

Hooked on Poison

Pesticide Use in California, 1991–1998

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Executive Summary

California Pesticide Use Remains High

Analysis of state pesticide use data shows that between 1991 and 1998 more than 1.5 *billion* pounds of pesticides were applied in California. During this eight-year period, Californians significantly increased their reliance on pesticides, with reported use up 40%, an average increase of 7.2 million pounds per year (see Figure A).

After a massive increase in pesticide use in the early to mid-1990s, newly released pesticide use data show that the overall pattern is one of continued high use of pesticides, with most uses remaining at or near all-time highs. There is only marginal evidence of a shift towards more sustainable pest control practices, with the overall pattern one of continued high use of pesticides.

There is good reason to be concerned about the continued annual use of hundreds of millions of pounds of chemicals on our farmlands, roadsides, forests, and homes. Research over the last 20 years has demonstrated that pesticides can cause cancer, sterility, birth defects, and damage to the nervous system. The steady increase in the use of carcinogenic pesticides—up 127% between 1991 and 1998—is especially disturbing in light of the concurrent increase in age-adjusted incidence of cancers associated with pesticide exposure—childhood leukemia, brain tumors, non-Hodgkin's lymphoma, testicular cancer, and some forms of breast cancer.

In an era of progress in protecting air and water from industrial emissions and cleaning up industrial hazardous waste sites, such skyrocketing trends in pesticide use contradict our nation's stated goal of reducing toxic emissions. Lack of leadership in promoting protection of public health and the environment is evident at both the state and national levels. In particular, there is no concrete commitment to pesticide use reduction either nationally or in California. Both the U.S.

Total Reported Pesticide Sales and Use in California, 1991–1998

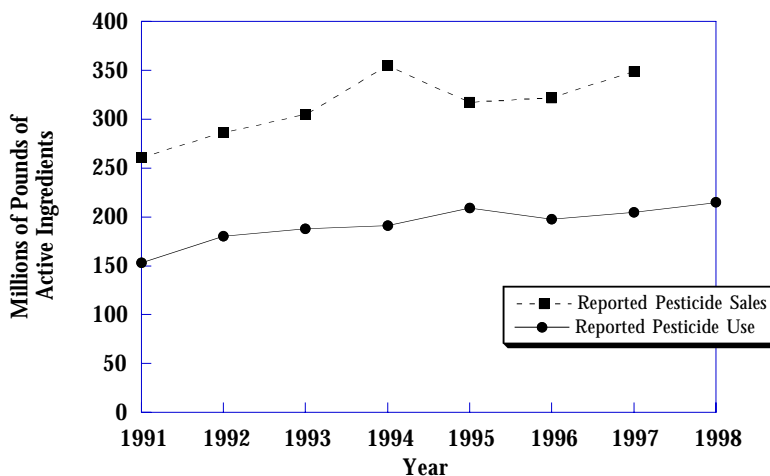


Figure A. Total reported pesticide use in California increased on average 7.2 million pounds of active ingredients per year between 1991 and 1998. Pesticide sales generally paralleled use, increasing on average 12.4 million pounds per year. The difference between reported pesticide sales and the reported pesticide use shows that a significant fraction of pesticide use in California goes unreported.

Source: DPR Pesticide Use and Sales Data, 1991–1998.

Environmental Protection Agency (U.S. EPA) and California Department of Pesticide Regulation (DPR) often respond to the fact of high pesticide use by asserting that use does not correspond with exposure and that pesticides can be used safely if the label directions are followed. This line of thinking has led to increasingly complex label directions that specify more and more detailed restrictions on technical application practices and allowable conditions of application. Such restrictions assume perfect compliance from pesticide users and no human error, and that the precautions on the label are adequately protective in the first place. In practice, restrictions are often far too complex to be enforceable and do not take into account the chronic effects of pesticides on human and environmental health. More importantly, ample evidence shows that these restrictions are ineffective for prevention of farmworker poisonings, drift of toxic chemicals into homes and schools, and contamination of groundwater and surface waters. There is a simple solution. More than any restriction, reduction in pesticide use and phase-out of the most dangerous pesticides would result in the greatest reduction in exposures to pesticides in air, water, and food.

