

GHOSTWORKERS AND GREENS

*The Cooperative Campaigns of
Farmworkers and Environmentalists
for Pesticide Reform*

ADAM TOMPKINS

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CONFRONTING THE CONSEQUENCES OF THE PESTICIDE PARADIGM

A chemical euphoria overtook American agriculture in the twentieth century. Dabbling with botanical control agents and soap-based emulsions to control insect threats, which had begun in the nineteenth century, soon gave way to experimentation with arsenical compounds that carried a greater kick. As growers became more enmeshed in the world of agricultural chemicals, their poison-free “friends” of the past, biological and cultural forms of pest control, seemed less appealing and less suited for the times. The United States Department of Agriculture (USDA), pesticide manufacturers, land grant colleges, and entomologists acted as facilitators that encouraged the use of a cornucopia of chemicals. DDT proved to be the gateway substance that led to the use of exponentially greater volumes of more powerful chemical combinations in agricultural production. Growers denied the existence of problems as evidence began to appear, choosing instead to trust more heavily in a variety of economic poisons until in the post–World War II period they became almost wholly dependent upon pesticides for crop protection.

The suggestion of addiction in the preceding paragraph is deliberate. “Chemical dependence” is a phrase most often employed in the discussion of persons who habitually use drugs or alcohol, yet it is an equally fitting descriptor of growers’ increasing reliance on pesticides in their operations and is a helpful frame of reference for understanding their strong resistance to reform efforts from 1962 onward. Agricultural chemicals came to greater use with the accession of Leland Howard, an entomologist who touted their supremacy over other methods of pest control, to the head of the USDA’s Bureau of Entomology. The volume of pesticides applied to fields grew markedly in the first half of the twentieth century before skyrocketing in the post–World War II era with the introduction of DDT to commercial markets. In what political scientist Christopher Bosso characterizes as the “golden age of pesticides,” with little debate about risks and minimal regulation, production of the compound tripled from 100 to 300 million pounds in the five years after the war’s end and doubled again in the decade following.¹ DDT and other new brands of synthetic chemicals promised fast action, greater efficiency, and universal applicability. Growers, captivated by the promise of total control and possible eradication of pests, applied pesticides in ever-increasing volumes. Insect pests, however, showed a remarkably proclivity for developing resistance to the chemicals designed to kill them. Still, researchers, pesticide manufacturers, and growers continued to invest heavily in chemical controls even as pests developed immunities to some of them. Growers saturated their fields with voluminous concentrations of more powerful chemical combinations, holding to the faith that pesticides would best prevent crop damage and financial loss. The remarkable ability of insects to continually develop new resistance to potent pesticides actually helped entrench chemical controls further in the modern industrial agriculture production system.

The chemical dependency in agriculture bears comparison to path dependency in other technological systems. Historians David Nye and Thomas Hughes introduce the concept of path dependency into their discussions of energy systems. They contend that when a system is in the process of being developed, decision makers have a wide range of options and flexibility in its design and function. As the system matures, however, it becomes path dependent: earlier choices narrow the range of options available for changing it.² This model applies just as aptly to the system of pest control used by growers in the United States. As chemical controls

became entrenched in agricultural production, biological and cultural control methods seemed less viable. Historian James McWilliams recognizes a path dependency in agricultural pest management, asserting that the investment of growers, government, and manufacturers in chemical solutions “limited the way in which scientists and farmers framed the pest situation and contemplated their options.”³ The investment and the faith in chemicals made the switch to other forms of pest control an improbable prospect.

Some regulation existed during the “golden age of pesticides” but it was not intended to impose a burden on growers by limiting their pest control options. The Insecticide Act of 1910 required that agricultural chemicals carry accurate product labeling, while the Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (FIFRA) made it necessary for manufacturers to attest to the efficacy of a pesticide and register it with the USDA before introducing it to the commercial marketplace. FIFRA also mandated that warning labels inform growers about potential risks to health, plants, or vertebrate animals. It did not, however, keep dangerous chemicals from being sold. Regulations to protect public health and the environment proved severely lacking and pesticide use rose unabated. Neither growers nor the USDA pushed for more stringent regulations to limit use of chemicals that posed a threat to human or environmental health. The parties with a vested interest in agricultural policymaking at this time all held to the “pesticide paradigm,” that agricultural chemicals were an indispensable component of modern agricultural production.⁴ Since the public remained uninterested in pesticide issues in the immediate postwar era, an iron triangle of interests developed; hence, policymaking, as Bosso demonstrates, was “clearly accommodative in tone,” with government officials primarily concerned with the interests of their clients, the agricultural industry.⁵

Rachel Carson awoke the nation to the dangers of pesticides in 1962 with the publication of *Silent Spring*. She was one of a group of scientists who harbored concern about some of the unintended consequences arising from the proliferation of economic poisons. They believed that complex scientific data needed to be communicated to the public in an understandable, nonpartisan manner, democratizing the information so that people would be better able to make informed personal and political decisions about the use of a broad range of potentially hazardous chemicals and new

technologies in society. According to historian Michael Egan, the science information movement, of which biologist Barry Commoner was at the forefront, believed that informed debate and dissent are fundamental to the maintenance of a functioning democracy and consciously worked to make the best available information accessible to the public.⁶ Carson held to this philosophy as well and intended *Silent Spring* to be a call for citizen engagement in pesticide politics and regulation. She believed that citizens had a right to participate in decisions on how and to what extent pesticides would be used on farms, forests, and suburban neighborhoods. Historian Karl Brooks asserts that Carson tapped into a public concern about the environment that had been building prior to 1962, stating that “Americans’ shared personal and civic experiences—what they had done, seen, and thought before 1963—laid a cultural powder trail that *Silent Spring*’s bright flame ignited.”⁷ Carson’s communication of scientific information to the public empowered individuals and groups with knowledge, giving them a degree of expertise that could be used to influence public policy and private practices.

