughout the rest of the century. I will examine market production of strawberries for New York City and to a lesser extent San Francisco to demonstrate not only the changes in nineteenth-century food production, but also the different paths truck farming could and did take.

Oldfields and New Fields

Colonial and early American farmers did not invest much time, money, or effort in the thing they held most dear—their land. Vast amounts of “free land” to the West (except for the Native Americans and other Europeans residing there) and the steady expansion of the United States ensured that if soils exhausted or eroded, other arable parcels would soon become available.⁵ Farmers in England’s colonies practiced wasty ways, rejecting the caution of their forebears and mining the soil with constant cropping. By the first decades of the nineteenth century, the farmed terrain of the Atlantic Coast states appeared worn out and unproductive. John James Audubon, when describing the early settlers of the Mississippi, remarked:

⁴ Steven Stoll, *Larding the Lean Earth: Soil and Society in Nineteenth-Century America* (New York: Hill and Wang, 2002), 19-49.

⁵ *Ibid.*

I shall introduce to you the members of a family from Virginia, first giving you an idea of their condition in that country previous to their migration to the West. The land which they and their ancestors have possessed for a hundred years, having been constantly forced to produce crops of one kind or another, is completely worn out. It exhibits only a superficial layer of red clay, cut up by deep ravines, through which much of the soil has been conveyed to some more fortunate neighbor residing in a yet rich and beautiful valley.⁶

Echoing the image of Virginia's abused and abandoned landscape, North Carolina farmer "Agricola" warned his readers that their present methods constituted a "land-killing system, which must be altered for the better; for if persevered in, it must ultimately issue in want, misery, and depopulation."⁷ Southerners were not the only ones implicated in ruining land, however. From New England to the Mid-Atlantic States and down through the Carolinas, farms became increasingly less productive in the nineteenth century owing to the sapped fertility of the soil.⁸

Destruction of arable land derived from the circumstances of early settlers. Because soils yielded satisfactory products without fertilizer and most labor whether slave, indentured, or free was occupied with other important tasks, long-term sustainability and farm viability was not an imminent concern. Little manure existed because of the relatively low number of animals on early American farms and the small size of cities and towns using

⁶ John James Audubon, "Early Settlers Along the Mississippi," in *Southern Life in Southern Literature: Selections of Representative Prose and Poetry*, edited by Maurice Garland Fulton, (Boston: Ginn and Company, 1917), 15.

⁷ George W. Jeffreys "Agricola," *A Series of Essays on Agriculture and Rural Affairs* (Raleigh, NC: Joseph Gales, 1819), 5 (accessed via Early American Imprints, Series II: Shaw-Shoemaker 1801-1819, <http://tinyurl.com/qgu38pg>).

⁸ Stoll, *Larding the Lean Earth*, 15-49; Clarence H. Danhof, *Change in Agriculture: The Northern United States: 1820-1870* (Cambridge, MA: Harvard University Press, 1969). 252-262.

horses for transport.⁹ But by 1800, the eastern seaboard states were no longer frontier colonies. Most had been established for more than one hundred years and the increasing marked declines in soil productivity signaled that a change needed to occur. Historian Steven Stoll described this fork-in-the-road as a choice between heading west or “improving” the land. Though many chose to move West to cultivate new tracts of earth, a significant minority argued for the necessity investing in the soils of the East. Otherwise, improvers argued, the old states might lose their demographic, social, and political importance.¹⁰

“Improvement” was a loaded term. It carried the cultural baggage of a society that deemed tilling the soil and taming the wilderness as leading to the highest form of civilization. Agriculture, in the Anglo-American mind, necessitated property and property ownership where land was bounded and attached to the marketplace with fixed values.¹¹ The improvers of the early nineteenth century worried about the worth of their current property and its ability to produce further wealth, fearing that a lack of industry could send themselves and their land into a demoralizing wilderness.¹² The great spokesman for finishing and improving the American landscape was Thomas Jefferson, architect of the grid system outlined in the Northwest Ordinances and purveyor of the agrarian ideal. Other famous advocates of improvement included President James Madison, who in an 1818 address to his local agricultural society in Albemarle County, Virginia, argued for a reimagining of

⁹ Danhof, *Change in Agriculture*, 251-254.

¹⁰ Stoll, *Larding the Lean Earth*, 15-49.

¹¹ For more on Anglo-American notions of property see: John Locke’s *Second Treatise of Government* 1690, particularly chapter 5 “On Property” and William Cronon’s *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983) particularly chapter 4, “Bounding the Land.”

¹² Stoll, *Larding the Lean Earth*, 46, 15-54.

agricultural practice. He advocated better plowing methods and the need for manuring, comparing the farm to a forest which through death and excrement replenished to the soil what had been taken out.¹³ Through these changes the land could be made to produce again and the wastefulness of heading west could be thwarted.

Farmers on Long Island, a main supplier of food for New York City, noticed the decline in their soils and had done something about it well before Madison made his speech. Timothy Dwight, former president of Yale University, recorded in his travels the enterprising nature of Long Islanders who, with lands “impoverished by a careless husbandry...too common on the continent as well as here,” sought for manure and fertilizer wherever they could find it.¹⁴ His 1804 account portrayed farmers heading up the Hudson River to retrieve the residuals of potash factories, gleaning the streets of New York, and importing manure from New Haven, New London, and even Hartford, Connecticut for their fields. They caught enormous amounts of whitefish and applied them as fertilizer, a practice taught to the first settlers by Native Americans, which caused wheat yields to jump from ten bushels to forty. These investments allegedly increased the value of some Long Island farms three, four, and even six times their former value.¹⁵ Other accounts described the use of menhaden and to a lesser extent shad or other bony-fish, collectively called “mossbunkers,” as fertilizers that dramatically increased Long Island wheat yields well into the middle of the nineteenth

¹³ James Madison, *An Address Delivered Before the Agricultural Society of Albemarle , on Tuesday, May 12, 1818*, (Richmond, Virginia: Shepherd and Pollard, 1818), 10, 15-20 (accessed through NCSU Libraries, Early American Imprints, Series II: Shaw-Shoemaker, 1801-1819, April 11, 2014).

¹⁴ Timothy Dwight, *Travels in New England and New York, Volume III* (New Haven: Timothy Dwight, 1822), ed. Barbara Miller Solomon with the assistance of Patricia M. King (Cambridge, MA: Belknap Press of Harvard University Press, 1969), 212-213.

¹⁵ Ibid.

century. In fact, the harvest of menhaden became an integral part of the agricultural rhythms of the eastern end of the Island. Farmers came together in companies during the summer for a week at a time, armed with large seine, boats, and a fish-house on shore to catch prodigious amounts of the baitfish. A single seine could bring in one million fishes.¹⁶

Improved soils allowed Long Island farmers and others who resided near urban centers to produce more food stuffs than were necessary for survival. Efficient water travel provided a way for excess grains and other products to be sold in New York City. Urban populations were not large enough to support expansive hinterlands of dedicated commercial farms in the late eighteenth and early nineteenth centuries. Farmers grew crops and raised livestock mainly to provide for their own families, and successful yields allowed them to sell the remainder of staple harvests to urban dwellers. However, a shift in crop production owing to grain competition from the West and population growth in the city would change those production patterns.

Most fruits and vegetables for urban consumption grew in market gardens or in kitchen and horticultural gardens of individual homes at the beginning of the nineteenth century. Poor road transport and a relative lack of demand prevented truck crops—fruits and vegetables grown for urban centers and “trucked” or carried to their destinations—from being grown extensively or very far from the point of consumption. Strawberries fit this

¹⁶ Marilyn E. Weigold, *The Long Island Sound: A History of Its People, Places, and Environment* (New York University Press, 2004), 71-71.

model well. They grew in urban market gardens, horticulturalists' patches, house gardens, and increasingly in local farmers' fields.¹⁷

Urban Strawberries

Thomas G. Fessenden, editor of the *New England Farmer*, published *The New American Gardener: Containing Practical Directions of the Culture of Fruits and Vegetables, Including Landscape and Ornamental Gardening, Grape-Vines, Silk, Strawberries, &* in 1828.¹⁸ Fessenden's work sold in Cambridge, Massachusetts, Boston, and New York City to an urban, middle-class elite who could afford to buy his book and had the luxury time to read it. In *The New American Gardener*, Fessenden detailed the various kinds of strawberries being planted (including those favored by horticulturalists in England and France) and how to properly soil and manure the fragile fruits. He recommended vegetable manure, also known as "green manure," because animal manure caused vines to grow strong at the expense of the fruit: "Rotten leaves, decayed wood, ashes, in small quantity, mixed with other vegetable substances in a compost heap, will make better manure for strawberries than any animal substance whatever."¹⁹ Similar recommendations were repeated several decades later in both the North and South by urban horticulturalists Richard G. Pardee and

¹⁷ Ulysses P. Hedrick, *A History of Horticulture in America to 1860* (New York: Oxford University Press, 1950), 39, 146, 148-149, 158; Paul W. Gates, *The Farmer's Age: Agriculture, 1815-1860* (New York: Harper Torchbooks, 1960), 260; Marc Linder and Lawrence S. Zacharias, *Of Cabbages and Kings County: Agriculture and the Formation of Modern Brooklyn* (Iowa City: University of Iowa Press, 1999) 19.

¹⁸ Thomas Green Fessenden, *The New American Gardener: Containing Practical Directions of the Culture of Fruits and Vegetables, Including Landscape and Ornamental Gardening, Grape-Vines, Silk, Strawberries, &*, (Boston: J.B. Russell, 1828), 285-288 (accessed via Google books, <http://tinyurl.com/1828strawberries>).

¹⁹ *Ibid*, 286.

Charles A. Peabody.²⁰ Fessenden wrote to gardeners, not farmers, and described the strawberry not as a commodity or staple of one's diet, but as a dessert and a delicacy, as a medicine that could cure gout and consumption, "dissolve tartareous incrustations of the teeth," and promote salutary perspiration.²¹

Urban horticulturalists served several functions in the early development of the strawberry industry. They bred new varieties of strawberries, made discoveries as to their propagation, and published articles and books (such as Fessenden's) regarding their cultivation. One of those publishers, Nicholas Longworth of Cincinnati, introduced the concept of self-sterile strawberries to American horticulturalists. "Self-sterile" or pistillate variety strawberries lacked sufficient male plant-organs (stamens) to pollinate their own flowers and produce fruit. "Perfect-flowered" or staminate variety strawberries possessed enough well-developed stamens to pollinate not only their own, but other plants' flowers, facilitating fruit growth.²² Longworth was not the first person to understand reproduction in strawberries. A French botanist by the name of Antoine Nicholas Duchesne discovered sterile and fertile strawberry plants in 1766 and the son of Longworth's German neighbor, Abergust, initially told him that his strawberries grew poorly because they were self-sterile. Thereafter, Longworth studied the plants and concluded that pistillate and staminate varieties must be inter-planted for successful cultivation. His 1842 publication incited what historian

²⁰ Richard G. Pardee, *A Complete Manual for the Cultivation of the Strawberry: With a Description of the Best Varieties. Also, Notices of the Raspberry, Blackberry, Cranberry, Currant, Gooseberry, and Grape; With Directions for Their Cultivation and the Selection of the Best Varieties* (New York: Orange Judd & Co, 1856), 21, 117-118 (accessed via Google books, <http://tinyurl.com/1856strawberries>).

²¹ Fessenden, *The New American Gardener*, 288.

²² S.W. Fletcher, *Strawberry-Growing* (New York: The Macmillan Company, 1917), 127-128.

Ulysses P. Hedrick called a “Strawberry War” over the next several decades among those horticulturalists opposed to his theory.²³

Strawberries became a commercially viable market-crop for New York City’s hinterland with mid-century urban population growth and the opening of the Erie Canal in 1825. Shipping costs between Lake Erie and New York City plummeted from \$100 to under \$9 per ton and some commodities shipped for as little as \$3 per ton.²⁴ Grains from the West—Illinois, Ohio, and Indiana—grown in larger quantities on more expansive farms immediately began to undercut the profits of local wheat and hay producers. As the city increased in size and importance, the population boomed and the need for perishable fruits and vegetables burgeoned. Traveler James Stuart, who visited New York in 1830, recounted the great abundance and wide variety of fruits and vegetables, including strawberries, available in the city at little cost.²⁵ The opening of the Long Island Railroad in 1836 facilitated the shift in crop production from grains to truck produce as trains gradually replaced water shipments. From 1840 to 1890, strawberries reigned as the chief truck crop of Long Island, bringing lucrative returns at market.²⁶ The island also became the nation’s most concentrated potato-producing area and the country’s cauliflower garden.²⁷ By mid-century, a clear pattern had emerged in King’s County, adjacent to the city: potatoes and other

²³ Hedrick, *Horticulture in America*, 311-313; 439-441.

²⁴ Charles Sellers, *The Market Revolution: Jacksonian America 1815-1846* (New York: Oxford University Press, 1991), 43.

²⁵ Gates, *The Farmer’s Age*, 267.

²⁶ Hedrick, *Horticulture in America*, 241.

²⁷ Marc Linder and Lawrence S. Zacharias, *Of Cabbages and Kings County: Agriculture and the Formation of Modern Brooklyn* (Iowa City: University of Iowa Press, 1999), 35.

market-garden vegetables steadily increased in production and value, while low-value wheat and corn stagnated and declined.²⁸

Kings County's transformation exemplified a theory also developed in the 1820s. German philosopher Johann Heinrich Von Thünen's isolated state theory (later known as central-place theory) imagined a town in the middle of a fertile plain with no accessible bodies of water or other towns nearby. All manufactured products came from the town and all provisions and raw materials derived from the countryside. Von Thünen asked, "What pattern of cultivation will take shape in these conditions and how will the farming system of the different districts be affected by their distance from the town?" To answer this question, he developed a model of concentric circles that placed intensive agriculture (truck farms, orchards, and dairies) closest to the town because of their products' perishability and cost of hauling. More extensive forms of agriculture, timbering, and livestock grazing occurred in outer rings, farther away from the town. Land rents decreased with distance from the town until, in theory, land reached a value of zero because anything harvested or manufactured would be too cost-prohibitive to ship. This idea helps explain what happened in King's County in the first half of the nineteenth century. Market vegetables initially grew in home gardens when New York City was relatively small. But as its size increased, the city could no longer feed itself. Then the circle of intensive farming pushed outward. Farms nearby the city that formerly sold excess grains and hay began to specialize in commercial production of perishable fruits and vegetables for the urban markets. Land rents in this ring increased and

²⁸ Linder and Zacharias, *Of Cabbages*, 304.

remained high with no land lying fallow because of the high per-acre profits strawberries and other produce fetched.²⁹

The Urban-Rural Manure-Food Cycle

As New York and other Eastern cities emerged as metropolises, those agriculturalists who stayed to supply exploding populations with food fully embraced the improver's land ethic. They recognized the necessity of fertilizing, manuring, and recycling organic matter for their soils and publications related to those topics increased and circulated widely. In the 1830s, agricultural journals frequently ran articles on how to best manage farmyard manure—how to build barns for its storage and properly compost it.³⁰ Others instructed farmers on how to use swamp muck and peat to revitalize worn out soils.³¹ Cuthbert W. Johnson, Esq., a lawyer and editor of Britain's *Farmer's Almanac*, with trans-Atlantic ties to the New York State Agricultural Society and the Maryland State Horticultural Society, published *The Fertilizers* in 1839. His expansive work covered the full gamut of fertilizers, from fish to bones to guano to liquid manure, with case studies demonstrating their potential

²⁹ Johann Heinrich Von Thünen, *Von Thünen's Isolated State An English Edition of Der Isolierte Staat* trans. Carla M. Wartenberg, ed. Peter Hall (New York: Pergamon Press, 1966), 7-11 ; Cronon, *Nature's Metropolis*, 48-54. This theory has been widely used by environmental historians from William Cronon's *Nature's Metropolis*, to Steven Stoll's *The Fruits of Natural Advantage*, and here in Linder and Zacharias's *Of Cabbages and Kings County*. It will appear again in relation to Santa Clara County, California when extensive wheat growing and cattle raising will again turn into intensive market fruit and vegetable orcharding/farming.

³⁰ Richard A. Wines, *Fertilizer in America: From Waste Recycling to Resource Exploitation* (Philadelphia: Temple University Press, 1985), 8.

³¹ *Ibid.*

uses.³² However, the most important work to influence farming in this era came from Germany and the work of Justus von Liebig. He uncovered for both scientists and farmers the “beautiful connexion [that] subsists between the organic and inorganic kingdoms of nature.”³³ Liebig’s scientific agriculture revealed that plants consumed certain substances, primarily nitrogen, phosphorus and potassium, and that by providing properly balanced fertilizers, farmers could produce healthy crops and healthy soils.

For farmers on Long Island making the transition from grain and livestock cultivation to fruit and vegetables, understanding how the composition of different manures affected crop production mattered enormously. Long Islanders continued to look to the city for their manure, as they had done during Timothy Dwight’s visit in 1804. They purchased various forms of excrement from several sources in the city: night-soil, livery, and dairy men, companies selling transmutations of city waste, and companies marketing guano and later commercial fertilizer. New York City by the 1840s had developed a serious detritus problem because of its ever-expanding population. As people poured into the growing metropolis, horses for transport also increased, along with other animals that poor urbanites traditionally used for food, such as pigs, and they each added their portion to dung and trash heaps.³⁴ Regional farmers helped alleviate this nuisance and health hazard by purchasing the city’s copious amounts of waste. Queens County farmers in 1840 purchased \$228,000 of manure

³² Cuthbert W. Johnson, *On Fertilizers Second Edition* (London: J. Ridgeway, 1844), 5-10 (accessed via Google Books <http://tinyurl.com/OnFertilizers>).

³³ Justus Liebig, *Chemistry in its Application to Agriculture and Physiology*, ed. and trans. Lyon Playfair (New York: Wiley and Putnam, 1842), 22 (accessed via Google books <http://tinyurl.com/1842Liebig>).

³⁴ Linder and Zacharias, *Of Cabbages*, 44-51; Ted Steinberg, *Down to Earth: Nature’s Role in American History* (New York: Oxford University Press, 2002), 157-172.

after grossing \$280,000 of hay.³⁵ With an additional 460,000 cartloads of manure produced on their farms, Queens County farmers that year harvested crops worth roughly two million dollars.³⁶

New York City's urban-rural manure-food cycle with Long Island and its other hinterlands continued to mature as immigration, urbanization, and industrialization swelled the ranks of the city's denizens.³⁷ The 1850s witnessed massive transformations in Northeastern agriculture as population growth and railroad expansion increased urban food needs and competition.³⁸ Land use became even more intensive as dairying, poultry raising, and truck orcharding and farming expanded and ousted extensive grain and livestock operations. As one speech from 1852 put it, the fear that the Erie Canal would destroy all the farms on Long Island turned out to be unfounded. Queens County turned into a veritable garden, supplying the needs of the growing city and adding two-to-three times the value of each arable acre.³⁹ Data from the 1860 census revealed that the five states where industry and urban growth centered—Massachusetts, New York, New Jersey, Pennsylvania, and Ohio—collectively became an orchard and truck growing belt, producing forty-seven percent of the country's orchard and garden output.⁴⁰

³⁵ Benjamin Miller, *Fat of the Land: Garbage of New York The Last Two Hundred Years* (New York: Four Walls Eight Windows, 2000), 47.

³⁶ Wine, *Fertilizer in America*, 9-15.

³⁷ Linder and Zacharias, *Of Cabbages*, 44. The “urban-rural manure-food cycle” is a concept taken from Linder and Zacharias's *Of Cabbages and Kings County*.

³⁸ Gates, *The Farmer's Age*, 269.

³⁹ Linder and Zacharias, *Of Cabbages*, 32.

⁴⁰ Gates, *The Farmer's Age*, 269-270.

Strawberries formed part and parcel of these changes. According to a *New York Times* article from 1856, New York City was then the largest strawberry market in the world with fifty thousand bushels of the salubrious fruit sold in 1855. That equated to at least eight million baskets, which wholesaled for \$200,000 and retailed for twice that amount. The author estimated that New York City required fifteen hundred acres in nearby vicinities to supply its strawberry needs. Farms dedicated to strawberry production ran from thirty to forty acres and averaged thirty to fifty bushels per acre. However, technologies such as the steamship and railroad permitted the city's agricultural hinterlands to stretch outward in ways they had not previously. From one port in New Jersey, the city received two hundred thousand baskets in a single day via steamship. The largest single day's shipment within the author's memory came on the Erie Railroad.⁴¹ On Staten Island, a free black community known as Sandy Ground sent their strawberries to Washington Market in Manhattan on a boat that left New Brunswick, New Jersey every morning.⁴² And still other farmers in Kings and Queens Counties brought their wagonloads of produce to market every day—in the morning, afternoon, evening, and night, depending on city regulations at the time.⁴³

⁴¹ "Strawberries," *New York Times*, May 30, 1856.

⁴² Mark Kurlansky, *The Big Oyster: History on the Half Shell* (New York: Ballantine Books, 2006), 124-128. Sandy Ground was the longest inhabited free black community in the country. Oystering became their primary means of survival and wealth, but strawberries were an initial and continuing source of income.

⁴³ Linder and Zacharias, *Of Cabbages*, 32, 34-35, 52-65.

Growing Commercial Strawberries

Horticulturalist Richard G. Pardee published *The Complete Manual for the Cultivation of the Strawberry* in 1856. Though written to gardeners, Pardee also recognized the growth of farms dedicated to market production of the fruit and set aside an entire section recommending the best way to cultivate on a commercial scale: “That class of persons are now becoming so numerous and important, particularly in the vicinity of our cities, that a general article, summing up the whole matter, may well be prepared for their especial convenience and benefit.”⁴⁴ He recommended light, gravelly loam soil, preferably planted with potatoes in prior years to add decomposing biomass to the soil. The land needed to be drained and then plowed deeply into the subsoil in September. In December, ten or twelve bushels of lime and two or three bushels of salt needed to be applied to each acre and plowed under again. If the soil was really poor, muck, wood’s mold, and turf could be piled in a compost heap and used in the spring instead of the December liming. Thirty bushels of leached or unleached ashes needed to be applied to each acre once spring arrived. If the soil was too light, Pardee suggested applying clay. If the farmer found it too heavy, sand or bog earth was needed. The amount of labor in each of these applications steadily increased, but Pardee assured farmers that the work remunerated handsomely. Strawberries could bring anywhere from \$100 to \$1300 per acre, depending on the effort applied to the soil and its care.⁴⁵

⁴⁴ Pardee, *The Complete Manual for Cultivation of the Strawberry*, 34.

