Summary of
Pesticide Use Report Data
2010

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For information on obtaining electronic data files, see Page iii.
This report is also available on DPR's Web site <www.cdpr.ca.gov>.
If you have questions concerning this report, call 916-445-3887.

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How to Access the Summary of Pesticide Use Report Data

The *Summary of Pesticide Use Report Data* indexed by chemical or commodity reports for years 1989-2010 can be found on DPR's Web site at <www.cdpr.ca.gov>. The *Summary of Pesticide Use Report Data* is available in two formats. One report is indexed by chemical and lists the amount of each pesticide used, the commodity on which it was used, the number of agricultural applications, and the acres/units treated. The second report is indexed by commodity and lists the chemicals used, the number of agricultural applications, amount of pesticides used, and the acres/units treated.

The *Annual Pesticide Use Report Data* (the complete database of reported pesticide applications for 1990-2010) are available on CD. The files are in text (comma-delimited) format.

The complete Pesticide Use Report database (Zip files by year, 1974 to current year) may be downloaded from DPR's FTP site at <ftp://pestreg.cdpr.ca.gov/pub/outgoing/pur_archives/>.

Questions regarding the *Summary of Pesticide Use Report Data* should be directed to the Department of Pesticide Regulation, Pest Management and Licensing Branch, P.O. Box 4015, Sacramento, California 95812-4015, telephone (916) 445-3887, or you may request copies of the data by contacting <mwilliams@cdpr.ca.gov>.

1 Introduction

Development and Implementation of the Pesticide Use Reporting System

The *2010 Summary of Pesticide Use Report Data* includes information about agricultural pesticide applications and other selected pesticide uses in California. The data were gathered in accordance with full use reporting requirements, which began in 1990. California was the first state to require reporting of all agricultural pesticide use, including amounts applied and types of crops or places (e.g., structures, roadsides) treated. Commercial applications in urban settings—including structural fumigation, pest control, and turf applications—must also be reported. Pesticide use reporting is a critical component of the Department of Pesticide Regulation's (DPR's) continuous evaluation of registered pesticide products, which is the process DPR uses to maintain its awareness of potential risks of pesticides to public health and the environment.

Types of Pesticide Applications Reported

Partial reporting of agricultural pesticide use has been in place in California since at least the 1950s. Beginning in 1970, anyone who used restricted materials was required to file a pesticide use report with the county agricultural commissioner. The criteria established to designate a pesticide as a restricted material include potential hazard to:

- Public health.
- Farmworkers.
- Domestic animals.
- Honeybees.
- The environment.
- Wildlife.
- Other crops.

With certain exceptions, restricted materials may be possessed or used only by, or under the supervision of, licensed or certified persons, and only in accordance with an annual permit issued by a county agricultural commissioner.

In addition, the State required commercial pest control businesses[1] to report all pesticides used, whether restricted or nonrestricted. These reports included information about the pesticide applied, when and where the application was made, and the crop involved if the application was in agriculture. The reports were entered into a computerized database and summarized by chemical and crop in annual reports.

With implementation of full use reporting in 1990, the following pesticide uses are required to be reported to the commissioner who, in turn, reports the data to DPR:

- For the production of any agricultural commodity, except livestock.
- For the treatment of postharvest agricultural commodities.
- For landscape maintenance in parks, golf courses, and cemeteries.
- For roadside and railroad rights-of-way.
- For poultry and fish production.
- Any application of a restricted material.
- Any application of a pesticide with the potential to pollute ground water [listed in section 6800(b) of the Title 3 California Code of Regulations, Division 6, Chapter 4, Subchapter 1, Article 1] when used outdoors in industrial and institutional settings.
- Any application by a licensed pest control business.

The primary exceptions to the use reporting requirements are home and garden use and most industrial and institutional uses.

How Pesticide Data Are Used

DPR undertook the expansion of use reporting primarily in response to concerns of many individuals and groups, including government officials, scientists, farmers, legislators, and public interest groups. DPR also recognized that full use reporting records would be an invaluable historical archive that DPR could rely on when performing assessments related to its continuous evaluation of pesticide products.

[1] Pest control businesses include those in the business of applying pesticides, such as agricultural applicators, structural fumigators, and professional gardeners.

The following are examples of how pesticide use reporting data are used in risk assessment; the protection of workers, public health, endangered species, and water and air quality; pest management assessments; and processor and retailer requirements.

Risk Assessment

Without information on actual pesticide use, regulatory agencies conducting risk assessment assume all planted crop acreage is treated with many pesticides, even though most crops are treated with just a few chemicals. If the assumptions used by regulatory agencies are incorrect, regulators could make judgments on pesticide risks that are too cautious by several orders of magnitude, reducing the credibility of risk management decisions. The use report data, on the other hand, provides actual use data so DPR can better assess risk and make more realistic risk management decisions.

After the passage of the federal Food Quality Protection Act (FQPA) in 1996, complete pesticide use data became even more important to commodity groups in California and to the U.S. Environmental Protection Agency (U.S. EPA). FQPA contained a new food safety standard against which all pesticide tolerances must be measured. The increased interest in the state's pesticide use data, especially for calculating percent crop treated, came at a time when DPR was increasing the efficiency with which it produced its annual report. DPR was able to provide up-to-date use data and summaries to commodity groups, University of California specialists, U.S. EPA programs, and other interested parties as they developed the necessary information for the reassessment of existing tolerances.