Civic Engagement, Science, and Environmental Health Reform

Numerous scholars recognize the fundamental importance of public engagement in issues related to industrial toxins, environment, and health. Robert Gottlieb locates the first campaigns for environmental reform in the Progressive Era, with citizens like Alice Hamilton initiating efforts to control pollution in the urban environment.⁸ Examining the roots of environmental health science, Christopher Sellers contends that “an energized labor movement unsettled employers’ assumptions about whether they were treating their workers fairly and catalyzed new legislative and judicial foundations for tending to worker health” between 1910 and 1930.⁹ Alan Derickson argues that public health officials knew about the deleterious effects of coal dust for over fifty years, yet proved reluctant to address the issue of black lung until the “confrontational collective action” of a worker-based social movement necessitated change.¹⁰ David Rosner and Gerald Markowitz assert that response to silicosis, an occupational lung disease, paralleled the rise of labor activism in the 1930s, while the

subsequent waning of government attention to the problem followed a decline in union influence.¹¹ In their next collaboration, *Deceit and Denial*, Rosner and Markowitz show that the lead and vinyl industries hid information about occupational risks and used soft money and donations to political action committees to placate certain elected officials and forestall the enactment of new regulations. The industries' actions, they state, became known as a result of lawsuits brought by poisoned workers.¹² Cancer expert and doctor of environmental and occupational medicine Samuel Epstein concludes that nearly every legislative regulation or reform to protect workers and consumers against cancer had its roots in a public interest group or labor organization.¹³

Public engagement in pesticide issues similarly proved a necessary predicate to reforming pest control practices in agriculture, since both growers and the USDA, the primary regulatory agency prior to 1972, presumed that chemicals were the single best pest control option. In an attempt to make agricultural pest control less harmful to the environment and human health, nongovernmental organizations employed a variety of strategies to curb pesticide usage that ranged from focusing on a single chemical to passing laws that reshaped the regulatory landscape. Growers' associations and the USDA consistently opposed efforts to restrict the use of agricultural chemicals or remove them from the marketplace. Similar to the tactics employed by industrial manufacturers, they tried to delay reform by downplaying risk, fostering doubt about existent scientific data, calling for more scientific studies, and leaning on sympathetic politicians and government officials for support. Pesticide reform advocates generated publicity and contested industry claims. Their efforts helped restrict or ban several dangerous pesticides and have forced growers to adopt safer pesticide use practices, though there are certainly still issues that remain to be addressed.

Scientists concerned about the unintended consequences of technological innovations sometimes struggled over the degree to which they should be visibly involved in political discourse. Certainly not all reach the same decision as Barry Commoner, Rachel Carson, and others in the science information movement. Historians Naomi Oreskes and Erik Conway state that "scientists consider their 'real' work to be the production of knowledge, not its dissemination, and they view these two activities as mutually exclusive," noting that scientists who try to bridge the gap between

academic and popular audiences risk being unfavorably labeled as “popularizers.”¹⁴ Hence, while *Silent Spring* reached millions of readers, subsequent scientific findings revealing the human health and environmental risks of pesticides did not get publicized in the same fashion. Some scientists also feared that political engagement would jeopardize the objectivity upon which scientific work is premised.¹⁵ Environmental and health policy, however, grows from an amalgam of scientific knowledge, ethical premises, and public opinion. It is necessarily important, then, that scientific knowledge be effectively communicated to the public.¹⁶

Political scientist Karen Litfin argues that “knowledge brokers” serve as “intermediaries between the original researchers, or producers of knowledge, and the policy makers who consume that knowledge but lack the time and training necessary to absorb the original research.”¹⁷ These knowledge brokers play the same role in shaping public opinion. The information presented by them often bears the imprint of their values. Different knowledge brokers interpret scientific results in varying ways, choosing which results to emphasize and how to address the issue of scientific uncertainty. Consequently, Litfin holds that science alone will “not likely to save us from environmental ruin, persistent political action informed by carefully chosen discursive strategies might.”¹⁸

Common Ground and Collaboration in Pesticide Reform

Indiscriminate use of pesticides concern environmentalists and farmworkers alike and their representative organizations have acted as important knowledge brokers advocating for pesticide reform. An interest in the preservation of environmental and human health committed a number of environmental organizations to campaigns for pesticide reform in the nearly fifty-year history of activism since the publication of *Silent Spring*. Organizations of farmworkers or groups representing them shared a similar desire to make agricultural pest control safer, since farmworkers risked injury to their personal and family health when exposed to pesticides in the fields. While both environmental organizations and farmworker groups acted as knowledge brokers and engaged in separate efforts to reform pesticide use practices, their common interest in protecting human health facilitated the development of episodic collaborative campaigns.