⁴⁵ *Ibid*, 34-37.

Once the soil had been deeply plowed again in the spring, and then harrowed and cross-harrowed (meaning pulverized and softened), Pardee instructed the farmer to plant strawberries eight-to-ten inches apart in rows three feet apart. This facilitated horse-drawn cultivation. He considered intercropping with two rows of beets in-between the strawberry rows a good idea—it would help keep weeds down and add more organic matter to the soil. Hoeing to remove weeds Pardee believed essential, and closer in to the plants he recommended hand picking of weeds. “Strawberry plantations,” as he called them, “must be kept clean... a covering of straw in winter, and a mulch of tanbark, straw, or grass, just previous to fruiting, will increase the crop.”⁴⁶ Runners, or clone growths from the mother plant, needed to be removed before they took root and sapped productive energy. Cultivating old rows into the soil also provided fertilizer for whatever strawberry varieties the farmer planted: Hovey’s or Crimson Cone in the pistillate, Iowa or Large Early Scarlet in the staminate, or any other of the several varieties listed.⁴⁷

Others offered similar advice. Unlike most other truck crops, animal manure was seldom ever recommended, unless well decomposed, because of its stimulating properties that caused plants to flower and fruit earlier. If farmers needed a stimulating material, Peter B. Mead recounted using “a solution of guano, the salts of ammonia, dilute tannic acid, or a top-dressing of guano, superphosphate of lime, potash &c.”⁴⁸ Each of Mead’s fertilizers were made and sold in and around New York City. He also emphasized the necessity of

⁴⁶ Pardee, *The Complete Manual*, 37

⁴⁷ Pardee, *The Complete Manual*, 36-39.

⁴⁸ Peter B. Mead, “Letter From Peter B. Mead,” appendix E to Pardee, *The Complete Manual*, 141.

thoroughly watering strawberry plants to keep them alive and flourishing.⁴⁹ Clearly the market truck farmers of the 1850s adhered to the improver's mentality of agriculture: invest in the soil instead of abandoning it.

By the mid-nineteenth century, strawberries constituted an important cash crop in the livelihood of New York City's local market farmers. The increasing importance of the strawberry could be seen in the number of newspaper articles dedicated to the fruit. Throughout the 1850s and early 1860s, the *New York Times* printed a range of articles related to strawberries. Entries detailed strawberry culture and the endless number of strawberry festivals and carnivals in the region, reminded readers to cut runners, pull up weeds, and loosen the soil to prepare for the following year's crop, recounted lectures made by horticulturalists such as Richard G. Pardee, and reported on the annual Free Exhibition of Strawberries held in the *Agriculturalist's* office.⁵⁰ Growing production and consumption of the fruit in different settings signaled its varied cultural meanings at the time. Strawberries served as an engine of economic growth, a scientific specimen, a dessert delicacy, and a celebratory token. Farmers and horticulturalists experimented with different varieties to perfect the taste, size, and maturing conditions of strawberries, expanding the genetic

⁴⁹ Ibid, 142.

⁵⁰ "Rural Economy. Gleanings of Fact and Practice in Fruit Culture. The Strawberry.," *New York Times*, June 7, 1853; "Jersey City. Another Festival.," *New York Times*, June 18, 1852; "New-Jersey. Strawberry Festivals.," *New York Times*, June 12, 1855; "Long Island.," *New York Times*, June 28, 1856; "City Intelligence.," *New York Times*, June 15, 1859; "Brooklyn News. The Lee-Avenue Sunday School Jubilee.," *New York Times*, June 28, 1860; "Brooklyn News. The Strawberry Carnival.," *New York Times*, June 25, 1862; "Look at the Strawberry Beds," *New York Times*, October 2, 1857; "Mr. Pardee On The Strawberry.," *New York Times*, February 8, 1860; "The Strawberry Exhibition.--" *New York Times*, June 21, 1862; "The Annual Strawberry Exhibition," *New York Times*, June 20, 1863.

diversity and creativity of the local industry. Strawberries also became enmeshed in annual cycles of community gathering and associated with summer time, while remunerating market farmers and gardeners handsomely.

According to the 1860 census, American market garden produce in at the end of the 1850s was valued at \$15,955,390. Combined with the value of orchard products and wine, the value of truck crops equaled or surpassed any Southern staple except cotton. Counties in and around large cities, such as Queens County on Long Island, ranked highest in production of garden vegetables. The increasing importance of fruits and vegetables appeared in the number of registered patented varieties—from a sixth to a fourth of the annual volume of U.S. agricultural patents at mid-century were fruit and nut varieties, with vegetables making up a smaller portion.⁵¹

Strawberry production in and around New York City continued unabated through the Civil War and late 1860s, despite the beginnings of Southern competition a few years prior. Norfolk, Virginia sent its first steamer laden with strawberries to the city in 1855.⁵² The Civil War disrupted interregional shipping, however, and allowed local farmers to retain their hold over the city's fruit and vegetable markets. In fact, when Union soldiers in the Ninth Vermont Regiment arrived at the city's Battery Barracks after serving in the field for three years, Colonel Vincent Collyer of the Soldiers' Rest filled a cart with strawberries and distributed about five hundred baskets at breakfast hour.⁵³ The next day Collyer "cleaned

⁵¹ Gates, *The Farmer's Age*, 251-262.

⁵² Hedrick, *History of Horticulture*, 287; Linder and Zacharias, *Of Cabbages*, 68.

⁵³ "Returning Troops.; Arrival of the One Hundred and Eighteenth New-York and Ninth Vermont," *New York Times*, June 18, 1865.

out” Washington Market’s strawberry offerings, distributing nearly ten thousand baskets to soldier’s hospitals and troops passing through.⁵⁴ Local production continued to grow after the war. Queens County on Long Island began holding horticultural fairs in 1867, drawing crowds out from the city and awarding prizes for best strawberry quarts of the Agriculturalist, Jucunda, General Scott, Austin, and General Downing varieties. The heaviest berries, best seedlings, and best new variety also won prizes.⁵⁵

New York City’s hinterlands became truck produce powerhouses in the second half of the nineteenth century. Queens County ranked first or second in market garden production in every federal census from 1850 to 1900. In 1879, Kings County experienced its peak production year, ranking second nationally behind Queens.⁵⁶ At the eastern end of the island, strawberries also shipped to Boston that on steamships and rails, averaging thirty-five thousand quarts daily.⁵⁷ In 1880, despite a severe drought affecting all garden truck in the region, Long Island expected a full and heavy strawberry harvest, perhaps its largest ever. Fruit and vegetable growing regions to the west of the city also saw abundant crops during the 1870s. Along the Hudson River, another long-time food supplier to the city, the strawberry crop of 1877 increased a full ten percent over previous years.⁵⁸ Thus, the urban-

⁵⁴ “Local News,” *New York Times*, June 20, 1865.

⁵⁵ “Queens County Horticultural Fair—List of Premiums Awarded,” *New York Times*, June 17, 1870.

⁵⁶ Linder and Zacharias, *Of Cabbages*, 37-38, 306.

⁵⁷ “The Long Island Strawberry Trade,” *New York Times*, June 17, 1877.

⁵⁸ “Troublesome Strawberry Pickers,” *New York Times*, June 26, 1877;

rural manure-food cycle allowed local farms on the fringes of a densely populated world capital to thrive as urban slums, factories, and smokestacks filled the world around them.⁵⁹

Industrializing to Compete

Even so, after the war steamships continued to ply the waters of the Atlantic Coast and railroads spread further inland, bringing competition to the city's local growers from far-flung regions. By 1870, New York City received steady shipments of strawberries from the South, particularly the Norfolk region of Virginia, in addition to New Jersey and closer locales. An article from 1872 claimed that the strawberry trade had become one of the great features of the produce market of the city, employing many as growers, carriers, and wholesale and retail sellers. Only a few years prior strawberries fell into the category of "rarities on the tables of the 'upper ten,'" but now they arrived in such enormous volume that prices dropped to within reach of wage laborers.⁶⁰ Strawberries came from seven different states up and down the Eastern Seaboard, from New York to North Carolina, via rail and steamship in 1872. Because strawberry plants matured and fruited earlier in the warmer climates of the South and Mid-Atlantic, the inhabitants of the city experienced longer strawberry-buying seasons compared to previous generations. However, those same southern latitudes quickly became too sultry for strawberry plants to continue fruiting. By the time

⁵⁹I find this notion particularly poignant given the importance Jacob Riis placed on nature and its power to heal a dirty, broken, corrupt world. Nature and its beautiful, life-giving propensity was not that far from the Bowery or the Bend. The filth that lined those streets caused flowers to bloom and food to grow a few miles away. One could literally get on a boat or simply walk there in a single day.

⁶⁰"The Strawberry Trade. The Arrivals and Expectations—Where the Berries Come From—Condition of the Crop.," *New York Times*, May 24, 1872.

local berries in the New York City area ripened in early summer, shipments from elsewhere could “not be considered as anything like a fair competitor or rival.”⁶¹

Increased trade brought with it attendant problems. An 1869 article titled “Monopoly in Fruit” revealed the problems of an industry in transition. The author decried the exorbitant prices of strawberries and other excellent “healthy luxuries.”⁶² Consumers paid three-to- four times the price for a pound of fresh fruit as compared to a pound of choice wheat flour, but the increased retail prices did not redound to the farmer. According to the author: “The industrious, toil-worn and frugal producer must consign the products of his hard-fisted industry to those who seem to care not one straw whether the consignment is thrown into the bay, at a dead loss, or whether a remunerative return is made for the products of the soil. Prices must be maintained... This is the point reached by the oppressive monopoly in our cities.”⁶³ The middle-man and marketer, an important part of the emerging agricultural-industrial system, was firmly set in place in the years following the Civil War, to the chagrin of both growers and consumers.

For good or ill, the gears of industry were changing the scale and sites of urban food production and exerting pressure on local truck farmers who had to function in an ever-expanding system. Even though Southern strawberries did not compete with New York’s early summer harvest, they always imposed some constraints by creating price ceilings and consumer expectations and by competing directly with early, “forced” hothouse crops, which

⁶¹ Ibid.

⁶² “Monopoly in Fruit,” *New York Times*, August 4, 1869.

⁶³ Ibid.

were abundant in the late nineteenth-century.⁶⁴ Long Island strawberries “of the finest kind” came in great quantities to New York City in 1877 and a ready market was found, but not at prices able to cover the costs of production and profit. The abundance of strawberries in earlier weeks and months had glutted the market and depressed wholesale prices. Some consumers also began to complain about the taste and lack of aroma of the strawberries arriving at Washington and Fulton Markets in Manhattan. They lacked flavor and fragrance, maintaining the appearance of a strawberry, but none of its other savory attributes. These berries had been bred to survive long-distance and rough transport, their hardiness taking away from those qualities customers actually desired in their fruit.⁶⁵

Competition from distant, industrialized farms increased financial pressures on local truck growers in many ways. In addition to setting market prices and consumer expectations, the amount of capital needed to start or to maintain a commercial truck produce business in and around New York was substantial. Peter Henderson calculated the costs in his 1886 *Gardening for Profit: A Guide to the Successful Cultivation of the Market and Family Garden*. He estimated \$300 per acre for anything less than ten acres, a smaller amount for larger farms—*not* including land rent, which may have been the largest expense in the enterprise. Farmers and those pursuing agricultural business ventures needed to invest extensive capital into relatively small areas of land to achieve economies of scale and stave off competition from other regions.⁶⁶ Local producers adopted the most advanced labor-

⁶⁴ Linder and Zacharias, *Of Cabbages*, 71-72.

⁶⁵ “Better Strawberries,” *New York Times*, June 11, 1876.

⁶⁶ Peter Henderson, *Gardening For Profit: A guide to the Successful Cultivation of the Market and Family Garden* (New York: Orange Judd Company, 1906), 17. Henderson’s \$300 included horses,

saving tools and techniques as competitors and the sheer volume of strawberries skyrocketed in the latter decades of the nineteenth century. Farmers employed several wage laborers per acre to reap the most from their relatively small parcels of land. They also called on an entomologist from the Agricultural Department in Washington D. C. to help when strawberry bud weevils infested New York City's strawberry fields in 1884-1885.⁶⁷ In essence, threats from large-scale Southern operations drove local truck growers to take on some, but not all, of the attributes of industrial agriculture. The continuum of industrialization allowed farmers to pick and choose which attributes best suited their needs and situations. Late nineteenth century, local New York City farmers chose to employ wage labor at certain junctures and to rely on experts to solve their pest and disease woes.

The Decline of Local Strawberries

Despite their industrial attributes, local farms faced another, more powerful enemy—the very city they produced for. Historians Mark Linder and Lawrence Zacharias have argued in great detail that the strongest factor in Brooklyn and Kings County's rapid decline in truck farming in the 1880s, 1890s, and thereafter came not from Southern competition or a lack of manure from streetcars replacing horses, but from (sub)urbanization spreading outward from New York City.⁶⁸ Whether country manors or apartment buildings, the towns and rural districts of Long Island succumbed to the outward growth and financial power of the

wagons, manure, glass and presumably seed, tools, and wage workers. The glass would have been used for greenhouses, which had been popular with urban horticulturalists and gardeners since the 1820s and were increasingly used by New York farms to produce earlier strawberries for market.

⁶⁷ Linder and Zacharias, *Of Cabbages*, 75; "Killing The Strawberry Plants," *New York Times*, May 26, 1885.

⁶⁸ A substantial number of horses remained in New York City through the 1920s.

metropolis. This was nothing new, however. Throughout the city's history, "to a large extent, the transfer of land away from agriculture has been irreversible."⁶⁹ "Iron laws" forced owners to put their land and its subsequent structures to the most profitable use.⁷⁰ Where the city heralded a golden age in local agriculture, suburbs spelled the end. People wanted to live in the garden rather than eat the fruit of it.

Local truck farming did not disappear all at once from Long Island or New York's hinterlands. The process took time and received help from the ever-increasing competition of other agricultural regions. In 1903, the U.S. Bureau of Soils noted that every acre not built upon or held in large country estates in the western third of Long Island was still under intense cultivation of truck crops. And as late as 1915, farmers on the western end of the island in Kings County still took their 1,800-pound horse-drawn wagons loaded with produce to market for the morning rush.⁷¹ Strawberries continued to be grown locally into the early twentieth century, both in hothouses and in open fields. However, the number of local farmers decreased precipitously and the proximity of produce fields to the city moved farther and farther away after the turn of the century.⁷²

⁶⁹ C. Lowell Harriss, "Free Market Allocation of Land Resources: (What the Free Market Can and Cannot Do in Land Policy)," in *The Farm and City: Rival or Allies?*, ed. Archibald M. Woodruff (Englewood Cliffs, New Jersey: Prentice-Hall, 1980), 129.

⁷⁰ Linder and Zacharias, *Of Cabbages*, 9-10; A.M. Woodruff and Charles R. Frink, "Introduction," in *The Farm and City: Rival or Allies?*, ed. Archibald M. Woodruff (Englewood Cliffs, New Jersey: Prentice-Hall, 1980), 1-2.

⁷¹ Linder and Zacharias, *Of Cabbages*, 58.

⁷² "Cheaper Oranges for New York Trade. Strawberries For All.," *New York Times*, April 24, 1908.

Heading West

If market truck farming in the New York City area intensified, spread outward from the city, made use urban waste and manure, and utilized different technologies and techniques throughout the nineteenth century, what did truck farmers that headed West do? California's San Francisco Bay region provides a comparison to changes in strawberry production on the East Coast. This juxtaposition focuses on key differences and similarities between the two regions and the separate land ethics that they each represented.

Alta California became an American possession in 1848. At that point, the tip of the peninsula that would become San Francisco was nothing more than a small pueblo and navy depot known as Yerba Buena.⁷³ Gold in the Sierra Nevada Mountains would soon change all that. San Francisco arose as an instant city and the economic engine of the American West. It housed "more manufacturing establishments, more employees in workshops, greater capitalization, larger value of materials, and higher value of products than all the other twenty-four western cities combined."⁷⁴ And it needed food for its growing population.

Fifty miles south of San Francisco lay San Jose, the heart of Santa Clara County. The first *pueblo* (secular farming community) established in Alta California under Spanish rule, San Jose and the missions dotting the Santa Clara Valley provided food in the form of cattle ranching and grain production to mission outposts and presidios in Yerba Buena and Monterey. The region continued as a wheat and livestock producing area after conquest in

⁷³ Matthew Morse Booker, *Down By The Bay: San Francisco's History Between the Tides* (Berkeley: University of California Press, 2013), 33-43.

⁷⁴ Robert W. Cherny and William Issel, *San Francisco, 1865-1932 Politics, Power, and Urban Development* (Berkeley: University of California Press, 1986), 23.

1848 until fruit and vegetable truck farming and orcharding began to dominate in the 1870s and beyond.⁷⁵ A railroad connected San Francisco and San Jose in 1864 and the Bay's waters could always be plied to reach the commercial capital's markets.⁷⁶ Following Von Thünen's theory, the movement of expansive grain agriculture to an outer ring beyond intensive fields of perishable fruits and vegetables made sense given the ease of water transport from the Delta region and the railroads that stretched not only into California's interior, but the continent's.

Strawberries formed a part of this agricultural shift, just as they had in the hinterlands of New York. Traveler Samuel Bowles recounted in his narrative from 1865 and 1868 the variety and high quality of fruits, vegetables, grains, and fishes in San Francisco food markets: "the markets of no other city approach them...here strawberries may be bought twelve months a year."⁷⁷ However, strawberries took on a specialized role in race relations in the Far West. White growers from the 1860s forward often leased land to or sharecropped with Chinese immigrants to grow strawberries, raspberries, blackberries, and loganberries because they considered berry production too menial, tedious, and difficult to do.⁷⁸ Seventeen percent of Santa Clara County's Chinese residents grew strawberries in 1870, which dipped to 13.4 percent in 1880. As historian Cecilia M. Tsu pointed out, many more Chinese residents were involved with strawberry production and trade than the census

⁷⁵ Cecilia M. Tsu, *Garden of the World: Asian Immigrants and the Making of Agriculture in California's Santa Clara Valley* (New York: Oxford University Press, 2013), 17-18, 29.

⁷⁶ Cherny and Issel, *San Francisco*, 22.

⁷⁷ Samuel Bowles, *Our New West. Records of Travel Between the Mississippi River and the Pacific Ocean.* (Hartford, Connecticut: Harford Publishing Co., 1870), 348.

⁷⁸ Tsu, *Garden of the World*, 28-32.

counted because harvest seasons required substantial numbers of pickers. Chinese dominance in local, California strawberry production was attested to by a boycott instituted in 1886. The Santa Clara County Boycott Committee, the Federated Trades and District Assembly No. 53 of the Knights of Labor, and the anti-Chinese leagues of San Francisco attempted to “confer” with owners of land leased to Chinese farmers “on the subject of substituting white help,” to no avail.⁷⁹ Instead, since “the strawberry crop of California [was] raised and picked almost exclusively by Chinamen,” the groups appealed to Californians state-wide, asking them to not purchase any strawberries not known to be picked by white persons (which, of course, was virtually all of them).⁸⁰

Sharecroppers and lessees grew berries in fields solely dedicated to their culture and interplanted with other crops such as onions.⁸¹ Strawberries required constant cultivation—hoeing six or seven times during the year, irrigation, and the planting of 15,000 to 16,000 vines per acre.⁸² But the manuring that became so prevalent back East was largely absent in late nineteenth century California. Westward migrating Americans did just they had before, as Madison and others said they would—they mined the soil for nutrients without putting anything back.

Produce Farming in the Land of Promise

Samuel Bowles’s travel account included descriptions of agriculture in the late 1860s Far West. Farmers ploughed shallow, only four to six inches deep, because deeper plowing

⁷⁹ “The Strawberry Boycotted,” *New York Times*, May 16, 1886.

⁸⁰ *Ibid.*

⁸¹ Tsu, *Garden of the World*, 30-32.

⁸² *Ibid.*, 32.

evaporated moisture from the land. No manuring existed except burning straw on the ground. The stable manure of farms dried out quickly in the sun, “so that something else must take its place to keep up the fertility of the soil in California.”⁸³ Several decades later, an article in the *San Francisco Call* detailed Liebig’s scientific agriculture and the chemical necessities for adequate plant growth and production. The author found it surprising that “in California, where the elements are so kind, greater progress [had] not been made in scientific farming...Fertilizers have been but little used in California. In fact many valuable fertilizers are thrown away.”⁸⁴ Just as colonial and early American settlers saw no immediate need to preserve the life of their soils, so too, California farmers lived wastefully off the bounty of the land, not seeing an end to their prosperity in sight.

Beginning in the 1890s, however, articles started to appear on how best to manure strawberries and use other types of fertilizer. One author urged both gardeners and farmers to manure strawberry fields and patches in the fall, so that winter rains could facilitate the absorption of nutrients. As Fessenden and Pardee suggested earlier in the century, any animal manure used needed be well decomposed and fine so as not to “snow under” or “burn” strawberry plants.⁸⁵ Whether such information reached the Chinese and increasing numbers of Japanese farmers producing strawberries for market was not made clear. San Francisco newspapers ran syndicated articles on fish manure and small entries advising farmers not to

⁸³ Bowles, *Our New West*, 439.

⁸⁴ “Agriculture on the Pacific Coast,” *San Francisco Call*, March 13, 1895.

⁸⁵ “Among the Berries,” *San Francisco Call*, April 20, 1890. Snowing under literally referred to smothering strawberry plants with heavy, wet manure. Burning referred to the heat that fresh dung emitted, forcing strawberry plants to flower and fruit earlier.

mix stable manure and commercial fertilizers because they decomposed each other.⁸⁶ In the city itself, Italian immigrants and others used horse manure in gardens and barges carried urban waste to other parts of the Bay area for fertilizer. By the turn of the century, however, cheap commercial fertilizers of enhanced potency undercut the need to recycle local organic matter on both the East and West coasts. Manure contained about seventy percent water, .05 percent phosphoric acid, and 0.4 per cent potash. Compared with commercial fertilizers, “one may easily carry in a basket in one hand, more plant food in the shape of nitrogen, phosphoric acid, and potash, than [was] contained in a ton of barnyard manure.”⁸⁷ Thus, the urban-rural manure-food cycle so crucial to the success of truck farms in New York City’s hinterlands did not develop as fully in California. Technological developments allowing farmers to circumvent reliance on urban manure, and settlers’ agricultural ideologies that continually sought new and better land at the expense of the old, halted the cycle as soon as it began.

