Pest Control in the Public Interest: Crop Protection in California

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I.
INTRODUCTION

Insect pests, weeds and crop diseases have threatened agricultural production in California for many years. To protect farmers' economic interests, state and local governments have frequently played a major role in organizing, coordinating, and even conducting pest control activities. For a long time, this promotion of agricultural producers' private interests coincided with the public interest in efficient agriculture. As agriculture and technology changed, however, and farm population dwindled, ongoing collective crop protection by government decreased. It is now limited to guarding state borders by quarantine, and to responding to breaches of this system by emergency eradication efforts.

Modern methods of pest control have serious disadvantages.[1] Not surprisingly, public attention has shifted from crop protection to regulation of pest control technology. One can no longer expect, therefore, that government efforts to protect crops and the public interest will neatly coincide with farmers' private interests.

This article reviews the history of public and private collective pest management in California. It examines how the evolution of ecology and technology caused political and legal changes, and how such changes in law and administration fostered technical change.

Crop protection was originally a broadly defined, but locally implemented policy. The original crop protection programs operated through local government and tort law. As technology developed,

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1. For a review of the environmental problems of pesticides, see ENVIRONMENTAL ASSESSMENT TEAM, CAL. DEP'T OF FOOD AND AGRICULTURE REPORT ON THE ENVIRONMENTAL ASSESSMENT OF PESTICIDE REGULATORY PROGRAMS (1978) [hereinafter EAT].

the institutions formed to manage and deliver it became increasingly specialized and centralized. Programs became more administrative as they began to focus on the protection of particular crops from particular pests. In that context, this article examines the citrus and cotton crops. As the focus of public policy moved from crop protection to pest abatement and eradication, pesticide regulations and quarantine restrictions also expanded the government's role in crop protection. These institutional and technological changes greatly affected agricultural ecology. This article chronicles this history from its origins to recent state-directed eradication programs undertaken where such action was not profitable, practical, or possible for the private sector. The article reviews recent pest control problems and examines the conflicts resulting from California's recent changes in crop protection policy.

II.
BIOLOGICAL AND CULTURAL CONTROL PRACTICES

California farmers grow a wide variety of crops and must cope with many insect pest problems. Before reliable chemical control methods[2] were available, the primary pest control practices used were cultural and biological. Often, a single farm could not practically implement these practices because of economic externalities. Thus, farmers organized pest control districts to achieve the cooperation required for successful biological and cultural control. Pest control districts offered farmers an organizational and administrative structure through which to deliver both biological and cultural control technology. The various districts typically received regional responsibility for a single crop, and often had responsibility for control or eradication of a single pest. Farmers' votes created the districts, which served at their behest. The primary goal of a pest control district was to achieve the maximum economic benefit for a majority of the farmers in the covered region. In some cases, the districts greatly lowered pest control costs and pesticide usage. In other cases, they failed to produce enough benefits to justify their continuation. As chemical control became increasingly available, pest control districts became both less important as an overall

2. Chemical control methods use pesticides or "economic poisons" for "preventing, destroying, repelling, or mitigating any and all insects, fungi, bacteria, weeds, rodents, or predatory animals or any other form of plant or animal life which . . . may infest or be detrimental to vegetation, man, animals, or households, or be present in any . . . environment whatsoever." CAL. FOOD & AGRIC. CODE § 12753 (West 1986).

means of pest control, and more involved in the delivery of chemical biocides within their boundaries.

Control of insects, weeds, and diseases by cultural methods[3] involves such practices as rotations, altered planting dates, cultivation, and planting border crops. This often requires some coordination of farm practices. If some farmers "hold out," they may negate the economic gains associated with the adoption of cultural control. For example, if one farmer plants a hostable crop for a given pest, while all neighbors cooperate, the non-cooperating farmer's crop can serve as a reservoir for the pest.

Biological control[4] agents present another case of market failure. When an individual farmer releases a biological control agent, such as a predator or parasite, that organism cannot be confined to the particular farmer's property. Predatory and parasitic insects often migrate to neighboring farmers' fields, where the presence of the parasite or predator increases crop yields without those farmers bearing the cost of introducing the agents. This results in economic inefficiencies in biological control.

To further complicate matters, biological and chemical control technologies can be incompatible if not coordinated. Broad spectrum pesticides can kill predators and parasites introduced for biological control purposes. Consequently, growers are sometimes reluctant to adopt biological control technology. However, chemical crop protection has also been responsible for the destruction of beneficial insects, pest resurgence, secondary pest outbreaks,[5] pest resistance,[6] exposure of farmers, farmworkers[7] and consumers[8] to harmful chemicals, groundwater contamination,[9] and damage to

3. Cultural control methods are reviewed in EAT, *supra* note 1, at 5.4.

4. For a useful overview of biological control methods, see P. DEBACH, BIOLOGICAL CONTROL OF INSECT PESTS AND WEEDS (1964); P. DEBACH, BIOLOGICAL CONTROL BY NATURAL ENEMIES (1974).

5. M. FLINT & R. VAN DEN BOSCH, INTRODUCTION TO INTEGRATED PEST MANAGEMENT 76 (1981).

6. G. Georghiu, *The Magnitude of the Resistance Problem*, in PESTICIDE RESISTANCE: STRATEGIES AND TACTICS FOR MANAGEMENT OF PESTICIDE RESISTANT PEST POPULATIONS (1986).

7. M. Coye, *The Health Effects of Agricultural Production*, in NEW DIRECTIONS FOR AGRICULTURE AND AGRICULTURAL RESEARCH: NEGLECTED DIMENSIONS AND EMERGING ALTERNATIVES 165-98 (K. Dahlberg ed. 1986).

8. BOARD ON AGRICULTURE, NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES IN FOOD: THE DELANEY PARADOX (1986).

9. R. Patrick, E. Ford & J. Quarles, GROUNDWATER CONTAMINATION IN THE UNITED STATES 83 (2d ed. 1987); OFFICE OF TECHNOLOGY ASSESSMENT, U.S. CONGRESS, PROTECTING THE NATION'S GROUNDWATER FROM CONTAMINATION 43 (1984).

wildlife.[10] As a result, biological and cultural control alternatives have become more attractive.

Integrated pest management (IPM) is the combined use of biological, chemical and cultural control.[11] IPM showed marked success in improving pest management, reducing pesticide use and increasing profitability.[12] Despite these encouraging results, IPM faced numerous obstacles to its development and adoption.[13] Failure to adopt IPM, despite its economic advantages, stemmed from political and philosophical interests that favor chemical control.[14] These biases existed before pesticides dominated plant protection.[15] In response, institutions developed to overcome these obstacles.

III.
COLLECTIVE ACTION IN CALIFORNIA AGRICULTURE

California's agriculture is regarded as a modern miracle of food production.[16] The state has a wide range of climates and soils hospitable to the cultivation of a diverse variety of crops. This diversity of cropping patterns and conditions makes it difficult to generalize about farm production statewide.

However, there are some common denominators to be found in both the ecology and economy of the state's agriculture. Most of the land in production has been cultivated for a relatively short time: about a century, give or take twenty years. California's arid climate made cultivation of most crops in the major growing regions impossible without irrigation. Governmental organizations formed early in the development of California's agriculture to invest in the infrastructure required to deliver water, allocate the resource,

10. Papendick, Elliot & Dahlgren, *Environmental Consequences of Modern Production Agriculture: How Can Alternative Agriculture Address These Concerns?*, 1 AM. J. ALT. AGRIC. 3; R. CARSON, SILENT SPRING (1962).

11. Integrated pest management is defined as "an ecologically based pest control strategy that relies heavily on natural mortality factors, such as natural enemies and weather and seeks out control tactics that disrupt these factors as little as possible." M. FLINT & R. VAN DEN BOSCH, *supra* note 5, at 6.

12. D. HALL, AN ECONOMIC AND INSTITUTIONAL EVALUATION OF INTEGRATED PEST MANAGEMENT WITH AN EMPIRICAL INVESTIGATION OF TWO CALIFORNIA CROPS (1977).

13. *See* Neeley-Kvarme, *Beyond Pesticides: Encouraging the Use of Integrated Pest Management in California*, 11 U.C. DAVIS L. REV. 301 (1978); A. D. Tarlock, *Legal Aspects of Integrated Pest Management*, in PEST CONTROL: CULTURAL AND ENVIRONMENTAL ASPECTS 217-36 (D. Pimentel & J. Perkins ed. 1980).

14. J. PERKINS, INSECTS, EXPERTS, AND THE INSECTICIDE CRISIS 270-73 (1982).

15. Dunlap, *Farmers, Scientists, and Insects*, AGRIC. HIST. 54, 93-107 (1980).

16. For an overview of California's agriculture, *see* A GUIDEBOOK TO CALIFORNIA AGRICULTURE (A. Scheuring ed. 1983).

and mediate conflict when it arose.[17] California growers also learned early of the advantages of cooperative marketing arrangements. Cooperatives offered growers many competitive advantages in distant markets. Most successful of the early marketing cooperatives was the citrus industry's California Fruit Growers' Exchange.[18] Not only was the organization used for water supply and marketing, it also formed the basis for political and economic structure in the agricultural sector.[19]

Collective action also extended to pest management early in the state's agricultural history. Practically all of the crops produced in California were non-native species. As such, most had no naturally occurring pest problems. However, weed and pest problems developed quickly as exotic insects and plants were introduced. The climate and cropping patterns made these insects difficult to control. The two crops which generated the greatest efforts toward pest management were, not surprisingly, those with the most severe pest problems: cotton and citrus.

IV.
INFESTED CROPS AS A PUBLIC NUISANCE

California's citrus industry developed rapidly in the last quarter of the 19th century. The introduction of scale insects soon threatened it, however. The cottony-cushion scale appeared in California in 1868;[20] California red scale and yellow scale insects also posed serious problems.[21]

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17. For history of the development of Western water rights and collective management, *see* D. WORSTER, RIVERS OF EMPIRE (1986); M. REISNER, CADILLAC DESERT (1985); D. PISANI, FROM FAMILY FARM TO AGRIBUSINESS (1985).

18. One economist commented that "[t]he California Fruit Growers' Association exists solely because it can earn greater profits for its members than can be obtained by any other marketing arrangement. It is difficult to see wherein this point of view differs from that which characterizes the stockholders of the ordinary business corporation." Cross, *Cooperation in California*, 1 AMER. ECON. REV. 535, 544 (1911).

19. To quote Carey McWilliams:

> No segment of American agriculture is so highly organized as the California segment. The history of some of the various 400 fruit-and-nut selling organizations dates back to the sixties and fifties of the last century. Area by area, crop by crop, California agriculture is tightly and efficiently organized, with the exception, of course, of the farm workers.

C. MCWILLIAMS, CALIFORNIA: THE GREAT EXCEPTION 123 (1949).

20. R. DAVIDSON & W. LYON, INSECT PESTS OF FARM, GARDEN, AND ORCHARD 520 (8th ed. 1987).

21. Scale insects attach themselves to citrus tree branches, twigs, and the fruit itself, robbing the plant of nutrients. Some seem to inject a toxic saliva into the plant. This lowers production, and damages the cosmetic quality of the fruit. *Id.* at 514-21.