Farmworker groups, in particular, recognized the value of building bridges to outside organizations and groups. Farmworkers represent a marginal, often invisible, segment of the populace. These “ghostworkers,” as they were called for a time in Arizona, wield less power than workers in other industries as a result of poverty, migratory work patterns, exemption from protective labor laws like the National Labor Relations Act, and sometimes undocumented immigrant status. Decades of effort at organizing farmworkers in the first half of the twentieth century failed to come anywhere close to the gains of unions in the industrial sector. Historian Jacquelyn Jones argues that agricultural migrants in the East were “systematically alienated from every level of the body politic” in the 1930s and 1940s.¹⁹ Cindy Hahamovitch similarly characterizes migrant farmworkers as “stateless” persons lacking political power.²⁰ Years of frustrated organizing efforts made clear that farmworkers needed allies if they were to win gains from growers or government. This fits sociologist Melvin Hall’s argument that people are the primary source of power in poor people’s organizations and that forming relationships with outside groups may be used as a means of building strength in a campaign.²¹ Sociologists Guy Burgess and Heidi Burgess similarly contend that one way for “low-power” groups to compensate for the absence of political and economic strength “is to enlist the help of external or more powerful groups.”²² Since farmworkers lacked political and economic capital, it behooved them to build bridges to other organizations and the public to enlarge their base of support.

Ghostworkers and Greens shows how farmworker groups often drew connections to the larger public in their pesticide reform efforts in order to increase the number of people supporting their campaigns and compensate for their lack of political and economic power. While several agricultural chemicals carried the risk of poisoning farmworkers, the United Farm Workers Organizing Committee (UFWOC) focused its initial campaign on DDT, the infamous persistent pesticide whose threat extended well beyond the bounds of the field. The launch of subsequent campaigns followed incidents of widespread poisoning of the public by pesticide residue. Cesar Chavez and other organizers argued that growers’ misuse of pesticides threatened the public and farmworkers alike and that the problem could be resolved with a strong union presence in the fields. Other farmworker groups like the Maricopa County Organizing Project, Arizona Farm Workers, and the Farmworker Association of Florida focused their

attempts to elicit public concern on issues of pesticide drift, ground-water quality, and ozone depletion. They similarly connected farmworker health issues to broader concerns. Additionally, these groups devoted resources to educational efforts among farmworkers, teaching workers and their families how to best protect their health around dangerous agricultural chemicals. The organizations used lawsuits to gain leverage as well. The public face of their campaigns, though, typically sought to establish a bond with people and groups having little direct connection to the fields.

This book also demonstrates that environmental organizations espoused a similar rhetoric of cooperation, suggesting that environmentalists and workers should work together on issues when interests overlapped. Organizers of the first Earth Day stressed the value of building alliances with organizations associated with other causes, stating that the potential for cooperative campaigns was innumerable because pollution affected everyone regardless of race or social standing. Recently formed environmental organizations like the Environmental Defense Fund (EDF), the Natural Resources Defense Council (NRDC), and Friends of Earth (FoE) embraced the expanded vision of environmentalism readily. Of the older conservation groups, the Sierra Club showed the greatest enthusiasm for tackling new challenges. This is made clear in *Sierra Club Bulletin* editorials from the early 1970s that spoke of the compatibility of environmentalism and social justice. Environmental organizations knew that workers and environmentalists would not agree on everything, but recognized the value of finding common ground and cooperating on issues of mutual interest. Many environmental groups continued to voice support for partnerships with labor organizations in the 1980s and beyond.

These attempts at outreach lack visibility in scholarly literature as divisions between the blue and green movements are often emphasized more than common ground. The “jobs versus environment” trope pervades popular and academic discussions on the topic. Historian Richard White contends that “environmentalists so often seem self-righteous, privileged, and arrogant because they so readily consent to identifying nature with play and make it by definition a place where leisured humans come only to visit and not to work, stay, or live,” and reasons that this leads them to “frame environmental issues so that the choice seems to be between humans and nature.”²³ This is certainly true of the epic battles over the future of old-growth forests in the Pacific Northwest that White references in

his essay. Yet this understanding can also be an oversimplification, a false dichotomy employed by opponents of regulation in a classic “divide and conquer” strategy.²⁴ Sociologist Brian Mayer acknowledges the class differences to which White refers, but suggests that “externalities such as environmental pollution and occupational health hazards disproportionately affect those at the lower end of the socioeconomic structure, the working class, which theoretically creates allies between environmentalists and organizations like unions that tend to represent working class individuals”²⁵ The efforts of labor and environmental organizations to address issues of seemingly mutual concern warrant closer scrutiny by scholars so that the nature of relations between the two movements can be better understood. This work contributes to that understanding with its investigation of the engagement of environmental organizations and farmworker groups in pesticide reform.

Previous comparative expositions of pesticide campaigns do not adequately address cooperation between the two groups. Historian Robert Gordon, who often explores the intersections of the labor and environmental movement, argues that “the battle to restrict the use of DDT is in many ways indicative of the gulf between the United Farm Workers (UFW) and the environmental mainstream,” contending that the Sierra Club and other leading environmental groups cared about the effect of persistent pesticides on “natural wildlife, not on Latino farmworkers.”²⁶ Qualitative social scientist Laura Pulido maintains that environmentalists chose to “focus on quality-of-life issues in which the social actors are fairly removed from the actual threat,” incorrectly asserting that “once DDT was banned, mainstream environmental groups retreated from the issue of pesticides for a number of years, thinking the problem was solved.”²⁷ In a subsequent co-authored article, Pulido and anthropologist Devon Peña hold that “mainstream environmentalists focused on protecting wilderness areas and consumers from pesticides, while ignoring the plight of farmworkers,” and assert that environmentalists’ “narrow articulation of the environment” rendered them “incapable of an oppositional politics that would allow them to make connections between agribusiness, the state, environmental degradation, and [the] highly exploited.” They suggest that environmentalists’ constrained view of pesticide problems was attributable to their “positionality” as college-educated white persons (often male), “privileged in their socioeconomic status,” who lived far from the fields

and had a “limited political consciousness.”²⁸ A close examination of the rhetoric and actions of mainstream environmentalists shows that such sweeping generalizations are problematic. Here I illustrate that environmental organizations and farmworker groups recognized their common interests on multiple occasions and collaborated in a number of efforts both before and after the 1972 DDT ban.