San Francisco’s market farmers did not face the same competition as New York City’s strawberry producers. Their distance from competing strawberry-growing regions and racial prejudice against the fruit of Chinese and Japanese farmers’ labors provided little pressure to industrialize in the late nineteenth and early twentieth centuries. Berries were not itemized in the fruits exported via train or steamship and the State-wide Fruit Growers’ Convention proceedings from the turn-of-the-century seldom mention berries or other small fruits associated with Chinese and Japanese growers. However, farmers’ success in growing

⁸⁶ “The Essence of Fish,” *San Francisco Call*, March 23, 1895; “On the Farms of the West,” *San Francisco Call*, March 27, 1895.

⁸⁷ “Agriculture on the Pacific Coast,” *SFC*, March 13, 1895.

strawberries in California's temperate climate eventually facilitated attempts at industry organization.

Bay-area market farmers founded the Central California Berry Growers Association in San Francisco in 1917. Strengthening of the Alien Land Act in 1920 that made land ownership or leasing nearly impossible undercut efforts by Japanese growers to organize—a void quickly filled by white landowners.⁸⁸ White farmers comprised seventy-five percent of the Berry Growers Association in 1924.⁸⁹ According to the general manager of the Association in 1925, Ernst H. Haack, the eight-year old organization was recognized by “retail dealers, commission houses, jobbers in *distant cities*, canners, and brokers...as a reliable business institution.”⁹⁰ The association also developed standardization laws that went into effect in 1920 and began concerted advertising campaigns in the San Francisco area in 1921. Many of the Issei (first-generation Japanese immigrants) who formerly leased or owned land to grow strawberries now largely sharecropped or worked as wage labor and foremen on strawberry plantations.⁹¹ With white landowners interested in the success of strawberries, researchers at Berkeley also initiated research on diseases that affected the fruit and founded new plant breeding stations (in San Jose, nonetheless). Unlike local New York

⁸⁸ Tsu, *Garden*, 130-137.

⁸⁹ Ibid, 131; Herbert E. Baum, *Quest for the Perfect Strawberry, A Case Study of the California Strawberry Commission and the Strawberry Industry: A Descriptive Model for Marketing Order Evaluation* (Lincoln, Nebraska: iUniverse, 2005), 5. The Central California Berry Growers Association was the precursor to Naturipe Berry Growers, according to former VP of Sales and CEO of Naturipe, Herbert Baum.

⁹⁰ E.H. Haack, *Central California Berry Growers Association, Inc., Annual Reports and Financial Statements for the Seasons 1920-1941*, San Francisco, California, quoted in James E. Sagen and Stephen Wilhelm, *A History of the Strawberry: From Ancient Gardens to Modern Markets* (Berkeley: University of California Division of Agricultural Sciences, 1974), 212. *emphasis added

⁹¹ Wells, *Strawberry Fields*, 111; Tsu, *Garden*, 53. Issei is the term used for Japanese immigrants.

City farmers, Far Western strawberry growers chose to adopt *all* the attributes of industrial agriculture—distant markets, division of wage labor, product standardization, expert intervention, and cooperative marketing—not to stave off competing regions and encroaching suburbs, but to expand their own operations and take advantage of a golden opportunity.

“little more than memories”

Local strawberry production for nineteenth-century urban markets was dynamic and profitable. Handsome rewards accrued to those farmers who stayed in the old states working worn-out fields and investing in their soils. As Eastern cities grew into metropolises, the industrial revolution induced transformations in the overall economy that remade and redefined American life and work, including agriculture. Providing fresh foods for burgeoning urban populations opened up new opportunities and placed unprecedented pressures on New York City’s local growers, eventually forcing them to intensify cultivation and adopt elements of industrial agriculture to compete with the economies of scale and cheaper land and labor costs of the South. In the fields that supplied San Francisco’s strawberries, truck farming did not mature into the urban-rural manure-food cycle common in the East. Technological advances severed the bond between the organic city and its food-producing hinterlands, altering agricultural rhythms and opening doors for extensive commercial growth and full-scale industrialization in the early twentieth century.

All regions—East, West, North, and South—disproportionately employed immigrants and racial minorities as agricultural laborers, planting, weeding, irrigating, and harvesting

strawberries and other truck crops. German and Irish immigrants and African-Americans appeared at the top of late nineteenth-century census rolls of farm laborers on Long Island, even as horticultural experts observed that Italians, Bohemians, and Poles did most of the strawberry picking in North Atlantic states.⁹² African-Americans, particularly women and children, performed stoop labor in the South, and Chinese and Japanese growers dominated the strawberry industry in California. However, the Far West seemed to be the only region where rigid racial divisions fell along the types of crops grown. Elsewhere, different ethnicities aided in the care and harvest of many different kinds of fruit and vegetables, participating in various stages the production process.

Agricultural industrialization transformed local food producers and their methods. Better transportation allowed strawberries grown several hundred miles away to compete in urban centers alongside those crops grown within a day's wagon journey. Market garden farmers within New York's orbit faced the onslaught of suburbanization as San Francisco's strawberry suppliers industrialized and expanded production. The subsequent increase in available fruits and vegetables decreased prices for consumers and made once-luxury items available to the wage-earning lower classes. But cheaper prices and larger volumes of food had its setbacks. As an article from the turn of the century put it, "nobody can question the assertion that seasons have been lengthened and diversity increased at a considerable cost of

⁹² Linder and Zacharias, *Of Cabbages*, 91-95, 310; S.W. Fletcher, *Strawberry-Growing* (New York: The Macmillan Company, 1917), 164.

merits which are now little more than memories.”⁹³ The process that extended those strawberry seasons and decreased their “merits” is the subject of the next chapter.

⁹³ “Topics of the Times,” *New York Times*, August 20, 1900.

CHAPTER 2—FROM LADY THOMPSONS TO KLONDIKES: INDUSTRIAL STRAWBERRY PRODUCTION IN CHADBOURN, NORTH CAROLINA

Chadbourn, North Carolina, annually traded its tranquility and relative isolation for the hustle and bustle of the spring strawberry trade. The “famous strawberry section of North Carolina” housed some of the country’s largest berry markets during the first decade of the twentieth century.⁹⁴ Farmers’ success in growing and shipping the sweet, little, red fruit drew dozens of well-dressed, Northern commission men with money to spend. Strawberry commerce fueled the building of storage sheds, a crate factory, and large ice houses, the latter owned and operated by the Chicago-based Armour’s Fruit Growers Express Company. Yet such a scene could not have been fathomed just twenty years earlier.

Chadbourn had differed very little from most small towns in the southeastern United States in the 1880s. The village sat nestled in the pinelands of the coastal plains and depended on lumber for its existence. Companies turned pine stands into shipbuilding supplies—tar, turpentine, and resin—or housing materials for the country’s burgeoning cities, providing jobs for a sparse rural population. But changes to the town were coming soon and fast. Strawberry farming’s swift introduction in the 1890s brought schools, churches, and businesses to an area previously dominated by lumber operations and plantations. At its height in 1907, 1,623 railcars containing 347,000 strawberry crates shipped to cities across the North.

⁹⁴ “Watermelons Here Two Weeks Early,” *New York Times*, April 24, 1921.

The success was short lived, though. Labor shortages, the arrival of strawberry bud weevils, and federal subsidizing of cotton and wheat for the war effort in the 1910s decimated Chadbourn's strawberry industry. The 1920s saw renewed interest and production of the crop, but at levels half of what they had been in 1905. Despite further efforts at product standardization and marketing starting in 1930, Chadbourn would never again attain its former prominence in the national strawberry trade.

Several intertwined stories transpire in this chapter. One details the possibilities and transformation of deforested Southern landscapes, which became ever-more prevalent in the late nineteenth and early twentieth centuries during the apex of longleaf pine timbering. Another outlines the provincial tale of Chadbourn's rise from a lumber hamlet to a strawberry producing powerhouse and its subsequent fall to a middling supplier of the fruit. More pertinent to the broader questions and themes of this thesis, however, are the national and international phenomena that Chadbourn both represented and was enmeshed within. The town emerged as an important distant supplier of strawberries to Northern cities, including New York, due to the expansion of railroads and opportunities that agricultural industrialization offered to an economically depressed region. This small Southern town provides a case study of the processes that enabled farmers from hundreds of miles away to compete with local urban market producers throughout the Gilded and Progressive Eras. Industrial strawberries, like those grown in and around Chadbourn, and their attendant problems derived from five specific phenomena: distant markets, division of wage labor, product standardization, expert interventions, and cooperative marketing efforts.

Environmental historians Ted Steinberg and John Perkins each provide models for agricultural industrialization at the turn of the twentieth century. As railroads connected rural regions and urban centers more effectively and cities exploded with new immigrants working in manufactories, unprecedented opportunities arose for American farmers. The ripple-effect of the industrial revolution induced significant changes in food production. Extensive fields of truck produce were economically viable where land and labor cost little (i.e. the American South). Common practice for farmers selling to distant urban markets soon entailed single-variety, high-quality produce. Commercial specialization in fruit required vast inputs of unskilled, manual labor at certain junctures, leading to a division of labor within a wage-based system. Government experts housed at land-grant universities such as the North Carolina State College of Agriculture and Engineering or within the United States Department of Agriculture aided farmers by breeding improved genetic fruit strains and combating bugs and blight. And cooperative advertising emerged in major fruit and vegetable growing areas to ensure quality and bring the highest price for crops. Chadbourn's strawberry growers, like their counterparts in Central California, adopted all of these elements. The story of how and why they took on the attributes of industrial agriculture furnishes a window onto how the industrial process worked.⁹⁵

⁹⁵ Ted Steinberg, *Down to Earth: Nature's Role in American History* (New York: Oxford University Press, 2002), 175-189; John H. Perkins, *Insects, Experts, and the Insecticide Crisis: the Quest for New Pest Management Strategies* (New York: Plenum Press, 1982), 15-23; Steven Stoll, *The Fruits of Natural Advantage: Making the Industrial Countryside in California* (Berkeley: University of California Press, 1998), 94-102.

When Timber Falls

Columbus County, North Carolina's main industry in the late nineteenth century was lumber. Railroads established circa 1850 provided access to the entire east coast for longleaf pine timber and related products. The Chadbourns, a prominent Wilmington, North Carolina, lumber family, purchased ten thousand forested acres south of Columbus County's rail-line around 1880. They built a lumber mill, which provided the economic basis for the village of Timberville and established the Chadbourn Lumber and Rail Company in 1882. Chadbourn Lumber and Rail built tracks south from Timberville to the South Carolina border to haul logs, and encouraged the incorporation of the hamlet under the name "Chadbourn" in 1883. One of the newly appointed town commissioners, the ambitious twenty-one year old J. A. Brown, provided the railroad its crossties and the passing locomotives' their needed water and wood. Brown later opened a hotel and store and continued as an agent for economic growth in the community.⁹⁶

⁹⁶ Strole, *Chadbourn*, 4-5, 9-10, 14, 46; "Wilmington Markets," *Wilmington Post*, May 22, 1881; "Arrival And Departure Of The Mails Under The New Arrangement, Which Went Into Operation, 1st March 1852," *Wilmington Daily Journal*, January 27, 1854; "General Superintendent's Office: Wilmington, Columbia, & Augusta Rail Company, Night Express Train (Daily)," *Wilmington Post*, January 2, 1881; David H. Armstrong III, *Dictionary of North Carolina Biography*, ed. William S. Powell (Chapel Hill: University of North Carolina Press, 1979), s.v. "Chadbourn, James Harmon"; Jas. H. Chadbourn, Jr. to To Whom It May Concern, August 28, 1899, Brown Family Papers, Southern Historical Collection, Wilson Library, University of North Carolina at Chapel Hill (hereafter cited as Southern Historical Collection); Ann Courtney Ward Little, ed., *Columbus County North Carolina: Recollections and Records* (Whiteville: Columbus County Commissioners and Columbus County Public Library, 1980), 206; The Brown Hotel photograph, Folder 1, Catherine and Robert Yates Collection on Chadbourn, North Carolina, Southern Historical Collection; J. A. Brown Mercantile and office, East Railroad Avenue, Folder 3, Catherine and Robert Yates Collection on Chadbourn, North Carolina, Southern Historical Collection; James A. Rogers, ed., *Columbus County North Carolina 1946: A review of Columbus County from an historical, agricultural, commercial, industrial, municipal, and photographic standpoint* (Whiteville, NC: The News Reporter, 1946), 47.

Once the Chadbourns exhausted their lumber supply, they sought another way to keep the mill running profitably. The most readily available and prolific resource grew in rows throughout the countryside: cotton. Soft, white bolls could be turned into linens or towels by simply modifying the lumber mill's equipment. Easy access to raw materials did not suffice to keep the enterprise running, however. A single rail accident in the early 1890s that destroyed large amounts of equipment closed the mill and forced the Chadbourns back to Wilmington.⁹⁷

The lumber mill's failure in the early 1890s left the young town of Chadbourn with scarce economic opportunities and a barren, cutover landscape. Soon all that would change. Local business man and commissioner J.A. Brown discovered something during a trip to Louisiana's Tangipahoa Parish that would change the course of Chadbourn's history: he found strawberries growing successfully on cutover timberlands. Growers in Tangipahoa Parish began cultivating strawberries when local timber and sawmill businesses died out. Chicago's Illinois-Central Railroad formed the parish in the 1860s out of two others that its rail-lines cut across. Investors promoted strawberries as a shippable commodity and enticed Midwesterners and recent European immigrants (Italians, Hungarians, and Germans) to move south to the new strawberry fields. Migrant white laborers harvested the berry crop in the spring, working alongside African-Americans from sawmill towns in Louisiana and

⁹⁷ Strole, *Chadbourn*, 7; Jas. H. Chadbourn, August 28, 1899, Brown Family Papers, Southern Historical Collection; "Wilmington Markets," *Wilmington Post*, May 22, 1881; William E. Worth to J.A. Brown, April 12, 1910, Brown Family Papers, Southern Historical Collection; George P. Cotchett to Hon. J.A. Brown, October 16, 1914, Brown Family Papers, Southern Historical Collection; Alexander Sprunt and Son to J.A. Brown, October 15, 1914, Brown Family Papers, Southern Historical Collection.

Mississippi. Deep South strawberries shipped in large quantities to Chicago, New Orleans, and other Southern cities. Tangipahoa's visible success and the parish's similarities to Chadbourn—railway access, cutover land, and potential supplies of migrant labor—convinced J.A. Brown that strawberries were the town's future.⁹⁸

Brown devised a plan that would not only spur the town's agricultural growth, but that would enshrine him as a founding father. His family papers reveal a man who travelled far and wide by rail, solidifying business contacts and building a commercial empire in the Carolina border belt. Sometime in the early-to-mid 1890s Brown visited the nation's booming agricultural metropolis, Chicago, where he met with Howard & Wilson Publishing Company, proprietors of *Farm, Field, and Fireside: The Western Rural*. Their meeting resulted in the establishment of the Sunny South Colony Department with Howard & Wilson as financiers and Brown as the local manager.⁹⁹ Brown cemented Chadbourn's future by purchasing large tracts of cutover timberland for the company. He subdivided acreages for sale, marketing forty acre parcels to growers and investors. Excursion trains, starting in 1895, brought potential landowners to assess the development, with some two hundred fifty families coming and around one hundred sixty staying to work the land. By 1897, people had built homes, initiated community institutions, and harvested strawberries for shipment.¹⁰⁰

⁹⁸ Strole, *Chadbourn*, 11; Jack Temple Kirby, *Rural Worlds Lost: The American South 1920-1960* (Baton Rouge: Louisiana State Press, 1987), 44; John V. Baiamonte, *Immigrants in Rural America: A Study of the Italians of Tangipahoa Parish, Louisiana* (New York: Garland Publishing, 1990), 31-96.

⁹⁹ J.A. Brown to Minnie McIver, December 23, 1897, Brown Family Papers, Southern Historical Collection; J.A. Brown to Minnie McIver, November 5, 1897, Brown Family Papers, Southern Historical Collection.

¹⁰⁰ Strole, *Chadbourn*, 11-12, 14, 26, 31-32, 34, 40; "Washington Avenue," *Truckers' and Planters' Journal*, May 1902; "Broadway News," *Truckers' and Planters' Journal*, May 1902; Sunny South

The location of the Sunny South Colony's parent company in Chicago sheds light on its interest and understanding of relocating farmers in the 1890s. Agricultural turmoil throughout the decade prompted varied responses from U.S. farmers, including expanded production and relocation to different geographic areas. Both Southern and Midwestern farmers faced falling crop prices worldwide due to overproduction of staples (corn, cotton, wheat) and a national economic depression that undercut urban purchasing power. Adding to their woes were problems involved in the transportation of commodities. Railroads held the monopoly on market transportation, making rate hikes and collusion between railroads, exchanges, and corporations endemic. Coupled together, decreasing incomes and increasing costs induced farmers to political action. Grassroots organizations like the Grange movement coalesced as early the 1870s and grew into a large, national political movement by the 1890s known as the People's Party or Populists. At the center of Populist criticisms stood Chicago: home of commodities markets, agricultural corporations, and gateways to the East and West. Howard and Wilson Publishing Company's investment in a small-fruit producing settlement far from Midwestern tensions thus reflected the pressures and sentiment of the times. The Sunny South Colony developed directly as a result of agricultural overproduction and farmers' nationwide agitation.¹⁰¹

Excursion Train, 1895, Folder 10, Catherine and Robert Yates Collection on Chadbourn, North Carolina, Southern Historical Collection; Little, ed., *Recollections*, 207, 209; Rogers, ed., *Columbus County North Carolina 1946*, 21.

¹⁰¹ James M. Beeby, *Revolt of the Tar Heels: The North Carolina Populist Movement, 1890-1901* (Jackson, MS: University of Mississippi Press, 2008), 10-26; William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W.W. Norton & Company, 1991), 137-139, 141-143, 359-365.

Chicago came into its own as an entrepôt of natural resources and commodities following the Civil War, due to the expansion of railroads. William Cronon has demonstrated Chicago's centripetal force over the American West in *Nature's Metropolis*, where he argued that the city and its countryside (both human and physical) could not be separated. Cronon looked to the Great West as Chicago's primary hinterland, but Chadbourn's strawberry story expands the geography of the city's capital to the South and East. It finds the growing city's influence and reach far from the expanses of the prairie, Plains, and Rocky Mountain states. Chadbourn's early development as a truck crop capital thus adds nuances to Cronon's thesis by demonstrating Chicago's sway in areas seemingly beyond its periphery.¹⁰²

Southern strawberry production, related truck crops, and the society they produced lay outside the scope of *Nature's Metropolis*. Yet the city's fingerprints cover the countryside. The Louisiana strawberry farms that convinced J.A. Brown to experiment with the fruit in Chadbourn sprang from Illinois-Central Railroad investments in the late 1860s. Chicago firms financed Chadbourn's first economic boom in 1895 and caused one of its largest economic disasters—the 1905 refrigerator car crisis, which will appear later in this story. Howard and Wilson Publishing, the Chicago company that backed the Sunny South Colony, invested in similar farming experiments in South Carolina and California. East and West, North and South, in the late nineteenth century all roads led back to Chicago—including Chadbourn's.

¹⁰² Cronon, *Nature's Metropolis*, 5-19.

Moving to Chadbourn

Would-be farmers from all over the United States migrated to the Sunny South Colony. A son of one of those hopeful farmers, Homer Case, recounted his family's journey:

My folks were farmers in Grand Lodge, Michigan in 1895. In a monthly magazine, 'Farm, Field, and Fireside,' they came across an advertisement put in by the Atlantic Coastline Railroad about the Sunny South Colony which comprised a large tract of land at Chadbourn, North Carolina. The railroad ran an excursion train to Chadbourn in the spring of 1895 and two car loads of prospectors took advantage of this excursion. My father was one of them and he bought a piece of land and moved on it that fall, Nov. 6, 1895. I was 11 years old at that time.¹⁰³

Other personal accounts of the "colonists" and their descendants abound. Jessie Thompson Anderson recounted leaving the alfalfa fields, butter churns, cattle, and horses of Watrous, New Mexico to arrive at the Sunny South Colony in 1896. Edna Fea Stevens described leaving Michigan on March 25, 1898 and arriving via covered wagon in Chadbourn on June 29.¹⁰⁴ Merle Penn recalled the successive drought and crop failures of Schuler, Nebraska that encouraged her father to look elsewhere for farmland:

The farmers in our section were desperate...about that time my father read the glowing accounts of The Sunny South Colony in the vicinity of Chadbourn. He read in 'Farm, Field, and Fireside,' a farm paper, about the good land, the middle climate and abundant rainfall, and the money people were making growing strawberries in this section.¹⁰⁵

The Penn family move was also supported by Merle's mother who believed a mild and sunny climate would help Jennie, their other daughter, cope with asthma. A November 1897 letter from J.A. Brown to his future wife also mentioned two Iowa and two Illinois parties arriving on the train. Each of these accounts attested to the power of periodical advertising to instigate

¹⁰³ Strole, *Chadbourn*, 32.

¹⁰⁴ Strole, *Chadbourn*, 34-35.