To "protect and promote the horticultural interests of the state," the 1881 California legislature passed a law that enabled any county to create a Board of Horticultural Commissioners.[22] These Boards had the duty to inspect orchards, nurseries, packing houses, or any other place in their jurisdiction for "scale bug, codlin [sic] moth, red spider, or other noxious insects."[23] If it found a pest, a Board could order the owner to destroy or disinfect the infested trees, places or articles. If the owner disobeyed, a Board could declare the infested area to be a nuisance, and abate the nuisance themselves. The expense of abatement became a lien on the infested real property.[24]

A challenge to the law's state constitutionality came in 1899 with *County of Los Angeles v. Spencer*.[25] The court decided that the delegation of power to the County Horticultural Board was constitutional.[26] The court also decided that the power to define a nuisance lay with the Board.[27] A challenge based on the right to due process and the takings clause came in 1901 with *County of Riverside v. Butcher*.[28] Butcher owned an orchard infested with scales and other insects. The county ordered the infested trees to be removed. Butcher refused, so the county destroyed the trees and placed a lien on Butcher's property for the expense. The county brought an action to foreclose on the lien. The lower court granted a demurrer to the county's complaint based on the ground that the act which created the County Horticultural Board was unconstitutional. The judgment was reversed on appeal, and the lien was declared constitutional.[29]

A. *Evolving Law Governing County Pest Control*

As pest ecology and the economic interests of agriculture changed, so did the law governing county pest control. The 1881 statute was amended in 1889,[30] 1891,[31] and again in 1897[32] for procedural and administrative reasons. The 1897 Act allowed commis-

22. 1881 Cal. Stat. 86.
23. *Id.* at 87.
24. *Id.*
25. 126 Cal. 670, 59 P. 202 (1899).
26. *Id.* at 672, 59 P. at 203.
27. *Id.* at 673, 59 P. at 203.
28. 133 Cal. 324, 65 P. 745 (1901).
29. *Id.* at 327, 65 P. at 746.
30. The amendment increased payments to board members and required reports to the state. 1889 Cal. Stat. 413.
31. The amendment established a power to abate on a non-resident's property without serving notice if person cannot be found. 1891 Cal. Stat. 268.
32. 1897 Cal. Stat. 244.

sioners to create districts within the county, and deputize inspectors in those districts.[33] A 1907 amendment allowed "[r]ussian thistle, saltwort or other noxious weed" to be declared a public nuisance.[34] A 1911 amendment established a state board of horticultural examiners that included the state Commissioner of Horticulture, the Dean of the University of California, and the superintendent of the state insectary.[35] A 1917 extension covered ground squirrels and gophers.[36] In 1923, several species of weeds were added to the act;[37] in 1927, the definition of weed was modified to cover "any species of plant injurious to agriculture."[38] The law continued to rely on the doctrine of nuisance law and the financial tool of liens to achieve insect abatement. Protection of agricultural interests from the nuisance of mobile pests, weeds and diseases seemingly took priority over individual farmers' property rights.

The law empowered county boards of supervisors to "provide their own system and procedure for the eradication of insect and vegetable and animal pests."[39] Liens could be filed to control multiple pests.[40] This allowed the county board to exercise broad management of the county's ecology.[41] Even if only a limited understanding of the ecosystem existed at the time, the county boards did not limit their efforts to protecting a single crop, nor did they focus on eradication of a single pest.

Litigants challenged the constitutionality of the statute's broad construction several times. For example, a similar statute in Virginia allowed cedar trees to be declared a public nuisance because of the disease threat they posed to apple growers from cedar rust. The owner of the cedar trees argued before the U.S. Supreme Court that the Virginia law provided for the taking of private property for the private gain of apple growers.[42] The Supreme Court decided that such a statute was in the public interest, following precedent set in earlier rulings which upheld the exercise of police power in the public interest to the detriment of private property interests.[43] The rul-

33. 1897 Cal. Stat. 245.
34. 1907 Cal. Stat. 802.
35. 1911 Cal. Stat. 491.
36. 1917 Cal. Stat. 627.
37. 1923 Cal. Stat. 1205.
38. 1927 Cal. Stat. 437.
39. County of Fresno v. Brix Estate Co., 194 Cal. 85, 90, 226 P. 77, 78 (1924).
40. County of Riverside v. Title Ins. and Trust Co., 202 Cal. 233, 259 P. 759 (1927).
41. *See* County of San Benito v. Wapple, 188 Cal. 423, 428, 205 P. 673, 674-75 (1922) (confirming that a county had such powers).
42. Miller v. Schoene, 276 U.S. 272 (1928).
43. The Court cited Mugler v. Kansas, 123 U.S. 623 (1887); Hadacheck v. Los An-

ing clearly favored economic success over other considerations.[44] The California courts accepted the Supreme Court view. For example, the court's ruling in *County of Contra Costa v. Cowell Portland Cement Co.*[45] quoted the Supreme Court ruling in *Lawton v. Steele*:[46] " 'The police power is universally considered to justify the destruction or abatement . . . of whatever may be regarded as a public nuisance.' "

B. *California Agricultural Code: Consolidation of Pest Control Laws*

The 1933 consolidation of the California Agriculture Code (CAC)[47] made few changes to the pest control law. Pest management continued to be administered at the county level. Responsibility for pest management decisions resided with the county agricultural commissioner.[48] The new act gave explicit instructions for the procedures to order abatement of a pest on irrigation district property,[49] and in irrigation ditches and canals.[50] Otherwise, the new statute retained the use of common law nuisance[51] to order the abatement of pests. If the owner failed to control the pest, the commissioner had the power to abate the nuisance.[52] Expenses incurred to control the pest were collected via a lien on the property.[53]

Skinner v. Coy reaffirmed these broad powers.[54] Skinner owned a peach orchard in San Bernardino County. Coy was the county agricultural commissioner. When an inspector found that peach mosaic infected Skinner's fruit, Coy ordered Skinner to eradicate, control

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geles, 239 U.S. 394 (1915); Village of Euclid v. Ambler Realty Co., 272 U.S. 365 (1926); Fertilizing Co. v. Hyde Park, 97 U.S. 659 (1878); Northwestern Laundry v. Des Moines, 239 U.S. 486 (1915); Lawton v. Steele, 152 U.S. 133 (1893); Sligh v. Kirkwood, 237 U.S. 52 (1914); and Reinman v. Little Rock, 237 U.S. 171 (1914). *Miller*, 276 U.S. at 280.

44. "This deliberate preferment of one property interest over another did not, in the Court's judgment, violate due process or constitute an invalid taking of private property, since the choice had been 'controlled by considerations of social policy which [were] not unreasonable . . . .' " van Alstyne, *Statutory Modification of Inverse Condemnation: Deliberately Inflicted Injury or Destruction*, 20 STAN. L. REV. 617, 629 (1968) (quoting *Miller*, 276 U.S. at 280).

45. 126 Cal. App. 267, 271, 14 P.2d 606, 608 (1932).

46. 152 U.S. 133 (1894).

47. 1933 Cal. Stat. 60.

48. *Id.* at 74.

49. *Id.* at 83.

50. *Id.* at 84.

51. *Id.* at 83.

52. *Id.*

53. *Id.* at 84.

54. 13 Cal. 2d 407, 81 P.2d 982 (1939).

or destroy the diseased trees within ten days, or the county would take action and attach a lien to the property. When Skinner failed to act, the diseased trees were declared a public nuisance. Skinner sought an injunction on several theories to prevent the agricultural commission from entering his property to remove the diseased trees. The trial court granted the injunction on the grounds that the disease itself, and not the trees, was the public nuisance;[55] that the removal of trees would render Skinner's property 'unproductive and practically valueless,'[56] and that the infected trees were abandoned.[57] The California Supreme Court rejected each of these theories. The court declared the theory that separated the disease from the trees to be fallacious, and ruled that infected plants could be named a public nuisance.[58] Neglected or abandoned plants were as subject to the law as productive plants.[59] The law offered no compensation, and the court decided none was necessary.[60] The court again affirmed the law's constitutionality, rejecting the taking claim (which it called self-contradictory to the abandonment claim).[61]

V.
PUBLIC PROVISION OF BIOLOGICAL CONTROL

By the end of the 1930s, counties were using their powers to protect and promote agriculture through the use of biological, cultural and mechanical control. Counties used Works Progress Administration (WPA) labor to condemn and remove infested crops, control noxious weeds, and eradicate varmints.[62]

Many counties established their own insectaries, raising and releasing beneficial insects as a public good. The first county branch of the state insectary was established in Ventura County in 1919[63] and others soon followed. County insectaries received matching funds from state and local government. Los Angeles County, for example, owned and operated a public insectary, and had a program which released mealybug predators and parasites of both red

55. *Id.* at 416, 81 P.2d at 987.
56. *Id.* at 409-10, 81 P.2d at 984.
57. *Id.* at 416-17, 81 P.2d at 987.
58. *Id.* at 415-16, 81 P.2d at 987.
59. *Id.* at 417-18, 81 P.2d at 987-88.
60. The lack of compensation in the law was based on the presumption that diseased or infested trees were valueless, or, in fact, a liability. *See* van Alstyne, *supra* note 44, at 630.
61. Skinner v. Coy, 13 Cal. 2d 407, 418-22, 81 P.2d 982, 988-90 (1939).
62. *Id.* at 423, 81 P.2d at 990-91.
63. Smith, *The Ventura County Branch Insectary*, 8 BULL. OF THE CAL. STATE COMM'N OF HORTICULTURE 230-31 (1919).

and black scales.[64]

There were other public and quasi-public efforts to provide biological control of insect pests. One of the better known efforts, the Fillmore Citrus Protective District (FCPD), still operates in the Ventura County town of Fillmore. In his study of the FCPD,[65] Graebner found that citrus grove owners reduced pest control costs and increased profits through biological control efforts. With the cooperation of University researchers and the public sector, they accomplished more collectively than they could have as individuals. Further, by using biological control, there was minimal adverse impact on the ecosystem.

The Fillmore district was established in 1922 in response to an outbreak of the California red scale in the Fillmore-Piru area of Ventura County. Before the district formed in 1922, almost 90% of all red scale in Ventura County was in the area of the FCPD.[66] Chemical treatment was an expensive proposition. However, an insurance scheme which spread the costs of chemical control effectively reduced pest control costs for individual citrus farmers.[67] Within a year of its founding the FCPD reduced infestation to less than 40% of the red scale found in the County.[68] In 1926, the area suffered a citrophilus mealybug outbreak. When chemical control proved ineffective against this pest, the FCPD established an insectary to breed the predator *Cryptolaemus montrouzieri* (Mulsant) or cryps.[69] Cryps have controlled citrophilus mealybugs in the district ever since their introduction in 1927.

Introduction of several predators and parasites to the district successfully achieved biological control of black scale, yellow scale and California red scale insects. Though the district's growers faced a severe infestation of California red scale in the late 1950s, the outbreak was not confined to the Fillmore-Piru area, and budgets from the California Citrus League at that time showed that the FCPD growers had lower average pest control costs per acre than any

64. *Over $2,000,000 Spent for Pest Control by Citrus Growers in L.A. County*, 24 CAL. CITROGRAPH 62 (1938).

65. L. Graebner, An Economic History of the Fillmore Citrus Protective District (1982) (unpublished Ph.D dissertation) (available at the University of California, Riverside).

66. Graebner, Moreno & Baritelle, *The Fillmore Citrus Protective District: A Success Story in Integrated Pest Management*, 30 BULL. ENTOMOLOGICAL SOC'Y AM. 27 (1984).