The work histories of leaders and organizers introduced in the following case studies, in fact, sometimes overlapped the social justice and environmental movements. EDF co-founder Victor Yannacone represented the NAACP for nine years before shifting his attention to environmental issues. Chicano activist Arturo Sandoval also organized activities for the first Earth Day in the southwest. Earth Day organizer and Sierra Club lobbyist Linda Billings later translated her concern about farmworkers and pesticides into a new position as the director of pesticide farm safety staff at the Environmental Protection Agency. Al Meyerhoff began his career with California Rural Legal Assistance before becoming an NRDC attorney. David Roe authored California’s Safe Drinking Water and Toxics Enforcement Act when he was an EDF senior attorney. He later transitioned into a senior council position at Human Rights First. Historian Adam Rome argues that “the rise of the environmental movement owed much to the events of the 1960s,” and suggests that scholars should consider the underexplored connections between environmentalism and other social movements.²⁹ Undoubtedly, the examples of overlap in this study and those mentioned by Rome represent only a sample of persons who transitioned from an environmental group to an organization focused more specifically on social justice and vice versa.

Cooperative efforts between farmworker groups and environmentalists often depended upon the work of bridge-builders within one or more of the organizations. I argue in this book that bridge-builders transcended differences between organizations and ably negotiated the cultural terrain of diverse movements to foster working relationships.³⁰ Staff professionals played a critical role in farmworker organizations. Nurse practitioner and boycott coordinator Marion Moses, for example, initiated contacts with scientists and the Environmental Defense Fund on behalf of Cesar Chavez and UFWOC in the 1960s. Maricopa County Organizing Project attorney Nadine Wettstein similarly established working relationships with the local chapter of the Sierra Club and Arizona Common Cause

to establish Arizona Clean Water Advocates. Farmworker Association of Florida Pesticide Safety and Environmental Health Project Coordinator Jeannie Economos and Administrator Sister Gail Grimes served as the primary contacts for FoE in the Sustainable Tomatoes/Safer Communities campaign. Sierra Club leaders—Raymond Sherwin, William Futrell, Will Siri, Michael McCloskey—issued invitations for partnerships with labor unions on issues of mutual interest, while some lobbyists like Linda Billings networked with different farmworker groups. NRDC attorney Al Meyerhoff undertook efforts to maintain a working relationship between his organization and the UFW in the wake of Cesar Chavez’s passing. These individuals facilitated the growth of collaborative efforts between the farmworker movement and the environmental movement.

Sociologists Sherry Cable, Tamara Mix, and Donald Hastings suggest that the most effective working relationships between environmentalists and environmental justice activists occur when the environmental justice organization has a professional staffer who shares a common background (well-educated and middle-class) with environmentalists and functions as a bridge between the groups.³¹ These case studies add support to that contention. Often the individuals within the farmworker organizations who communicated with environmental groups had not previously worked in the fields. Rather they were professionals committed to principles of social justice, and their level of education and professional background likely facilitated communication between the organizations.

Differences in strategy and timing limited cooperative opportunities to some extent. Though the collaborative efforts between movements often proved temporary, I contend that this does not weaken the significance. Political scientist David Meyer maintains that cooperative endeavors and coalitions lack permanence and that “the peak of mobilization is always limited.” He argues that “changes in policy, political alignments, or even rhetoric alter the constellation of political opportunities for each organization.”³² Organizations do often drift apart at the conclusion of a trial or when efforts to enact new regulatory laws end in success or failure, but in the cases studied here, channels of communication remained open for future collaborations between farmworker groups and environmentalists that maintained a keen interest in pesticide issues for roughly fifty years since the release of *Silent Spring*. The different organizations, however, also addressed a host of different issues and shifted resources to address

other concerns during that time as well. This book shows that the possibility of reestablishing cooperative arrangements arose when the different organizations returned their focus to pesticides at the same time and when strategies and goals aligned.

Overview

Chapters 1 and 2 briefly explain the development of chemically intensive, industrial-style agriculture in the United States. The first chapter shows how growers' early concerns about economic poisons gave way to an ardent belief that pesticides were an indispensable necessity in their ongoing war against insect predators. It simultaneously charts changes in government agencies and professions connected with agriculture and the evolution of clientele politics and pesticide regulation through the Federal, Insecticide, Fungicide, and Rodenticide Act of 1947. The chapter following focuses on another key change in the transformation of farms into what Carey McWilliams so poignantly characterized as "factories in the fields." It examines the growth of a large marginalized, often migratory, workforce that was systematically disempowered by growers and government. These hidden hands of the harvest fell out of view of the public eye and did not benefit from the protection of the growing body of labor laws in the mid-twentieth century. Consequently, it behooved the people most effected by the deleterious effects of pesticides to find allies outside of the agricultural industry in their reform campaigns because they had been rendered powerless in formal politics. Together these chapters set the foundation for the examination of cooperative efforts in pesticide reform that follow in subsequent chapters.