Worker Health and Safety

As part of DPR's risk assessment process, scientists in the Worker Health and Safety Branch (WHS) assess potential exposure and associated health impacts of pesticides to individuals involved with the preparation and application of pesticides (referred to as handlers), and individuals entering treated areas (referred to as reentry workers or individuals). These assessments also include individuals who may not be involved with the use of the pesticide or work in the treated area, but may come in contact with pesticides as the result of proximity to their use. These individuals are referred to as bystanders. The PUR helps the scientists to identify current and historical use patterns and allows them to focus their efforts on specific exposure scenarios in specific locations. Over the years, the PUR has proven to be essential to WHS scientists when assessing potential for acute (short-term) exposures as well as chronic (repeated or continual) exposures. These assessments are documented in many WHS publications, including those that estimate exposure of persons in California to methyl bromide, metam sodium, endosulfan, and various organophosphate and carbamate insecticides.

Public Health

The expanded reporting system provides DPR, the State Department of Public Health, and the Office of Environmental Health Hazard Assessment with more complete pesticide use data for evaluating possible human illness clusters in epidemiological studies.

Endangered Species

DPR works with the county agricultural commissioners to combine site-specific use report data with geographic information system-based data on locations of endangered species. The resulting database helps commissioners resolve potential conflicts over pesticide use where endangered species may occur. DPR and the commissioners can also examine patterns of pesticide use near habitats to determine the potential impact of proposed use limitations. With location-specific data on pesticide use, restrictions on use can be better designed to protect endangered species while still allowing necessary pest control.

Water Quality

Since 1983, DPR has had a program to work with the rice growing industry and the Central Valley Regional Water Quality Control Board to reduce contamination of surface water by rice pesticides. Using PUR data to help in pinpointing specific agricultural practices, more precise alternative use recommendations can be made to assure protection of surface water.

The Pesticide Contamination Prevention Act requires site-specific records to help track pesticide use in areas known to be susceptible to ground water contamination. Determinations can also be made from the records on whether a contaminated well is physically associated with agricultural practices. These records also provide data to help researchers determine why certain soil types are more prone to ground water contamination.

DPR's Surface Water Protection Program reviews PUR data and water quality monitoring data to identify potential sources (e.g., specific crops) of pesticide contamination. PUR data also help guide investigations of application practices, application timing, and local cultural practices to identify factors that contribute to the contamination. Similarly, they help DPR identify mitigation measures and alternatives that may pose lower risks to water quality. The Surface Water Protection Program also tracks use trends of products containing relatively new active ingredients to determine the best locations and times to monitor surface waters that may be affected by the use of these products.

Air Quality

Many pesticide products contain volatile organic compounds (VOCs) that contribute to the formation of smog. DPR worked with the state Air Resources Board to put together a State

Implementation Plan under the federal Clean Air Act to reduce emissions of all sources of VOCs, including pesticides, in nonattainment areas of the state. DPR's contribution to the plan included accurate data on the amount of VOCs contained in pesticides and the ability to inventory the use of those pesticides through pesticide use reporting.

Beginning in January 2008, regulations went into effect to reduce emissions of VOCs from fumigant pesticides. To help DPR keep track of these smog-producing emissions, PURs are used to monitor fumigant use and methods of fumigant application. This information is then used to compare with targeted emission reduction goals designed to improve air quality.

Pest Management

The Department uses the PUR database to understand patterns and changes in pest management practices. This information can be used to determine possible alternatives to pesticides that are subject to regulatory actions and to help determine possible impacts of different regulatory actions on pest management.

The PUR is used to help meet the needs of FQPA, which requires pesticide use information for determining the appropriateness of pesticide residue tolerances. As part of this process many commodity groups have created crop profiles, which include information on the pest management practices and available options, both chemical and nonchemical. Pesticide use data is critical to developing these lists of practices and options.

The PUR data have been used to support and assess grant projects for the Alliance grant program conducted by DPR to develop, demonstrate, and implement reduced-risk pest management strategies from 1995 to 2003. The PUR data have been used in several other projects that build on work conducted in the almond and stonefruit industries. In these and other projects, the PUR data are used to address regional pesticide use patterns and environmental problems such as water and air quality. The data are also used to better understand current changes in pesticide use.

DPR has published general analyses of statewide pesticide use patterns and trends. The first analysis covered the years 1991 to 1995, and the second more detailed analysis covered 1991 to 1996. These analyses identified high-use pesticides, the crops to which those pesticides were applied, trends in use, and the pesticides most responsible for changes in use. In addition, since 1997, the annual Summary of Pesticide Use Report Data include summary trends of pesticides in several different categories such as carcinogens, reproductive toxins, and ground water contaminants.

Processor and Retailer Requirements

Food processors, produce packers, and retailers often require farmers to submit a complete history of pesticide use on crops. DPR's use report form often satisfies this requirement.

2 Comments and Clarifications of Data

The following comments and points should be taken into consideration when analyzing data contained in this report.

Terminology

Number of agricultural applications - Number of applications of pesticide products made to production agriculture. More detailed information is given below under "Number of Applications."

Pounds applied - Number of pounds of an active ingredient.