Use of the Most Toxic Pesticides Remains High

Approximately one-third of the total pounds of pesticides used in California in any given year are known to be particularly toxic to humans, whether as immediate (acute) poisons, chronic toxins, or both. In this report, we use the term California (CA) Bad Actor pesticides to designate the most toxic pesticides that meet both of the following criteria: 1) they are registered for use in California, and 2) they are either acute poisons, known or probable carcinogens, neurotoxins, reproductive or developmental toxicants, or are known to have contaminated Cali-

fornia groundwater. Figure B summarizes trends in use for these categories of pesticides.

- **All CA Bad Actor Pesticides:** Total reported use of all CA Bad Actor pesticides increased sharply between 1991 and 1995, from 50.4 million pounds to an all-time high of 72.5 million pounds, a 44% increase. Between 1995 and 1998, total reported Bad Actor use declined approximately 12% from this peak, to 63.9 million pounds. The decline was driven primarily by reduction in use of the soil fumigants methyl bromide and metam sodium on some crops, in part because of public health concerns and regulatory pressures.
- **Carcinogens:** Reported use of carcinogenic pesticides increased 127% between 1991 and 1998, from 12.1 million pounds to 27.6 million pounds, an average increase of

CA Bad Actor pesticides are California-registered pesticides that are acute poisons, carcinogens, reproductive or developmental toxicants, neurotoxins, or groundwater contaminants.

Trends in the Use of Different Categories of CA Bad Actor Pesticides, 1991–1998

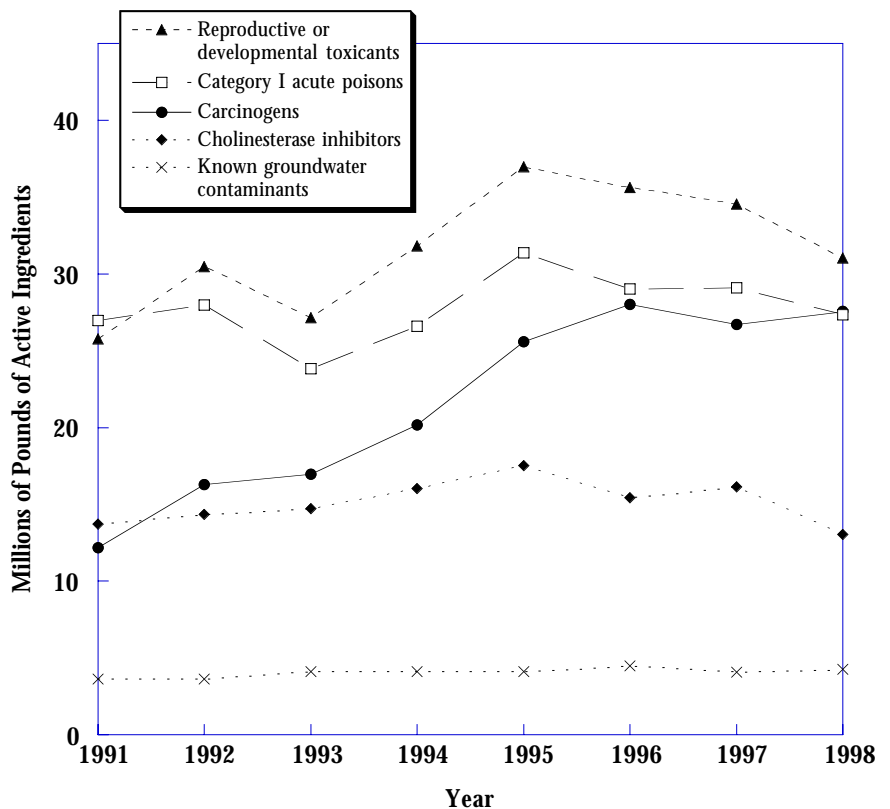


Figure B. Overall use of CA Bad Actor pesticides increased significantly from 1991 to 1995, but declined steadily after 1995. Use of carcinogens and groundwater-contaminating pesticides continued to increase between 1995 and 1998; other categories of CA Bad Actor pesticides remained stable or showed a slight decrease.