Chapter 3 begins with the publication of *Silent Spring* in 1962 and shows how concerned scientists disseminated information about the ill effects of pesticides directly and indirectly to UFWOC and environmental groups. The belief that an informed citizenry would be better able to debate and make decisions about innovations that had potentially adverse effects on people and the environment underlay this scientific information movement. Both environmentalists and farmworker groups showed increasing concern about pesticides, particularly DDT, as they understood more about the problem, but developed fairly different strategies in their

attempts to make change. I argue that the variance in strategies limited but did not preclude opportunities for collaboration between the two movements. Cooperation happened most often in mounting legal challenges.

The next chapter tracks the pesticide reform efforts of UFW and mainstream environmental organizations in the years immediately following the DDT ban. Contrary to the predominant scholarly narrative, environmentalists remained invested in the issue. Environmental organizations, particularly the Sierra Club, showed interest in a broadened range of environmental issues and expanded their lobbying efforts to address many of these concerns. They consistently stressed the fundamental importance of securing the public's "right to know" about pesticides and better democratizing decision making on related issues. Opportunities for collaboration with the UFW proved fleeting though, because union battles with the Teamsters between 1972 and 1976 consumed so much of the organization's resources.

Chapter 5 narrows the focus to state-level pesticide politics in Arizona during the 1970s and 1980s. Both farmworkers and suburban families affected by pesticide drift tried to make the grower-dominated Board of Pesticide Control more responsive to the concerns of the public. However, these efforts rarely occurred concurrently, so collaborative campaigns did not develop between the groups for many years, in part because growers' associations recognized the potential power and threat of a cross-class coalition and strategized to keep one from developing. When the opportunity finally arose in 1984, farmworkers joined with suburbanites and environmentalists to overcome the power of the agricultural lobby and reshape pesticide governance in the state.

The next chapter also looks at state-level activism with an examination of responses to the deregulatory efforts of California Governor George Deukmejian in the 1980s. With the gains of the previous decade under assault, environmentalists and unions partnered to counter the governor's attacks. The labor-environmental coalition filed lawsuits to force enforcement of existent law and continued to support legislative measures that would help protect public health. California Rural Legal Assistance partnered with environmental organizations on multiple occasions during this period. Meanwhile Chavez and the UFW set their sights on eliminating five pesticides from use, hoping that a renewed nationwide boycott would bring enough economic pressure to bear on growers that they would

negotiate new contracts. Environmentalists, by comparison, committed their energies to mobilizing California voters to pass a sweeping toxics initiative that fundamentally changed the state's regulatory landscape. Both efforts shared the common goal of better protecting the health of farmworkers and the public, but variant scopes and campaign strategies hampered collaboration. Still, cooperation between the UFW and environmentalists occurred on a limited basis in California during this period.

The final case study, in Chapter 7, encompasses pesticide politics from the local to the international level, centering on the long struggle to halt usage of methyl bromide. Signatory nations of the Montreal Protocol, an international treaty to curb ozone depletion, amended the agreement with a phase-out schedule for methyl bromide soon after its deleterious effects on the atmosphere were discovered. Growers associations put up a fierce resistance to the plan, using uncertainty in science to foster doubt about its necessity. Environmental groups and farmworker organizations functioned in part as a counterweight against growers' lobbying; in particular, the Farmworker Association of Florida partnered with FoE in a campaign against methyl bromide. Together they publicized that the fumigant posed a threat not only to atmospheric integrity, but to the health of farmworkers in the fields and people living in adjacent communities. This chapter also discusses joint efforts between farmworker groups and environmental organizations in California to advance the phase-out schedule. Though the fumigant continues to be used to a limited degree in the United States to this day, the collaborative efforts of regulatory proponents added information about the hazardousness of methyl bromide to bank of knowledge and hastened the switch to viable alternatives. Just as they have done consistently since the mid-1960s, environmental organizations and farmworker groups continue to compile pesticide data; analyze risks and educate the public; initiate reform campaigns in attempt to resolve pressing problems; and collaborate with each another when timing, strategies, and goals overlap.

SOWING THE SEEDS OF CHEMICAL DEPENDENCY

The end of World War II heralded an era of agriculture in which many growers unflaggingly put their faith in chemicals as their primary means of pest control. Synthetic compounds offered growers a previously unobtainable mastery over nature. Pesticides had a long history of usage in the United States prior to the introduction of synthetic chemicals, but were never relied upon as completely as they were after 1945. The embrace of these powerful new poisons solidified a path dependency in agriculture that made it ever more difficult for growers and entomologists to switch from chemical control technology to other systems of pest management.¹

Farmers employed folk remedies, botanicals, and soap-based emulsions as agricultural development spread westward across the nation. Pyrethrum became the first botanical insecticide sold commercially, but its high cost limited its appeal.² Soap solutions offered a more affordable pest control option beginning in the 1840s, making usage more feasible as monoculture became more common.³ Changing vast stretches of

complex ecosystems into much simpler forms significantly heightened threats of insect damage to crops. California growers who imported non-native nursery stocks for cultivation in the burgeoning citrus industry accidentally imported a host of serious pests, like the San Jose Scale, as well.⁴ Transcontinental rail lines further hastened the spread of pest infestations. The unwanted insects feasted in the new simplified environments and had few native predators to keep their numbers in check.⁵ Growers increasingly considered insecticides as an option as they faced greater risks of crop damage.