¹⁰⁵ Strole, *Chadbourn*, 29.

action and the willingness of Americans to uproot their families in search of economic opportunity. Such stories revealed the pull of a warmer climate that could bring success and prosperity to farmers in the throes of severe economic depression.¹⁰⁶

Farmers' dissatisfaction with their circumstances worked in tandem with European immigration to draw farmers to Chadbourn's strawberry colony. An exchange of letters between *Farm, Field and Fireside* and two "Austmans,"¹⁰⁷ Anton Logar and Chas. Serticher, demonstrated how recent immigrant groups relied on their fellow countrymen and the printed press to search out business opportunities. Logar and Serticher forwarded an inquiry regarding the land around Chadbourn to the magazine. Family members of the two men had recently purchased plots in the Sunny South Colony and informed others in their ethnic community about the high-quality land. Logar and Serticher made a proposal to *Farm, Field, and Fireside*: if the company desired, they would translate the Colony's prospect book into "Slavenic," the language of their people, and advertise the Colony in their people's newspapers. The two American-Austman newspapers, published respectively in New York City and Tower, Minnesota, reached a large percentage of the roughly fifty thousand-person ethnic group. Other fraudulent land companies had swindled some of Logar and Serticher's countrymen through language barriers because the majority of Austmans did not speak

¹⁰⁶ Strole, *Chadbourn*, 29; J.A. Brown to Minnie McIver, November 04, 1897, Brown Family Papers, Southern Historical Collection.

¹⁰⁷ "Austman" is consistently equated with Austrian in the *New York Times* archive. Given these men's Slavic language and identification of a Carmolia state from whence their people came, I will assume that "Austmans" are emigrants from the Austro-Hungarian empire. I will continue to describe them as Austmans—the name they gave themselves—but without quotation marks, in order to prevent confusion of their ethnicity with German speaking, Austrian-Austro-Hungarians.

English.¹⁰⁸ *Farm, Field, and Fireside* responded with interest, but the final outcome has been lost to the historical record. Small, rural Chadbourn clearly exemplified the intertwined trends of Southern and Eastern European immigration, population growth, and American internal migration during the late nineteenth century.¹⁰⁹

As people and their families moved to Chadbourn's Sunny South Colony, established homes, and planted strawberries, they invested their hopes, dreams, and labor in the crop. Success or failure meant the difference between a new life in a warmer climate or another move. For many, strawberry cultivation required learning new methods of farming and adjusting to different seasons of planting and harvest. Those changes and adaptations were well worth the effort. Strawberries and other truck crops brought handsome profits to growers and commission men and provided annual wages to a regional populace plagued by debt-peonage.

Shipping Berries North

Commercial strawberries grew intensively, not extensively. Vast acres of Lady Thompsons could prove unprofitable failures because of the amount of labor needed to grow and harvest the crop. Smaller acreages, ranging from one to ten acres, produced sufficient numbers of strawberries to be profitable while requiring less labor. According to Albert E. Wilkinson, an instructor and horticultural investigator at the New York State College of

¹⁰⁸ Anton Logar and Chas. Serticher to Jas. W. Wilson, Esq., Gen'l Manager of the Farm, Field, and Fireside Homeseekers Dept., August 22, 1898, Brown Family Papers, Southern Historical Collection.

¹⁰⁹ Howard and Wilson Publishing Company to Anton Logar, September 01, 1898, Brown Family Papers, Southern Historical Collection; Jas. W. Wilson to Senator J.A. Brown, September 01, 1898, Brown Family Papers, Southern Historical Collection.

Agriculture at Cornell University, 12,000 “pedigreed plants” costing \$6 per thousand was the average number one could expect to plant on an acre. A fair yield amounted to 8,000 quarts per acre or 250 crates, each crate wholesaling for \$2.¹¹⁰ Professor S. W. Fletcher, in 1917’s *Strawberry-Growing*, gave the range of one-to-three cents per quart as the cost of strawberry picking labor, with the standard price in most sections being two cents per quart.¹¹¹ Total average cash outlay for the landowner amounted to \$362.85 per acre. Subtracting overall costs left \$137.15 profit at wholesale for the 250 crates. Retail fetched even higher prices, 12 cents per quart, and left the model farmer with \$597.15 profit per acre.¹¹²

Growers and their fieldworkers planted strawberries in straight, long rows of soil hills several feet apart. Pine straw was the bedding of choice in Chadbourn and the Carolinas due to the abundance of longleaf pine needles in surrounding forests.¹¹³ Farmers seldom cultivated strawberries solely. Many practiced what Richard Pardee had suggested in the mid-nineteenth century, intercropping. Different kinds of living mulches in between strawberry rows suppressed weeds, kept strawberry plant runners from growing, reduced disease and insect pests, reduced labor input, and enhanced the nutrient content and biomass of the soil. Types of mulch and companion crops ranged from crabgrass to cabbage to

¹¹⁰ Albert E. Wilkinson, *Modern Strawberry Growing* (New York: Doubleday, Page & Company, 1913), 134.

¹¹¹ Fletcher, *Strawberry-Growing*, 172.

¹¹² Wilkinson, *Modern Strawberry Growing*, 137-138.

¹¹³ “Chadbourn Will Again Be World’s Largest Market,” *The Columbus News*, May 13, 1925; “Chadbourn: Agriculture: Strawberries: Strawberry Fields print 1,” Folder 0030, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; “Chadbourn: Agriculture: Strawberries: Strawberry Fields print 2,” Folder 0030, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; Fletcher, *Strawberry-Growing*, 49-51, 116-118; Strole, *Chadbourn*, 26, 32; “Labor For Berry Fields,” *Columbus News*, May 13, 1925.

tomatoes and potatoes. Use of living mulches combined with strawberries' early harvest season and restricted acreage allowed farmers to raise other truck and cash crops.

Cucumbers, watermelons, cantaloupes, Irish potatoes, lettuce, beans, and (later) tobacco all appeared in newspaper advertisements and reports alongside strawberries.¹¹⁴

Chadbourn experienced a thousand-fold increase in strawberry crate shipments between 1897 and 1898. Eastern Carolina Truck and Fruit Growers Association logs from 1898 dedicated a separate page to Chadbourn's refrigerator railcar freights, due to the considerable volume. The logs detailed the number of truck crates, meaning packed fruit and vegetables awaiting shipment, as well as their prices and destinations, which included: Boston, Providence, New York, Philadelphia, Newark, Baltimore, Pittsburg, Chicago, Cleveland, and Detroit. An Association representative stationed at Rocky Mount, North Carolina, kept records on every car shipping north. The representative also ensured that refrigerated cars received proper icing, left according to schedule, and distributed strawberry crates according to daily market reports from Northern cities. The Growers Association's ultimate responsibilities entailed protecting truck farmers' interests, recording their claims, and keeping them abreast of market conditions. J.A. Brown, the local manager of the Sunny

¹¹⁴ Ibid; "Height Of Lettuce Season," *Wilmington Morning Star*, May 3, 1914; "Crops Looking Well in Clarkton Section," *Carolina Fruit and Truckers Journal*, May 7, 1926; J.A. Brown to Minnie Brown, June 23, 1906, Brown Family Papers, Southern Historical Collection; Rogers, ed., *Columbus County North Carolina 1946*, 44; B.C. Ellis to J.A. Brown, February 28, 1908, Brown Family Papers, Southern Historical Collection.

South Colony, served as chairman of the Association's executive committee as early as 1897, ostensibly to promote and protect his strawberry interests.¹¹⁵

Gatherings of strawberry crate-laden wagons alongside Chadbourn's railroad tracks appear in the earliest photographs of the town's strawberry market. Initially berries sold and shipped on consignment. Companies from Northern cities sent agents or hired local men to purchase strawberries. These men received their payment based on the quantity, quality, and price of berries that arrived at urban markets. Advertisements of commission merchants and the companies they represented filled local newspapers at the turn of the century. One such middle man was Robert E. Lee Brown, J.A. Brown's brother. He worked for multiple Northern firms, including: W.N. Gleason & Co. of Worcester, Massachusetts; WM. Sweet & Son of Providence, Rhode Island; and York & Whitney of Boston, Massachusetts. Clearly, Chadbourn's strawberry growers and commission men fully embraced a critical aspect of industrial agriculture—distant markets.¹¹⁶

¹¹⁵ Rogers, ed., *Columbus County North Carolina 1946*, 21; Eastern Carolina Truck and Fruit Growers Association, Rail Road Freights In Refrigerator Cars From—Chadbourn, N.C. 1898, June 18, 1898, Miscellaneous Materials, Brown Family Papers, Southern Historical Collection; "Railroads And Armour Liable, For Failure To Furnish Berries. Crop is Half Gone," *Raleigh News and Observer*, May 10, 1905; J.A. Brown to Minnie McIver, June 05, 1897, Brown Family Papers, Southern Historical Collection.

¹¹⁶ Little, ed., *Recollections*, 209; "Chadbourn: Agriculture: Strawberries: 'Selling Strawberries,'" Folder 0028, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; Strole, *Chadbourn*, 17-18; "Commission. W.N. Gleason & Co., Wholesale Dealers in Fruit & Produce.," *Truckers' and Planters' Journal*, 1902; "WM. Sweet & Son Wholesale Commission Merchants. Fruit and Produce.," *Truckers' and Planters' Journal*, 1902; "York & Whitney, Fruit And Produce Commission Merchants," *Truckers' and Planters' Journal*, 1902.

Strawberry Workers

In order to ship refrigerator cars full of strawberry crates north, berries had to be harvested. Gathering the delicate fruits required large amounts of inexpensive, wage labor. Thousands of African-American field workers came to the Sunny South Colony to pick strawberries every spring. Contemporary photographs pictured fields full of black women and children stooped over and bent down, expending energy under the watchful eye of white overseers.¹¹⁷ “Ten thousand hands have been imported here to pick the berries, and they are at work receiving on an average \$1 per day...Legions of negroes have thronged here to pick and handle the crop,” reported the *Raleigh News and Observer* in May 1905. The article suggested that black strawberry pickers came both by their own means and at the behest of growers to work in Sunny South Colony fields. Strawberry production peaked in 1907. That year, the largest single day’s shipment, 180 cars holding 36,000 crates, required fifteen thousand harvesters—half the population of Columbus County. African-American wage laborers travelled to Chadbourn from surrounding counties in North and South Carolina.

Once picked, white women stacked strawberry quarts three high, four across, and two deep in wooden crates for shipment.¹¹⁸ Hired hands picked and local women packed the berries for white male landowners to haul to the rail station. There, Northern middlemen

¹¹⁷ “Chadbourn: Agriculture: Strawberries: ‘Picking Strawberries’ circa 1900,” Folder 0075, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives, Wilson Library, University of North Carolina at Chapel Hill (hereafter cited as North Carolina Collection Photographic Archives).

¹¹⁸ “Chadbourn: Agriculture: Strawberries: ‘Herman Blake (?) Packing Shed’ circa 1930s,” Folder 0017, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; “Chadbourn: Agriculture: Strawberries: ‘Packing Strawberries’ circa 1900,” Folder 0024, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives.

purchased the crates or placed bids for them in an auction, after which the farmer turned responsibility for the strawberry cargo over to the railroad station agent.¹¹⁹ Here the division of labor within a wage-based system emerged as a prominent feature of strawberry farming, facilitating efficient production and transportation of the crop.

The race and gender hierarchies clearly displayed in divisions of strawberry labor were not unique to Chadbourn or the American South. As seen in the story of California's early strawberry industry in the last chapter, racial minorities often performed the tedious and grueling tasks associated with raising strawberries. White landowners, particularly women and widows, leased land to recent immigrants and minorities as a mode of income that allowed a distancing of themselves from both the business transactions and the physical, stoop labor that contemporary class and gender norms deemed taboo. Around New York City and other urban centers, disproportionate numbers of immigrants and African-Americans worked in truck crop fields. Strawberries, therefore, not only enriched white landowners, but required the toil of ethnically diverse laboring masses. As such, the fruit represented the social, cultural, and economic structures of a nation in transition.¹²⁰

¹¹⁹ Strole, *Chadbourn*, 12; "Losses About Chadbourn: Detail Of The Immense Damage Caused By Lack Of Cars," *Raleigh News and Observer*, May 9, 1905; Speech by Minnie Brown, 1935, Brown Family Papers, Southern Historical Collection; "Strawberries: Scan 1," Folder 0288: Columbus County, Series 1. Photographic Prints, circa 1850-1990, Subseries 1.24. Columbus County, North Carolina County Photographic Collection, circa 1850-1990, Digital North Carolina Collection Photographic Archives, University of North Carolina at Chapel Hill; Little, ed., *Recollections*, 211; "Half A Million, This Wouldn't Cover Losses About Chadbourn: An Unheard of Situation Caused By Lack of Cars to Move Strawberries, Dumping Car Loads Into River," *Raleigh News and Observer*, May 7, 1905; "Railroads And Armour," *N&O*, May 10, 1905.

¹²⁰ Cecilia M. Tsu, *Garden of the World: Asian Immigrants and the Making of Agriculture in California's Santa Clara Valley* (New York: Oxford University Press, 2013), 28-32, 35-36.

Standardization

Strawberry growers standardized the berry varieties grown in Sunny South Colony fields from inception. In doing so, they signaled their intent to become large-scale, industrial producers of the crop. Official letterhead used by J.A. Brown advertised in 1898 that he had two million Lady Thompson strawberry plants for sale.¹²¹ By the 1920s, Klondike strawberries supplanted Lady Thompsons as the main variety grown in and around Chadbourn. S.W. Fletcher, Professor of Horticulture at Pennsylvania State College, described Lady Thompsons in his 1917 *Strawberry-Growing* as “a [one-time] standard variety in the South for shipping to northern markets.” They originated in Mount Olive, North Carolina in 1894; hence the variety’s prominence in Sunny South Colony fields.¹²² Klondike strawberries developed in the Tangipahoa Parish in 1901 and quickly became the favored strawberry for northern markets. “It is a superb shipping variety, of good size and attractive appearance...the blossoms are protected from frost by the foliage,” according to Fletcher. Chadbourn’s strawberry growers switched to Klondikes by the 1920s because of the poor carrying quality of the Lady Thompson strain. Carrying quality denoted how well the fruit held its ripeness, shape, color, and flavor during shipment. Strawberries with poor carrying quality did not meet urban consumers’ expectations after transport. Less prolific than its

¹²¹ J.A. Brown to Minnie McIver, May 21, 1898, Brown Family Papers, Southern Historical Collection.

¹²² S.W. Fletcher, *Strawberry-Growing* (New York: The Macmillan Company, 1917), 305.

predecessors, Klondike strawberry plants grew larger, prettier berries that brought higher prices in Northern markets.¹²³

Adherence to a single breed of strawberry in certain locales or for certain markets became customary as strawberry production expanded and commercialized nationwide.

Professor Fletcher again provided insight from the time:

As competition increases, the necessity for standardization of varieties becomes more imperative. In recent years, the number of varieties that are grown for the general market at any one shipping point has been much reduced. A car of a single variety commands the attention of buyers more than a car of several varieties.¹²⁴

Strawberry-Growing's survey of different strawberry types listed seventeen as "noteworthy varieties," including Klondikes, while over forty were listed as "less prominent varieties" including Lady Thompsons. Standardization not only occurred with strawberries.

Environmental historians John Perkins and Ted Steinberg chronicled the same process of declining genetic variety with increased apple and pear production, respectively, throughout the late nineteenth and early twentieth centuries.¹²⁵ Chadbourn's small fruit businesses thus followed closely the practices and patterns of industrial agriculture in other important growing regions of the United States.

¹²³ Fletcher, *Strawberry-Growing*, 296; Rogers, ed., *Columbus County, North Carolina 1946*, 22; The Agricultural Experiment Station of the North Carolina State College of Agriculture and Engineering and North Carolina Department of Agriculture, Bulletin No. 320, *Breeding New Strawberry Varieties* (Raleigh, 1939), 2.

¹²⁴ Fletcher, *Strawberry-Growing*, 290.

¹²⁵ Perkins, *Insects*, 15-18; Steinberg, *Down to Earth*, 180.

A Bust Amid the Boom

Chadbourn's economic growth relied on mutually dependent parties and processes to succeed. The slightest hitch in any facet of production or transportation to market could cause major problems for growers, wage labor, commission men, railroads, and end consumers. One such mishap occurred in May 1905. A headline of the May 7th edition of the *Raleigh News and Observer*, North Carolina's most prominent newspaper, read: "Half A Million, This Wouldn't Cover Losses About Chadbourn: An Unheard of Situation Caused By Lack of Cars to Move Strawberries, Dumping Car Loads Into River." Three days later another *News and Observer* headline reported: "Three Millions Lost on Berries, Train Loads Reach New York Rotten. The Armours Blamed."¹²⁶

At the height of the season, strawberry crates piled alongside Chadbourn's railroad tracks for a week. Refrigerated railcars used for shipping perishables were in short supply and rail congestion around Washington, D.C. prevented quick solution of the crisis. The firm handling local strawberry shipping contracts, Armour's Fruit Growers Express Company, underestimated the size of the Southern strawberry crop and allegedly had its iced cars bringing Oregon apples east. While western farmers succeeded in trucking their crisp, sweet produce to market, Chadbourn's townspeople dealt with the stench and potential health hazard of berries rotting in the hot, Southern sun.¹²⁷

¹²⁶ "Half a Million, *N&O*, May 7, 1905; "Three Millions," *N&O*, May 10, 1905.

¹²⁷ "Relieving The Famine In Cars, Refrigerator Cars Moving at Last. Huge Losses In Belt," *Raleigh News and Observer*, May 9, 1905; "Three Millions," *N&O*, May, 10, 1905; "Losses About Chadbourn," *N&O*, May 9, 1905; Little, ed., *Recollections*, 210; Rogers, ed., *Columbus County North Carolina 1946*, 22.

Local people eventually loaded the decaying berries onto sixty-two freight cars and dumped them into nearby White Marsh Swamp. Other crates shipped in non-refrigerated box cars, arriving at their respective locales spoiled. The Pennsylvania Railroad Company condemned eleven railcars of Chadbourn strawberries and Jersey City dumped all of their received fruit into Jersey Meadows. Armour's Fruit Growers Express Company, headquartered in Washington, but Chicago-controlled, reimbursed Chadbourn's farmers \$2.00 per crate. The market would have given them \$4.00. Needless to say the event disheartened many involved with the industry.¹²⁸

Railroads created the necessary connections for Chadbourn's economic growth, but forced dependence on their hauling monopoly became a major source of contention due to the refrigerator car crisis. Commission agents, along with growers, wage labor, and the railroads, lost considerable amounts of money and time while strawberries stacked and rotted awaiting their trains. The Atlantic Coast Line Railroad, the entity responsible for Columbus County's truck shipments, had contracted with Armour's for 1,700 refrigerator cars. By the time strawberry crates started piling along Chadbourn's tracks, only around 500 had arrived. Commission agents could not invest the \$200,000 originally allotted for strawberry purchases. Instead agents stayed in local hotels and wandered aimlessly about Chadbourn's streets, waiting for iced cars. News reports characterized the situation as a monolithic trust

¹²⁸ "Relieving The Famine," *N&O*, May 9, 1905; "Three Millions," *N&O*, May, 10, 1905; Little, ed., *Recollections*, 210; Rogers, ed., *Columbus County North Carolina 1946*, 22; "Railroads and Armour Liable, For Failure to Furnish Cars For Berries: Crop Is Half Gone," *Raleigh News and Observer*, May, 10, 1905; Associated Press, "Unfit For The Market. Carolina Berries Refused Because of Delayed Shipment—Crop Underestimated," *Raleigh News and Observer*, May 9, 1905; "Losses About Chadbourn," *N&O*, May 9, 1905; Strole, *Chadbourn*, 6; "Notice to Quit Trucking," *Raleigh News and Observer*, May 11, 1905.

doing as it pleases, unanimously blamed by commission men and sharing the fault with irresponsible railroad companies. While the Fruit Growers Express Company, Atlantic Coast Line Railroad, and Eastern Carolina Fruit and Truckers Association each sent attorneys and representatives to adjust grower claims in Columbus County, commission agents received no compensation.¹²⁹

1906 also saw a shortage of refrigerator cars, but nothing as serious as 1905. A Western Union telegram sent on May 4, 1906 from J.A. Brown to Franklin McNeill, chairman of the State Corporation Commission, informed McNeill of a shortage of cars to move strawberries and requested that the commission come to Chadbourn. McNeill immediately wired the Atlantic Coast Line Railroad's general manager in Wilmington, asking him to alleviate the shortage. The next morning Brown sent another telegram to Corporation Commissioner H.C. Brown stating, "No cars present to move fruit." Two days later, May 7, 1906, State Commissioners arrived in Chadbourn and found plenty of refrigerator cars available to ship strawberries. Recurring problems such as these continued well into the 1920s and 1930s, until automobiles and trucks became widely available and brought their own opportunities and problems to bear on the commercial strawberry industry. Correspondence between various entities over the supply of railcars, telegraph facilities

¹²⁹ "Losses About Chadbourn," *N&O*, May 9, 1905; "Three Millions," *N&O*, May 10, 1905. "Relieving The Famine," *N&O*, May 09, 1905; "Berry Cars Coming: Many Are Moving South and Armour's Agents Are Adjusting Claims," *Raleigh News and Observer*, May 09, 1905; Little, ed., *Recollections*, 210.