Unit type - The amount listed in this column is one of the following:

A = Acreage
C = Cubic feet (of commodity treated)
K = Thousand cubic feet (of commodity treated)
P = Pounds (of commodity treated)
S = Square feet
T = Tons (of commodity treated)
U = Miscellaneous units (e.g., number of tractors, trees, tree holes, bins, etc.)

Commodity Codes

DPR's pesticide product label database is used to cross-check data entries to determine if the product reported is registered for use on the reported commodity. The DPR label database uses a crop coding system based on crop names used by the U.S. EPA to prepare official label language. However, this system caused some problems until DPR modified it in the early 1990s to account for U.S. EPA's grouping of certain crops under generic names. Problems occurred when the label language in the database called a crop by one name, and the use report used another. For example, a grower may have reported a pesticide use on "almonds," but the actual label on the pesticide product—coded into the database—stated the pesticide was to be used on "nuts." DPR modified the database to eliminate records being rejected as "errors" because the specific commodity listed on the use report is not on the label. A qualifier code is appended to the commodity code in the label database to designate a commodity not specifically listed on the label as a correct use. A qualifier code would be attached to the "almond" code when nuts are only listed on the label. This system greatly reduces the number of rejections.

Plants and commodities grown in greenhouse and nursery operations represented a challenge in use reporting because of their diversity. Six commodity groupings were suggested by industry in

1990 and incorporate terminology that are generally known and accepted. The six use reporting categories are: greenhouse-grown cut flowers or greens; outdoor-grown cut flowers or greens; greenhouse-grown plants in containers; outdoor-grown plants in container/field-grown plants; greenhouse-grown transplants/propagative material; and outdoor-grown transplants/propagative material.

Tomatoes and grapes were also separated into two categories because of public and processor interest in differentiating pesticide use. Tomatoes are assigned two codes to differentiate between fresh market and processing categories. One code was assigned to table grapes, which includes grapes grown for fresh market, raisins, canning, or juicing. A second code was assigned to wine grapes.

Unregistered Use

The report contains entries that reflect the use of a pesticide on a commodity for which the pesticide is not currently registered. This sometimes occurs because the original use report was in error, that is, either the pesticide or the commodity was inaccurately reported. DPR's computer program checks that the commodity is listed on the label, but nonetheless such errors appear in the PUR, possibly because of errors in the label database. Also, the validation program does not check whether the pesticide product was registered at the time of application. For example, parathion (ethyl parathion) is shown reported on crops after most uses were suspended in 1992. (These records are researched and corrected as time and resources allow.) DPR continues to implement methods that identify and reduce these types of reporting errors in future reports. Other instances may occur because by law, growers are sometimes allowed to use stock they have on hand of a pesticide product that has been withdrawn from the market by the manufacturer or suspended or canceled by regulatory authorities.

Other reporting "errors" may occur when a pesticide is applied directly to a site to control a particular pest, but is not applied directly to the crop in the field. A grower may use an herbicide to treat weeds on the edge of a field, a fumigant on bare soil prior to planting, or a rodenticide to treat rodent burrows. For example, reporting the use of the herbicide glyphosate on tomatoes—when it was actually applied to bare soil prior to planting the tomatoes—could be perceived to be an error. Although technically incorrect, recording the data as if the application were made directly to the commodity provides valuable crop usage information for DPR's regulatory program.

Adjuvants

Data on spray adjuvants (including emulsifiers, wetting agents, foam suppressants, and other efficacy enhancers), not reported prior to full use reporting, are now included. Examples of these types of chemicals include the "alkyls" and some petroleum distillates. (Adjuvants are exempt from federal registration requirements, but must be registered as pesticides in California.)

Zero Pounds Applied

There are a few entries in this report in which the total pounds applied for certain active ingredients are displayed as zero. This is because the chemical (active ingredient) made up a very small percentage of the formulated product that was used. When these products are applied in extremely low quantities, the resulting value of the active ingredient is too low to register an amount.

Acres Treated

The summary information in this annual report cannot be used to determine the total number of acres of a crop. However, it can be used to determine the cumulative acres treated. The problem is that the same field can be treated more than once in a year with the same active ingredient. A similar problem occurs when the product used contains more than one active ingredient. (In any pesticide product, the active ingredient is the component that kills, or otherwise controls, target pests. A pesticide product is made up of one or more active ingredients, as well as one or more inert ingredients.) For example, if a 20-acre field is treated with a product that contains three different pesticide active ingredients, a use report is filed by the farmer correctly recording the application of a single pesticide product to 20 acres. However, in the summary tables, the three different active ingredients will each have recorded 20 acres treated. Adding these values results in a total of 60 acres as being treated instead of the 20 acres actually treated.

Number of Applications

The values for number of applications include only production agricultural applications. Applicators are required to submit one of two basic types of use reports, a production agricultural report or a monthly summary report. The production agricultural report must include information for each application. The monthly summary report, for all uses other than production agriculture, includes only monthly totals for all applications of pesticide product, site or commodity, and applicator. The total number of applications in the monthly summary reports is not consistently given so they are no longer included in the totals. In the annual PUR reports before 1997, each monthly summary record was counted as one application.

In the annual summary report by commodity, the total number of applications given for each commodity may not equal the sum of all applications of each active ingredient on that commodity. As explained above, some pesticide products contain more than one active ingredient. If the number of applications were summed for each active ingredient in such a product, the total number of applications would be more than one, even though only one application of the product was made.