Copper acetoarsenite, commercially sold as Paris Green, became the first widely used chemical poison in agricultural pest control in the early 1860s. Other compounds bearing names like London Purple, Paris Purple, and Scheele's Green soon competed for favor on the market, but Paris Green remained the arsenic-based poison of choice well into the late nineteenth century.⁶ Arsenic, of course, kills more than target insects and negative stories periodically filtered through to the press. The poison likely killed thousands of fish in the Connecticut River in 1878 after heavy rains washed the chemical into the waterway from adjacent fields.⁷ It also posed risks to careless farmers, and to consumers who purchased fruit with excessive residues.⁸ Its extreme toxicity actually made it popular with individuals harboring suicidal intent or murderous thoughts.⁹ Despite its potential for causing unintended harm, American farmers applied two thousand tons of Paris Green to crops annually by 1896.¹⁰

Pesticide applications increased with the development of a professional class of economic entomologists. Most farmers lacked the financial resources necessary to pay for independent consultations, yet a series of devastating locust outbreaks between 1873 and 1876 made clear the need for improved pest control. Missouri state entomologist Charles Valentine Riley argued for an increased federal role and helped convince Congress to allocate funds for the creation of a three-man Entomological Commission in 1876.¹¹ The passage of the Hatch Act in 1887 created opportunities for the growing class of professionals who soon found employment in a host of government agencies and public institutions, including the US Department of Agriculture (USDA), land grant universities, state agricultural experiment stations, and extension services.¹²

Still, neither farmers nor entomologists wholly put their faith in chemical control methods. Farmers continued to employ cultural methods of control that had worked for them in the past. These practices included the alteration of planting schedules, intercropping, hybridization, and the use of lure plants to draw predacious insects away from cash crops.¹³ The majority of chemicals in this period carried unproven, often fraudulent claims about the effectiveness and safety of the products. The USDA reported that nineteen out of forty-five tested samples of Paris Green contained unallowable amounts of sodium sulfate. Other pesticides contained high levels of arsenic that would burn crop foliage. Nearly 20 percent of tested pyrethrum contained a "poisonous substance" that posed a threat to applicators.¹⁴ No regulatory laws existed, though, to prevent companies from making dubious claims about adulterated pesticides. Consequently, many farmers remained wary and those that did not sometimes suffered financial loss.¹⁵ The difficulties of preparing mixtures, the instability of some compounds, and the necessity of considering variables like weather slowed the process by which chemical controls were incorporated into agricultural production practices.¹⁶

Entomologists did not solely focus on chemical solutions either, choosing instead to experiment with a variety of techniques to protect crops from insects. Experimental farms tested biological, cultural, and chemical controls to determine the best combination of strategies.¹⁷ The United States Entomological Commission, for instance, recommended that Great Plains farmers extinguish autumn prairie fires so that there would be fuel for controlled burning to combat locust infestations in the spring.¹⁸ Respected entomologist Charles Riley recognized the utility of pesticides like Paris Green and London Purple in some circumstances, but thought it "unwise and unsafe to employ such poisons, or to recommend them" in other situations.¹⁹ Riley continued to show favor for biological controls after becoming chief of the Bureau of Entomology in 1881, holding that every insect pest had a predator to keep its population in check.²⁰ Biological controls received an additional boost when the nonnative ladybug, a natural predator of the problematic fluted scale, saved the California citrus industry from devastation. Yet separate campaigns against the gypsy moth and the boll weevil that respectively employed biological and cultural controls proved embarrassing public failures for the Bureau of Entomology.²¹

The unsuccessful gypsy moth and boll weevil campaigns contributed to the Bureau of Entomology's shift toward more chemical solutions in agriculture. Leland Howard, who replaced Riley as chief, always harbored more interest in agricultural chemicals than his predecessor. Unlike earlier generations of entomologists who received their training on the farm and in the fields, Howard gained his knowledge in the classrooms and laboratories of Cornell University. The time spent at Cornell undoubtedly exposed him to the discourse of scientific colleagues who still characterized entomologists as amateurish bug-catchers, despite their clear attempts to define themselves as a professional class. The development of chemical solutions to solve pest problems held the possibility of granting entomologists access to the more prestigious ranks of scientists. Pesticides' promise of universal applicability, fast action, and predictable results fit the mood of an era that valued standardization, efficiency, and progress.²² Howard increasingly treated agricultural chemicals as the best and most reliable form of pest control.²³

If farmers were to rely more heavily on chemical controls, they had to trust more completely in the effectiveness of pesticides. New York in 1898 and California in 1901 passed legislation intended to curtail fraudulent claims from pesticide manufacturers.²⁴ Howard and other entomologists lobbied Congress for national legislation that would establish guidelines for the manufacture and sale of agricultural chemicals.²⁵ The National Grange, the American Apple Growers' Congress, the New York State Fruit Growers Association, and several state horticultural societies urged Congress to pass a bill regulating agricultural chemicals, believing it necessary to protect farmers' economic interests. Major pesticide manufacturers similarly supported the passage of the Insecticide Act of 1910, recognizing that profits would grow if trust in their product increased.²⁶