67. L. Graebner, *supra* note 65, at 69-75.

68. Graebner, Moreno, & Baritelle, *supra* note 66, at 28.

69. L. Graebner, *supra* note 65, at 78.

county-wide average.[70] Growers began using organophosphates in an attempt to eradicate the red scale beginning in 1952.[71] The use of pesticides disrupted natural controls of other insects, in particular the predators of the citrus red mite.[72] By 1961, it was clear that chemical control of red scale was ineffective and expensive. Cost assessments in 1961 reached $24 per acre, up from $4 per acre when chemical control began.[73] At this point, growers were unhappy, and ready to dissolve the district. The FCPD faced a choice between continuing its attempt to eradicate the red scale using chemical control, or returning to biological control. The district chose to adopt biological control.[74] Red mite predators were soon re-established and the district insectary made several large releases of red scale parasites. The district assessment for 1961 amounted to $6 per acre.[75] During the 1970s, FCPD growers had mean pest control costs that were one-fifth the county-wide average.[76]

Although the FCPD remained a voluntary organization it maintained a 100% (of eligible growers) membership from the late 1920s to the present. Its success has been partially attributed to the sound management and visionary practices of its first manager, Howard Lorbeer.[77] The economic benefits provided to individuals through the FCPD concurrently motivated grower cooperation.[78] The Fillmore-Piru Citrus Association also played a major role in fostering cooperation by refusing to accept fruit from any grower not a member of the FCPD.[79]

VI.
CITRUS PEST CONTROL DISTRICTS

No other area-wide cooperative has enjoyed success comparable to the success enjoyed by the Fillmore-Piru Valley. Declining yields, increasing pest control costs, and cosmetic damage concerned almost all other citrus growers. To focus attention on citrus crops, and to give more direct control to growers, the state legislature authorized citrus regions to form pest abatement districts. Cit-

70. *Id.* at 126.
71. *Id.* at 107.
72. Graebner, Moreno & Baritelle, *supra* note 66, at 32.
73. L. Graebner, *supra* note 65, at 108.
74. *Id.* at 138; Graebner, Moreno, and Baritelle, *supra* note 66, at 32.
75. L. Graebner, *supra* note 65, at 224.
76. Graebner, Moreno and Baritelle, *supra* note 66, at 32.
77. L. Graebner, *supra* note 65, at 158.
78. *Id.* at 165.
79. *Id.* at 169.

rus White Fly Districts had been authorized in 1925,[80] but other pests threatened the citrus industry. Broader legislation passed with the Citrus Pest District Control Act of 1939.[81] The purpose of the act was to "make available a procedure for the organization, operation, government and dissolution of districts for the more effective control and eradication of citrous [sic] pests."[82] The act was declared an "urgent measure," because the red scale insect had spread to inland regions previously thought to be immune, and because growers had observed the development of "resistance to the accepted means of control."[83]

A petition by the owners of 51% of the citrus land (land devoted exclusively to growing citrus) in an area could form a district.[84] Once established, the County Board of Supervisors appointed a district board of directors composed of five citrus land owners.[85] The board received broad legal powers,[86] including the power to "[e]radicate, remove or prevent the spread of any and all citrus pests"[87] and the power to "[e]nter into or upon any land included in the district for the purpose of inspecting and treating the citrus fruit growing thereon."[88] A levy assessed on district citrus trees provided funds for the district.[89]

The constitutionality of these districts was challenged on several grounds in *Irvine v. Citrus Pest District No. 2 of San Bernardino County*.[90] The most notable challenge was to the delegation of legislative power to a local board. The court ruled in favor of the district, stating that local boards of limited jurisdiction not possessing statewide authority may act in a judicial capacity as a quasi-judicial body.[91] The provision allowing owners of 51% of the citrus land in a region to form a district and control pests was held to fulfill due process requirements.[92] The court also affirmed the district's power to raise taxes, and settled the takings issue in the district's favor. As in earlier proceedings with County Horticultural Boards, the pro-

80. 1925 Cal. Stat. 1011.
81. 1939 Cal. Stat. 1055.
82. *Id.*
83. *Id.* at 1065.
84. *Id.* at 1056.
85. *Id.* at 1058.
86. *Id.* at 1059.
87. *Id.*
88. *Id.*
89. *Id.* at 1061.
90. 62 Cal. App. 2d 378, 144 P.2d 857 (1944).
91. *Id.* at 385, 144 P.2d at 861.
92. *Id.* at 381, 144 P.2d at 859.

tection of health, safety and general welfare overcame any property considerations.[93] The court noted that the board promoted the general welfare, even though its actions collaterally increased the prosperity of individuals engaged in citrus culture.[94] In short, *Irvine v. Citrus Pest District No. 2 of San Bernardino County* upheld the ability of growers to form special districts for pest control.

A. *Riverside Pest Control District*

Notwithstanding the broad powers granted by the legislature, no mandatory pest control district has had the same degree of success as the FCPD. The only one that comes close is Riverside Pest Control District No. 2.[95] Located in the Coachella Valley, the district covers over 2,000 square miles in the area around Palm Springs. Unlike the coastal areas, the Coachella Valley is isolated from the moderating influence of the Pacific Ocean. It has a desert climate, with temperatures fluctuating widely over the course of a season. The red scale was not sighted in the Coachella Valley until 1935; the first infestation in a commercial orchard came in 1944.[96] Previously, growers were certain that the red scale could not establish itself in the hot, dry climate. By 1946, it became clear that the red scale was well adapted for desert conditions. That year, county citrus growers formed two pest control districts. Riverside County Citrus Pest Control District No. 1 covered the Hemet Valley, near the San Diego County border. Coachella Valley formed the Riverside County Citrus Pest Control District No. 2. Owners of about 52% of the valley's acreage formed the district that year.[97]

Biological control agents effective against red scale in Fillmore and other coastal areas could not survive the hot, dry summers and cold winters in the desert areas.[98] Growers were therefore expected to heavily prune infested orchards, and spray dormant oils. The district provided scouts to conduct annual surveys and tree-to-tree inspections of infested orchards. Districts also paid bounties to pickers and packers who reported infestations.[99] The district en-

93. *Id.* at 384-85, 144 P.2d at 861.

94. *Id.* at 386, 144 P.2d at 862.

95. L. Graebner, *supra* note 65, at 176.

96. Howie & Heard, *History of the Coachella Valley Citrus Pest Control District*, PEST CONTROL CIRCULAR 313 (1963).

97. Riverside County Bd. of Supervisors Res. Sept. 16, 1946 (Citrous [sic] Pest Control District No. 2 Duly Organized).

98. P. DEBACH, BIOLOGICAL CONTROL BY NATURAL ENEMIES, *supra* note 4, at 69.

99. Wright, *Red Scale Eradication: Hemet and Coachella Valleys*, 40 CAL. DEP'T. AGRIC. BULL. 230-31 (1951).

gaged in an integrated pest management program intent on eradicating the red scale by scouting and spot treatment of chemicals. This treatment was labor intensive, and the materials were expensive. Entomologists at the University of California, Riverside developed a pheromone trapping system in the late 1960s and early 1970s[100] which was employed by the district beginning in 1971.[101] This trapping system reduced scouting time and costs for the district.[102] The district also maintained an insectary for rearing virgin females for the traps.[103] This insectary was closed in 1979, after a synthetic red scale sex pheromone became available in 1978.[104] The district remains in operation, however, providing inspection and chemical treatment.

B. *Pest Management in the San Joaquin Valley*

The San Joaquin Valley is the richest agricultural region in the state of California, and possibly in the world. The eight county region produces a diverse number of commodities. The soil is level, and the climate is favorable for the production of both temperate and subtropical crops. The San Joaquin Valley is also capable of supporting a large number of insects that can potentially cause economic damage to crops and which are difficult to isolate and suppress because of its vast area.

Citrus production in the San Joaquin Valley is located in four counties: Tulare, Kern, Fresno and Madera. The first pest problem that led to the formation of a pest control district was red scale on oranges and lemons. Red scale was first reported in these counties in 1939.[105] The reaction of growers varied with the severity of the outbreak. Growers in southern Tulare County formed a Pest Control District (PCD) within a year of the first sighting. Northern Tulare, Fresno, Kern and Madera Counties left growers individually responsible for handling infestations. Although some of the infestations could be controlled, individual management could not prevent migration and infestation.[106] The growers in northern Tu-

100. Shaw, Moreno, & Fargerlund, *Virgin Female California Red Scales Used to Detect Infestations*, 64 J. ECON. ENTOMOLOGY 1305-06 (1971).

101. R. ERVIN, A HISTORY AND ECONOMIC APPRAISAL OF AN INSECT MONITORING PROGRAM: CALIFORNIA RED SCALE 62 (1982).

102. *Id.* at 60-69.

103. *Id.* at 62-64.

104. *Id.* at 67.

105. McKenzie, *The Armored Scale Insects of California*, 40 BULL. OF THE CAL. INSECT SURVEY 5 (1956).

106. R. ERVIN, *supra* note 101, at 86.

lare County formed a PCD in 1947. These districts achieved some success in controlling red scale infestations and reducing control costs. However, reinfestation from citrus growing regions in neighboring counties without PCD's prevented eradication. By the late 1950's, citrus growers were convinced that red scale could not be controlled until the entire San Joaquin Valley formed a unified PCD. Encouraged by the modest successes in Tulare, Fresno growers formed two districts in 1958, one west and one east of the Kings River. Kern growers formed one district in 1960 to cover the entire county. Table 1 lists the dates these PCD's were formed.

Table 1
Formation Dates of San Joaquin Valley Citrus Pest Control Districts

District	Date
Southern Tulare County Citrus Pest Control District	June 1939
Tulare County Red Scale Protective District	April 1947
West Fresno County Red Scale Protective District	July 1958
Central Valley (East Fresno) Pest Control District	December 1958
Kern County Pest Control District	January 1960
Central California Citrus Pest Control Agency	March 1960
Central California Tristeza Control Agency	July 1968

Source: R. ERVIN, A HISTORY AND ECONOMIC APPRAISAL OF AN INSECT MONITORING PROGRAM: CALIFORNIA RED SCALE 86-90 (1982).

After establishing these districts, it became apparent that red scale infestations were more severe and extensive than anticipated. Entomologists realized that the management of red scale could not be left at the district level because no natural boundaries prevented migration across district/county lines.[107] The California legislature therefore amended the Citrus Pest Control Act of 1939 to permit

107. Lewis, *Consolidating Pest Control Districts*, 45 CAL. CITROGRAPH 2 (1959); *see also* Opitz, *Red Scale, Tristeza Suppression in Central California*, 53 CAL. CITROGRAPH 2 (1967).

districts to consolidate even if they were not in the same county.[108] The five San Joaquin Valley PCD's consolidated in March of 1960. Growers were convinced this would enable the eradication of the red scale in the San Joaquin Valley.[109]

It soon became clear that eradication was not possible. The San Joaquin Valley's climate was too hot and dry for natural enemies to establish themselves. The consolidated district then sought to manage red scale at economically feasible levels. The discovery of the tristeza virus, the cause of quick decline disease, complicated management of the San Joaquin Valley PCD's.[110] The Central California Citrus Pest Control Agency began a program of inspection and removal of infected trees that year. Several of the growers questioned the efficiency of the program, and by 1967, the agency decreased its workforce to seven full-time inspectors.[111]

Though red scale infestation persisted, resources were diverted to tristeza management. This created conflict between those growers who wanted resources dedicated to the eradication of the red scale, and those who preferred extension of the existing district's power to include controlling tristeza as well. In October of 1967, five growers from Tulare County registered a formal complaint with the Tulare County Board of Supervisors. This letter criticized the PCD's shift from red scale eradication to tristeza eradication. The dissenting growers cited five areas towards which the agency should direct its attention: finances, red scale eradication methods and procedures, management, presentation of information to growers, and actions of the governing boards.[112]

The two Tulare PCD's polled their members on withdrawing from the agency in November of 1967. These PCD's eventually withdrew, leading to the resignation of the agency's director and then to the dissolution of the agency in 1968.[113] Growers were concerned that dissolution of the district would cause tristeza to spread rapidly.[114] In order to reassure growers and to overcome opposition to the removal of trees infected by tristeza virus, the state legis-

108. 1959 Cal. Stat. 4039.

109. *Pest Control Districts Consolidate*, 45 CAL. CITROGRAPH 243 (1960).

110. Opitz, *supra* note 107, at 2.

111. Ervin, Gardner, Baritelle, & Moreno, *A History of Red Scale Districts in Central California*, 62 CAL. CITROGRAPH 71, 73 (1986).

112. *Id.* at 73.