Errors

In any database with millions of records there will almost certainly be errors. Most of the values in the PUR are checked for errors and, where possible, corrections are made. However, some errors will remain. If a value is completely unknown the value will either be left blank for numeric fields or replaced with a "?" or "UNKNOWN" in character fields.

If a reported rate of use (pounds of pesticide per area treated) was so large it was probably in error, the rate was replaced with an estimated rate equal to the median rate of all applications of the pesticide product on the same crop or other site treated. Since the error could have been in the pounds reported or the area or unit treated, the value that was most unusual was the one replaced with an estimate. In some cases, a reasonable estimate could not be made, for example, if there were no or few other reported applications of the product on the site. In these cases, the pounds value was set equal to 0.

Pesticide rates were considered outliers if (1) they were higher than 200 pounds of active ingredient per acre (or greater than 1,000 pounds per acre for fumigants) or (2) they were 50 times larger than the median rate for all uses with the same pesticide product, crop treated, unit treated, and record type (that is, production agricultural or all other uses). Although these criteria identified as outliers less than one percent of the rate values in the PUR, some rates were so large that if included in the sums, they would have significantly affected total pounds applied of some pesticides.

3 Data Summary

This report is a summary of data submitted to DPR. Total pounds may change slightly due to ongoing error correction. The revised numbers, when available, will more accurately reflect the total pounds applied.

Pesticide Use in California

In 2010, there were 173 million pounds of pesticide active ingredients reported used in California. Annual use has varied from year to year since full use reporting was implemented in 1990. For example, reported pesticide use was 195 million pounds in 2005, 172 million pounds in 2007, and 158 million pounds in 2009.

Such variances are and will continue to be a normal occurrence. These fluctuations can be attributed to a variety of factors, including changes in planted acreage, crop plantings, pest pressures, and weather conditions. For example, extremely heavy rains result in excessive weeds, thus more pesticides may be used; drought conditions may result in fewer planted acres, thus less pesticide may be used.

In addition, it should be noted that the pounds of pesticides used and the number of applications are not necessarily accurate indicators of the extent of pesticide use or, conversely, the extent of use of reduced-risk pest management methods. For example, farmers may make a number of small-scale "spot" applications targeted at problem areas rather than one treatment of a large area. They may replace a more toxic pesticide used at one pound per acre with a less hazardous compound that must be applied at several pounds per acre. Either of these scenarios could increase the number of applications or amount of pounds used, respectively, without indicating an increased reliance on pesticides.

As in previous years, the greatest pesticide use occurred in California's San Joaquin Valley (Table 1). The four counties in this region with the highest use were Fresno, Kern, Tulare, and San Joaquin.

Table 2 breaks down the pounds of pesticide use by general use categories: production agriculture, post-harvest commodity fumigation, structural pest control, landscape maintenance, and all others.

Table 1: *Total pounds of pesticide active ingredients reported in each county and rank.*

	2009 Pesticide Use		2010 Pesticide Use	
County	Pounds Applied	Rank	Pounds Applied	Rank
Alameda	214,588	42	290,790	36
Alpine	362	58	633	58
Amador	66,657	45	66,813	44
Butte	2,462,411	15	1,945,444	22
Calaveras	27,195	48	38,078	47
Colusa	2,412,124	16	2,050,670	21
Contra Costa	414,036	35	460,029	33
Del Norte	231,234	41	288,120	37
El Dorado	108,061	43	136,723	42
Fresno	27,769,122	1	30,283,617	1
Glenn	2,123,913	21	2,117,453	19
Humboldt	28,567	47	31,021	49
Imperial	3,924,514	11	4,901,524	11
Inyo	5,292	56	1,285	57
Kern	21,997,483	2	25,782,086	2
Kings	6,760,478	7	6,743,291	9
Lake	367,113	36	419,249	34
Lassen	86,872	44	211,211	41
Los Angeles	2,239,089	18	2,112,663	20
Madera	7,698,784	6	9,129,884	5
Marin	63,136	46	64,475	46
Mariposa	9,791	52	5,875	54

Table 1: (continued) *Total pounds of pesticide active ingredients reported in each county and rank during 2009 and 2010.*

	2009 Pesticide Use		2010 Pesticide Use	
County	Pounds Applied	Rank	Pounds Applied	Rank
Mendocino	659,766	33	1,145,626	27
Merced	5,977,272	8	7,736,269	7
Modoc	452,166	34	78,327	43
Mono	8,433	53	5,544	55
Monterey	7,788,548	5	8,727,282	6
Napa	1,542,908	24	1,326,805	24
Nevada	16,364	51	10,252	53
Orange	1,231,316	26	1,305,617	25
Placer	282,905	38	232,967	40
Plumas	24,997	49	12,785	52
Riverside	1,787,288	22	2,339,739	18
Sacramento	3,084,565	13	3,622,828	13
San Benito	802,402	31	699,886	32
San Bernardino	320,969	37	397,317	35
San Diego	1,016,777	28	1,370,559	23
San Francisco	5,701	55	18,476	50
San Joaquin	8,490,520	4	9,421,118	4
San Luis Obispo	2,230,354	19	3,033,455	14
San Mateo	242,279	40	271,727	38
Santa Barbara	3,733,610	12	4,378,453	12
Santa Clara	679,712	32	1,131,360	28
Santa Cruz	1,585,810	23	1,028,209	30
Shasta	268,154	39	249,060	39
Sierra	1,031	57	1,413	56
Siskiyou	1,484,802	25	66,702	45
Solano	891,606	30	1,069,343	29
Sonoma	2,149,900	20	2,648,451	17
Stanislaus	5,548,517	10	5,961,801	10
Sutter	2,611,821	14	2,797,033	16
Tehama	900,387	29	794,216	31
Trinity	7,329	54	13,298	51
Tulare	14,074,834	3	13,148,843	3
Tuolumne	24,641	50	31,910	48
Ventura	5,782,307	9	6,991,486	8
Yolo	2,390,160	17	2,830,795	15
Yuba	1,057,863	27	1,233,935	26
Total	158,168,838		173,213,823	