The component parts of the Insecticide Act centered on protecting farmers from dubious claims about the efficacy of pesticides.²⁷ It required companies to accurately describe the effects of their products and list inert ingredients on labels. The act set purity and strength standards for the two most popular agricultural chemicals, Paris Green and lead arsenate.²⁸ It also charged the newly created Insecticide and Fungicide Board with the responsibility of making sure that manufacturers followed the new guidelines.²⁹ The board undertook scientific investigations to determine

the effects of various pesticides on insects, fungi, and commercial crops; conducted hearings on alleged violations of the law; and engaged in educational outreach efforts to help bring pesticide manufacturers into compliance.³⁰ Concerns about human and environmental health did not factor into the passage of the law.³¹

Entomologists found opportunity to bolster their professional status and improve public perceptions of agricultural chemicals during World War I. Howard believed that the profession was poised to make an important contribution to the war effort by protecting critical foodstuffs and other agricultural commodities. He and others further concluded that the pressures of the global crisis necessitated that pest issues have solutions that were universally applicable, fast-acting, and effective. When boll worms infested fields of castor beans that were used to lubricate airplane engine cylinders, entomologists did not have the luxury of time to develop a biological or cultural response to the problem.³² Farmers likewise valued solutions that delivered quick results and it was the bureau's charge to satisfy the demands of its primary customers. The Bureau of Entomology continued to consider biological and cultural controls, but turned increasingly to chemical solutions.³³

American chemical companies, hoping to continue the expansion of their markets after the end of the European conflict, invested in research as never before and promoted the agricultural use of pesticides. Advertising attempted to sway consumers who still harbored a degree of distrust about the ability of chemicals to conquer pests without harming commercial crops. Manufacturers promised that their products would vanquish insect foes rather than simply control populations, casting pesticides as the best means to counter the insect hordes.³⁴ This tone matched the character of messages from the Bureau of Entomology and Leland Howard, who warned that "the great armies of insect pests . . . are our worst rivals and enemies."³⁵

The rhetoric appealed to growers in an increasingly capital-intensive industry. Nearly all of the agricultural innovations of the twentieth century—machinery, pesticides, fertilizers, irrigation developments—raised the fixed cost of production. The technological developments promised increased yields with less labor, but required greater investments up front. The most commercially successful farmers adopted the new technologies despite the added cost. Those who chose not to

adapt or could not afford to do so became less viable in the marketplace and gradually disappeared. As a result, from the 1930s onward, farms became increasingly consolidated into the hands of persons with a higher level of education, wealth, and power. This group generally valued managerial skills and technological efficiency over hard physical labor.³⁶ Chemicals promising total control of pest populations proved attractive because they saved labor and seemed to offer the best protection of invested capital.³⁷ Environmental historian James McWilliams rightly contends: “Path dependency—in this case, the idea that agribusiness, the federal government, and the insecticide industry had chosen to fight insect infestations exclusively with chemicals—limited the way in which scientists and farmers framed the pest situation and contemplated their options.”³⁸ Consequently the volume of insecticides applied to fields continued to climb as the twentieth century progressed and chemical controls became increasingly entrenched in agricultural pest management strategies.

Despite the growing chemical dependency in agriculture, scientists still knew little about the health effects of exposure to some of the most popular compounds. A consumer scare over arsenic on apples in 1925 prompted the Food and Drug Administration (FDA) to begin monitoring residues of lead arsenate. The agency had the approval of growers’ associations anxious for a rebound in consumer confidence, though some growers demanded justification for the new policy and proof that the substance posed a health threat.³⁹ Assessing public risk in a widely varying populace of young, old, healthy, and infirm individuals proved a difficult task for the agency, particularly when attempting to find the chronic effects of low exposure to lead arsenate. The FDA opted to initiate animal-based experimentation, conducting lifetime feeding experiments on rats. It planned to make projections of risks to humans based on the findings.⁴⁰ Growers’ associations opposed the research, fearing the results would lead to the establishment of low residue tolerance levels, and voiced their concerns to congressional allies.⁴¹ Testing the chronic effects of a poison on humans, however, raised obvious moral problems and was not a feasible option. Still, Missouri Democratic Representative Clarence Cannon, who chaired the Agricultural Appropriations Subcommittee, responded by inserting a clause into the 1937 budget bill that read: “no part of the funds appropriated by this

act shall be used for laboratory investigations to determine the possible harmful effects on human beings of spray insecticides on fruits and vegetables.”⁴²

The Public Health Service later undertook a study examining Washington orchard workers' exposure to lead arsenate. The study, though, examined data that would show acute rather than long-lasting or slow-developing effects. The difference in design made the agency less able to determine the associated risk of chronic health problems than the preceding FDA tests and yielded little useful information on the dangers of lead arsenate. Since the test results suggested that the chemical did not have severe health impacts, the Federal Security Administration raised residue tolerance levels for fruit. The action failed to generate a public response, because attention to the issue waned by the time that the Public Health Service completed its investigation. Little impetus existed to conduct additional tests, particularly when a well-organized agricultural lobby opposed further study.⁴³

Attention soon shifted from lead arsenate to a new “miracle” chemical, DDT, during World War II. Its proven effectiveness seemingly provided a means by which farmers could exert total control over their insect enemies.⁴⁴ Some scientists tempered their optimism because of the uncertain effects of DDT on beneficial bugs. Eradication of some non-target insects had the possibility of increasing pest problems, and tests by pharmacologists also revealed that the compound accumulated in the fat cells of dogs. Prudence led some scientists to call for more testing before use became widespread. Nevertheless, glory stories of DDT decimating populations of mosquitoes and lice on the war front made the transition to civilian markets a near certainty, particularly because the lack of an appropriate regulatory framework made it nearly impossible for the government to keep any chemicals from being sold. The FDA had the power to set residue tolerance levels on foodstuffs and the USDA ensured that the poisons were correctly labeled, but neither could keep pesticides from being sold commercially if the labeling guidelines were followed.⁴⁵