113. Schilling, *Central California Citrus Pest Control Agency Terminates—Individual Districts to Conduct Red Scale Work*, 53 CAL. CITROGRAPH 368 (1968).

114. Opitz, *supra* note 107, at 12

lature made provisions to compensate growers.[115] In addition, Meyer lemon-free districts were established to eliminate the Meyer lemon plant, seen as a reservoir for the tristeza virus.[116]

While public policy and attention have focused largely upon citrus crops, other crops have state-recognized cultural control programs as well. The state has authorized the formation of weed-free areas,[117] beet leafhopper control districts,[118] and host-free period districts[119] dating back to the 1930s.[120] There are host-free periods and/or districts for sugar beets,[121] cotton,[122] celery,[123] and lettuce.[124] However, these programs have not led to the development of a significant body of case history in comparison to that created by citrus pest management. In addition, the County Agricultural Commissioner has the power to "adopt regulations applicable in his or her county which are supplemental to those of the director [of the California Department of Food and Agriculture] which govern the conduct of pest control operations."[125] However, the focus of pest control at the county administrative level has gone from crop protection to pesticide regulation.

VII.
THE SHIFT TO PESTICIDES

Technology for pest control changed rapidly during and immediately following World War II. The development of biocides during wartime was no coincidence. Synthetic organic chemicals, such as DDT, developed as weapons, defoliants, and as a means to control disease-carrying insects. Aerial application improved for wartime use, and this, like other defense technology, had civilian spinoffs. The chemicals used as defoliants were adopted as herbicides.[126] Spray equipment developed for chemical warfare made aerial appli-

115. 1967 Cal. Stat. 903, 904.
116. 1957 Cal. Stat. 322.
117. CAL. FOOD & AGRIC. CODE §§ 7201-7207 (West 1986).
118. *Id.* §§ 6031-6043.
119. *Id.* §§ 5781-5785.
120. *See* 1935 Cal. Stat. 2122.
121. CAL. ADMIN. CODE tit. 3, § 3601 (1988).
122. *Id.* §§ 3595 (for pink bollworm), 3596 (for boll weevil).
123. *Id.* § 3610.
124. *Id.* § 3611.
125. CAL. FOOD & AGRIC. CODE § 11503 (West 1986).
126. 2,4-D was patented in 1945, and makes up part of Agent Orange, a defoliant used during the Vietnam War. It was also the subject of much of the original litigation regarding aerial drift. *See generally* Note, *Crop Dusting: Legal Problems in a New Industry*, 6 STAN. L. REV. 69 (1953).

cation to crops more economical. The government further promoted the new technology through research and extension in the Land Grant University system.

After the introduction of DDT, 2,4-D and other new synthetic pesticides, the new technology made chemical control economically feasible for individual farmers. Research and development in biological control declined as use of the new insecticides increased.[127] Crop rotation for insect control was no longer necessary, making continuous monoculture feasible. Of course, farmers used various chemical preparations to suppress pests before DDT came on the market, but the chemicals' inefficacy, expense, and application difficulty limited their adoption. Growers resisted cultural and biological control even as they sometimes used these methods, because use of these methods required cooperation and collective action.[128] In contrast, chemical control offered the prospect of quick, large-scale commercial exploitation.[129] Furthermore, the biological, cultural and chemical control technologies were not mutually exclusive. Institutions formed to deliver crop protection technology would use whatever technology was most cost-effective. For example, some of the Citrus Protection Districts performed chemical fumigation when such treatment would have been prohibitively expensive for most farmers.[130]

Pest management became privatized as farmers realized they could control pests on their property by chemical application without relying on the pest control district. Most citrus pest control districts were dissolved during this period and public insectaries were either retrenched or closed completely. Counties stopped enforcing public nuisance abatement. As long as insecticides successfully controlled insect pest populations, there was no need for government intervention, although the agricultural commissioners continued to quarantine imported fruit and inspect it for exotic infestations.

A. *Government Regulation of Pesticides*

The government played an increasingly important role in regulating the new technology.[131] Original pesticide regulation developed

127. J. PERKINS, INSECTS, EXPERTS, AND THE INSECTICIDE CRISIS 11 (1982).

128. T. DUNLAP, DDT: SCIENTISTS, CITIZENS, AND PUBLIC POLICY 17-35 (1981).

129. *Id.* at 35-38.

130. *See* L. Graebner, *supra* note 65.

131. (The development of this regulatory apparatus has been the subject of other studies, and will not be discussed here in detail.) Note, *The Regulation of Pesticide Use*

to protect farmers from being sold fraudulent concoctions by disreputable dealers.[132] Health and environmental protection from pesticides was not an issue in the first half of the century. Even though some of the chemicals used posed grave risks to public health, little was done to protect farmers and consumers from pesticide poisoning.[133] County agricultural commissioners took responsibility for pesticide regulation in the absence of state and federal action.[134] The primary motivation for county action was to protect the economic interests of other farmers, such as beekeepers.[135]

As health, safety, and environmental problems associated with pesticide use created a cause for concern, the focus of pesticide regulation shifted from protecting the farmer to protecting the environment. The passage of the Federal Insecticide, Fungicide and Rodenticide Act of 1947 (FIFRA),[136] established that public health problems caused by pesticide use were to be considered in part to be federal problems. This federal legislation inadequately dealt with the increasing use of pesticides and the effects these chemicals had on the ecosystem. The publication of *Silent Spring* in 1962[137] greatly increased the public's awareness of these shortcomings. Congress, however, still resisted efforts to create a greater federal role in pesticide regulation.[138] It was not until the passage of the Federal Environmental Pesticide Control Act of 1972 (FEPCA)[139] that environmental effects of pesticides also came under federal regulation.

With the void created by the lack of federal regulation, California acted independently to register pesticides in 1969.[140] The California

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in California, 11 U.C. DAVIS L. REV. 273 (1978); van den Bosch, *Insecticides and the Law*, 22 HASTINGS L.J. 615 (1970); C. BOSSO, PESTICIDES AND POLITICS (1987).

132. *See* 1901 Cal. Stat. 69.

133. J. WHORTON, BEFORE SILENT SPRING: PESTICIDES AND PUBLIC HEALTH IN PRE-DDT AMERICA (1974).

134. One early example of such regulation was the use permit system instituted by Imperial County in 1938. As originally worded, the ordinance required a permit for "any person, firm, corporation or association desiring or intending to apply insecticide of any kind or character whatsoever to any agricultural crop or crops in the County of Imperial by mechanical device or otherwise. . . ." Imperial County, Cal., Ordinance 141 (March 21, 1938), *cited in* Dunning, *Pests, Poisons, and the Living Law: The Control of Pesticides in California's Imperial Valley*, 2 ECOLOGY L.Q. 633, 642 n.45 (1972).

135. Dunning, *supra* note 134, at 643.

136. Current version is codified at 7 U.S.C. §§ 136-136y (1982 & Supp. V 1987).

137. R. CARSON, SILENT SPRING (1962).

138. The history of congressional opposition to pesticide regulation is given in C. BOSSO, *supra* note 131.

139. 7 U.S.C. §§ 136-136y (1982 & Supp. V 1987).

140. 1969 Cal. Stat. 2261 (codified at CAL. FOOD & AGRIC. CODE §§ 12824-12828 (West 1986 & Supp. 1989).

Department of Food and Agriculture (CDFA) may cancel the registration of, or refuse to register, any pesticide:

(a) Which has demonstrated serious uncontrollable adverse effects either within or outside the agricultural environment.

(b) The use of which is of less public value or greater detriment to the environment than the benefit received by its use.

(c) For which there is a reasonably effective and practicable alternate material or procedure which is demonstrably less destructive to the environment.[141]

The coexistence of federal and state regulatory programs has led to some interagency and intergovernmental difficulties, mostly stemming from a basic conflict between state and federal objectives. For example, FEPCA modifies federal regulation of pesticides to protect the environment as well as the farmer.[142] California has a three-tier pesticide regulation system[143] which places wide discretion in county commissioners, with the intent that local needs and environmental concerns receive priority over state policy.[144] But FEPCA explicitly preempts states' rights to regulate certain aspects of pesticide protection, such as labelling and packaging requirements.[145] Further, under federal law, state regulations and enforcement programs may be more strict, but not more lax, than those at the federal level.[146] While county agricultural commissioners have the authority to issue pesticide use permits, and must consider environmental and public health factors before issuing one,[147] counties can use this power only to adopt more restrictive regulations than the state.[148]

B. *Registration and Pesticide Regulation*

The registration process is central to pesticide regulation. Pesti-

141. CAL. FOOD & AGRIC. CODE § 12825(a)-(c) (West 1986).

142. It has been noted that FEPCA is better suited to restrict the sale of adulterated poisons than to prevent the use of dangerous poisons. Note, *supra* note 131, at 277.

143. *Id.* at 278-80.

144. *See* People *ex rel.* Deukmejian v. County of Mendocino, 36 Cal. 3d 476, 683 P.2d 1150, 204 Cal. Rptr. 897 (1984).

145. 7 U.S.C. § 136v(b) (1982).

146. *Id.* § 136v(a).

147. CAL. FOOD & AGRIC. CODE § 14006.5 (West 1986).

148. *See* People *ex rel.* Deukmejian v. County of Mendocino, 36 Cal. 3d 476, 683 P.2d 1150, 204 Cal. Rptr. 897 (1984). Federal or state law has preempted this power from political subdivisions in other states. *See id.* at 495, 683 P.2d at 1162, 204 Cal. Rptr. at 909 (Kaus, J., dissenting); Long Island Pest Control Ass'n, Inc. v. Huntington, 72 Misc. 2d 1031, 341 N.Y.S.2d 93 (1973), *aff'd*, 43 A.D.2d 1020, 351 N.Y.S.2d 945 (1974).

cide registration is designed to balance risks to human health and the environment with the benefits of using pesticides.[149] The U.S. Environmental Protection Agency (EPA) controls the registration of all pesticides. The burden of proof for a pesticide's safety rests on the registration applicant.[150] One court has established guidelines for environmental considerations through the Rebuttable Presumption Against Registration (RPAR) process.[151]

As part of the registration process, the EPA collects data on the health and environmental effects of pesticides.[152] The sophisticated technology, trained personnel, and resources required to evaluate different pesticides are clearly beyond the scope of practically every county, and all but the biggest states.[153] Even a state as large as California relies on much of the same data as the EPA when evaluating pesticides.[154] But the state still has the power not to register pesticides registered by the EPA.[155] The pesticide manufacturers' trade association challenged this state right in *National Agricultural Chemicals Association v. Rominger*.[156] The federal court held that there was no conflict between the state and federal registration programs.[157]

While the federal government sets the basic requirements of pesticide registration, the states are responsible for the implementation of the concomitant regulations. Final authority over who may use registered pesticides resides with the counties.[158] In California, county implementation of the permit system seldom requires alternatives to pesticides. This failure to require alternatives has been attributed to the political pressures exerted by local farm interests.[159] Enforcement authority resides with the Director of the CDFA and the county agricultural commissioners under the Direc-

149. For a summary of the pesticide registration process, see COMMITTEE ON PROTOTYPE EXPLICIT ANALYSIS FOR PESTICIDES, NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES (1980); *see also* NATIONAL RESEARCH COUNCIL, REGULATING PESTICIDES IN FOOD: THE DELANEY PARADOX (1987).

150. Environmental Defense Fund v. Ruckleshaus, 439 F.2d 584, 592 (D.C. Cir. 1971).

151. *See* Environmental Defense Fund v. EPA, 510 F.2d 1292 (D.C. Cir. 1975).

152. EPA Regulations, 40 C.F.R. §§ 162.11-.31 (1987) (details RPAR requirements).

153. *See, e.g.*, Note, *supra* note 131, at 289.

154. *Id.* at 284.

155. CAL. FOOD & AGRIC. CODE § 12824 (West 1986 & Supp. 1988).

156. 500 F. Supp. 465 (E.D. Cal. 1980).