Source: DPR Pesticide Use Reporting data, 1991–1998.

2.4 million pounds per year. While use of carcinogens has remained relatively constant since 1996, it remains within 0.5 million pounds of the highest level ever reported. The highest-use pesticides in this category are the soil fumigants metam sodium and Telone® (1,3-dichloropropene). Telone® is increasingly used as a replacement for methyl bromide and metam sodium in spite of the fact that its registration was suspended by DPR between 1990 and 1994 because it was deemed too hazardous to use. Use of Telone® soared to 2.8 million pounds in 1998, up from 2,000 pounds in 1994.

- **Reproductive and Developmental Toxicants:** Reported use of pesticides that are reproductive and developmental toxicants, causing sterility, birth defects, or impaired childhood development, show a two-phase trend, with reported use up 43% between 1991 and 1995, from 25.8 million pounds to a high of 37.0 million pounds. From 1995 to 1998, use dropped by 16% to 31.0 million pounds in 1998. The decline over the last few years is dominated by a decrease in the use of the soil fumigants methyl bromide and metam sodium, which account for 90% of pesticide use in this category.
- **Groundwater Contaminants:** Reported use of known groundwater contaminants increased steadily, up 18% between 1991 and 1998, from 3.6 million pounds to 4.3 million pounds. This trend is dominated by increases in the use of the herbicides diuron (also a carcinogen) and norflurazon and the insecticide aldicarb (also an acutely toxic pesticide and a neurotoxin).
- **Acutely Toxic Pesticides:** Reported use of highly toxic pesticides that are acute systemic poisons remained relatively constant between 1991 and 1998, fluctuating around an average of 27.8 million pounds annually and peaking in 1995 at 31.4 million pounds. The highest-use pesticides in this category are the fumigants methyl bromide, chloropicrin, and sulfur fluoride.
- **Neurotoxic Pesticides:** Neurotoxic pesticides—organophosphates and carbamates—exhibit a two-phase trend, with re-

ported use peaking at 17.5 million pounds in 1995, then decreasing to 13.0 million pounds in 1998, the lowest amount reported since comprehensive pesticide use reporting was instituted in 1990. Overall use of these pesticides decreased 5% between 1991 and 1998, representing a reduction in the use of nearly all pesticides in this category. Reduction in use of these pesticides is likely due to a combination of factors, predominantly the U.S. EPA's new scrutiny of them under the federal Food Quality Protection Act (FQPA) of 1996. Reassessment of all of these pesticides is in progress, causing growers to consider alternatives more seriously.

While the CA Bad Actor pesticides are the most toxic, the remaining pesticides are not benign; in fact, the widely used fungicide sulfur (78 million pounds used in 1998) is responsible for the largest number of reported farmworker poisonings. Petroleum oils, used in large amounts as insecticides (22 million pounds in 1998), are major air pollutants in California. The CA Bad Actor list also does not include endocrine-disrupting pesticides. Although there is ample evidence demonstrating the adverse reproductive and developmental effects of these pesticides in humans and animals, there is no official designation of a pesticide as an endocrine disruptor because the testing methodology is only now being developed and implemented for all pesticides.

Intensity of Pesticide Use on Cropland Is Increasing

Between 1991 and 1998, the total pounds of pesticides used on California cropland increased 51%, from 129 million pounds of active ingredients to 195 million pounds. During this same time period, the number of acres planted remained approximately constant. The result was a dramatic increase in pesticide intensity—pounds of active ingredients applied per acre—up 60%, from 14.4 to 23.0 pounds per acre between 1991 and 1998. Major crops with the highest intensity for total pesticide use are: strawberries, dates, sweet potatoes, pears, and lemons.