The manufacture and usage of DDT and other pesticides exploded after World War II. Production in the United States rose from 10 million pounds in 1945 to 100 million pounds in 1951.⁴⁶ Yet as the volume of use exponentially increased, indications suggested that DDT's reign

as a chemical miracle worker would be short. The common housefly and two strains of mosquitoes had developed resistance to the chemical by 1949, even when the application was ten times stronger than in previous years.⁴⁷ New and powerful chemical combinations soon joined approximately twenty-five thousand other pesticide products registered for sale in 1947. The ever-changing and supersaturated nature of the pesticide marketplace made it extremely difficult for the government to monitor.⁴⁸

Congress responded in 1947 with the passage of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), which required pesticides to be registered with the USDA before being sold commercially. Manufacturers had to attest to a product's safety and effectiveness by submitting a description of its chemical composition, results of residue tests, safety reports, analytical methodology, and the proposed label to the USDA's Pesticide Regulation Division. New labels needed to include a warning about potential harm to humans, vertebrate animals, and vegetation (excepting weeds). The act also necessitated that companies add a dye to agricultural chemicals sold in white powder form, in hopes that the discoloration would prevent individuals from mistaking the poisons for similar-looking products (sugar, flour, salt, baking powder) used in cooking.⁴⁹

State-level legislation preceded and sparked the congressional action. Nine states passed laws to address a spate of injuries and deaths resulting from the accidental use of white powdered pesticides in food preparation. Fifty persons at a state hospital in Salem, Oregon died and 467 others became ill after eating food contaminated with the insecticide sodium fluoride. A Salvation Army community center in Pennsylvania mistook the same substance for flour and served food that killed twelve and sickened fifty-seven people. Similarly, a field cook in Texas unknowingly used an arsenic-based insecticide in the preparation of pancakes for farmworkers, resulting in the immediate death of a large number of men.⁵⁰ New York, Pennsylvania, Texas, Oregon, North Carolina, South Carolina, Louisiana, Tennessee, and New Hampshire responded with legislation designed to minimize accidental poisonings, though the legislative provisions varied from state to state.⁵¹ The USDA, pesticide manufacturers, and distributors favored the passage of

FIFRA, because it would bring uniformity to pesticide regulation, vesting enforcement responsibilities with the Department of Agriculture. The American Farm Bureau Federation, the National Grange, and the National Council of Farmer Cooperatives voiced support because the registration and labeling requirements promised to better protect growers from ineffective or harmful products. No consumer, conservation, or labor organization testified at the congressional hearings on FIFRA prior to its passage.⁵²

FIFRA proved to be a relatively loose regulatory law that did little to keep dangerous agricultural chemicals off the market. Political scientist Christopher Bosso asserts that the legislation, as originally passed, “displays all the dynamics of classic clientele politics . . . [because] the pesticides issue was not salient to any but those directly benefiting from pesticides, and the scope of the debate was severely limited to those most intimately involved.”⁵³ If the USDA concluded that a pesticide did not comply with the tenets of the law, the agency could notify the company and provide opportunity for correction. The company, however, could refuse to follow the recommendations and register its product under protest.⁵⁴ To force its removal from commercial markets, USDA had to prove the hazardousness of the pesticide in court. The length and difficulty of this procedure helped assure that the agency would take a noninterventionist approach.⁵⁵ The Pesticide Registration Division consistently bowed to pressure when companies challenged a denied request.⁵⁶ The regulation was so toothless that environmental lawyer William Rodgers Jr. reported that the USDA had never “secured the cancellation of a registration in a contested case” in the twenty-three years following the law’s passage.⁵⁷

Farmers’ growing chemical dependency remained unchecked and usage of pesticides grew exponentially through the 1950s. The powerful new synthetic chemicals of the postwar era brought problems as well as promise. The indiscriminate poisons killed target species and beneficial bugs alike. The killing of insect predators eliminated a natural control of minor agricultural pests, allowing their numbers to explode to the point that they represented a serious secondary threat to farmers. The problems of pest resistance, pest resurgence, and the growth of secondary pest populations did not cause farmers to turn

back toward biological and cultural controls. Rather, they invested even more heavily in chemical solutions.⁵⁸ Pesticide companies funded entomological research in universities, government dollars financed field tests, and farmers struggled to stay a step ahead of their insect foes in order to meet the global demand for American agricultural products in the Cold War era.⁵⁹ Pesticides, including those that posed a threat to human and environmental health, saturated the United States as it entered the 1960s.

HIDDEN HANDS OF THE HARVEST

The modernization and professionalization of agriculture also reshaped many farm owners' thinking about labor and production. Prior to the growth of an industrialized agricultural system, families and local hired hands handled the bulk of farm chores outside of the plantation South. This changed in the twentieth century as multitudes of migrant laborers shouldered the burden of work on large farms. Labor relations in this context bore comparison to the relations between manager and employee in industrial settings, yet distinct differences between the field and the factory arguably made agricultural labor exceptional. While work increasingly followed an industrial logic, farm owners chose to stress the differences and argued that twentieth-century labor legislation should not apply to farmworkers. They regularly acted in concert with the government to deny farmworkers political power in order to maintain a cheap and plentiful supply of labor.

The industrial model of modern agriculture in the United States has roots in the slave South; its development in free society, however, can be