(controlled by the railroad company), and the icing of refrigerated cars revealed how dysfunction in an industrial system hindered and sometimes halted economic progress.¹³⁰

In 1907, the peak strawberry production year, an auction house replaced Chadbourn's consignment shipping. Berries now sold to the highest cash bidder. Eventually a two-line system developed, alternating produce for auction between the two lines of wagons and later trucks. Once purchased, a ticket detailing the number of crates, purchase price, and designated refrigerator car allowed the landowner to unload his crates and receive payment at the bank. Originally J.A. Brown processed all strawberry checks issuing forth from the

¹³⁰The citations in this footnote are individual letters and telegrams that together make up the conversations between various entities about problems with the railroads. J.A. Brown to Hon. Franklin McNeill, May 04, 1906, Case #2129, Brown and Long v. Atlantic Coast Line Railroad Co., 1906, Corporation Commission, Case Files, 1906, Chief Clerk's Office, Case Files (Docket files), Utilities Commission Record Group, North Carolina State Archives, Raleigh (hereafter cited as Case #2129, Corporation Commission, NC State Archives); Chairman Franklin McNeill to W.N. Royall, May 04, 1906, Case #2129, Corporation Commission, NC State Archives; J.A. Brown to H.C. Brown, May 5, 1906, Case #2129, Corporation Commission, NC State Archives; Chairman of North Carolina State Corporation Commission to Hon. J.A. Brown, June 11, 1906, Case #2129, Corporation Commission, NC State Archives; A.W. Anderson to Mr. J.A. Fountain, April 10, 1907, Case #2129, Corporation Commission, NC State Archives; A.W. Anderson to Mr. Franklin McNeill, April 12, 1907, Case #2129, Corporation Commission, NC State Archives; Clerk to Mr. A.W. Anderson, April 17, 1907, Case #2129, Corporation Commission, NC State Archives; A.W. Anderson to Mr. H.C. Brown, April 18, 1907, Case #2129, Corporation Commission, NC State Archives; William F. Allen & Co. to Supt. Of Transportation, A.C.L. Railway and Supt. Fruit Growers Express Co., Case #5935, William F. Allen & Co. v. Fruit Growers Express Co., 1923, Corporation Commission, Case Files, 1923, Chief Clerk's Office, Case Files (Docket Files), Utilities Commission Record Group, North Carolina State Archives, Raleigh (hereafter cited as Case #5935, Corporation Commission, NC State Archives); E. J. Roth to Mr. R.O. Self, March 9, 1923, Case #5935, Corporation Commission, NC State Archives; E.J. Roth to William F. Allen & Co., March 10, 1923, Case #5935, Corporation Commission, NC State Archives; Clerk to Dr. R.L. Carr, March 12, 1923, Case #5935, Corporation Commission, NC State Archives; William F. Allen & Co. to The Fruit Growers Express Co., March 12, 1923, Case #5935, Corporation Commission, NC State Archives; S.A. Stockard to Mr. R.O. Self, March 12, 1923, Case #5935, Corporation Commission, NC State Archives; Lyman Delano to Mr. R.O. Self, March 12, 1923, Case #5935, Corporation Commission, NC State Archives; E.J. Roth to William F. Allen & Co., March 15, 1923, Case #5935, Corporation Commission, NC State Archives; S. A. Stockard to Mr. R. O. Self, March 16, 1923, Case #5935, Corporation Commission, NC State Archives.

Sunny South Colony and local farmers, but by 1904 the volume grew too large for his capabilities. The Bank of Chadbourn opened in March 1904, with Brown as president, and that year's berry crop poured \$600,000 worth of deposits into its accounts. Throughout the rest of the decade the strawberry trade continued to fill the bank's coffers and the pockets of growers, commission men, and railroads with wealth. But the success would not last. Problems sprouting from various sources began to plague the industry in the next decade.¹³¹

Problems Take Root

Chadbourn's increasingly industrialized strawberry sector faced numerous production problems in the 1910s. Local farmers, laborers, businesses, Northern commission men, and the entities involved with transporting strawberries from Eastern Carolina to their urban destinations had grown dependent on distant markets, divisions of wage labor, and standardized products for economic success. They would soon turn to government experts and cooperative marketing to revive their stagnating strawberry enterprises. Beginning in the 1910s, a lack of available wage labor, federal interventions during World War I, and the ravages of the strawberry bud weevil drove strawberry harvests to their lowest levels since

¹³¹ Speech by Minnie Brown, 1935, Brown Family Papers, Southern Historical Collection; Strole, *Chadbourn*, 11, 17; "Chadbourn: Agriculture: Strawberries: Chadbourn Strawberry Market, 'Strawberries Going into the Market,'" Folder 0011, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; "Chadbourn: Agriculture: Strawberries: Chadbourn Strawberry Market, 'Second Strawberry Market Between Railroad Tracks,'" Folder 0011, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; "Chadbourn: Agriculture: Strawberries: 'Loading Strawberries onto Railcars,'" Folder 0011, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; "Chadbourn: Agriculture: Strawberries: 'Loading Strawberries at Chadbourn, N.C.,'" Folder 0011, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; "Relieving Famine," *N&O*, May 09, 1905.

the inception of the Sunny South Colony. Growers responded in a number of ways. Many switched to cotton and wheat with government subsidies for food and fiber staples, opening the door to newly mechanized technologies and a reduction of labor inputs. When global commodities prices collapsed in the early 1920s, however, the labor shortage handicapped farmers returning to strawberry production. The government played a pivotal role in alleviating the strawberry bud weevil crisis, as it had in the New York area in the 1880s. In 1920, the United States Department of Agriculture established a Bureau of Entomology station in Chadbourn to study insect depredations and other problems related to truck crops. Such solutions kept strawberry production from complete extirpation, but at harvest levels significantly lower than those seen during the first decade of the twentieth century.

Higher industrial wages depleted the South of much of its agricultural wage labor in the decades leading up to the Great Depression. This hamstrung not only strawberry growers, but many industries and forced farmers to choose between shrinking the size of their operations, adapting labor-saving technologies as New York City's market producers had done, or switching entirely to another crop. From roughly 1910 to 1930, thousands of African-Americans participated in the Great Migration—including those who worked in Chadbourn's strawberry fields. The onset of World War I in 1914 expanded economic prospects specifically for African-American wage labor. White Americans' ardent nationalism and fear of foreign, subversive ethnic cultures induced immigration quotas that stopped the flood of industrial workers coming from Europe. Those unfilled positions in munitions and war-related factories and the new jobs created by the economic growth of the

1920s thus became available to Southern agricultural workers. In the wake of their migration, would-be agricultural laborers left a gaping void for landowners to fill.

Chadbourn's strawberry field workers in 1925 numbered only half their population from the time of the refrigerator car crisis. That same year North Carolina's state government began responding to the labor shortage, calling for laborers to come and work in fields throughout the state.¹³²

Labor shortages were not the only factor for strawberries' initial decline in the 1910s. Federal wartime policies during World War I that advanced money to cotton planters for their crop and encouraged corn and wheat production meant that fruits, vegetables, and other non-staple crops significantly decreased in production. J.A. Brown wrote a letter to Hal Buck of Columbia, South Carolina, addressing the government subsidies. He argued that commodity gluts and other market phenomena should not be the concern of the federal government, "it is a question to be settled by the individual...we have too much paternalism." Wilmington's *Morning Star* newspaper reprinted the letter in the editorial column, eliciting several empathetic responses sent to Brown himself. George Cotchett asked, "If the government is to advance money to the cotton planters, why not to the strawberry growers et. al?" Alexander Sprunt agreed that the government should not provide relief for market problems, but that farmers should themselves adjust to the extraordinary conditions. Another letter argued the erroneous nature of "valorization" and decried government intervention as an unnatural violation of the law of supply and demand. High

¹³² "Chadbourn Will Again," *Columbus News*, May 13, 1925; "Labor For Berry Fields," *The Columbus News*, May 13, 1925; "Chadbourn Local Items And General County News," *The Columbus News*, May 13, 1925.

prices for cotton and tobacco during the war led to the smallest annual shipment of strawberries since the very early years of the Sunny South Colony, a meager two hundred cars.¹³³

Insect Infestations

Problems endemic to simplified, monocropped landscapes drove Chadbourn's growers to adopt another aspect of industrial agriculture, expert intervention. Commercial strawberry production nationwide exacerbated the spread of disease and insect pests. By the 1910s, leaf spot, powdery mildew, tarnished plant bugs, crown borers, and strawberry bud weevils, among other insect and disease threats, became persistent and costly nuisances to growers. The forests that had provided material, jobs, and the foundation of Chadbourn, harbored one of the strawberry's natural enemies: the strawberry bud weevil.¹³⁴ Closely related to the cotton boll weevil simultaneously wreaking havoc throughout Southern cotton fields, the strawberry bud weevil appeared sometime between the late 1900s and the late 1910s. A long-snouted beetle roughly an eighth of an inch long, the weevil destroyed strawberry flower buds by eating and/or laying eggs inside of them. Female adult weevils cut the stem of strawberry buds and left them dangling until they dropped to the ground. Eggs

¹³³ George P. Cotchett, October 16, 1914, Brown Family Papers, Southern Historical Collection; Speech by Minnie Brown, 1935, Brown Family Papers, Southern Historical Collection; Alexander Sprunt and Son, October 15, 1914, Brown Family Papers, Southern Historical Collection; Fst. Fechy to Hon. J.A. Brown, October 16, 1914, Brown Family Papers, Southern Historical Collection.

¹³⁴ This is the same insect that infested strawberry fields in and around New York City in the mid-1880s.

inside the detached and browning buds hatched within a week; the new grubs ate pollen inside the buds.¹³⁵

In response to crop losses in and around Chadbourn attributed to the strawberry bud weevil, the U.S. Department of Agriculture established a federal division of entomology in Chadbourn in 1920. The USDA appointed W. A. Thomas as the station's junior entomologist, tasked with work not just on strawberries, but many truck crops. Strawberry shipments in 1920 continued their decline, hovering around one hundred and fifty carloads—a far cry from the sixteen hundred carloads in the first decade of the twentieth century. It took nine years of research for Thomas to discover that strawberry bud weevils wintered in forests adjacent to strawberry patches. His control recommendation involved burning the first hundred feet of woodlands abutting strawberry fields, which destroyed nine-five percent of the pest.

Despite Thomas's prolonged investigation into strawberry weevil depredations, five years after his discovery, a front page article of the *Columbus County News* read: "It has been suggested that the growers...use weevil dust or weevil poison before the devastation becomes great."¹³⁶ What had happened to the burning that Thomas found so efficacious at ridding strawberry fields of the pests? Perhaps the practice never took root in the local community because entrenched logging interests worried about what fires might do to remaining timber stands. Professional foresters looking to restore long leaf pine ecosystems

¹³⁵ Little, ed., *Recollections*, 210; Rogers, ed., *Columbus County North Carolina 1946*, 22; Kenneth A. Sorensen, "The Strawberry Weevil," North Carolina State University, Extension Integrated Pest Management Program, http://ipm.ncsu.edu/small_fruit/Strawberry_Weevil.html (accessed March 08, 2013).

¹³⁶ "Strawberry Weevil []," *Columbus County News*, April 5, 1934.

also regarded fire as a danger to forest habitats and could have urged farmers not to adapt the practice.¹³⁷ Controlled burning may have been too costly and labor intensive for both farmers and wage-earners. The closure of the USDA's Bureau of Entomology in 1934 may also have left the region without a guide as to how to properly ignite the underbrush. Or perhaps the idea that pesticides developed in a laboratory carried special legitimacy caused farmers to switch control methods. Whatever the reason, Chadbourn's strawberry farmers quickly supplanted cultural methods of weevil control with chemical controls.

Thomas's solution to the weevil infestation, however, corroborated the advice of other horticultural experts. They recommended cultural practices like burning, mowing, and proper drainage of soils for disease and insect suppression and control, along with pesticides such as lead arsenate, paris green, pyrethrum powder, kerosene emulsion, and the bordeaux mixture (lime, copper sulfate, and hot water). Specifically for the strawberry bud weevil, clean cultural practices that included covering beds, rotating crops, ploughing or burning badly affected beds, and destroying nearby old strawberry or blackberry patches (places where the weevil reproduced) proved essential, as demonstrated by Thomas's recommendation. Professor S.W. Fletcher in 1917's *Strawberry-Growing* argued that since weevil larvae fed mainly on pollen, growing mostly pistillate varieties (those that do not

¹³⁷ Ibid; United States Department of Agriculture, *Monthly Letter of the Bureau of Entomology, Number 130* (Washington, DC: Government Printing Office, 1925), 3; "Chadbourn: Agriculture: U.S. Department of Agriculture, Bureau of Entomology & Soils, Plant Industry," Folder 0036, Print Box 01, Collection P56: Catherine and Robert Yates Collection, North Carolina Collection Photographic Archives; "Chadbourn Will Again," *Columbus News*, May 13, 1925; Speech by Minnie Brown, 1935, Brown Family Papers, Southern Historical Collection; Stephen Pyne, "Our Pappies Burned the Woods: A Fire History of the South," in *Fire in America: A cultural history of wildland and rural fire* (Princeton University Press, 1982), 143.

produce enough pollen to pollinate themselves) would help keep grub populations low. Fletcher also noted that weevil infestations occurred so sporadically that most growers “found it impracticable to spray” regularly.¹³⁸ Cornell horticultural instructor Albert E. Wilkinson observed that insecticides induced little to no harm on weevil population numbers because grubs fed inside flower buds, not on the outside. Top-dressing poisons were also useless on adult weevils because the insects did not chew their food, they sucked it out of plant tissues.¹³⁹ Once an infestation occurred, however, Wilkinson found that pyrethrum powder and bug-contact sprays such as kerosene emulsion provided the most effective control of adult weevils.¹⁴⁰

Thomas’s, Fletcher’s, and Wilkinson’s expert findings make the choices of Chadbourn’s strawberry growers seem misguided. Not only distant academics, but local agricultural scientists eschewed the use of pesticides and favored burning and other cultural techniques as weevil control strategies. Chemicals only came into play when it was too late, when infestations had already begun. Similar field-culture suggestions for how to solve the strawberry bud weevil problem were probably given to New York City’s strawberry farmers when they called on the Agriculture Department’s entomologist to assist with an infestation in 1884-1885.¹⁴¹ In both situations, New York City’s and Chadbourn’s, farmers took on an attribute of industrial agriculture to ensure their competitive positions, adding scientific expertise (both in the field and the lab) to the necessary components of successful

¹³⁸ Fletcher, *Strawberry-Growing*, 273.

¹³⁹ Wilkinson, *Modern Strawberry Growing*, 67.

¹⁴⁰ Wilkinson, *Modern Strawberry Growing*, 60-72; Fletcher, *Strawberry-Growing*, 268-279.

¹⁴¹ “Killing The Strawberry Plants,” *New York Times*, May 26, 1885.

commercial farming. Whether they actually followed the advice of those experts was another story.

The Berries Make A Comeback

A needed boost to Chadbourn's post-World War I strawberry industry came ironically with the global agricultural depression of the 1920s. Many local farmers had switched to cotton production during the war because of federal intervention and high prices. When cotton prices plummeted in the fall of 1920, farmers turned to tobacco and strawberries, among other truck crops, for economic sustenance. Because strawberry harvests ended as tobacco plantings began, farmers could grow two cash crops per year. Both crops required large inputs of wage labor, the availability of which continued to dwindle throughout this period.¹⁴²

Amidst these labor shortages and the continuing ravages of the strawberry bud weevil (Thomas's solution did not come until 1929), Chadbourn decided to celebrate the thirtieth anniversary of the Sunny South Colony's founding. The first strawberry festival filled the town with visitors, spectators, dignitaries, and the usual growers and commission men in May of 1926. Strawberries again put Chadbourn on the front page of the *Raleigh News and Observer*: "Berry Festival Is Rousing Success, Chadbourn For The Time Being Is a City of Ten Thousand People." To accommodate their guests, local women transformed a tobacco warehouse into a lovely exhibition hall with roses and longleaf pine needles. "Comely young

¹⁴² "Watermelons Here Two Weeks Early," *New York Times*, April 24, 1921; Strole, *Chadbourn*, 20; "Chadbourn Local Items and General County News," *Columbus News*, May 13, 1925; Rogers, ed., *Columbus County North Carolina 1946*, 22; W.B. Keziah, "The Columbus News," *Columbus News*, May 13, 1925.

women” greeted visitors with powder-sugared strawberries and no celebration would have been complete without a carnival. Hotdog stands, Ferris wheels, and “strange freaks” all entertained the multitude.¹⁴³

Partial and full page advertisements for the festival appeared, some with maps and strawberry sketches. One revealing advertisement spelled Chadbourn in an acrostic and attempted to entice readers to relocate there. The “o” in Chadbourn explained that the town needed human capital: people to live, work, and invest in the community’s socio-economic wellbeing. Comparing the area to California and Florida, promising good returns to developers and investors, and overstating the importance of Chadbourn’s banking industry, the advertisement shed light on the prolonged economic troubles facing the area.¹⁴⁴

Chadbourn’s Chamber of Commerce and other organizations initially sponsored the festival. Local papers cast the one-day event as a boost to the local strawberry market, which in 1926 grappled with a late harvest due to frost and drought. The economic underpinnings of the festival amidst regional and national agricultural problems suggested a people struggling and turning to an illustrious past for aid.¹⁴⁵

¹⁴³ Ben Dixon MacNeill, “Berry Festival Is Rousing Success, Chadbourn For The Time Being Is a City of Ten Thousand People,” *Raleigh News and Observer*, May 13, 1926. Strawberries’ association with sexuality is a theme not touched on much in this thesis, but is interesting to think about in accordance with race and perceptions of particularly black lasciviousness. As a corollary, a book published by the former CEO of Naturipe Berry Growers—an elderly, white man, who firmly believed in the free market and studied under Milton Freedman many decades ago—has the picture of a very feminine-looking, youthful hand with long manicured nails holding a large, ripe strawberry on its cover. The connection isn’t subtle; it’s almost raunchy.

¹⁴⁴ “Welcome To Strawberry Festival,” *Carolina Fruit and Truckers Journal*, May 07, 1926; “All Roads Leads To Chadbourn May 12th For The Great Strawberry Festival,” *Carolina Fruit and Truckers Journal*, May 07, 1926; “Come To The Festival Wednesday, May 12th,” *Carolina Fruit and Truckers Journal*, May 07, 1926; “COME--,” *Carolina Fruit and Truckers Journal*, May 07, 1926.

¹⁴⁵ “Chadbourn Is Preparing For Large Numbers,” *Columbus News and Reporter*, May 06, 1926.

Chadbourn's strawberry farmers also responded to economic woes by recognizing the need for government regulations and better marketing techniques to compete in the national marketplace. Strawberry buyers' and consumers' complaints ranged over the years from large berries masking smaller sizes below to the mixing of fresh and rotten berries to bottom quarts in strawberry crates filled with pine cones—an extreme case. Eventually these situations necessitated local support of state and federal inspections. The Chadbourn Marketing Association organized in 1930 and called for strict fruit standards that led to official examinations of each crate-load brought to auction. With its formation, growers implemented the last element of industrial agriculture, cooperative marketing, in order to meet consumer expectations and remain competitive in Northern urban markets.¹⁴⁶

Government seals of approval and a unified advertising campaign did not originate with Chadbourn's strawberries. Other farming districts and food sectors utilized these tools years before Chadbourn realized their benefit. Louisiana's Tangipahoa Parish's first organized strawberry marketing efforts dated to the 1890s and many more developed around 1910. The Strawberry Growers Selling Company lobbied the Louisiana state government for official inspection of produce in 1922 with the first inspection occurring in 1923. By 1928, Louisiana's strawberry standards matched the USDA's, leading to the parish's peak production year in 1931.¹⁴⁷ Quality assurance of standardized produce translated into higher prices for growers and middlemen. This lesson was first learned by late nineteenth century

"Prices Are Good On Strawberries," *Columbus News and Reporter*, May 13, 1926.

¹⁴⁶ Speech by Minnie Brown, 1935, Brown Family Papers, Southern Historical Collection; Strole, *Chadbourn*, 18; Rogers, ed., *Columbus County North Carolina 1946*, 89.

¹⁴⁷ Ginger Romero, *The Louisiana Strawberry Story* (Natchitoches, Louisiana: Northwestern State University Press, 1984), viii, 39-40; Baiamonte, *Immigrants in Rural America*, 98-101.

and early twentieth century California fruit growers whose produce competed with Eastern farmers' local truck crops. Environmental historian Ted Steinberg detailed the way Far Westerners came to dominate national urban markets: formal rules for packing and shipping, specific grading of fruits, and cooperative organizations that developed brand names ("Sun-Maid" raisins, for example). Chadbourn's Klondike strawberries became the region's signature and competitive strategy at the national level, following the California model.¹⁴⁸

Strawberry Factories

Marketing in the late 1920s and into the 1930s did not raise Chadbourn's strawberry production levels to those seen during the first decade of the century. Smaller numbers of available wage-laborers, insect pests, and higher market values for crops such as tobacco continued to push area farmers away from berry production. During World War II, strawberry acreage plummeted in North Carolina from over 7,000 acres to approximately 2,000. Farmers no longer viewed the fruit as profitable, especially when many African-Americans laborers who previously worked in those fields could find higher-paying manufacturing jobs elsewhere.¹⁴⁹

Chadbourn became a middling fruit supplier even as other strawberry growing districts emerged, peaked, or increased production. The process by which the town rose to agricultural prominence, however, revealed the mechanics of industrial truck farming and the

¹⁴⁸ Ginger Romero, *The Louisiana Strawberry Story* (Natchitoches, Louisiana: Northwestern State University Press, 1984), viii, 39-40; Baiamonte, *Immigrants in Rural America*, 98-101; Steinberg, *Down to Earth*, 175-183.

¹⁴⁹ House Subcommittee on Agriculture, *Hearings on Ceiling Price on Strawberries*, 79th Cong., 1st sess., 1945, 3.

attendant problems that could lead to its demise. Railroads transformed rural sections of the nation into hinterlands for burgeoning urban populations, yet a failure in refrigerator car supply could wipe out an entire season's profitability. Farmers employed a wage system and division of labor that reflected the race and class tensions inherent at the turn of the century. Through expert advice and research, a myriad of genetic varieties contracted to a handful of marketable types, which relied on poisons and practical controls to mitigate disease and pest damage. And consolidated marketing efforts attempted to convince consumers of Chadbourn's strawberries' superiority and reliability compared to other fruits available. Advertising, however, could only do so much to sustain an industry competing with local urban farmers, allied strawberry growers from across the nation, and other crops gaining commercial prominence in and around Chadbourn.

Together the five elements of industrial production constituted a system that radically changed the way Americans grew and purchased their food. Truck produce of endless shape, flavor, and color grown nearby on small farms became harder and harder to find. By the 1930s, the foundations of national agri-business, veritable factories-in-the-fields, across the food and fiber spectrum had been laid. The type of agricultural system portrayed in Chadbourn's strawberry story thrived on efficiency and large scales—a feature that made it the perfect set-up for the blanket spraying of synthetic pesticides after World War II. The next chapter will return to the West Coast to see how farmers, scientists, and ag-business leaders enhanced the efficiency of industrial strawberry production in the decades after 1945 and what problems exponential industrial growth caused.

CHAPTER 3—SUBURBAN STRAWBERRIES: THE RISE OF CALIFORNIA PLASTICULTURE IN POST-WAR AMERICA

Before World War II, commercial strawberries grew in thirty states scattered across the nation. The South—from Maryland to Louisiana—dominated strawberry production with Northern states such as Michigan and New Jersey and the West Coast contributing significant volume to the marketplace.¹⁵⁰ Within a few decades, however, the nation's strawberry-scape would radically change. One state came to dominate the American strawberry industry and its growers, scientists, and ag-business leaders pioneered revolutionary methods of production still in use today.