Table 2: *Pounds of pesticide active ingredients, 1998 – 2010, by general use categories.*

Year	Production Agriculture	Post Harvest Fumigation	Structural Pest Control	Landscape Maintenance	All Others	Total Pounds
1998	200,987,040	1,707,576	5,930,341	1,396,288	6,832,143	216,853,389
1999	186,601,750	2,021,915	5,673,520	1,398,399	7,871,937	203,567,521
2000	173,317,852	2,127,442	5,186,945	1,403,069	6,780,506	188,815,814
2001	139,373,912	1,436,505	4,922,132	1,282,313	6,264,497	153,279,359
2002	154,706,580	1,804,360	5,468,749	1,440,444	6,688,364	170,108,497
2003	160,106,585	1,780,631	5,177,207	1,961,049	7,401,329	176,426,801
2004	164,896,626	1,860,036	5,119,190	1,600,303	6,972,732	180,448,886
2005	177,098,387	2,256,918	5,624,996	1,761,333	8,490,899	195,232,532
2006	167,794,066	2,106,010	5,273,674	2,269,899	10,310,559	187,754,207
2007	156,723,694	2,278,310	3,967,303	1,654,803	7,293,560	171,917,670
2008	149,376,019	2,540,186	3,224,551	1,577,266	7,124,028	163,842,050
2009	146,425,156	1,479,221	2,939,830	1,336,317	5,988,314	158,168,838
2010	158,135,912	2,136,270	3,699,579	1,710,564	7,531,499	173,213,823

Pesticide Sales in California

Reported pesticide applications are only a portion of the pesticides sold each year. Typically, about two-thirds of the pesticide active ingredients sold in a given year are not subject to use reporting. Examples of non-reported active ingredients are chlorine (used primarily for municipal water treatment) and home-use pesticide products.

Sales data for 2010 will be released in January 2012. There were 604 million pounds sold in 2009, 729 million pounds sold in 2008, 678 million pounds sold in 2007, and 743 million pounds in 2006. Prior-years data are posted on DPR’s web site at
<www.cdpr.ca.gov>, click “A - Z Index,” “Sales of pesticides.”

4 Trends in Use in Certain Pesticide Categories

Reported pesticide use in California in 2010 totaled 173 million pounds, an increase of 15 million pounds from 2009. Production agriculture, the major category of use subject to reporting requirements, accounted for most of the overall increase in use. Applications increased by 12 million pounds for production agriculture. Similarly, there was a 657,000-pound increase in post-harvest treatments, a 760,000-pound increase in structural pest control, a 374,000-pound increase in landscape maintenance, and 1.5 million-pound increase of other reported non-agricultural uses, which includes rights of way, vector control, research, and fumigation of nonfood and nonfeed materials such as lumber and furniture.

The active ingredients (AI) with the largest uses by pounds in 2010 were sulfur, petroleum and mineral oils, metam-sodium, 1,3-dichloropropene (1,3-D), and glyphosate. Sulfur was the most highly used non-adjuvant pesticide in 2010, both in pounds applied and acres treated. By pounds, sulfur accounted for 27 percent of all reported pesticide use. Sulfur is a natural fungicide favored by both conventional and organic farmers.

Most of the increase in reported pesticide use were from sulfur, which increased by 4.4 million pounds (10 percent increase). Other pesticides with increased use include 1,3-D (2.4 million-pound increase, 37 percent), metam-sodium (2.0 million-pound increase, 22 percent), glyphosate (1.5 million-pound increase, 20 percent), potassium n-methyl dithiocarbamate (also called metam-potassium) (728,000-pound increase, 18 percent), and kaolin (662,000-pound increase, 28 percent).

In contrast, some pesticides had decreased use. Non-adjuvant pesticides with the greatest decrease in pounds applied were methyl bromide (1.7 million-pound decrease, 31 percent), oxyfluorfen (385,000-pound decrease, 40 percent), maneb (287,000-pound decrease, 44 percent), propanil (146,000-pound decrease, 7 percent), propargite (87,000-pound decrease, 23 percent), and pendimethalin (85,000-pound decrease, 5 percent).

Major crops or sites that showed an overall increase in pesticide pounds applied from 2009 to 2010 include wine grape (4.1-million pound increase, 19 percent), carrots (2.9-million pound increase, 55 percent), cotton (1.6-million pound increase, 110 percent), almond (1.6-million pound increase, 9 percent), and table and raisin grape (1.2 million pound increase, 9 percent) (Table 3). Major crops or sites with decreased pounds applied include soil fumigation/pre-plant (1.2-million pound decrease, 32 percent), rice (967,000-pound decrease, 17 percent), processing tomatoes (738,000-pound decrease, 5.1 percent), alfalfa (652,000-pound decrease, 19 percent), peach and nectarine (564,000-pound decrease, 11 percent). The “soil fumigation/pre-plant” category refers to applications made to a field before a crop is planted. In most cases, a grower will report the crop to be planted, but in some cases they may not know what crop will be planted when the application is made.