157. *Id.* at 467-71.

158. CAL. FOOD & AGRIC. CODE § 14006.5 (West 1986 & Supp. 1988).

159. Note, *supra* note 131, at 288-89.

tor's supervision.[160] As mentioned above, the county commissioner has responsibility for pest control within a framework which must balance crop protection with environmental protection interests.

VIII.
AN ECOSYSTEM-WIDE APPROACH TO INSECT ERADICATION

During the 1950's, government programs often used vast quantities of pesticides for insect eradication.[161] These eradication programs took place at all levels of government and employed an ecosystem-wide approach to destroy the entire population of a single pest. The Riverside Pest Control District No. 2 is an example of one local eradication program. Three recent pest infestations demonstrate the complicated interrelationship between state and local government, between farmers and non-farmers, between farm workers and farm owners, and among different farmers. These cases involved, first, the pink bollworm in cotton, second, the mediterranean fruit fly in citrus and stone fruits, and, third, the apple maggot in pome fruits.

A. *Pest Control in Cotton*

California is the second largest producer of cotton in the United States.[162] California's most lucrative field crop,[163] over 90% of the cotton is grown in the San Joaquin Valley. San Joaquin Valley's major cotton pest historically has been the lygus bug.[164] Efforts to control the lygus bug with pesticides resulted in resistance, which in turn led to higher application rates with more kinds of pesticides, some of which had toxic effects on cotton plants. The depletion of natural predators was followed by secondary pest outbreaks of the cotton bollworm, the beet armyworm and the cabbage looper.[165]

Though occasional outbreaks of boll weevil and pink bollworm

160. CAL. FOOD & AGRIC. CODE § 11501.5 (West 1986 & Supp. 1988); *see also* People *ex rel.* Deukmejian v. County of Mendocino, 36 Cal. 3d 476, 482, 683 P.2d 1150, 1153, 204 Cal. Rptr. 897, 900 (1984).

161. Bosso recounts some of these programs in PESTICIDES AND POLITICS, particularly the fire ant program conducted in the Southern States by the USDA. C. BOSSO, *supra* note 131, at 79-108.

162. U.S. DEPARTMENT OF AGRICULTURE, AGRICULTURAL STATISTICS 63 (1985).

163. CALIFORNIA DEPARTMENT OF FINANCE, CALIFORNIA STATISTICAL ABSTRACT 108 (1987).

164. EAT, *supra* note 1, at 5.93-11.

165. Van den Bosch, Leigh, Falcon, Stern, Gonzales & Hagen, *The Developing Program of Integrated Control of Cotton Pests in California*, in BIOLOGICAL CONTROL (C. Huffaker ed. 1971).

occurred in the San Joaquin Valley, they never established themselves the way those pests have elsewhere. Pink bollworm has not been a major pest in the San Joaquin Valley because of a successful program to map, trap, and release sterile male moths. The agency responsible for this program is the California Cotton Pest Control Board (CCPCB). The CCPCB serves as an advisor to the CDFA and makes recommendations to growers, but does not have any regulatory power. The CCPCB was established in 1967,[166] following a particularly severe outbreak of pink bollworm near the Mexican border. Growers support the program through a $2 per bale assessment on cotton.[167] As a result, the farmers have been able to keep boll weevil and pink bollworm from becoming established. The pests are kept below the economic threshold by trapping and spot treatment and, where economically feasible, through biological control.

1. The Desert Valleys: Imperial and Palo Verde

The Imperial and Palo Verde Valleys both experienced serious pest infestations. One entomologist described the situation in the late 1970s as an "ecological horror," stating that no cotton-growing area in the world had a more severe insect problem than the deserts of California.[168]

The Imperial Valley is an agricultural region with a variety of problems caused by its unique set of environmental circumstances. Located on the Mexican border of California, south of the Salton Sea and the Chocolate Mountains, east of the Coastal Range and west of the Colorado River, most of the valley is below sea level. Soils in the valley bottom slope gently northward, and have excellent drainage. The Imperial Valley is a desert region, with average rainfall of less than three inches a year, making agriculture impossible without irrigation. The Imperial Irrigation District receives all of its water supply from the Colorado River via the All American Canal. The Imperial Valley has an average growing season of 350 days, a great advantage in the production of many crops.

One major field crop grown in the Imperial Valley is cotton. Growers in the Imperial Valley practice what is known as long sea-

166. CAL. FOOD & AGRIC. CODE § 6006 (West 1986).

167. *Id.* § 6005.

168. Address by H. T. Reynolds, *Pink Bollworm Status in California and Arizona*, Ninth Annual Meetings of AAIE in Berkeley, Cal. (Feb. 3, 1977), *quoted in* EAT, *supra* note 1, at 5.93-18 to 5.93-19.

son or second-set cotton.[169] Under irrigated desert conditions a cotton crop can be produced in approximately 240 days. If permitted to continue to grow, the plant will produce a second set of squares which develop into bolls. This second set is known as the "top crop." Under ideal conditions, growers can increase yields by producing a top crop.

The climate and long growing season also make control of insect pests a difficult and expensive management function. Nearly 40% of all restricted pesticides used on cotton in California are applied in Imperial County, even though it accounts for only eight percent of the cotton grown in the state. Imperial County consistently ranks first in the application of amount of restricted pesticides applied in California.[170]

The Imperial Valley has grown cotton since the early 1950s and has a rich history of conflict over pesticide regulations and pest control activity. Imperial County has long been an innovator in formulating pesticide policy and its actions have generated many of the California restrictions on pesticides.[171] In 1938, for example, Imperial County became the first county in California to adopt a permit system for pesticides.

Prior to the introduction of DDT and other synthetic organic compounds, a variety of pest problems made cotton production risky. DDT was used in Imperial County until the early 1960s. In 1961, when measurements of milk containing alfalfa hay with residues of the pesticide exceeded tolerance levels, Imperial County imposed strict conditions on the application of DDT. These regulations led to the virtual elimination of DDT in Imperial Valley.[172] After DDT use was restricted, Integrated Pest Management (IPM) techniques such as scouting and the use of selective chemicals were introduced. These techniques were successful at reducing the overall amount of pesticides used.

By the mid-1960s, however, the pink bollworm became a serious cotton pest problem in the southern California desert valleys, particularly the Imperial Valley.[173] Cotton yields in Imperial County

169. Personal communication with C. Beasley, University of California Cooperative Farm Extension, Area Farm Advisor, Cotton Specialist (Apr. 13, 1986).

170. S. Archibald, A Dynamic Analysis of Production Externalities: Pesticide Resistance in California Cotton 37 (1984) (unpublished Ph.D. dissertation) (available at the University of California, Davis).

171. Dunning, *supra* note 134, at 633, 649.

172. *Id.* at 633, 667-668.

173. *Hearings on the Pink Bollworm Problem Before the Joint Meeting of the California Senate and Assembly Agriculture Committees passim* (1967).

dropped to an average of less than two bales per acre between 1969 and 1971 from an average of almost five in the mid-1960s.[174] While increased pesticide use improved productivity for a short time, it seriously disrupted the Valley's ecology. The use of chemical control caused a decline in the number of predators and other beneficial insects. Secondary pests resistant to chemical control, most notably the tobacco budworm and the white fly, emerged to severely reduce crop yields and quality. White fly damage caused cotton to become sticky and difficult to mill.

Growers were convinced that the pink bollworm could be eradicated by chemical control,[175] although at least three entomologists predicted pesticide failures of the type that were later to occur.[176] These entomologists recommended release of parasites,[177] introduction of exotic predators and parasites,[178] a shorter growing season and rotations.[179] Growers instead opted for chemical control. They divided the Imperial Valley into five districts, with the goal of eradicating the pink bollworm by use of the pesticide Azodrin.[180]

The organophosphates used to eradicate the pink bollworm quickly failed. Many growers considered synthetic pyrethroids to be the most effective pesticide available to control the pink bollworm.[181] The efficacy of synthetic pyrethroids was frequently enhanced by the use of a synergist, a chemical not particularly toxic in itself but capable of acting on the target organism to increase the toxicity of the biocide. Chlordimeform was one synergist commonly used with pyrethroids. Chlordimeform speeds the metabolism of an insect, thus increasing the rate of pyrethroids' absorption.[182] After it was found to be a carcinogen in 1976, chlordimeform's manufacturers, Ciba-Geigy and Nor-Am Agricultural Products, removed it from the market.[183] Based on its toxicity to farm and factory workers, the state of California removed

174. IMPERIAL COUNTY OFFICE OF THE AGRICULTURAL COMMISSIONER, IMPERIAL COUNTY AGRICULTURE (1962) (available from Imperial County Office of the Agricultural Commissioner, El Centro, Cal.).

175. *Hearings, supra* note 173, at 3-20 (statement of Wes Bisgaard).

176. *Id.* at 98-121 (statements of Laura Tallian, Louis Ruud, and Everett Dietrich).

177. *Id.* at 99 (statement of Laura Tallian).

178. *Id.* at 111 (statement of Louis Ruud).

179. *Id.* at 116 (statement of Everett Dietrich).

180. *Id.* at 23 (statement of Robert Meyer).

181. Personal communication with Eric Natwick, University of California Imperial County Cooperative Farm Extension Entomologist (Oct. 12, 1986).

182. Interview with T. A. Miller, Entomologist, University of California, Riverside (Apr. 13, 1986).

183. G. WARE, PESTICIDES: THEORY AND APPLICATION 49 (1982).

chlordimeform's registration in 1977.[184] The manufacturers then returned chlordimeform to the market for use on cotton under strict application restrictions.[185] Growers requested that chlordimeform be registered because the alternatives used to control the pink bollworm, mainly organophosphates and pyrethroids without a synergist, failed.

After a disastrous 1981 growing season, the State of California registered chlordimeform for use on cotton within the Imperial Irrigation District under the condition that growers form a pest abatement district. This district would try to control the pink bollworm through pheromone trapping. Once pink bollworm levels exceeded an economic threshold, growers were given the option of using organophosphate pesticides or pyrethroids with chlordimeform as a synergist. The state Department of Food and Agriculture granted an emergency registration to growers in the Imperial Valley on the same conditions: that they form a pest abatement district, practice biological control with pheromone trapping, and reduce organophosphate usage.

Special enabling legislation was passed to authorize cotton pest abatement districts.[186] It authorized these districts to "[p]rohibit the planting, growing, or maintenance of cotton plants within the boundaries of the district if it determines that such a prohibition is necessary for cotton pest control."[187] The districts also had the power to "[e]radicate, remove, or prevent the spread of any disease, insect, or other pest injurious to cotton"[188] and to "[e]radicate, eliminate, remove, or destroy any cotton plants except those cotton plants which are growing under the conditions established by a valid permit."[189]

2. The Imperial Valley Cotton Pest Abatement District

By 1982, pest problems were so serious that the Colorado River Cotton Growers Association formed the Imperial Valley Cotton Pest Abatement District (IVCPAD). Approximately 120 of 140 growers signed up for the program, well in excess of the 65% required by California law.[190] The objectives of the district were to

184. S. Archibald, *supra* note 170, at 47.
185. G. WARE, *supra* note 183, at 49.
186. CAL. FOOD & AGRIC. CODE § 6051 (West 1986).
187. *Id.* § 6062(e).
188. *Id.* § 6062(h).
189. *Id.* § 6062(i).
190. Ariz.-Cal. Farm Press, Apr. 10, 1982, at 23.