The story of the post-World War II strawberry is the California story. In a few short years after 1945, California's strawberry growers, armed with new high-yielding varieties and freezing facilities, consolidated their fields along the Central Pacific Coast and catapulted the Golden State once again into fruit-growing fame. A decade of record growth ensued, followed by a mild national recession and saturation and stagnation in the strawberry marketplace. During this period of economic readjustment, a new method of strawberry production emerged that sought to remedy the problems inherent in specialized, industrial truck farming.

¹⁵⁰ U.S. Department of Agriculture, Bureau of Agricultural Economics, *Origin and Distribution of the Commercial Strawberry Crop*, by J.W. Strowbridge, (Washington, DC: Government Printing Office, 1930), 1-3, 5-7, 14; House Subcommittee on Agriculture, *Hearings on Ceiling Price on Strawberries*, 79th Cong., 1st sess., 1945.

Plasticulture, as the method came to be known, used the same layout as prior strawberry fields, rows separated by several feet that could be intercropped and mulched to the benefit of strawberry plants, but with new elements. Mulch no longer meant organic material; it implied polyethylene plastic covering raised soil beds. The plastic not only suppressed runners and weeds, but acted like a hothouse, “forcing” plants to mature and fruit earlier. Field laborers began replacing strawberry plants annually with “plugs” from nurseries located at cooler, higher elevations in Northern California. However, the most important part of the new system was the widespread adoption of soil fumigation with synthetic organic chemicals, in addition to top-dressing synthetic pesticides.¹⁵¹ These efforts all aimed at minimizing the spread of disease and insect pests. Together, they created a capital-intensive structure that promulgated high strawberry yields and required more and more chemical and labor inputs.

Through geographic consolidation, new market outlets, and new production technologies, California’s strawberry growers built an industrial-agricultural empire. Central Coast strawberry farmers no longer served only nearby urban centers, but the entire country via improved transportation methods and shipping technologies. Wage labor’s importance for planting, spreading plastic, weeding, and harvesting escalated as production intensified and grew. Experts at state universities and in the U.S. Department of Agriculture developed new strawberry varieties that inundated California’s fields. And cooperative marketing efforts

¹⁵¹ Top-dressing refers to the act of applying manure, pesticides, mulch, etc. above ground on the leaves, flowers, and nearby soil of the plant.

enabled California's farmers to establish themselves as the premier strawberry section of the nation, through investment in advertising and research and development.

But epitomizing industrial agriculture had its pitfalls. Distant markets relied on transportation that could fail, as seen with Chadbourn's refrigerator car crisis. Race and class structures often intervened in production processes as wage labor went elsewhere for higher-paying work and certain growers were excluded from landowning and the marketplace. Standardization of fruit strains, appearance, size, and taste required time, effort, and capital to ensure that strawberries met consumers' expectations. Experts provided guidance and possible solutions to prevent insects and diseases from ravaging crops, but discovering those fixes could take years. And marketing often exacted a heavy tax on producers' incomes, leveraging their success on how well real strawberries measured up to advertisers' models.

California's plasticulture system was no different. By the 1970s, insect resistance to pesticides, the outlawing of certain chemicals by the newly minted Environmental Protection Agency, and increasing dependency on wage labor beset the industry. Even more problematic for the long-term was the corner strawberry growers had backed themselves into. The sky-rocketing amount of capital needed to maintain a competitive edge in the marketplace ensured that farmers could not escape the very apparatus they built. Much like New York City's local market-garden producers facing the onslaught of suburbanization and Southern competition, Central Coast berry growers either intensified operations or stood to lose the land they lived on. This chapter will briefly outline the origins of California's

industrial-strawberry system from the late 1910s to the mid-1940s and then describe how that system evolved in the decades following 1945.

Racialized Strawberry-scapes

When we left California previously, Chinese and later Japanese growers produced “exacting” berries for San Francisco’s urban markets. Other California urban centers also developed strawberry hinterlands: Los Angeles County and Sacramento and Florin Counties around the state capital.¹⁵² Strawberry farms serving the San Francisco metropole adopted the attributes of industrialization in the late 1910s and 1920s, particularly after the Alien Land Act of 1920 forbid Japanese immigrants from owning land. White landowners then became the primary growers of the fruit and sought to further industrialize the strawberry sector. Issei, first generation Japanese immigrants, who could no longer grow their own strawberries turned to sharecropping or working as wage laborers and foremen on strawberry plantations.¹⁵³ On the eve of World War II, estimates put ninety percent of strawberry farmland in the possession of “Anglos” with most of the direct labor performed by Japanese sharecroppers.¹⁵⁴

A major setback for the industry came during the Second World War. In 1942, the U.S. military drew a line down the Western side of the continent beyond which no one of Japanese descent could remain, regardless of citizenship or birthplace. Issei and Nisei, first

¹⁵² Cecilia M. Tsu, *Garden of the World: Asian Immigrants and the making of Agriculture in California’s Santa Clara Valley* (New York: Oxford University Press, 2013), 68; Miriam J. Wells, *Strawberry Fields: Politics, Class, and Work in California Agriculture* (Ithaca: Cornell University Press, 1996), 110-111. Watsonville berries appeared on the San Francisco markets.

¹⁵³ Wells, *Strawberry Fields*, 111; Tsu, *Garden*, 53. Issei is the term used for Japanese immigrants.

¹⁵⁴ Wells, *Strawberry Fields*, 112.

and second generation Japanese-Americans, left their homes, communities, businesses, and the strawberry fields for camps further inland, where they would be quarantined and prevented from causing harm to the United States. Responding to the internment, Ernst Haack, general manager of the Central California Berry Growers Association, wrote in 1942, “What the future holds no one knows, but let it always be said that the members of the Central California Berry Growers Association, all citizens of the United States, have been loyal in every respect and have backed the government to the utmost of their ability.”¹⁵⁵ The coerced removal of California’s strawberry labor force virtually halted production until their release in 1945.¹⁵⁶

Returning Japanese-Americans and Japanese immigrants settled in both the Santa Clara and Pajaro Valleys where anti-Japanese sentiment was weakest. Those who went back to agricultural work sharecropped or worked in the strawberry fields of large growers like the Driscoll brothers—one of the largest employers of Japanese labor.¹⁵⁷ But many sought to own their own land. With the repeal of the Alien Land Act in 1952, that dream became more readily attainable and by the end of the decade Japanese-descended farmers comprised three-fourths of the total strawberry grower population. The rapid ascent of Issei and Nisei into

¹⁵⁵ E.H. Haack, *Central California Berry Growers Association, Inc., Annual Reports and Financial Statements for the Seasons 1920-1941*, San Francisco, California, quoted in James E. Sagen and Stephen Wilhelm, *A History of the Strawberry: From Ancient Gardens to Modern Markets* (Berkeley: University of California Division of Agricultural Sciences, 1974), 212.

¹⁵⁶ *Ibid*; Wells, *Strawberry Fields*, 112.

¹⁵⁷ Tsu, *Garden*, 213.

strawberry farm ownership attested not only to their skill in growing the fruit, but to the massive growth of California's strawberry industry in the mid-1950s.¹⁵⁸

Strawberries: The Suburban Fruit

Major changes refashioned California's industrial strawberry system following the Second World War. Prior to the 1940s, the Golden State contributed a small amount to the nation's strawberry volume, only 4.2 percent of the total U.S. crop on 3.2 percent of the national acreage.¹⁵⁹ New high-yielding, virus-free cultivars developed by plant breeders at the University of California, Berkeley, entered fields in 1945 and with the return of the Japanese labor force, the state's strawberry industry reemerged and grew exponentially. Climate also constituted an important factor in California's quick rise to stardom, just as it had in other specialty fruit and orchard industries fifty years prior. Forty-one percent of the state's strawberry farms were in the inland valleys before the war. Growers soon realized that the new cultivars produced higher yields for extended periods in the temperate microclimates and sandy loam soils of the coast.¹⁶⁰ Less than a thousand strawberry acres existed in California in 1945 and the 3.7 tons grown in the state in 1946 represented a mere 6 percent of the national strawberry market. By 1953, California's share of the U.S. market jumped to 36 percent; in 1956 it reached 55 percent. The state's strawberry acreage skyrocketed to 20,700

¹⁵⁸ Wells, *Strawberry Fields*, 113-114.

¹⁵⁹ Wells, *Strawberry Fields*, 29.

¹⁶⁰ Sagen and Wilhelm, *A History of the Strawberry*, 226-230; Wells, *Strawberry Fields*, 29-34.

acres at its peak in 1957. Not surprisingly, California took the lead in U.S. commercial strawberry tonnage in 1949 and has held that position ever since.¹⁶¹

An even more important boost to California's strawberry production came with the growth of the frozen food industry. Between 1941 and 1957, U.S. national freezer capacity increased 326 percent as rising family incomes and more women working outside the home swelled frozen-food demand.¹⁶² In 1952, Americans purchased one million stand-alone freezers; in 1953, they owned over three million.¹⁶³ According to three food technologists in 1953, "Within the last few years, more and more people in all sections of the country, from all walks of life and at all income levels, have been demanding and getting freezing facilities for their homes."¹⁶⁴ Soon freezers became integral parts of the middle-class, suburban dream of comfortable living.¹⁶⁵ Frozen strawberry packs were second only to orange concentrate in frozen commodity sales and quickly became a staple of any upwardly-mobile household on a

¹⁶¹ Wells, *Strawberry Fields*, 29-34; Bain and Hoos, Beatrice M. Bain and Sidney Hoos, "California's Strawberry Industry," 4; U.S. Department of Agriculture, Economics, Statistics, and Market Information System, *Table 4--U.S. strawberry harvested acreage, yield per acre, and production, 13 States, 1970-2012*, in U.S. Strawberry Industry (95003), prepared by the Economic Research Service, (accessed April 11, 2014

<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1381>); George M. Darrow, *The Strawberry: History, Breeding, and Physiology* (New York: Holt, Rinehart, and Winston, 1966), 231.

¹⁶² Wells, *Strawberry Fields*, 33; Shane Hamilton, "The Economies and Conveniences of Modern-Day Living: Frozen Foods and Mass Marketing, 1945-1965," *The Business History Review* Vol. 77, No.1 (Spring 2003): 42 (accessed through J-STOR January 25, 2014).

¹⁶³ Donald K. Tressler, Clifford F. Evers, and Barbara Hutchings Evers, *Into the Freezer—and Out, Second Edition* (New York: The Avi Publishing Company, 1953), 9 (accessed through HathiTrust, July 13, 2014, <http://tinyurl.com/freezers53>); Jonathan Rees, *Refrigeration Nation: A History of Ice, Appliances, and Enterprise in America* (Baltimore, MD: John Hopkins University Press, 2013), 175.

¹⁶⁴ Tressler, Evers, and Evers, *Into the Freezer*, 7.

¹⁶⁵ Hamilton, "Frozen Foods," 42.

budget.¹⁶⁶ Whereas strawberries had previously been a seasonal luxury product, they could now be eaten year-round as a “moderate-priced dessert-type product available anywhere and at any time with refrigeration.”¹⁶⁷

Evidence for the ubiquity and cultural importance of frozen strawberries can be seen in a *New York Times* column titled “News of Food.” The column provided constant updates on supermarket prices and advice on how to prepare meals at the lowest price throughout the 1950s. Writing in the middle of 1951’s strawberry season, the author related these statistics: 1950’s strawberry crop “totaled 11,169,000 crates of twenty-four quarts each, the largest since 1942. A third of this was processed nearly all by freezing, and of that quantity the unusually large proportion of 61,288,000 pounds still was in storage a month ago.”¹⁶⁸ The large carry-over from the previous harvest meant cheaper prices for consumers were on their way. The U.S. Department of Agriculture also predicted that 1951’s harvest would be ten percent greater than 1950’s “tremendous crop” and that “the low rates at which freezers [were] offering to buy fresh strawberries from farmers” meant that even more savings would redound to consumers.¹⁶⁹

Frozen strawberries often appeared in recipes, usually as part of a dessert. A “Strawberry Soufflé A La Chiese” called for a 12.5 ounce package of frozen strawberries to

¹⁶⁶ Wells, *Strawberry Fields*, 33.

¹⁶⁷ Bain and Hoos, “California’s Strawberry Industry,” 4.

¹⁶⁸ “News of Food, White Potato Cheapest Food to Be Found—Bumper Strawberry Crop to Trim Prices,” *New York Times*, May 1, 1951.

¹⁶⁹ *Ibid.*

be puréed, cooked with sugar, beaten with eggs, and baked.¹⁷⁰ For Easter dinner 1952, Jane Nickerson, the “News of Food” author, recommended one pound of frozen strawberries for a shortcake that along with the traditional baked ham, apple sauce, and spring vegetables, comprised a meal costing \$3.42 for four people.¹⁷¹ Nickerson wrote a column several years later in which she solicited recipes from food experts for formal summer weekend meals that would not overburden the hostess. One of the responses, sent by New York City writer and gastronome Lawton Mackall, suggested “broiled Portuguese sardines on toast, sweetbreads creamed with cooked ham in a ring of steamed barley or rice, peas, *frozen strawberries* on fresh pineapple rounds with a ‘sauce’ of tawny port. To drink—Inglenook White Pinot, California white wine, chilled.”¹⁷² Frozen strawberries were not just a cost-saving way to add fruit to the diet; they also appeared in haute cuisine.

For California’s strawberry growers, the division of the strawberry crop into fresh and frozen outlets induced a stabilizing effect on fresh market prices, which before the war fluctuated enormously.¹⁷³ Over fifty-five percent of the U.S. strawberry crop went to processors in the mid-1950s, with California alone harvesting and processing half that amount.¹⁷⁴ The majority of frozen strawberries did not enter the retail market, but sold in

¹⁷⁰ “News of Food, Celery Completely Encased in Pliofilm Follows the Trent to Prepackaged Items, *New York Times*, September 20, 1950.

¹⁷¹ “Baked Ham for Easter,” *New York Times*, April 11, 1952.

¹⁷² Jane Nickerson, “The Week-end Hostess Cooks,” *New York Times*, June 17, 1956. *emphasis added

¹⁷³ Wells, *Strawberry Fields*, 34

¹⁷⁴ Bain and Hoos, “California’s Strawberry Industry,” 5.

institutional-sized containers.¹⁷⁵ At the same time, fresh-market California strawberry growers had two of the largest, burgeoning populations in the U.S. in which to sell their product: the Los Angeles and San Francisco metropolitan areas. Nationwide, however, between 1950 and 1955 per capita fresh strawberry consumption decreased as frozen strawberry consumption increased—a pattern that was part and parcel of a larger shift in American food consumption.¹⁷⁶ At no time in the post-war period (up to 1962) did U.S. per capita consumption of strawberries, combined fresh and frozen, equal that of prewar years, when almost all strawberries were purchased and consumed fresh.¹⁷⁷

Success encouraged greater cooperation among California's strawberry growers. In 1955, at the behest of the industry, the state legislature established the California Strawberry Advisory Board (CSAB) as a research program to develop new varieties of berries, investigate solutions to pest and disease problems, and to improve the efficiency of strawberry cultivation. The Board was also responsible for marketing California's strawberries both nationally and internationally. Funding came from levies assessed on all

¹⁷⁵ Jane Nickerson, "News of Food, Fall Brings Tasty Harvest of New Brands: Sugarless Fruit, Instant Coffee, Cake Mix," *New York Times*, November 19, 1952.

¹⁷⁶ Hamilton provides the following example: "...in the late 1940s and early 1950s. Even as all food sales climbed steadily in this period, frozen foods outpaced the total rate of growth. In particular, customers increasingly shunned fresh vegetables and fruit juices in favor of frozen. For instance, in 1940, annual per capita consumption of frozen lima beans was .29 pounds. By 1949 consumption had jumped to 1.09 pounds per person, and by 1955 it was up to 1.58. Meanwhile, annual per capita consumption of fresh lima beans had gone down, from .80 pounds in 1940 to .50 in 1949 to .30 in 1955." Hamilton, "Frozen Foods," 36-37. I found a *New York Times* article that contradicted this pattern. Fresh orange consumption kept sales pace with the preceding year as did single-strength orange juice from 1951 to 1952. But I do not have data for the overall trend of citrus fruits during this time period. Nickerson, "News of Food," *NYT*, November 19, 1952.

¹⁷⁷ Bain and Hoos, "California's Strawberry Industry," 5.

parts of the production process: growing, processing, and shipping.¹⁷⁸ One of the first actions of the CSAB included approaching the Department of Plant Pathology at Berkeley to initiate research on soil-borne diseases—a project supported by Board funding.¹⁷⁹ Also, the CSAB emerged as the single largest supporter of the University of California’s strawberry breeding program, repaying in a way the initial efforts that allowed the state’s post-war industry to flourish.¹⁸⁰

Decreasing Profits, Increasing Yields

The frozen strawberry boom did not last forever. A bumper crop in 1956-57 led to a glut in the market owing to the slowing increase of per capita strawberry consumption and a national recession in 1957-58. American growers attempted to alleviate the over-abundance of both fresh and frozen strawberry packs by exporting to countries such as Canada. The Canadian government responded to American farmers who dumped produce onto their markets with tariffs that set a price floor for fresh berries at 13.5 cents; an undisclosed higher amount applied to frozen packs.¹⁸¹ As a result of the drop in prices, many California strawberry growers went out of business and the state industry entered a period of economic readjustment.¹⁸² Farmers who shipped strawberries to processing plants increasingly

¹⁷⁸ Baum, *Quest for the Perfect Strawberry*, 16-17. The CSAB was a typical marketing order, which many states enacted for the benefit of different industries.

¹⁷⁹ Stephen Wilhelm, Richard C. Storck, and John M. Wilhelm, “Preplant Soil Fumigation with Methyl Bromide-Chloropicrin Mixtures For Control of Soil-Borne Diseases of Strawberries—A Summary of Fifteen Years of Development,” *Agriculture and Environment* 1 (1974): 229.

¹⁸⁰ Wells, *Strawberry Growing*, 42-44.

¹⁸¹ “Action Against Dumping, Canada Sets Price Minimum for Strawberry Imports,” *New York Times*, June 15, 1957.

¹⁸² *Ibid*; Hamilton, “Frozen Foods,” 54.

switched to fresh market outlets, a process known as “reallocation of utilization.”¹⁸³ Instead of designating larger portions of their crops to the stagnant frozen food industry, growers more and more sold their strawberries fresh to supermarkets both local and nationwide. Total acres planted with strawberries plummeted 61.4 percent in a decade: from 20,700 acres in 1957 to 8,000 acres in 1967. The state industry would not again reach its 1957 acreage level for over three decades.¹⁸⁴

While many California growers went bankrupt or sold their land, surprisingly, strawberry yields and total production did not suffer near as badly. Between 1957 and 1967 total production of strawberries by pound only decreased 6.6 percent, compared to the 61.4 decrease in acreage planted. Fresh pounds produced actually increased by 20 percent as farmers moved away from frozen market outlets, and the tonnage per acre more than doubled during this same time span.¹⁸⁵ How was this possible? State strawberry production bottomed in 1960 with 467 million lbs.—a fifteen percent drop from 1956’s record of 551 million lbs., but still considerably less of a decline than in acreage planted.¹⁸⁶ Yields began to rebound in 1961 and 1962 owing to the implementation of new production techniques, specifically soil fumigation and the control of cyclamen mites with synthetic chemicals.¹⁸⁷ Sidney Hoos, Professor of Agricultural Economics at Berkeley, and Beatrice M. Bain, Assistant Specialist in Agricultural Economics, explained the situation in 1962:

¹⁸³ Bain and Hoos, “California’s Strawberry Industry,” 5.

¹⁸⁴ Baum, *Quest for the Perfect Strawberry*, 43.

¹⁸⁵ Baum, *Quest for the Perfect Strawberry*, 3.

¹⁸⁶ Bain and Hoos, “California’s Strawberry Industry,” 5.

¹⁸⁷ *Ibid.*

The 1960's have seen a resurgence in California strawberry yield and total production, a return to higher fresh market utilization, and application of the newest techniques in the growing and marketing of strawberries. The adaptation of new fumigants for soil preparation, new plant varieties and new methods of controlled growth, new miticides, fertilizers, and irrigation techniques...all indicate that California growers are receptive to change in their own interest.¹⁸⁸

These new instruments and novel ways of imagining strawberry fields, collectively called “plasticulture” because of the use of polyethylene mulch, brought the industry out the turmoil of the late 1950s and 1960s.

Plasticulture

Plasticulture required rows of soil hills, separated by several feet, covered in polyethylene plastic to facilitate effective soil fumigation and underground watering systems. In the late 1960s, the traditional method of raised soil beds with two separate plant rows running the length of the field expanded, allowing for up to four rows of plants in beds between 48 and 52 inches wide (or 64 to 68 inches wide in southern California). Denser plantings increased yields and higher soil beds aided in better root development, drainage, and easier manicuring of strawberry plants.¹⁸⁹ Plastic mulch, as opposed to previous uses of straw, manure, intercropping, and green mulches such as crabgrass, raised the temperature of the soil causing plants to mature earlier and suppressed both weeds and runners.¹⁹⁰

¹⁸⁸ Bain and Hoos, “California’s Strawberry Industry,” 6.

¹⁸⁹ Wells, *Strawberry Fields*, 181.

¹⁹⁰ Darrow, *The Strawberry*, 232; Marvin Pritts, “Growing Strawberries, Healthy Communities, Strong Economies, and Clean Environments: What is the Role of the Researcher?” in *Proceedings of the Fourth International Strawberry Symposium: Volume Two*, ed. T. Hietaranta, M.-M. Linna, P. Palonen, and P. Parikka (Leuven, Belgium: International Society for Horticultural Science, 2002), 411. Runners are clone growths from the mother plant that will take root and sap productive energy if not thwarted.

Polyethylene also prevented soil moisture from evaporating and kept plants and fruit clean for harvest.