Table 3: *The change in pounds of AI applied and acres planted or harvested and the percent change from 2009 to 2010 for the crops or sites with the greatest change in pounds applied.*

	Change in Use 2009–2010		Percent Change 2009–2010	
Crop Treated	Pounds	Acres	Pounds	Acres
Wine Grapes	4,109,761	4,000	19	1
Carrot	2,868,076	-4,500	55	-7
Cotton	1,611,317	116,000	110	61
Almond	1,611,305	15,000	9	2
Table and Raisin Grapes	1,205,553	-5,000	9	-2
Peach/Nectarine	-563,917	-3,500	-11	-4
Alfalfa	-652,294	-40,000	-19	-4
Processing Tomatoes	-737,943	-41,000	-5	-13
Rice	-967,491	-3,000	-17	-1
Soil Fumigation/Preplant	-1,242,314		-32	

DPR data analyses have shown that pesticide use varies from year to year depending upon pest problems, weather, acreage and types of crops planted, economics, and other factors. Use of most pesticide categories increased from 2009 to 2010, except for decreases in acres treated with fumigants.

Pesticide use is reported as the number of pounds of AI and the total number of acres treated. The data for pounds include both agricultural and nonagricultural applications; the data for acres treated are primarily agricultural applications. The number of acres treated means the cumulative number of acres treated; the acres treated in each application are summed even when the same field is sprayed more than once in a year. (For example, if one acre is treated three times in a season with an individual AI, it is counted as three acres treated in the tables and graphs in Sections IV and V of this report.)

To provide an overview, pesticide use is summarized for eight different pesticide categories from 2001 to 2010 (Tables 4 – 19) and from 1994 to 2010 (Figures 1 – 8). These categories classify pesticides according to certain characteristics such as reproductive toxins, carcinogens, or reduced-risk characteristics. Some of the major changes from 2009 to 2010 include:

- Chemicals classified as reproductive toxins increased marginally in pounds applied from 2009 to 2010 (up 123,000 pounds or 0.8 percent) and decreased slightly in acres treated (down 770 acres or 0.1 percent). The increase in pounds was mostly from use of the fumigant metam-sodium. The decrease in acres was mostly from reduced uses of the insecticides propargite and carbaryl. Pesticides in this category are ones listed on the State's Proposition 65 list of chemicals "known to cause reproductive toxicity."

- Use of chemicals classified as carcinogens increased from 2009 to 2010 (up 5.1 million pounds or 26 percent and up 566,000 acres or 18 percent). The increase in pounds was mainly due to increases in use of the fumigants 1,3-dichloropropene and metam-sodium. The increase in acres treated was mostly from increases in the fungicides mancozeb and iprodione and the adjuvant polyacrylamide polymer. The pesticides in this category are ones listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals "known to cause cancer".

- Use of cholinesterase-inhibiting pesticides (organophosphate [OP] and carbamate pesticides), which include compounds of high regulatory concern, increased. Pesticides in this category had continued to decline for nearly every year since 1995. Use increased both in pounds (up 165,000 pounds or 4 percent) and in acres treated (up 509,000 acres or 14 percent). The AI with the greatest increase in pounds was the plant growth regulator ethephon, used mostly in cotton. The AIs with the greatest increases in acres treated were ethephon and the insecticides chlorpyrifos and malathion.

- Use of chemicals categorized as ground water contaminants decreased by pounds (down 62,000 pounds or 5 percent) and increased by acres treated (up 65,000 acres or 8 percent). The decrease in pounds was largely from reduced use of the herbicides simazine and diuron, and the increase in acres treated was mostly from the increase in acres treated with diuron.

- Chemicals categorized as toxic air contaminants increased from 2009 to 2010 both in pounds (up 4.7 million pounds or 15 percent) and by acres treated (up 129,000 acres or 5 percent). By pounds, most toxic air contaminants are fumigants which are used at high rates. The increase in pounds was mainly from increased uses of the fumigants 1,3-D and metam-sodium. The increase in acres treated was mainly from the fungicides mancozeb and captan.

- The pounds of fumigant chemicals applied increased (up 4.1 million pounds or 12 percent) and the acres treated decreased (down 8,000 acres or 2 percent). Pounds of 5 of the 6 major fumigants (metam-sodium, potassium n-methyldithiocarbamate, 1,3-D, sulfuryl fluoride, and chloropicrin) increased and pounds of one fumigant (methyl bromide) decreased. The decrease in acres treated was mostly from decreases in acres treated of methyl bromide and aluminum phosphide.

- Pounds of oil pesticides increased marginally (up 48,000 pounds or 0.2 percent) and the acres treated increased significantly (up 268,000 acres or 8 percent). Oils include many different chemicals, but the category used here includes only ones derived from petroleum distillation. Some of these oils may be on the State's Proposition 65 list of chemicals "known to cause cancer" but most serve as alternatives to highly toxic pesticides. Oils are also used by organic growers.