Crops with the highest intensity of CA Bad Actor pesticide use are strawberries, sweet potatoes, carrots, brussels sprouts, potatoes, and watermelons.

Intensity of CA Bad Actor pesticide use increased 54% from an average of 4.1 to 6.3 pounds per acre of planted cropland between 1991 and 1998, with a peak of 7.0 pounds per acre in 1995. The largest increase in CA Bad Actor intensity between 1991 and 1998 was for vegetables and melons as a group (see Figure C). Crops with the highest intensity of CA Bad Actor pesticide use are strawberries, sweet potatoes, carrots, brussels sprouts, potatoes, and watermelons.

While overall pesticide use remained relatively high between 1995 and 1998, significant progress was made in reduction of CA Bad Actor pesticide intensity on some crops. Passage of the federal FQPA, increasing concerns about water quality, and the very real threat of losing certain pesticides prompted some growers to seriously investigate alternative pest control measures. With assistance from DPR, University of California Integrated Pest Management (IPM) and Sustainable Agriculture Research and Education Program (UC SAREP), commodity boards, and the Community Alliance with Family Farmers (CAFF), concerted efforts to reduce toxic pesticide use have been made for most stone fruits, grapes, and a few vegetable crops.

Such instances show that it is possible to reduce toxic pesticide use if resources are directed towards research and support for a transition towards more ecologically based pest control measures. However, this is not necessarily enough to bring about substantial change. For example, much research has been done to develop biocontrol methods for pests in pear orchards, yet pesticide use data show a nearly linear increase in use of toxic pesticides on pears between 1991 and 1998. This suggests that grower adoption of biocontrol methods is low. Mandated pesticide use reduction must accompany grower support in order to guarantee reduced pesticide use.

Non-agricultural Pesticide Use Remains High

Use of pesticides outside of agriculture is extremely difficult to estimate. Only 7% of reported pesticide use falls in this category, but pesticide sales data indicate that many more

Average Intensity of CA Bad Actor Pesticide Use in California by Crop Category, 1991–1998

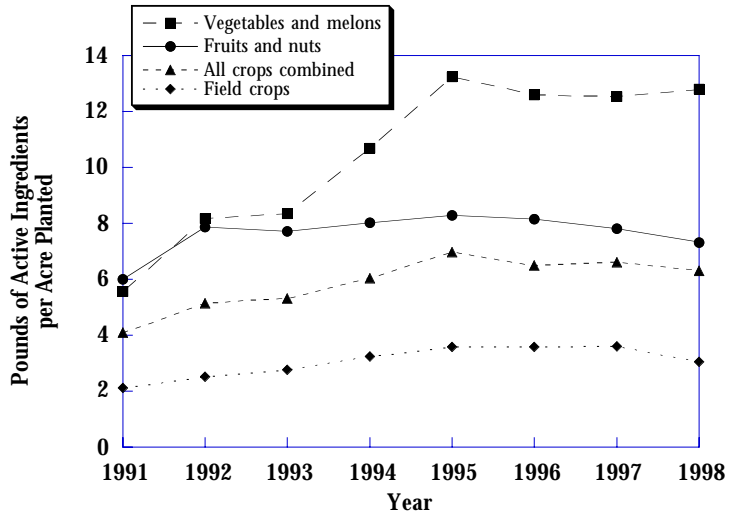


Figure C. Pesticide intensity on all crops increased between 1991 and 1995 with vegetables and melons posting the most dramatic increases. The increase in intensity observed for vegetables and melons was primarily due to increased use of soil fumigants on carrots, tomatoes, onions and melons.

pounds of pesticides are applied but not reported (see Figure A). This gross underestimate is the result of non-reporting of consumer use (estimated to be about 20% of total use) and some institutional and manufacturing uses—for example by schools and hospitals. Non-agricultural applications of pesticides are of particular concern because they are applied in close proximity to where large numbers of people live and work.