Beyond the soil hills themselves, strawberry cultivation still required a great deal of effort. Fields needed to gently slope for water drainage and air movement.¹⁹¹ Farmers could accomplish this through the particular siting of strawberry fields and by surveying and grading soils with tractor-pulled equipment, which were guided by lasers starting in the 1970s.¹⁹² Ploughing needed to be deep and careful. Tilling under grass, oats, and meadow crops provided an efficient way to add organic matter and nutrients to the soil. In addition to plowing thoroughly so that no large air spaces were left, leading strawberry experts recommended a traditional, but nonetheless vital agricultural practice: manuring. George F. Waldo, Royce S. Bringhurst, and Victor Voth of the USDA's Agricultural Research Service and the University of California's Agricultural Experiment Station, respectively, explained that, "In many areas, particularly in the Northwest, continuous cropping has depleted the soil of plant nutrients and organic matter and has left the soil in poor physical condition... Often you must give these old cultivated soils a program of soil improvement to increase organic matter and make plant nutrients available."¹⁹³ They suggested barnyard manure as one of the quickest and most effective ways of enriching soils, particularly for strawberries. For those farmers who worried about the spread of weed seeds from dung, scientists reminded readers that all California commercial strawberry growers used synthetic chemicals to control weeds.

¹⁹¹ U.S. Department of Agriculture, *Farmer's Bulletin No. 2236: Commercial Strawberry Growing in the Pacific Coast States* by George F. Waldo, Royce S. Bringhurst, and Victor Voth, (Washington, DC: Government Printing Office, 1971), 2, 6.

¹⁹² *Ibid*, 6; Wells, *Strawberry Fields*, 180.

¹⁹³ USDA, *Commercial Strawberry Growing*, 10.

Strawberry plants themselves, like soils, required maintenance as part of the plasticulture system. Throughout the late 1940s and 1950s, viruses and nematodes plagued growers and forced them to relocate their fields every few years.¹⁹⁴ To remedy the situation, the USDA collected plant samples from around the country, tested to see which ones were disease-free, and then bred new nursery stocks from the healthy plants. Thirty-three virus-free commercial strawberry varieties entered the market by 1960 with several more strains expected to enter the market by 1962. However, during their research scientists also discovered that breeding out disease did not solve the nematode (worm) problem. Nematodes, or “tiny, eel-like worms [that] feed on strawberry plants and reduce their vigor,” constituted a pervasive and persistent threat for strawberry growers nationwide.¹⁹⁵ Plants were often afflicted with several different types of nematodes in addition to viruses, which left nurserymen and farmers struggling to figure out how to control both problems without killing their strawberry plants. Experiments demonstrated that submerging infected plant samples in 127 degree Fahrenheit water and planting them in fumigated soils markedly decreased the occurrence of nematodes. Another round of fumigation with dibromochloropropane after planting successfully reduced the remaining nematode population during the growing season.¹⁹⁶

The most vital component of the plasticulture system, mentioned several times already, was the synthetic chemical control of pest and disease problems. Pesticides allowed farmers to invest heavily in particular spaces in order to produce enormous yields and

¹⁹⁴ Wells, *Strawberry Fields*, 180.

¹⁹⁵ USDA, *Reducing Virus and Nematode Damage to Strawberry Plants*, 2.

¹⁹⁶ USDA, *Reducing Virus and Nematode Damage*, 2-8.

achieve economies of scale—exactly as local New York City truck farmers had done more than half a century prior. Synthetic organic pesticides differed from previous insect, weed, and disease controlling agents in significant ways. Growers previously used naturally occurring poisons such as arsenic, paris green, the bordeaux mixture (lime, copper sulfate, and water), and pyrethrum powder to mitigate crop losses and damage. These general insecticides had less residual effects and shorter half-lives (the time needed for the compound to degrade) than carbon-based chemicals made in a laboratory. Also, their residues were usually less toxic than later synthetics. Pyrethrum powder, for instance, derived from crushed chrysanthemums and reached its fifth half-life, or ninety-seven percent degraded, in sixty days. It represented a low toxicity risk to mammals, including humans, because it quickly broke down into inactive forms and was excreted before it could accumulate.¹⁹⁷

In contrast, DDT, the most well-known synthetic pesticide, originated in the laboratory of a Swiss scientist named Paul Müller in 1939.¹⁹⁸ The U.S. army first made use of the compound in World War II to protect soldiers from mosquitos in malaria-ridden climates. After the war, American companies quickly adapted the chemical for use in the agricultural sector. One half-life of DDT, meaning the compound was fifty percent degraded, took anywhere from two-to-fifteen years. To reach a ninety-seven percent degradation level

¹⁹⁷ National Pesticide Information Center, *Pyrethrins & Pyrethroids General Fact Sheet*, <http://npic.orst.edu/factsheets/pyrethrins.pdf> (accessed January 29, 2014).

¹⁹⁸ Edmund Russell, *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (New York: Cambridge University Press, 2001), 86. DDT's full name is: dichlorodiphenyltrichloroethane.

required ten-to-seventy-five years for DDT molecules.¹⁹⁹ DDT did not dissolve in water; it maintained its chemical properties when washed by rain into creeks, lakes, rivers, oceans, and underground aquifers. However, DDT was fat soluble and stored in the tissues of organisms, be they humans or other animals.²⁰⁰

Chemical Strawberries

Investigations using synthetics in strawberry fields began soon after the end of World War II and continued through the boom years of the 1950s. As early as 1948, *California Agriculture* published the work of an assistant nematologist and a graduate researcher who tested the use of parathion, a member of the organophosphate chemical family, to combat spring dwarf nematodes in strawberry fields.²⁰¹ Thereafter a wave of studies examined the residues of chemicals on strawberries, the effects of synthetics on plant growth and maturation, and pesticide efficacy in controlling insect, weed, and disease problems.²⁰² Soils, the most critical element in any form of agriculture, became the most important area of chemical application. A Washington State University scientist discovered in 1955 that applying aldrin and dieldrin, both chlorinated hydrocarbons, to the soil before planting controlled strawberry root weevils and black vine weevils for at least four years. The

¹⁹⁹National Pesticide Information Center, *DDT General Fact Sheet*, <http://npic.orst.edu/factsheets/ddtgen.pdf> (accessed January 29, 2014).

²⁰⁰ Andrew G. Smith, "Chlorinated Hydrocarbon Insecticides," in *Handbook of Pesticide Toxicology Volume 2: Classes of Pesticides*, eds. Wayland J. Hayes, Jr. and Edward R. Laws, Jr. (New York: Academic Press, Inc., 1991), 743-745.

²⁰¹ M. W. Allen and D. J. Raski, "Spring Dwarf Nematode," *California Agriculture* 2, no. 4 (April 1948): 23.

²⁰² William Anderson, ed., *The Strawberry: A World Bibliography 1920-1966* (Metuchen, New Jersey: The Scarecrow Press, Inc., 1969), 427-437.

chemical application became standard practice in the Pacific Northwest, which along with California accounted for eighty-five percent of all U.S. strawberry production during the peak years of the 1950s through the early 1960s.²⁰³

Soil fumigation in the plasticulture system after 1960 entailed machines that simultaneously injected methyl bromide-chloropicrin mixtures into raised soil beds and covered them with polyethylene plastic. Between 1950 and 1955, scientists demonstrated chloropicrin as a control of *Verticillium*, a soil-inhabiting fungus that had long ravaged strawberry fields.²⁰⁴ When mixed with methyl bromide, the two chemicals acted synergistically.²⁰⁵ A 200 lbs. per acre dosage of either methyl bromide or chloropicrin under polyethylene film failed to control *Verticillium* wilt, but a combined mixture of equal amounts applied at 200 lbs. per acre provided almost complete control of the disease.²⁰⁶ Furthermore, the concoction was “one of the most effective fungicidal soil fumigants ever developed.”²⁰⁷

California’s strawberry industry fully recognized the value of the amalgam by the mid-1960s as an antidote not only to *Verticillium*, but a host of other biological problems. Farmers used methyl bromide-chloropicrin as a remedy to fungi of the *Pythium*, *Rhizoctonia*, and *Ceratobasidium* genera (among others), soil-borne insects, nematodes, weed seeds, and

²⁰³ Bain and Hoos, “California’s Strawberry Industry,” 5; Carl H. Shanks Jr., “Insects and Mites,” in *The Strawberry: Cultivars to Marketing*, ed. Norman F. Childers (Gainesville, FL: Horticultural Publications, 1981), 296.

²⁰⁴ Wilhelm, Storkan, and Wilhelm, “Preplant Soil Fumigation,” 230.

²⁰⁵ *Ibid.*, 232.

²⁰⁶ *Ibid.*, 232-233.

²⁰⁷ *Ibid.*, 233.

dormant weed structures.²⁰⁸ According to the U.S. Department of Agriculture in 1960, “most cropland in the United States is infested with nematodes that attack strawberries...therefore, it is usually necessary to fumigate the soils in which they are grown.”²⁰⁹ Dr. George M. Darrow, the foremost American authority on strawberries, wrote in 1966 that “soil fumigation to kill the sting nematode has been found necessary to raise good crops in Florida...fumigation of the soil is generally practiced in California to control the complex of soil troubles, including black root, and is beginning to a be a standard practice in the eastern United States.”²¹⁰ According to a June 1971 USDA Farmer’s Bulletin on Commercial Strawberry Growing in the Pacific Coast States, *all* California producers fumigated their soils with methyl bromide-chloropicrin mixtures under polyethylene mulch.²¹¹ Much like the high residual efficacy of DDT when it entered the agricultural sector, methyl bromide-chloropicrin soil fumigation seemed to be the magic bullet that strawberry scientists and growers had long sought after.

Plasticulture and the adoption of synthetic chemicals greatly increased both the inputs and outputs of strawberry farms. Combined with other technological changes affecting the strawberry production process, such as efficient highway shipping and cold storage with CO₂, California’s post-war strawberry industry used the five elements of industrial agriculture to build a commercial empire. It supplied evermore distant markets through

²⁰⁸ Ibid.

²⁰⁹ USDA, *Reducing Virus and Nematode Damage*, 7.

²¹⁰ Darrow, *The Strawberry*, 367.

²¹¹ U.S. Department of Agriculture, *Farmer’s Bulletin No. 2236: Commercial Strawberry Growing in the Pacific Coast States* by George F. Waldo, Royce S. Bringhurst, and Victor Voth, (Washington, DC: Government Printing Office, 1971), 13.

improved transportation technologies, created new tasks for wage labor, continually invested in breeding and genetic research for better strawberry varieties, partnered with university experts to increase the profitability and efficiency of strawberry farms, and used cooperative marketing to make California strawberries the premier small fruit in grocery stores nationwide. Ironically, the increasing technological sophistication of strawberry production, its chemical dependency, and the vast amount of human intervention needed for commercial production stayed hidden from common view. Consumer beliefs and perceptions of strawberries as a wholesome, natural food and advertising campaigns emphasizing those messages belied the advanced industrial-agricultural system in place.

The “Natural Food” Movement

Strawberries grew in popularity with concerns over health and the American diet in the 1960s and 1970s. A 1971 USDA Food and Nutrition Service bulletin titled “Fruits: A Good Choice for the Thrifty Family” pictured strawberries along with watermelon, cantaloupe, oranges, and other citrus fruits as good sources of vitamin C. The bulletin also advised consumers to “Buy when [fresh fruits] are low in cost,” appealing to the same consumer price consciousness the “News of Food” column targeted in the 1950s. Beyond their noted health benefits, strawberries also appealed to the natural food movement sweeping the nation. Food historian Harvey Levenstein chronicled the rise of “natural food” as it moved out of hippie enclaves and into mainstream American consciousness.²¹² Soon large corporate entities began fortifying cereals and adapting labels such as “natural,”

²¹² Harvey Levenstein, *Paradox of Plenty: A Social History of Eating in Modern America* (Berkeley: University of California Press, 2003), 195-212.

“organic,” “real,” and “no preservatives” to address concerns over the health and safety of processed foods.²¹³ Strawberries constituted part and parcel of the new food fad as demonstrated by the marketing of the fruit and the national increase in consumption.²¹⁴

A 1979 J.M. Smucker Company television commercial epitomized the notion of strawberries as a natural, wholesome food. The ad included several scenes: a farmer wearing a baseball hat with strawberries on the front, stacking strawberry crates in a strawberry field, and biting into a strawberry while answering “naturally” to whether he knew that Smucker’s had no artificial ingredients; a woman in bed spreading strawberry jam on toast, who when asked if she liked the taste of fresh strawberries in the morning replied “naturally;” a jar of Smucker’s strawberry jam against the backdrop of a red and white-plaid summer picnic table, with a basket of fresh strawberries, a loaf of homemade bread, and a glass carafe of milk on it; and the final scene, which showed a jar of strawberry preserves on the red and white-plaid table surrounded by fresh strawberries and strawberry jam spread on English muffins. The word “naturally” occurred seven times in thirty seconds.

Besides the appeal to whole-food advocates, this advertisement played on a number of themes often associated with strawberries. Everyone in the commercial was white. However, the white male farmer in reality would not have picked or stacked produce grown in his fields. Hispanic-descended laborers completed those jobs for wages, just as Chinese, Japanese, and African-American laborers had done in decades prior. By the 1970s,

²¹³ Ibid, 199.

²¹⁴ YouTube, “1979 commercials smuckers’ strawberry jam,” posted by classiccommercial (accessed July 6, 2014, <https://www.youtube.com/watch?v=0luWMK0Alvs>).

individuals of Mexican descent also began moving up the corporate agricultural ladder to become managers and strawberry growers—not just planters, pickers, machine operators, or sharecroppers. The commercial opened with a child at a baseball game and the last person seen appeared to be a mother preparing a large batch of sandwiches for an event—both wholesome, pure images of white Americans enjoying a favored national fruit. Furthermore, the plaid picnic table with homemade bread and milk that came from a milkman harkened back to past times, repeating the myth of health and happiness before the advent of machine-processed food. The plaid picnic table also represented strawberries' role as a herald of summer, a concept dating back to Native America before contact, appearing with fervor in religious celebrations around New York City in the 1850s, and continuing up through the cultural traditions of the twentieth century.

As “natural foods” became a mainstay of American diets and corporate advertisements, California's strawberry industry once again experienced extensive growth. Production as measured by strawberry tonnage almost doubled from 1970 to 1980. Yield per acre increased 38 percent, from 34,000 pounds to 47,000 pounds, and harvested acreage increased 29 percent, from 8,500 acres to 11,000 acres during the same time-span.²¹⁵ Frozen strawberries no longer constituted the main outlet for growers; Americans consumed the vast majority of strawberries fresh and per capita consumption was on the rise.²¹⁶ The California Strawberry Advisory Board initiated advertising campaigns in newspapers and on television

²¹⁵ USDA, *Table 4--U.S. strawberry*, accessed April 11, 2014
<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1381>.

²¹⁶ Baum, *Quest for the Perfect Strawberry*, 86, 159; Wells, *Strawberry Fields*, 48-51.

during the 1970s, helping make strawberries synonymous with California.²¹⁷ By 1973, between two-thirds and three-quarter of all strawberries in the greater New York City area came from California; the remainder originated in Mexico, the Southern states, and local farms.²¹⁸ The Big Apple's strawberry sourcing demonstrated a nationwide pattern. In 1980, California produced nearly three-quarters of all strawberries grown in the United States.²¹⁹ Revolutions in fruit transportation accounted for the size of the West Coast's exports to distant urban centers. Airplanes and refrigerated truck shipping, the latter aided by implementation of the interstate highway system, accelerated the speed in which perishables reached consumers. These changes enabled California's strawberry growers to become the primary supplier to cities and towns thousands of miles away.²²⁰

But all was not well in strawberry land. The industrial agricultural system needed to meet growing consumer demand for strawberries relied on synthetic organic chemicals that produced many unwanted side effects. Throughout the 1960s and 1970s, growing public

²¹⁷ Baum, *Quest for the Perfect Strawberry*, 76-85; U.S. Department of Agriculture, Food and Nutrition Service, Agricultural Research Service, *Fruits: A Good Choice for the Thrifty Family* (Washington, DC: Government Printing Office, 1971), 1, (accessed via HathiTrust, <http://tinyurl.com/healthystrawberries> April 12, 2014).

²¹⁸ U.S. Department of Agriculture, Agricultural Research Service, *Market Research Report No. 996: The Nature and Extent of Consumer and Retail Losses in Apples, Oranges, Lettuce, Peaches, Strawberries, and Potatoes Marketed in Greater New York*, by M.J. Seponis and J.E. Butterfield (Washington, DC: Government Printing Office, July 1973), 18.

²¹⁹ USDA, *Table 4--U.S. strawberry*, accessed April 11, 2014 <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1381>.

²²⁰ *Ibid*; U.S. Department of Agriculture, Agricultural Research Service, *Marketing Research Report No. 810: Export of California Strawberries to Europe Via Jet Airfreighter—1966-67*, by John M. Harvey, C. Max Harris, and H. Melvin Couey (Washington, DC: Government Printing Office, 1968); U.S. Department of Agriculture, Agricultural Research Service, *Air Transport of California Strawberries: Pallet Covers to Maintain Modified Atmospheres and Reduce Market Loses*, by John M. Harvey and Frank M. Porter (Washington, DC: Government Printing Office, 1971) (accessed via HathiTrust, <http://tinyurl.com/airstrawberries> April 12, 2014).

concern regarding the risks to humans and the environment from chemical usage gained political momentum and prompted sweeping legislation at the federal level. Simultaneously, strawberry growers, scientists, and agribusiness leaders began to realize that their “magic bullets” came with hidden production costs. The quintessential natural food now had quite unnatural problems.

Insecticide Crises

Increased synthetic chemical usage not just in the strawberry industry, but across the agricultural sector, posed problems for growers, scientists, and the public alike. To use environmental historian John Perkins’ terminology, an “insecticide crisis” developed and progressively worsened throughout the post-war decades as a consequence of the widespread usage of synthetic chemicals in American agriculture. The crisis consisted of two components: internal and external issues affecting the industry. Internally, pest resistance to chemicals and the damage to beneficial insect populations led to a constant need for chemical innovation and entomological research. Externally, safety problems affecting the public attracted much attention.²²¹

A prominent example of insect adaptation in the strawberry ecosystem occurred with the most common and wide-spread U.S. strawberry pest, the two-spotted spider mite. It developed resistance to both organophosphorus and chlorinated hydrocarbon compounds by 1973 through over-application of the chemicals. More virulent concoctions of the organotin, cyclic carbonate, and sulfite compounds provided some relief, but only three chemicals from

²²¹ John H. Perkins, *Insects, Experts, and the Insecticide Crisis: the Quest for New Pest Management Strategies* (New York: Plenum Press, 1982), 1, 29-58.

these families were properly registered with the newly formed Environmental Protection Agency. Commenting on the problem, Washington State University researcher Carl H. Shanks Jr., wrote: “previous experience suggests that the mite will eventually become resistant to any effective chemical once it is put into widespread use.”²²² In Shanks’ comment lay one of the problems with over-reliance on chemical solutions to agricultural problems: it mandates continual research for different and more efficacious compounds to combat insects that evolve and develop immunity. Strawberry growers, horticultural scientists, and agribusiness leaders thus became trapped in a never-ending cycle of ensuring that they would have a product to control pest species before the current chemicals became ineffective. As researcher Robert Van Den Bosch of the University of California, Berkeley’s Division of Biological Control wrote: “Chemical control is our paramount tactic for *localized, temporary*, pest insect suppression. But chemical insecticides do not resolve pest problems. The chemicals must be applied relentlessly...[and] despite this heavy and increasing use of insecticides and the associated rising costs, there are probably more insect species of pest status today [1971] than ever before.”²²³ Solving the pest problem would take more than simply applying excess chemicals. It required innovation, creativity, and a reimagining of the technologies of strawberry production.

²²² Shanks, *Cultivars to Marketing*, 297; W. Carson, H. Nakakihara, V. Voth, John T. Trumble, “Impact of Pesticides for Tomato Fruitworm (Lepidoptera:Noctuidae) Suppression on Photosynthesis Yield and Non-Target Arthropods in Strawberries,” *Journal of Economic Entomology* 81, no. 2 (April 1988): 608.

²²³ Robert Van Den Bosh, “Biological Control of Insects,” *Annual Review of Ecology and Systematics* 2 (1971): 48.

Externally, public concern about the effects of synthetic chemicals on humans and the environment extended well beyond the strawberry industry to include the agricultural sector as a whole. The most famous and most poignant expositor on the external side of the insecticide crisis was Rachel Carson. In 1962's *Silent Spring*, Carson claimed that "Along with the possibility of the extinction of mankind by nuclear war, the central problem of our age has therefore become the contamination of man's total environment with such substances of incredible potential for harm."²²⁴ Other entities such as the *New York Times* reported on public meetings and outrage over the effects of DDT, aldrin, and other synthetic chemicals on wildlife.²²⁵ As the decade progressed, more and more cases of environmental damage surfaced and a movement with real political ramifications coalesced. President Nixon and Congress reacted to national sentiment by passing important pieces of environmental legislation and investing the newly minted Environmental Protection Agency with the ability to "protect human health and preserve the environment."²²⁶ In 1972, the Federal Environmental Pesticide Control Act gave the EPA authority to regulate the sale and use of pesticides. These new powers allowed the EPA to strengthen the pesticide registration process by putting the burden of proof for a product's safety on the manufacturer. The EPA could also cancel chemicals if they had "unreasonable adverse effects" on the environment.

²²⁴ Rachel Carson, *Silent Spring, Fortieth Anniversary Edition* (New York: First Mariner Books, 2002), 8.

²²⁵ "DDT Controversy Erupts in Detroit," *New York Times*, September 16, 1962; David Anderson, "Poisons Kill Fish in the Mississippi," *New York Times*, March 22, 1964; "Pelicans Appear to be Disappearing on Gulf Coast," *New York Times*, April 20, 1968; Jane E. Brody, "Attacks on Use of DDT Increasing," *New York Times*, April 30, 1969; Roy Reed, "Pesticides Make Cotton Prosper but Endanger Life," *New York Times*, December 26, 1969.

²²⁶ U.S. Environmental Protection Agency, *Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)* <http://www.epa.gov/oecaagct/lfra.html> (accessed January 29, 2014).