- Pounds of biopesticides increased (up 326,000 pounds or 30 percent) and acres treated also increased (up 416,000 acres or 19 percent). The most used biopesticide AIs by pounds are vegetable oil and *Bacillus thuringiensis* (combining all subspecies), but most of the increase in pounds was from vegetable oil. The most used by acres treated are propylene glycol and *Bacillus thuringiensis*, and most of the increase in acres treated was from propylene glycol. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds (such as pheromones) not toxic to the target pest.

Since 1993, the reported pounds of pesticides applied have fluctuated from year to year. An increase or decrease in use from one year to the next or in the span of a few years does not necessarily indicate a general trend in use; it simply may reflect variations related to various factors (e.g. climate or economic changes). Short periods of time (three to five years) may suggest trends, such as the increased pesticide use from 2001 to 2005 or the decreased use from 2005 to 2009. However, regression analyses on use from 1993 to 2010 do not indicate a significant trend of either increase or decrease in total pesticide use.

To improve data quality when calculating the total pounds of pesticides, DPR excluded values that were so large they were probably in error. The procedure to exclude probable errors involved the development of complex error-checking algorithms, a data improvement process that is ongoing.

Over-reporting errors have a much greater impact on the numerical accuracy of the database than under-reporting errors. For example, if a field is treated with 100 pounds of a pesticide AI and the application is erroneously recorded as 100,000 pounds (a decimal point shift of three places to the right), an error of 99,900 pounds is introduced into the database. If the same degree of error is made in shifting the decimal point to the left, the application is recorded as 0.1 pound, and an error of 99.9 pounds is entered into the database.

The summaries detailed in the following use categories are not intended to serve as indicators of pesticide risks to the public or the environment. Rather, the data supports DPR regulatory functions to enhance public safety and environmental protection. (See “How Pesticide Data are Used” on page 2.)

USE TRENDS OF PESTICIDES ON THE STATE'S PROPOSITION 65 LIST OF CHEMICALS THAT ARE "KNOWN TO CAUSE REPRODUCTIVE TOXICITY."

Table 4: *The reported pounds of pesticides used that are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity." Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1080	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-DB ACID	16,954	9,393	6,408	5,486	11,722	9,733	9,185	11,416	13,523	4,570
AMITRAZ	263	154	115	0	0	12	0	0	7	0
ARSENIC PENTOXIDE	259,400	194,650	129,889	12,705	180,505	474,517	7,805	7,433	400	16,144
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BENOMYL	76,713	29,005	7,105	2,210	948	898	590	100	56	31
BROMACIL, LITHIUM SALT	3,217	4,016	3,025	1,801	1,059	2,529	1,172	1,851	896	1,835
BROMOXYNIL OCTANOATE	78,454	72,900	75,345	50,223	34,463	37,400	41,210	65,375	50,300	44,694
CARBARYL	286,199	256,098	205,102	240,135	190,633	157,000	142,010	126,665	135,313	113,050
CHLORSULFURON	1,312	2,190	8,684	9,967	3,242	3,488	3,675	3,886	5,048	3,370
CYANAZINE	17,131	7,178	37	8	7	0	0	0	0	0
CYCLOATE	31,785	34,387	30,012	43,209	39,709	41,447	31,344	21,242	25,284	27,292
DICLOFOP-METHYL	11,765	5,058	9,309	5,988	1,413	174	157	0	15	0
DINOCAP	<1	2	<1	2	2	2	2	2	2	0
DINOSEB	268	577	113	63	131	213	81	166	816	26
EPTC	276,724	253,634	141,552	182,532	181,825	108,209	152,707	129,470	128,993	118,509
ETHYLENE GLYCOL MONOMETHYL ETHER	2,248	3,009	1,782	2,729	2,476	4,186	2,653	1,986	2,257	5,187
ETHYLENE OXIDE	3	0	0	0	0	0	2	3	7	0
FENOXAPROP-ETHYL	366	106	53	64	161	196	153	219	11	<1
FLUAZIFOP-BUTYL	149	166	31	34	41	26	5	3	21	11
FLUAZIFOP-P-BUTYL	9,489	9,985	8,759	10,298	11,638	11,103	10,192	11,287	7,903	9,485
HYDRAMETHYLNON	2,381	2,741	2,029	1,896	1,381	1,231	887	825	393	607
LINURON	58,173	62,006	60,117	69,289	72,031	59,164	58,592	60,230	51,265	48,454
METAM-SODIUM	12,562,799	15,116,768	14,822,689	14,698,228	12,991,279	11,422,382	9,923,453	9,489,335	9,027,455	11,000,336
METHYL BROMIDE	6,625,336	7,008,644	7,289,389	7,105,612	6,504,576	6,541,159	6,438,044	5,693,325	5,615,653	3,867,829
METIRAM	2	0	1	5	0	<1	0	0	0	0
MOLINATE	733,534	877,572	539,871	367,155	171,362	141,421	75,241	19,653	12,516	24
MYCLOBUTANIL	83,668	76,635	83,426	70,908	80,143	71,221	65,172	61,550	59,056	65,147
NABAM	8	0	0	10,693	30,440	23,414	9,073	9,635	8,963	10,518
NICOTINE	17	2	2	4	2	<1	<1	<1	<1	<1
NITRAPYRIN	16	89	117	12	171	0	9	0	84	211
OXADIAZON	15,905	16,692	12,566	12,979	13,762	11,714	12,512	9,402	8,738	12,314
OXYDEMETON-METHYL	99,756	96,363	93,774	102,563	121,910	119,717	122,018	111,612	68,576	71,256
OXYTHIOQUINOX	145	117	34	27	8	90	166	170	45	6