The largest reported amounts of pesticides applied in non-agricultural settings are used for structural pest control (termites, ants, roaches, wood rot, etc.), on rights-of-way, and for landscaping. For structural pest control, 62% of the 5.9 million pounds of pesticide active ingredients used in 1998 were CA Bad Actors, most of them toxic fumigants. Thirty-five percent of the 3.6 million pounds of pesticide active ingredients used for roadside spraying in 1998 were CA Bad Actor pesticides, many of which are herbicides known to contaminate groundwater. Twenty-eight percent of the 1.4 million pounds of pesticide active ingredients used for landscape maintenance in 1998 were CA Bad Actor pesticides, predominantly carcinogenic fungicides, herbicides, and fumigants.

Mandated pesticide use reduction must accompany grower support in order to guarantee reduced pesticide use.

County and Regional Pesticide Use in California

A handful of counties are responsible for most of the state's reported pesticide use (see Appendix 4 and maps on pages 34-35). Not surprisingly, the counties with the heaviest reported pesticide use are those in the San Joaquin Valley, where intensive farming is a primary land use. The eight counties in the San Joaquin Valley account for 60% of total reported pesticide use in California. Counties in this region also account for 47% of CA Bad Actor pesticide use, with just two counties, Kern and Fresno, reporting more than 25% of all CA Bad Actor pesticide use in California. Pesticide use is also high in the South Coast, Central Coast, and Southeast Interior regions of the state.

Trends in use of CA Bad Actor pesticides vary considerably by county and region, reflecting crops grown and the level of urbanization in a particular area. Over the 1991–1998 time period, 12 counties reported a significant increase in CA Bad Actor pesticide use, four reported a significant decrease, and the remainder showed no statistically significant trends over this time period. In counties where CA Bad Actor pesticide use was increasing, use was dominated by agricultural applications. Counties with a significant decrease over the same time period reported primarily urban pesticide uses.

Why Pesticide Use Remains High

The primary reasons for continued high use of pesticides are structural causes such as economic factors, marketing standards, and institutional support for present practices, all of which impede grower transitions to more ecologically based pest management practices. There are many costs associated with transitioning that are major economic deterrents to change. In addition, the fact that pesticide users do not have to pay for environmental and health damage caused by their use of pesticides provides no incentive for farmers to reduce use.

Pest management practices could change, but not without institutional support for research into alternatives and extension outreach to

growers. At present, pesticide-intensive farm practices receive extensive support, including, but not limited to free agricultural advice and subsidized research into chemical solutions. Funding for ecologically based pest management research and extension support to help growers incorporate these methods into their farming practices is miniscule relative to that for conventional methods of farming.

Policy Recommendations

Mandate Pesticide Use Reduction

While the analysis presented in this report documents limited progress in reducing use of hazardous pesticides, California still lacks a guiding strategy to assist growers and consumers in transitioning their pest control practices to less toxic, ecologically sound approaches. For change to occur, both DPR and the U.S. EPA must take a proactive stance in advancing pest management into a new era of sustainability. This includes setting quantifiable interim and longer-term pesticide use reduction targets, then using these targets to measure progress toward the larger goal of sustainable pest management. In this context, immediate efforts should be made to:

- **Set phaseout goals for all CA Bad Actor pesticides.** Reduction efforts should focus on the most toxic pesticides, including carcinogens, reproductive and developmental toxicants, acute poisons, neurotoxic cholinesterase-inhibiting pesticides, and groundwater contaminants, with the stated goal of eliminating their use entirely.
- **Ban use of soil fumigants.** The soil fumigants metam sodium, methyl bromide, and Telone® are a particular problem because they are extremely toxic and used in large quantities. (In 1998, these pesticides accounted for 56% of CA Bad Actor pesticide use.) Fumigants routinely drift off-site, including into nearby homes and schools. Because there is no way to use these chemicals safely, the practice of soil fumigation should be rapidly phased out and replaced with biologically intensive, least-toxic soil management practices.
- **Target crops with high pesticide intensity for mandatory use reduction programs.** Crops with high acreage and high