(1) preserve the populations of beneficial insects by relying on pheromone (autocidal) control in the early season combined with controlled use of chlordimeform, and (2) reduce the use of organophosphate and synthetic pyrethroids normally used to control the pink bollworm.[191]

This new district spent the 1982 growing season monitoring compliance with the pheromone trapping program. A farmer who skipped a treatment was subject to fines, a measure deemed necessary to hold the program together.[192] The district also became a forum for researchers to present entomological findings and for pesticide manufacturers to demonstrate their products.[193] The 1983 and 1984 seasons were relatively pest-free. Pheromone trapping was no longer mandatory. Few growers continued to use pheromone trapping because the district no longer had an enforcement role.[194]

Meanwhile, an international agreement to control the boll weevil involved the governments of the United States, Mexico, California, Arizona and Baja California Norte.[195] A host-free district for boll weevil was established,[196] and boll weevil declined as a problem. Pink bollworm was held in check by pyrethroids and chlordimeform, despite indications of resistance.

The most serious pest problem in 1983 was a secondary outbreak of whiteflies.[197] Natural predators of the whitefly are susceptible to pyrethroids, but whiteflies are resistant. Whiteflies are also vectors of plant disease. Not only do whiteflies transmit mildew to cotton, but they carry lettuce yellows to winter vegetables.[198]

Improved yields and higher prices led to an increase in cotton acreage in 1984. Boll weevil continued to decline in importance as a

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191. Minutes of Imperial Valley Cotton Pest Abatement District (IVCPAD) Meeting (June 15, 1982) (available from the Office of the Agricultural Commissioner, Imperial County, Cal.).

192. Minutes of Imperial County Desert Cotton Pest Abatement District Meeting (Aug. 3, 1982) (available from the Office of the Agricultural Commissioner, Imperial County, Cal.).

193. *See, e.g.*, Minutes of IVCPAD Meeting, *supra* note 191 (Aug. 3, 1982).

194. Personal communication with C. Beasley, *supra* note 169.

195. CAL. FOOD & AGRIC. CODE § 6002 (West 1986). The role of Imperial County was presented at the Imperial Valley Cotton Pest Abatement District Meeting on Dec. 5, 1983. *See* Minutes of IVCPAD Meeting, *supra* note 191.

196. Imperial County was actually divided into three districts. The area near the Mexican border was assigned a host-free period of 15 December to 1 March; the northern and western areas had a host-free period of 15 January to 15 March. CAL. ADMIN. CODE tit. 3, §§ 3596(b)-(c) (1988).

197. Minutes of Imperial County Desert Cotton Pest Abatement District Meeting, *supra* note 192 (Nov. 3, 1983).

198. Personal communication with Eric Natwick, *supra* note 181 (Apr. 15, 1987).

pest, but pink bollworm and whitefly populations were up sharply during the 1984 season. White fly diseases also increased.[199] Mildew introduced from white fly damage reduced the quality and therefore the price of cotton harvested.[200] Pink bollworm population increases were seen as the direct result of increased resistance to synthetic pyrethroids.[201] Farmers sprayed as often as twenty times a season, incurring annual pest control costs of $250 per acre,[202] with some costs running as high as $300 per acre. Because the pink bollworm rapidly developed resistance to pyrethroids, emergency registration offered little help.

Other states with pink bollworm problems had successfully controlled them with control zones, planting dates, and regulations for the destruction of crop residue and debris.[203] Such an approach was proposed for the Imperial Valley. An election was held in October of 1985 to mandate cultural practices to control the pink bollworm. The ballot presented three options: late planting dates, early harvest date or a moratorium. Complicated balloting procedures required approval of 65% of the growers and 75% of the acres, or 75% of the growers and 65% of the acres for adoption.[204] No single practice received approval by more than 32% of the growers. However, 58% of the growers approved some form of practice.[205]

The growers could not agree on a single approach because maximum potential yields would be reduced by not allowing late maturation of bolls. Yet entomologists believed that a short season would eliminate the pink bollworm, by both plowing down earlier and planting later. Early plowdown would kill overwintering pupae, while later planting would not allow surviving adults to lay eggs on cotton plants.

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199. Minutes of Imperial County Desert Cotton Pest Abatement District Meeting, *supra* note 192 (June 13, 1984).

200. Heinrichs, *Short Season or Nothing*, CAL.-ARIZ. COTTON, Dec. 1987, at 12.

201. Miller, *The Development of Resistance Management-Conservation of Insecticides*, Cotton Insect and Production Meetings 17-21 (1985) (available from the Imperial County Cooperative Extension, El Centro, Cal.). Dr. Miller presented his findings to the IVCPAD meeting of June 26, 1985.

202. *Imperial Growers Approve Mandatory Short Season*, CAL.-ARIZ. COTTON, Jan. 1987, at 27.

203. For instance, Texas has nine climatic regions for PBW control. For an evaluation of this program, *see* Bottrell and Adkisson, *Cotton Insect Pest Management*, 22 ANN. REV. ENTOMOLOGY, 451 (1977).

204. Minutes of IVCPAD Meeting, *supra* note 191 (Sept. 16, 1985).

205. *Id.* (Oct. 22, 1985).

Yields were again lower for the 1986 season.[206] Permethrin and chlordimeform were expensive, and offered relatively low return for the great economic and health costs they imposed.[207] The state decided not to renew the registration for chlordimeform.[208] The short season cotton option was offered for a straight yes-or-no vote.[209] The initiative placed on the November, 1986 ballot passed in a close and controversial vote.[210] The results were challenged immediately.[211] The board set a planting date of March first, a defoliation date of September first and a plowdown date of November first.[212] Because of a conflict in the cooperative agreement with Arizona and Mexico to control the boll weevil, the planting date was moved back from March fifteenth.[213]

The pink bollworm program operated in a rural, predominately agricultural area. The major conflict occurred between growers, with conflict between growers and farmworkers also playing a role. Two pest outbreaks in the 1980s, however, demonstrated changed attitudes towards, and increased involvement of non-farmers in, public management of pests. The Mediterranean fruit fly (medfly) outbreak of 1980-82 and the continuing apple maggot infestation of 1983 highlighted the ongoing tension between public nuisance and private property concerns, and provided arenas for new conflicts over technology and state-local power.

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206. Yields dropped from 2.7 bales per acre in 1985 to 2.5 in 1986. IMPERIAL COUNTY, OFFICE OF THE AGRICULTURAL COMMISSIONER, IMPERIAL COUNTY AGRICULTURE (1986).

207. *See* C. Harper, Optimal Regulation of Agricultural Pesticides: A Case Study of Chlordimeform in the Imperial Valley (1987) (unpublished Ph.D. dissertation) (available at the University of California, Berkeley).

208. *Mandatory or Not, Short Season Only Economical Alternative*, CAL.-ARIZ. COTTON, Aug. 1987, at 23.

209. Minutes of IVCPAD Meeting, *supra* note 191 (Oct. 28, 1986). The same 75% of growers and 65% of acreage requirement for approval was retained.

210. Seventy ballots were received by election day. The results were 75.71% of growers representing 65.67% of the acreage in favor of short season. A late "no" ballot would have defeated the proposal had it been counted. *Id.*

211. *Short Season Cotton Plan Hangs on a Fraction*, Imperial Valley Press, Nov. 25, 1986, at A-3; *Short Season for Cotton Gets Approval*, Brawley News, Nov. 27, 1986; Letter read by William Macklin, attorney for growers Alvaro Deen and Charles Smith, *printed in* Minutes of IVCPAD Meeting, *supra* note 191 (Nov. 26, 1986).

212. Minutes of IVCPAD Meeting, *supra* note 191 (Jan. 24, 1987).

213. B. Hass, Changes in Regulations of the Department of Food and Agriculture Pertaining to Cotton Boll Weevil Host-Free Districts, Section 3596, California Administrative Code (Feb. 25, 1987) (Cal. Dep't of Food & Agric. Memorandum).

IX.
QUARANTINES AND ERADICATION PROGRAMS

Natural barriers once readily contained pest movement. As transportation improved and trade patterns developed, insects, weeds, and diseases were introduced into areas previously foreign to them. Quarantines and the imposition of restrictions on the movement of crops, commodities, and plants across state lines broadened the scope of government crop protection. These policies have not received as much attention as pesticide regulation. However, these laws cannot be overlooked in a review of public crop protection.

California established quarantines at the state line in 1911.[214] These quarantines formed the state's first line of defense against the introduction of exotic pests.[215] The state was authorized to seize and destroy any pest-infected plants at the owner's expense.[216] As in-migration to California increased over the years, the quarantine system was constantly tested and occasionally breached. Programs to exclude pests operated with deficient staff and resources.[217] Quarantine programs were relatively unchanged by the pesticide revolution.[218] Indeed, given the volume of trade and travel into California, it is surprising that more exotic infestations did not occur.

While quarantines are an important component of California's crop protection policy, they are alone insufficient to prevent infestation by exotic pests. When certain insects are detected in the state, the Director of the CDFA is required to proclaim an eradication area and take steps to eradicate the insect.[219] Government action is justified by those who view individual growers as incapable of eliminating exotic pests. Eradication is deemed possible where a pest is not indigenous and it is not likely to establish itself if given immediate, stringent action to eliminate the species from the ecosystem.

If the population of a pest goes beyond eradicable levels, the objective becomes one of control, rather than eradication. Control programs are considered to be largely, or wholly, in the domain of the private sector, and particularly within the domain of the af-

214. 1911 Cal. Stat. 433.

215. California law regarding quarantines of plant shipments can be found at CAL. FOOD & AGRIC. CODE §§ 6301-6524 (West 1986 & Supp. 1989).

216. For interstate shipments, *id.* § 6461; for intrastate shipments, *id.* § 6521 (West 1986).

217. PEST RESPONSE REVIEW COMMITTEE, REPORT TO THE LEGISLATURE OF THE STATE OF CALIFORNIA (Oct. 1983).

218. J. PERKINS, *supra* note 14, at 12.

219. CAL. FOOD & AGRIC. CODE § 5761 (West 1986 & Supp. 1989).

fected industry. While the enforcement of pest control district rules is undertaken by government, the cost of the control program is largely supported by the private sector. Therefore, it is important that growers prevent the establishment of exotic pests.

The quarantines and eradication system has been severely tested twice in the past decade, when the CDFA Division of Plant Industry quarantined both the medfly[220] and the apple maggot.[221] Both pests were the subject of eradication projects authorized by the Plant Quarantine and Pest Control Code.[222] Both infestations changed the role of public involvement in crop protection. The contrasting outcomes of the two cases show the growth of conflicting interests in plant protection and pest management policy.

A. *The Medfly Crisis*

The Mediterranean fruit fly or medfly is a heterophagous pest of citrus and pome fruits that causes cosmetic damage and spoilage of mature fruit. It reproduces rapidly and is difficult to control once established. California successfully combatted two outbreaks early in this century.

The third outbreak of the century was not as easily controlled. Instead, it created a crisis atmosphere in state government. First discovered in separate traps in Los Angeles and Santa Clara Counties on June 5, 1980, the medfly spread rapidly throughout those counties.[223] The Medfly Eradication Project (MEP) was established shortly after the first sighting, even though the extent and seriousness of the medfly infestation was not clear for several weeks.[224] Because of the insect's short reproduction cycle and high fecundity, the infestation rapidly spread unchecked. The MEP implemented a program of trapping, stripping fruit, and ground spraying in infested areas.[225] Unfortunately, the project received funds inade-

220. CAL. ADMIN. CODE tit. 3, §§ 3406, 3421 (1988) (concerning medfly and apple maggot, respectively).

221. *Id.* § 3421.

222. CAL. FOOD & AGRIC. CODE §§ 5761-5764 (West 1986).

223. The specific locations and times of trapping are recorded in CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE, USDA-CALIFORNIA COOPERATIVE MEDFLY ERADICATION PROJECT, CHRONOLOGY OF EVENTS (1982) [hereinafter MEDFLY CHRONOLOGY].