Pesticides sold commercially before 1970 and used extensively in strawberry fields were grandfathered into the system until the EPA could review them.²²⁷

Fear of chemical cancellations prompted agricultural experts to action. In 1971, the USDA published a report on the economic impact of discontinuing farm use of chlordane, a chlorinated hydrocarbon insecticide first registered in 1948.²²⁸ The report initiated as a request from the EPA, which was reevaluating the necessity of using certain pesticides on farms. Researchers concluded that if chlordane had been cancelled, U.S. farmers would have incurred an additional \$1.84 million in costs based on 1971 estimates of acreage treated with the insecticide. Per acre yield losses for strawberries specifically would have amounted to \$75 and 3.3 percent of the crop. Costs of an alternative insecticide for strawberries amounted to \$9.00 per acre, compared to \$6.75 for chlordane. The authors argued that using a non-organochlorine insecticide posed a greater threat to farm workers because many other chemical families and compounds were more toxic than chlordane. Also, organophosphorus and carbamate insecticides broke down more quickly in the environment and needed more frequent applications, further increasing costs for farmers. Strawberry growers thus had acute economic reasons to oppose chemical cancellations.²²⁹

²²⁷ USEPA, *FIFRA*, accessed January 29, 2014; Richard N. L. Andrews, *Managing the Environment, Managing Ourselves; A History of American Environmental Policy Second Edition* (New Haven, CT: Yale University Press, 2006), 227-239, 243.

²²⁸ National Pesticide Information Center, *Chlordane General Fact Sheet*, <http://npic.orst.edu/factsheets/chlordanegen.pdf> (accessed April 12, 2014); Smith, "Chlorinated Hydrocarbon Insecticides," 816-822.

²²⁹ U.S. Department of Agriculture, Economic Research Service, *Economic Impact of Discontinuing Farm Use of Chlordane*, by Robert P. Jenkins, Herman W. Delvo, and Austin S. Fox (Washington, DC: Government Printing Office, 1972), abstract, preface, ii, 4-5, 7 (accessed through HathiTrust, <http://tinyurl.com/chlordanerpt> April 12, 2014).

The EPA began issuing cancellations for specific substances, starting with DDT, in 1972.²³⁰ Aldrin and dieldrin were banned in 1974, except for use against termites; in 1987 both chemicals were cancelled completely.²³¹ Federal removal of DDT and dieldrin from recommended control lists in the 1970s received blame for significant strawberry damage caused by once-controlled pests like root weevils and tarnished plant bugs. Many state governments responded quickly to the situation, recommending replacement chemicals such as malathion, parathion, and methoxychlor.²³²

Chemical defoliation of strawberry plants using dinoseb in oil became the American alternative to burning or mowing plant leaves by 1965. American strawberry growers continued to use the mixture despite evidence that such chemicals reduced the “vigour” of strawberry plants and were not sufficient substitutes for mechanical cutting. Dinoseb was originally used in the early twentieth century as a weight loss agent, but because of the small margin between a dose that could slim and a dose that could kill humans, administration halted. The EPA banned dinoseb in 1986 due to the potential for birth defects and the chemical’s endocrine disrupting capabilities.²³³

Proceedings of the National Strawberry Conference in 1980 reveal the complete chemical path-dependency of strawberry farming and strawberry scientists at the time. Fear

²³⁰ Andrews, *Managing the Environment*, 243.

²³¹ Agency for Toxic Substances and Disease Registry, *Aldrin and Dieldrin*, <http://www.atsdr.cdc.gov/tfacts1.pdf> (accessed January 29, 2014).

²³² Shanks, “Insects and Mites,” 296.

²³³ D.T. Mason and R. J. Stephens, “The Use of Chemicals for the Post-Harvest Defoliation of Strawberry Plants,” *Weed Research* 5, no. 4 (December 1965): 305-310; Carson, *Silent Spring*, 36; Allan S. Felsot, “Dinoseb—Banned But Not Forgotten, The Tale of an Unusually Hazardous Pesticide,” *Agricultural and Environmental News* 146 (June 1998), <http://aenews.wsu.edu/June98AENews/Dinoseb--Banned.html> (accessed May 2, 2013).

of more chemicals being decommissioned through the EPA's registration process permeated the "Insect and Mites" section of the proceedings. One prominent scientist, lamenting the recent loss of chlorinated hydrocarbons as legal pest control methods, argued that Environmental Protection Agency standards forced farmers to switch to chemicals with less residual activity. At the same time, however, the author necessarily addressed insect resistance to overused chemicals.²³⁴

Though internal and external insecticide crises plagued California's strawberry industry in the 1960s, 1970s, and beyond, strawberry production boomed. Growers, scientists, and agri-business leaders invested more time, money, and capital into their land and operations, trapping themselves in cycle that was difficult, if not impossible, to escape. California's temperate microclimates along the Central Coast and elsewhere limited where strawberries could successfully grow to meet production quotas. Given these limitations and the high cost of agricultural land in the Golden State, California's industrial strawberry growers did as local New York City farmers had a century earlier—they intensified operations on their restricted acreages and adopted new technologies. The one production problem that technological sophistication could not solve, however, was the growing need for and cost of wage labor.

Labor-Increasing Technologies

Despite tractors, laser-guided grading of fields, and underground irrigation systems that decreased labor inputs, late twentieth century strawberry growers developed an ever

²³⁴ Shanks, *Cultivars to Marketing*, 295, 293-308.

more crippling dependency on wage labor. A strike in the Salinas Valley in 1970 organized by the Farm Workers Organizing Committee under the guidance of Cesar Chavez revealed the reliance of landowners on their field workers and the often acrimonious relationship between the two parties. “For a fella who was raised here, it’s damn hard to eat this stuff. People who aren’t even citizens telling you what to do,” bemoaned Joe Violini, the son of a Swiss immigrant to the Valley whose crops needed harvesting. Picketers explained the situation differently: “The union would give us security in our jobs...The way it is now we have no one to defend us if something goes wrong. There’s nobody to back us up.”²³⁵

Regional farmers turned to schoolboys and families to pick their ripe cauliflower and other truck produce. The *New York Times* reported that “Shipments of lettuce, the area’s chief crop dropped to one-third of normal. Other crops were virtually shut down.”²³⁶ The other crops grown in the valley included strawberries, broccoli, beans, celery, and garlic. Because strawberries could not be harvested mechanically, picking ripe fruit always required vast amounts of wage laborers. But other tasks such as planting, pruning, packing, and managing teams of workers also required increasing numbers of employees as farms grew enormous strawberry tonnages for the national market.

Strawberry field laborers now planted and harvested proprietary and university-bred varieties in fields of plastic where nothing else grew. Summer and winter plantings of refrigerated “plugs” from nurseries in Northern California had to be replanted annually to produce the highest yields and prevent the spread of disease. Further breeding experiments in

²³⁵ Steven V. Roberts, “Fear and Tension Grip Salinas Valley in Farm Worker’s Strike,” *New York Times*, September 6, 1970.

²³⁶ *Ibid.*

the 1970s and 1980s by university scientists adapted strawberry plants to differing amounts of day length, extending harvesting seasons and making strawberry picking almost a year-long task. As anthropologist Miriam J. Wells noted, “The longer and more even bearing season increases workers’ strawberry-related income, thus enhancing their job commitment and reducing the labor management problems associated with a large, brief labor demand.”²³⁷ Steadier employment also granted workers greater bargaining power in relation to wages, working hours, benefits, and a host of other issues. Landowners and those involved in the strawberry business now had to grapple with organized labor and its ability to stymie and shut down production, in addition to the other pitfalls of the industrial system.

America’s Strawberry Patch

Synthetic pesticides and plasticulture were the signatures of California’s post-war strawberry empire, but they did not alter the foundations of industrial agriculture. The demands of distant urban markets, necessity of paid farm labor to perform specific tasks, standardization of strawberries and their production processes, interventions of expert breeders, plant pathologists, and economists, and the efforts of California’s state marketing order, the California Strawberry Advisory Board, comprised the mechanism that turned the Central Pacific Coast into the nation’s strawberry patch. Technological advancements simply enhanced production efficiency and altered temporal aspects of berry cultivation, making the plants’ fruiting cycle more uniform and the field more factory-like. Thus, post-war

²³⁷ Wells, *Strawberry Fields*, 184-185.

production techniques did not alter the cornerstones of agricultural industrialization, they simply intensified and refined the process.

California became the center of U.S. commercial strawberry farming in the decades after 1945 through a series of choices made by the state's growers and horticultural scientists. By geographically consolidating operations, utilizing frozen and fresh market outlets, and adopting new production technologies such as plasticulture, growers dramatically increased yields and their market-share nationwide. Once a well-oiled machine is in place, however, any wrench can wreck the system. The apparatus of post-war strawberry production required the investment of enormous resources into concentrated, monocrop agriculture. Simplifying the ecology of the Pajaro and Salinas Valleys created optimum conditions for insect depredations and soil-borne pests, necessitating surface-level pesticide applications and soil fumigation for control. Insect resistance and federal regulation owing to public concerns over the safety of synthetic chemicals set strawberry growers on a vicious cycle of needing ever-stronger chemical solutions to their pernicious problems with nature. And yet, strawberries continued to embody a wholesome, pure "natural food" to most Americans.

Such conundrums would not go away easily. California not only maintained, but increased its lion's share of the American strawberry market in the 1980s and 1990s. From 74 per cent of the national strawberry trade in 1980, the number rose to 79 per cent in 1990, and 83 percent in 2000.²³⁸ Synthetic pesticides remained the foundation of the plasticulture system, a precarious position as the harmful side effects of laboratory chemicals became

²³⁸ USDA, *Table 4--U.S. strawberry*, accessed April 11, 2014
<http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1381>.

more and more visible. As will be seen in the conclusion, these predicaments led the strawberry industry to a dangerous precipice at the turn of the twenty-first century, prompting scientists to reflect on the road taken during the post-war decades.²³⁹

²³⁹ Z. Gollop, "The Problems of Bromine Residues After Soil Fumigation," *Agriculture and Environment* 1 (1974): 317-318.

CONCLUSION—THE CHEMICAL-STRAWBERRY EQUATION

“Imagine a food production system that requires complete sterilization of the soil to be successful, uses large amounts of unrecyclable and nonrenewable plastic for controlling weeds and plant growth, requires a considerable amount of water to establish plantings, and depends on frequent applications of pesticides to produce acceptable fruit quality. In addition, imagine that the food from this system is considered to be among the most inconsistent items in the grocery store, and contains higher levels of pesticide residue than most other produce items. The price is sufficiently high so that poorer segments of society tend not to purchase the product, yet farm workers accuse growers of not paying a fair wage. Unfortunately, this description is typical of strawberry production in much of the world.”²⁴⁰

~Marvin Pritts, Professor Horticulture at Cornell University, writing for the Fourth International Strawberry Symposium in 2002

Pritts’s description reveals the problems plaguing the current industrial system of strawberry cultivation. Cooperative marketing sets appearance and taste standards that growers attempt to meet, but often fail to replicate. Furthermore, an ideal strawberry type forces growers to rely on a handful of varieties that produce “perfect” fruit and exacerbate the problems with disease and pests inherent in vast acreages of monocropped fruits and vegetables. The solution to pathogen and insect ravages recommended by experts include the environmentally-expensive techniques of plasticulture—a system dependent on chemical controls that not only soak into soils, plants, and the skin and clothing of field workers, but that also destroy beneficial insect populations and leave residues on the foods consumers eat. Manual wage labor provides a key component of strawberry farming, without which the industry would collapse. And the consumers that are the focus of marketing and

²⁴⁰ Marvin Pritts, “Growing Strawberries, Healthy Communities, Strong Economies, and Clean Environments: What is the Role of the Researcher?” in *Proceedings of the Fourth International Strawberry Symposium: Volume Two*, ed. T. Hietaranta, M.-M. Linna, P. Palonen, P. Parikka (Leuven, Belgium: International Society for Horticultural Science, 2002), 411.

standardization efforts generally live nowhere near where strawberries are cultivated, but in distant markets all over the United States and the globe.

Strawberries are no longer the wild, natural fruit foraged by Native peoples, colonists, and early Americans.²⁴¹ Plants germinate, mature, flower, and fruit in carefully controlled environments designed by people interested in the business of selling strawberries to urban and suburban consumers. However well managed those fields may be, though, they cannot escape the consequences of their own existence. Intensive horticultural monocropping simplifies ecological systems and creates ideal environments not only for strawberries, but for soil-borne and surface-level pests and pathogens. Solutions to this problem have varied over the last two centuries, from intercropping to burning, but by far the most effective control of insects and disease have been synthetic chemicals. These compounds did not come without their own inherent flaws. Insect resistance to pesticides became apparent shortly after their abundant usage in American agriculture, leading to a cycle of chemical usage, insect adaptation, and switching to more potent agents. As Carl H. Shanks, Jr. of Washington State University wrote in 1980, “Better insecticides are [always] needed.”²⁴² A secondary cycle complicating industrial strawberry production began in the 1970s. The Environmental Protection Agency’s cancellation of certain pesticides that strawberry growers relied on forced a switch to different, sometimes more toxic chemicals. Lurking at the end of both of

²⁴¹ That is not to say that wild strawberries no longer grow. But the vast majority of Americans do not forage for strawberries in nature anymore, they purchase them from grocery stores and farmer’s markets or pick them on farms designed to mimic foraging—another development from the “natural food” movement of the 1970s.

²⁴² Carl H. Shanks, “Insects and Mites,” in *The Strawberry: Cultivars to Marketing*, ed. Norman F. Childers (Gainesville, FL: Horticultural Publications, 1981), 296.

these rotations was the problem of what to do when synthetics could no longer be used, whether due to resistance or legal prohibitions. Professor Shanks, at the end of the “Insects and Mites” section in the proceedings of the first National Strawberry Conference made an accurate observation: “Failure to work toward the goal of an integrated [pest management] program could eventually leave us without effective insecticides or reliable alternatives.”²⁴³

A critical juncture for the strawberry industry occurred a little over a decade after Shanks published his work. Methyl bromide, one of the ingredients used in plasticulture’s soil fumigation, came under international scrutiny in the early 1990s. The EPA classified the compound, which has been linked to fetal deformations, eye infections, and dermatitis in humans, as an ozone depletion agent. Under the Clean Air Act and the Montreal Protocol on Substances that Deplete the Ozone Layer, U.S. production and importation had to be reduced incrementally until it was completely phased out by January 1, 2005. However, due to the lack of safe, viable substitutes for the chemical, methyl bromide has received annual Critical Use Exemption (CUE) status, “designed for agricultural users with no technically or economically feasible alternatives.”²⁴⁴

Research for viable alternatives to methyl bromide has been underway worldwide for the last two decades. In North Carolina, the Department of Environment and Natural Resources funded an Alternative Strawberry Production with Compost project in Franklin

²⁴³ Shanks, *Cultivars to Marketing*, 302.

²⁴⁴ Eric Schlosser, “In the Strawberry Fields,” *The Atlantic*, November 1, 1995; B. H. Shomar, G. G. Müller, A. A. Yahya, “Occurrence of Pesticides in Groundwater and Topsoil of the Gaza Strip,” *Water, Air, & Soil Pollution* 171 (March 2006): 238; John Vollmer, *Alternative Strawberry Production With Compost, Final Report* (Raleigh, NC: North Carolina Department of Environment and Natural Resources, 1999), 6; U.S. EPA, *The Phaseout of Methyl Bromide*, (<http://www.epa.gov/ozone/mbr/> accessed May 3, 2013).

County starting in 1997. In California in the early 2000s, the state's Agricultural Research Scientists investigated beneficial microbes as one biological pest control option to work alongside other common strawberry chemicals like chloropicrin. And in Spain, projects launched in the late 1990s around Huelva and Valencia tested alternative chemicals to methyl bromide as well as non-chemical pest and disease control options such as soil solarization and biofumigation using mushroom compost.²⁴⁵

However, contrary to what many activists, scientists, and lay people believe, synthetic pesticides are not the root problem of modern industrial truck farming. Yes, they are toxic compounds that pollute landscapes and seemingly trap producers and consumers in a corporate food system that is difficult to escape. But synthetics are a technology, a knowledge by which people use environmental resources in order to satisfy material wants and needs.²⁴⁶ As such, they are comparable to burning to eradicate strawberry bud weevils or breeding strawberries to achieve a certain trait. When growers and scientists plug synthetic chemicals into an industrial system of distant markets, division of wage labor, product standardization, expert intervention, and cooperative marketing, it runs more efficiently.

²⁴⁵ John Vollmer, *Alternative Strawberry Production With Compost, Final Report* (Raleigh, NC: North Carolina Department of Environment and Natural Resources, 1999), 6; Marcia Wood, "Strawberry Growers Test Methyl Bromide Alternatives." *Agricultural Research* 49, no. 1 (January 2001): 4-8; J.M. López-Aranda, J.J. Medina, L. Miranda, R. Bartual, V. Cebolla, F. Dominguez, and J. López-Medina, "The Spanish Project on Alternatives to Methyl Bromide (1): the Case of Strawberry in the Area of Huelva," in *Proceedings of the Fourth International Strawberry Symposium: Volume Two*, ed. T. Hietaranta, M.-M. Linna, P. Palonen, and P. Parikka (Leuven, Belgium: International Society for Horticultural Science, 2002), 427-430; R. Bartual, V. Cebolla, J. Bustos, A. Giner, and J.M. López-Aranda, "The Spanish Project on Alternatives to Methyl Bromide (2): the Case of Strawberry in the Area of Valencia," in *Proceedings of the Fourth International Strawberry Symposium: Volume Two*, ed. T. Hietaranta, M.-M. Linna, P. Palonen, and P. Parikka (Leuven, Belgium: International Society for Horticultural Science, 2002), 431-434.

²⁴⁶ John H. Perkins, *Insects, Experts, and the Insecticide Crisis: the Quest for New Pest Management Strategies* (New York: Plenum Press, 1982), 1-49, 210-231.

Yields and profits increase dramatically and allow for further growth and capital investment. But synthetics come with their own inherent problems and costs. Once these burdens become too onerous and cost-inefficient, new technologies of strawberry production can and will take the place of synthetic pesticides.

What actually traps commercial farmers and consumers in a capital-intensive and environmentally destructive food production system is the adoption of all five elements of industrial agriculture, not the tools and technologies used. The central paradox of an agricultural system promulgating its own demise raises broader questions. Is industrial strawberry production the best way to cultivate the fruit? Are there other ways of growing small fruits that will not lead to the problems currently faced? In other words, can you undo the industrial? Can local production or less industrialized forms of production that use only some, not all of the elements of industrialization become the means by which American growers cultivate strawberries? These questions are salient given the recent surge in locavorism in many U.S. cities, food justice movements worldwide, and global concerns about the logistics of feeding nine billion people. When discussing local farming and food creation—meaning food produced for one, nearby urban center—it is imperative to remember that strawberries and other truck crops such as asparagus or cauliflower are not staples in the majority of American or world-wide diets. Strawberries for most of their commercial existence have been luxury crops, meaning they cost more than commodities such as wheat or corn or the many permutations of these grains found in supermarkets. With that perspective, local production's assets versus industrial production can be compared.

Eating specialty foods grown on an industrial scale requires immense inputs of manual, immigrant and minority labor in addition to the ecological and commercial costs of an unsustainable system. Industrial strawberry production in the late nineteenth century appeared in Southern states shipping fruit to various Northern cities. The sheer economies of scale achieved on Southern strawberry farms put price ceilings on berries for all growers, including local ones. However, the proximity of New York City's truck farmers' to their market and their ability to transport crops quickly, undercut many of the economic advantages of industrial production. Likewise, today's cities receive the vast majority of their strawberries from California farms that harvest enormous volumes of berries and ship them considerable distances. The fruits' fragility requires special cooling and storage facilities that add to the end-price consumers pay. Strawberries grown on the West Coast are not as fresh as those grown nearby urban centers, but can be purchased for a much longer timespan given the Central Coast's climate and fruit varieties bred to mature in different day-lengths.

Industrial production, then, seems to rely on consumers who desire to purchase healthy, "natural," specialty fruits out-of-season. However, eating foods out of local seasons is a learned trait, one that can be unlearned if deemed beneficial or necessary. In locavore circles throughout the country this is indeed happening. People are choosing to eat seasonal fruits and vegetables grown on local, nearby farms. Wage labor is still usually required for produce cultivation at the local scale, but in far smaller quantities. Cooperative marketing and specialization in certain crops and varieties are sometimes adopted, but not always. And

expert advice, when available, is highly sought after as many farmers have not been trained in organic methods.²⁴⁷ Given these options to full-scale industrial agriculture and its attendant problems, the question begs: What is the real price paid for industrial luxuries that can otherwise derive from local, less-industrialized sources serving particular urban markets? And who actually pays it?

According to Marvin Pritts, Professor of Horticulture at Cornell University,

No one set out to deliberately design an input-intensive, environmentally expensive production system for strawberries, it just evolved as growers and researchers responded to problems with short-term solutions...As we solved problems to help move producers further down the road to profitability, we never paused to look where the road was leading.²⁴⁸

The problem with Pritts's statement is that growers and researchers actually *did* choose the road they went down, just as Chadbourn's farmers actively chose not to follow expert advice for burning their fields. Strawberry scientists and farmers moved to temperate climates and increased land inputs, from synthetic chemicals to water to labor. Strawberries historically have always been a cash crop, so the question was not one of profitability, but of scale. Experts aided in building California's commercial truck farming empire and now they can aid in ensuring that the state's strawberry industry becomes sustainable and survives into the future.

The strawberry industry today faces a crisis of imagination. Many believe that without synthetic chemicals, their industry will collapse. In this thesis, I sought to reach back into the archive to uncover forgotten, but not lost episodes in the history of strawberry

²⁴⁷ Eastern Carolina Organics, "Who's Your Farmer?," <http://www.easterncarolinaorganics.com/> (accessed July 15, 2014).

²⁴⁸ Pritts, "Growing Strawberries," 411-412.

production that can provide inspiration and alternatives to the current mode of industrial agriculture. Instead of sterile soils, enormous amounts of water, rolls of non-reusable plastic, a deluge of toxic chemicals, and immense amounts of low-paid, manual labor, imagine less industrialized farms using natural mulches and intercropping or perhaps burning as a tool alongside or instead of chemicals. Imagine successful small farms inside cities and suburbs and on the outskirts of metropolitan areas cooperatively providing fresh produce to nearby communities. Though perhaps less profitable, these alternatives will prolong and increase the viability of the strawberry industry, making it an example for other chemically-dependent industrial truck crops to follow.

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