Table A:
Top Ten California
Counties for CA
Bad Actor
Pesticide Use
in 1998

Rank	CA Bad Actor Pesticide Use (millions of pounds)
1	Kern 8.4
2	Fresno 8.1
3	Monterey 5.2
4	Imperial 5.1
5	Merced 3.3
6	Ventura 2.9
7	Tulare 2.8
8	Santa Barbara 2.3
9	Stanislaus 2.2
10	San Joaquin 2.1

Source: DPR PUR data, 1991–1998.

or increasing intensity of pesticide use are logical priorities for transitioning to least-toxic, ecologically-based pest management systems. Carrots, strawberries, tomatoes, cotton and almonds meet these criteria and should be evaluated immediately for short, mid- and longer-term pesticide use reduction goals.

- **Use the Pesticide Use Reporting (PUR) system to verify progress towards use reduction targets.** An ounce of prevention is worth a pound of cure, and the surest approach to risk reduction is continual reductions in both the amount and intensity of pesticide use by crop, by geographic region, and by ecosystem. Such reductions are easily quantifiable in California, using the state PUR system.

Change the Economic Equation and Increase Support for Alternatives
The best way to ensure a transition away from toxic pesticides is to provide incentives and support for reducing use, as well as strong disincentives for continued reliance on chemically-based pest management practices. In particular, state and federal agencies should work together to:

- **Internalize the full costs of pesticides.** Pesticide manufacturers and users should pay the full costs associated with the adverse health and environmental effects of pesticides. Methods for achieving this should include increasing registration fees and sales tax (Mill Tax) on all CA Bad Actor pesticides by an amount sufficient to influence economic decision-making, and instituting fees for restricted materials use permits. Revenues generated should be used to support adoption of biologically based IPM and transition to organic production systems in priority crops and uses.
- **Provide financial support for growers to transition to ecologically based pest management.** The transition to ecologically based pest management involves economic risks and underscores the need for greater extension support to help pesticide users learn new practices, including increasing UC Extension field support. Subsidies for transitions to sustainable pest management practices should be made available

through competitive grants and other means.

- **Increase research funding for alternative approaches to pest management.** The miniscule amounts of funding for ecologically-based IPM, organic agriculture and related purposes are not sufficient to support a broad-based transition to more sustainable pest control throughout California. The state and USDA should increase funding for research and development of alternative pest management techniques. Research and funding should be coordinated among state, federal and non-profit agencies to optimize progress towards stated pesticide use reduction goals.

Develop and Implement Consumer Education Strategies

- **Ensure the right-to-know.** Growers, farmworkers, and consumers have the right to know about the hazards associated with all ingredients. The U.S. EPA and DPR should require pesticide manufacturers and registrants to fully disclose all active and inert ingredients, and any adverse health or environmental impacts associated with them on their product labels.
- **Improve consumer access to information on alternative methods of pest control.** At present, consumers with pest problems are deluged with an vast array of information on chemical products and approaches, while information on least-toxic alternatives remains difficult to find. DPR must strongly promote least-toxic methods of pest control, and provide educational materials to help consumers make least-toxic choices.

Improve DPR's Pesticide Use Reporting System

The Pesticide Use Reporting system is a powerful tool for tracking pesticide use and should be expanded to include more information on pests, crops, and inert ingredients, as well as information on consumer use of pesticides. A Web-based data entry system should be developed and implemented to ensure data accuracy, and data categories should be harmonized with the U.S. EPA label database and California Department of Food and Agriculture (CDFA) categories.

More than any restriction, reduction in pesticide use and phaseout of the most dangerous pesticides would result in the greatest reduction in exposures to pesticides in air, water, and food.