224. For a description of the scientific, technical, political, and economic uncertainties that hampered the administration of the MEP, *see* H. Lorraine, The California 1980 Medfly Crisis; An Analysis of Uncertainty Management under Conditions of Non-Routine Problem Solving (1984) (unpublished Ph.D. dissertation) (available at the University of California, Berkeley).

225. MEDFLY CHRONOLOGY, *supra* note 223, at 7.

quate to achieve eradication by those methods.[226] The experts overseeing the project faced uncertainty, both as to the extent of the problem and as to the results of action taken to abate it.[227]

The infestation became an issue of interstate commerce when Texas announced a quarantine of California fruit. Both California and the United States Justice Department argued against the quarantine.[228] California asserted that the quarantine was used for the protection of Texas' markets, rather than the protection of Texan citizens' health and safety.[229] The Supreme Court issued a temporary restraining order against the Texas quarantine.[230]

No specifically registered pesticide for medfly eradication existed.[231] The United States Department of Agriculture (USDA) sought and received an exemption from FIFRA to use fenthion and malathion for eradication.[232] By November of 1980, the USDA and growers were applying pressure for aerial application of malathion.[233] Local communities immediately opposed this action.[234] In particular, the Santa Clara County community and local government did not support the eradication program financially or politically.[235]

The California Conservation Corps mobilized in order to intensify the fruit stripping and ground spraying effort. Sterile males were purchased from Mexico and Peru. Unfortunately, the flies from Peru later turned out to be fertile, and their subsequent release

226. Lorraine describes the conditions that existed in the project's early days. *See* H. Lorraine, *supra* note 224.

227. *Id.* at 28-33.

228. Epstein, *U.S. Sides with California in Texas Quarantine Fight*, San Jose Mercury News, Mar. 5, 1988, at 1B.

229. *See* City of Philadelphia v. New Jersey, 437 U.S. 617, 624 (1977).

230. Walston, *The Great Medfly War: A Short Memoir of the Legal Battle*, STANFORD LAW., Fall/Winter 1981, at 10, 12.

231. Letter from James O. Lee, Deputy Administrator, U.S.D.A. Animal and Plant Health Inspection Service (APHIS) to Douglas Campt, Director, Registration Division, Environmental Protection Agency Office of Pesticide Programs (Aug. 7, 1980).

232. Mailgram from Edwin L. Johnson, Deputy Assistant Administrator for Pesticide Programs, Environmental Protection Agency, to James O. Lee, Deputy Administrator, U.S.D.A. Animal and Plant Health Inspection Service (Oct. 16, 1980).

233. *See* MEDFLY CHRONOLOGY, *supra* note 223, at 35-37. USDA announced it had reached a consensus on the necessity to spray on Nov. 24, 1980. *Id.* at 37.

234. Palo Alto and Mountain View prohibited aerial spraying on Dec. 8; Santa Clara County Board of Supervisors, and Los Altos and Sunnyvale, on Dec. 9; Los Gatos, Dec. 15; Monte Sereno, Dec. 16; and Saratoga, Cupertino, and Milpitas, Dec. 17. *Id.* at 39-42.

235. Minutes of the Medfly Technical Review Committee (Nov. 6, 1980) (available from B. Baker).

exacerbated the infestation,[236] which added to the strain of interagency relations between the CDFA and the USDA.[237]

After the failure of sterile insect treatment, California faced a federal and international quarantine of fruit if it did not adopt aerial spraying.[238] Meanwhile, the USDA and the CDFA produced a controversial environmental assessment which concluded that there were no environmental or health risks associated with aerial spraying.[239] California filed a petition in federal district court on July 2, 1981 to strike down the local ordinances that prohibited aerial application. The petition was granted with a temporary restraining order. Finally, on July 10, 1981, Governor Brown of California issued the order to commence aerial application.[240] Local governments sought restraining orders to prevent the spraying, but both the Santa Clara Superior and California Supreme Courts refused to grant them.[241] The spraying program continued for more than a year, and covered six counties, including heavily urbanized Santa Clara and Los Angeles. Finally, on September 21, 1982, the medfly was declared eradicated.[242]

This case highlights several notable developments in pest control. For example, the Medfly Eradication Project encountered more challenges from non-agricultural interests than in any other California pest infestation case. The state faced more private property claims than in any of the earlier cases. In addition, the program's benefits and risks were more ambiguous than those of previous eradication efforts, defying purely economic classification. For example, potential annual losses of fruit and vegetables from the infestation were estimated at between roughly $320 and $760 million.[243]

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236. Governor Brown made this announcement on July 8, 1981. The contract and procedures were investigated in CALIFORNIA STATE AUDITOR GENERAL, PROCUREMENT OF STERILE MEDFLIES FROM PERU: RESPONSE TO QUESTIONS POSED BY THE LEGISLATURE (1982).

237. *See* H. Lorraine, *supra* note 224, at 51-52.

238. Mexico and Japan both embargoed California's fruit during the crisis. Several states, including Florida, Georgia, Mississippi, South Carolina, and Texas sought more restrictive quarantines than those imposed by the USDA. *Id* at 53-56.

239. ANIMAL AND PLANT HEALTH INSPECTION SERVICE, U.S. DEP'T OF AGRIC., & CAL. DEP'T OF FOOD & AGRIC., ENVIRONMENTAL ASSESSMENT OF THE MEDITERRANEAN FRUIT FLY ERADICATION PROGRAM (1981).

240. MEDFLY CHRONOLOGY, *supra* note 223, at 77.

241. H. Lorraine, *supra* note 224, at 57.

242. MEDFLY CHRONOLOGY, *supra* note 223, at 130.

243. In 1981 U.S. Dollars. *See* G. Rowe, Deposition to the Superior Court of the State of California (1981), *cited in* R. CONWAY, AN ECONOMIC PERSPECTIVE OF THE CALIFORNIA MEDITERRANEAN FRUIT FLY INFESTATION 5 (1982).

The total estimated project costs were close to $100 million.[244] Ten million acres were sprayed with almost 200,000 gallons of malathion.[245]If simple benefit/cost criteria were applied, eradication made economic sense.

However, non-agricultural interests complicated the analysis. Risks to human health, the environment, and damage to personal property were not easily quantifiable. While claims for aesthetic damages were rejected, these were not an insignificant economic argument against eradication. One environmental group estimated that the paint damage to automobiles alone amounted to $40 million.[246] In response to mounting claims against the state, an expert panel sought absolute immunity for the state from liability.[247]

The medfly crisis also led to substantial public disagreement between governmental and non-governmental experts over the means and ends of eradication, particularly regarding aerial application, the toxicity of malathion, and environmental consequences of an eradication program.[248] Some argued that failure to eradicate by aerial sprays would result in a permanent increase in the exposure of Californians to pesticides.[249] Others argued that ground spraying, fruit stripping, and sterile release had not been given a chance to succeed. The ethical and methodological problems inherent in the translation of human life, health, and environmental quality into dollar values further complicated this calculation.

Both sides employed scientists in a partisan political debate. Each side claimed that the other's position was political, while its own was scientific. In fact, neither side's position rested on a purely scientific or a purely political basis. Both opponents and proponents of aerial spraying marshalled scientific evidence to support their case; each side had a political agenda to follow. The final decision to spray was based on the economic power of agriculture. The potential agricultural losses to be caused by a continued infestation outweighed the potential environmental losses. The public interest

244. CAL. DEP'T OF FOOD & AGRIC. & CAL. DEP'T OF FINANCE, FINAL REPORT TO THE LEGISLATURE ON MEDFLY ERADICATION PROJECT EXPENDITURES, 1980-1982 (1982).

245. H. Lorraine, *supra* note 224, at 67.

246. Citizens for a Better Environment, Medfly Fact Sheet: Aerial Spraying and Paint Damage (1981) (leaflet handed out to the public) (available from B. Baker).

247. PEST RESPONSE REVIEW COMMITTEE, *supra* note 217, at 36.

248. H. Lorraine, *supra* note 224, at 28-37.

249. WORKER HEALTH AND SAFETY UNIT, DIV. OF PEST MGMT., CAL. DEP'T OF FOOD & AGRIC., ANTICIPATED ECONOMIC AND PUBLIC HEALTH IMPACT OF ESTABLISHMENT OF PERMANENT MEDITERRANEAN FRUIT FLY INFESTATIONS IN THE MAJOR AGRICULTURAL AREAS OF CALIFORNIA (1981).

in crop protection was still identified with the private interest of agriculture. For the first time, however, environmental concerns received serious consideration in a challenge to eradication.

Not only had the new technology for crop protection made pest control more risky, but a growing non-farm population made eradication an urban problem. Industry portrayed urban dwellers as misinformed and antagonistic toward agriculture.[250] However, the urban communities supported all efforts, short of aerial spraying, to eradicate the pest.[251] The end was never in dispute, only the means.[252] Citizen involvement went beyond farm groups, but ultimately gave way to the organized group that had an economic stake in crop protection. Notification requirements for eradication programs changed in recognition of the conflict between urban and agricultural interests,[253] obliging the state to inform the public on the use of pesticides in eradication projects.[254]

The medfly crisis exemplified how ecological disruption can rapidly become an international incident. It also exemplified the conflict between a growing urban population and agriculture. An effort to balance environmental and agricultural interests ended by displeasing both. The ecological and economic tradeoffs were never clear, nor was the solution obvious. The public interest in the medfly crisis was lost to a technocracy that had insufficient information, economic interests that sought eradication at any cost to the environment, and environmental and local government interests that did not share in agriculture's benefits. Following the medfly crisis, California established an eradication task force that sought to remove eradication issues from political conflict.

This eradication task force did not have its intended effect, as proved by subsequent cases involving the Japanese beetle and apple maggot. Several Japanese beetles were found in the Sacramento area in June of 1983. The CDFA convened a scientific advisory panel to study the problem and to determine if eradication was a

250. *See, e.g., Sides Being Drawn in Medfly Dispute*, Los Angeles Times, Mar. 2, 1981, Part 1, at 3, col.5.

251. S. Dreistadt, The Socio-Political Impacts of California's Medfly Eradication and its Implications for Public Participation in Urban Pest Management (Dec. 2, 1982) (paper presented at the Symposium of the Entomological Societies of America and Canada).

252. Personal Communication from Jerry Scribner, Director, California Department of Food & Agriculture during the Medfly Crisis; currently attorney in private practice (Apr. 13, 1988).

253. *See* CAL. FOOD & AGRIC. CODE § 5029 (West 1986).

254. *Id.* § 5029(b)

possibility. The panel recommended that insecticides be sprayed to eradicate the beetles. The CDFA began spraying carbaryl, diazinon, and oftanol later that summer. Oftanol use was halted when the CDFA suspended its registration after it was found to cause cancer in laboratory animals. Carbaryl and diazanon use continued, but the eradication program was soon challenged as a threat to public health and safety.

Approximately one hundred citizens and a local school district filed suit against the USDA and the CDFA to enjoin spraying in the Japanese beetle program.[255] They argued that spraying violated the labelling provisions of FIFRA and that an environmental impact statement had not been filed in compliance with the National Environmental Policy Act (NEPA).[256]

The court struck down both arguments, noting that FIFRA lacks enforcement provisions for citizens to protect the public from toxic chemicals through civil suits.[257] The court further noted that FIFRA expressly delegates enforcement responsibility to the state.[258] The court's holding gave the state the ability to use pesticides not available to private users. Because the project was state-initiated, and received only minor support from the federal government, it was not considered a major federal project. Therefore, it was not subject to the provisions of the NEPA calling for an environmental impact statement.[259]

This case gave the state great discretion in the use of pesticides. In essence, it placed the state above laws developed to protect public health and the environment from pesticides. The state was permitted to use pesticides in ways that would be illegal if used by a private individual. However, another pest, the apple maggot, soon challenged the broad, sweeping state powers used to control the medfly and the Japanese beetle.

B. *Apple Maggot Eradication Project*

The apple maggot is indigenous to the east coast of the United States, and has been established in Pacific Northwest orchards for decades. While the apple maggot periodically appeared at border checkpoints in California, flies were first discovered in traps in

255. Almond Hill School v. Department of Agric., 768 F.2d 1030, 1032 (9th Cir. 1985).
256. *Id.* at 1032-33.
257. *Id.* at 1035 (citing Fiedler v. Clark, 714 F.2d 77 (9th Cir. 1983)).
258. *Id.* at 1038.
259. *Id.* at 1039.

northern California in 1983.[260] A pest of apples,[261] the apple maggot posed a threat to northern California's agriculture. But, as with the medfly, the scientific community was divided over the extent of the threat, and the means necessary to control or eliminate it. A science advisory panel was established to determine the feasibility of eradication. This panel concluded that eradication of the apple maggot was neither feasible, nor advisable.[262] The CDFA ignored the recommendations of this panel, and selected a new panel of vocal eradication supporters. This panel concluded that eradication had a 95% probability of success given an annual budget of $2.6 million.[263] The Apple Maggot Eradication Project (AMEP) was established the next year.[264] The CDFA created an Apple Maggot Eradication Area in eight northern counties.[265] The AMEP was charged with preparing a report on the range and status of the apple maggot infestation. If the apple maggot was eradicable, the AMEP would receive funding to eradicate the pest. A 1984 CDFA committee report projected an 80% probability of eradication.[266] However, committee's chairperson later expressed doubts about this probability.[267] The AMEP sought to eradicate the apple maggot by intensive scouting, trapping, and spraying with the pesticide Imidan. Public notice consisted of a press conference held four days before spraying began.[268] In 1985, the legislature exempted state sponsored eradication programs[269] from the environmental impact review requirements of the California Environmental Qual-

260. CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE, APPLE MAGGOT ERADICATION PROJECT REPORT TO THE LEGISLATURE (1986).

261. The apple maggot fruit fly damages the fruit by laying her eggs in the host fruit. The females ovipositor causes dimpling of the fruit by puncturing the skin. When the eggs hatch, the larvae tunnel and feed on the fruit. The larvae then drop to the ground and pupate in the soil for one or two winters, before emerging as adult fruit flies. Joos, Allen & van Steenwyk, *Apple Maggot: A Threat to California Agriculture*, CAL. AGRIC., Jul.-Aug. 1984, at 9, 10.

262. APPLE MAGGOT COMMITTEE, FINAL RECOMMENDATIONS TO THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE (Jan. 23, 1984).

263. APPLE MAGGOT PROJECT, REPORT TO THE CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE AT AN APPLE MAGGOT MEETING (Dec. 17, 1984).

264. 1984 Cal. Stat. 270.

265. Del Norte, Humboldt, Lake, Mendocino, Shasta, Siskiyou, Sonoma, and Trinity. CAL. ADMIN. CODE tit. 3, § 3591.10(a) (1987).

266. CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE, APPLE MAGGOT FRUIT FLY REPORT 2 (1984).

267. The committee was chaired by Ron Prokopy, Professor of Entomology, University of Massachusetts, Amherst. *See* Robinson, *State Mandated Pesticide Application and the Due Process Rights of Organic Farmers* 17 PAC. L.J. 1301, 1308-09 (1986).

268. *Id.* at 1301.

269. CAL. FOOD & AGRIC. CODE §§ 5771-5780 (West 1988).

ity Act (CEQA).[270] A coalition of environmental groups and organic farmers opposed to the use of Imidan challenged this exemption and brought suit to stop the AMEP.[271]

Organic farmers had a special interest in this case. They grow crops without the use of synthetic pesticides, herbicides or fertilizers.[272] Products labelled "organically grown" are limited in California to crops "produced, harvested, distributed, stored, processed, and packaged without application of synthetically compounded fertilizers, pesticides, or growth regulators."[273] In the case of perennial crops, such as apples and pears, this restriction applies "for 12 months prior to the appearance of flower buds and throughout the entire growing and harvest season of the particular commodity."[274] Organic farmers can obtain a premium profit by marketing their produce to consumers willing to pay a higher price for pesticide-free food. This gives organic farmers an economic interest in preventing chemical treatment of their crop.

The conflict between organic and conventional farmers in the AMEP litigation was a new twist on an old theme in pest control. This time, organic farmers had a property interest to protect from pesticides.[275] By not giving adequate notice nor filing an environmental impact review, the CDFA deprived organic farmers of their property without due process.[276] A county court order blocked the AMEP from mandatory spraying.[277] The state court of appeal upheld the lower court's ruling, and found that the CDFA was not exempted from CEQA.[278]

The law governing eradication projects was amended three times subsequent to the *Citizens for Non-Toxic Pest Control* suits. The first amendment changed the procedures for hearings prior to eradication activities.[279] It also declared that "[a]ny program for the regulation of pesticides certified pursuant to this section and Chapter 308 of the Statutes of 1978 shall apply to the use of pesticides by

270. CAL. PUB. RES. CODE §§ 21000-21177 (West 1986 & Supp. 1989).

271. Citizens for Non-Toxic Pest Control v. California Dep't of Food and Agric., 187 Cal. App. 3d 1575, 232 Cal. Rptr. 729 (1986).

272. R. OELHAF, ORGANIC AGRICULTURE (1978).

273. CAL. HEALTH & SAFETY CODE § 26569.11(a)(1) (West 1984).

274. *Id.* § 26569.11(a)(2).

275. Robinson, *supra* note 267, at 1318-23.

276. *Id.* at 1326-30.

277. Citizens for Non-Toxic Pest Control v. California Dep't of Food & Agric., No. 75602 (Humboldt County Super. Ct. filed July 25, 1985).

278. Citizens for Non-Toxic Pest Control v. California Dep't of Food & Agric., 187 Cal. App. 3d 1575, 1583-89, 232 Cal. Rptr. 729, 732-34 (1986).

279. CAL. FOOD & AGRIC. CODE §§ 5051-5064 (West 1986 & Supp. 1989).

any state agency acting under authority of Divisions 4 (commencing with Section 5001) and 5 (commencing with Section 9101) of the Food and Agriculture Code in eradicating a plant or animal pest."[280] This act passed five days after the trial court ruled in favor of the *Citizens For Non-Toxic Pest Control* plaintiffs.[281] The court of appeal commented on this amendment. It found that when the CDFA "failed to proceed in the manner required by law a prejudicial abuse of discretion was established."[282]

The appellate court also struck down the exemption from the CEQA and ordered the CDFA to prepare an environmental impact review (EIR) before proceeding with the eradication.[283] The court noted that the EIR is intended to do more than provide the public with detailed analysis of the likely effects of a project on the environment and its alternatives.[284] Another court noted that an EIR

> also demonstrates to an apprehensive citizenry that the responsible public agency has considered the ecological implications of its action and correspondingly makes elected and appointed officials accountable for their environmental values. CDFA's attempt to embark on a seven-year multimillion-dollar pest eradication and control project absent any compliance with CEQA other than its alleged use of a properly registered pesticide served none of these salutary purposes.[285]

The California legislature again amended the law governing eradication efforts, first in 1986 and then in 1987. This time, changes were made regarding pest control and eradication challenges.[286] The amendment lengthened the notification period for challenges to a director's decision from thirty to forty-five days.[287] More important is the requirement that "[t]he decision of the director shall include written findings of fact as to each element of the decision including use or non-use of the nonpesticide alternatives."[288]

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280. CAL. PUB. RES. CODE § 21080.5(k) (West 1986 & Supp. 1989). The California legislature amended § 21080.5 in 1986 and 1987. 1986 Cal. Legis. Serv. No. 2 at 39-42; 1987 Cal. Legis. Serv. No. 11 at 521-26 (West). The 1987 revision deletes subsection (k) as quoted, effective Jan. 1, 1991.

281. *See* 1985 Cal. Stat. 4404

282. *Citizens for Non-Toxic Pest Control*, 187 Cal. App. 3d at 1585, 232 Cal. Rptr. at 734.

283. *Id.* at 1588-89, 232 Cal. Rptr. at 736.

284. Sutter Sensible Planning, Inc. v. Sutter County Bd., 122 Cal. App. 3d 813, 176 Cal. Rptr. 342 (1981).

285. *Citizens for Non-Toxic Pest Control*, 187 Cal. App. 3d at 1588, 323 Cal. Rptr. at 736.

286. CAL. PUB. RES. CODE § 21080.5 (West 1988).

287. CAL. FOOD & AGRIC. CODE § 5051 (West 1988).

288. *Id.*

If the medfly crisis expanded the state government's role in crop protection, and preempted local government restrictions, the AMEP drew the limits on government power. The AMEP shows that the state must use due process in respecting the property rights of farmers injured by pest control activities. Public agencies are also responsible for managing the ecology, and can no longer define pest control objectives as protecting the economic interest of only one segment of society.

The role of the public sector became even more complicated by the passage of the Safe Drinking Water and Toxic Enforcement Act of 1986.[289] This act states that "[n]o person in the course of doing business shall knowingly discharge or release a chemical known to the state to cause cancer or reproductive toxicity into water or onto or into land where such chemical passes or probably will pass into any source of drinking water."[290] This may serve to encourage government support of biological and cultural alternatives to chemical uses which would threaten to contaminate drinking water with carcinogens. However, the act currently exempts "any city, county, or district or any department or agency thereof or the state or any department or agency thereof."[291] This clause may allow the government to shield private parties from liability by performing chemical control functions that the private sector could not afford to undertake.

X.
CONCLUSIONS

Changes in public management of pests in California reflected changes in technology, property rights and values. Collective management of pests was never conflict-free. However, as farmers became able to practice pest control on an individual basis, cooperation became less important. Public efforts at pest control focused primarily upon eradication, and relied heavily on chemical control technology.

There was a long period where agricultural commissioners required farmers to control pests on their own property. But before county agricultural commissioners were responsible for pesticide regulation, they were first responsible for crop protection. Commissioners therefore used the newest technology in pest control when

289. CAL. HEALTH & SAFETY CODE §§ 25249.5-25249.13 (West Supp. 1988) (added by Initiative Measure Proposition 65, Nov. 4, 1986.

290. *Id* § 25249.5.

291. *Id* § 25249.11(b).

they carried out their duty to abate pests. The use of new technology caused four dramatic shifts in public involvement with pest control:

1. Pest management became privatized as government became less actively involved in controlling pests and less responsible for the delivery of pest control technology.
2. Government relied more on administrative law and less on common law as pesticides, rather than pests, became the object of governmental action.
3. The power to regulate pest control technology became more centralized in higher levels of government, thereby decreasing local discretion.
4. The public interest became less identified with the private interests of agriculture.

Crop protection was long equated with the common good. Public crop protection programs evolved along with technology to control pests. As the risks of this technology became more apparent and spread beyond the agricultural sector, however, opponents of pest eradication programs emerged to challenge the programs' legal foundations. At the same time, economic, social, and political changes diminished the importance of agriculture. The growing urban population was concerned with a quality of life beyond the production of goods. Moreover, opposition to eradication programs emerged within the agricultural community itself from organic farmers practicing an alternative technology.

As the ecological problems associated with pesticides become more severe, there is a greater need to coordinate crop protection with environmental protection. The two goals need not conflict, but reconciling them does not present an easy task. The Imperial Valley infestations, the medfly crisis, and the apple maggot infestation exemplify how modern efforts to balance economic and environmental interests can create conflicts. These conflicts take many different forms: state/local, federal/state, farmer/environmentalist, grower/grower. They go well beyond the individual versus public interests that marked early, collective crop protection efforts.

Even as environmental concerns, economic conflicts, and jurisdictional disputes redefine the public interest in pest control, however, one must realize that the primary objective of pest control is crop protection. To meet this objective, policy makers ultimately must consider the effects of policy on agricultural ecology, and select sustainable technology.