Table 4: (continued) *The reported pounds of pesticides used that are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity."*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	22	28	293	0	0	0	0	<1	0
PROPARGITE	1,159,792	972,382	1,054,691	1,010,874	995,038	570,560	529,536	389,492	380,651	294,109
RESMETHRIN	542	661	1,561	245	958	676	452	269	211	202
SODIUM DIMETHYL DITHIO CARBAMATE	173	0	0	10,693	30,440	23,414	9,073	9,800	8,963	11,053
SODIUM TETRATHIOCARBONATE	375,487	352,342	212,308	259,542	330,886	171,194	386,876	354,294	249,580	233,949
STREPTOMYCIN SULFATE	7,554	5,989	8,463	4,702	7,790	7,582	5,809	4,394	3,233	4,040
TAU-FLUVALINATE	2,207	2,117	1,632	1,581	1,162	1,081	1,019	1,068	1,179	866
THIOPHANATE-METHYL	66,985	71,486	125,388	119,063	158,594	112,747	98,655	74,903	89,882	114,139
TRIADIMEFON	2,764	1,736	1,773	2,111	1,918	1,116	872	1,503	1,056	2,153
TRIBUTYLTIN METHACRYLATE	106	39	0	0	0	0	0	0	0	0
TRIFORINE	99	72	88	295	137	452	64	69	4	42
VINCLOZOLIN	32,208	22,170	18,581	14,863	3,574	402	390	512	476	217
WARFARIN	1	1	3	3	1	9	1	<1	<1	1
TOTAL	22,902,095	25,569,151	24,955,848	24,431,088	22,177,538	20,131,879	18,140,859	16,673,146	15,958,833	16,081,678

Table 5: *The reported cumulative acres treated with pesticides that are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity." Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1080	30	301	50	<1	41	22	170	<1	67	176
2,4-DB ACID	25,843	15,584	10,384	10,162	18,597	16,303	15,080	19,457	21,629	6,980
AMITRAZ	1,269	605	379	0	0	<1	0	0	74	0
ARSENIC PENTOXIDE	56	<1	<1	48	<1	<1	<1	<1	<1	<1
ARSENIC TRIOXIDE	<1	0	<1	<1	1	<1	<1	<1	<1	<1
BENOMYL	135,929	47,879	13,340	3,983	2,789	1,674	568	221	162	0
BROMACIL, LITHIUM SALT	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
BROMOXYNIL OCTANOATE	251,527	239,110	218,281	162,572	120,175	134,283	136,831	186,026	146,301	124,955
CARBARYL	147,612	106,616	97,811	103,261	99,086	87,789	97,016	95,982	107,458	80,067
CHLORSULFURON	29,079	18,836	26,280	25,745	21,903	26,345	12,653	32,912	31,267	19,978
CYANAZINE	19,708	8,763	25	5	8	0	0	0	0	0
CYCLOATE	15,918	17,228	16,713	20,699	19,319	19,886	15,601	10,581	12,058	13,799
DICLOFOP-METHYL	14,198	6,259	11,257	7,391	729	186	224	0	30	0
DINOCAP	0	3	<1	47	7	9	8	7	7	0
DINOSEB	166	167	59	98	310	72	16	453	304	111
EPTC	99,953	94,240	56,639	64,194	64,263	38,871	51,706	45,560	49,708	44,289
ETHYLENE GLYCOL MONOMETHYL ETHER	33,256	36,299	24,249	25,075	16,655	25,655	26,412	14,857	14,573	35,802
ETHYLENE OXIDE	<1	0	0	0	0	0	<1	2	60	0
FENOXAPROP-ETHYL	3,820	1,326	839	1,681	3,247	3,418	2,552	3,444	142	<1
FLUAZIFOP-BUTYL	144	98	<1	<1	3	<1	<1	6	2	80
FLUAZIFOP-P-BUTYL	34,283	40,967	28,325	31,739	35,348	34,591	31,920	31,045	25,517	27,513
HYDRAMETHYLNON	2,762	2,148	2,057	1,314	1,990	657	931	1,138	1,280	4,689
LINURON	81,801	86,942	85,412	95,565	101,987	81,535	81,041	81,211	68,604	68,098
METAM-SODIUM	125,417	141,415	142,406	128,427	97,562	102,451	78,030	71,815	74,132	70,431
METHYL BROMIDE	60,892	53,140	55,254	57,385	45,700	50,677	45,675	35,685	39,587	28,062
METIRAM	7	0	<1	2	0	1	0	0	0	0
MOLINATE	190,488	222,044	134,120	89,593	40,535	33,045	17,476	4,529	2,942	6
MYCLOBUTANIL	737,643	704,827	742,139	656,020	699,773	644,490	599,368	545,175	512,906	583,440
NABAM	60	0	0	<1	<1	<1	2	1	3	12
NICOTINE	31	1	<1	2	3	<1	<1	<1	<1	<1
NITRAPYRIN	<1	169	258	42	143	0	35	0	88	111
OXADIAZON	2,637	1,838	1,904	3,120	2,209	2,144	2,991	2,747	1,451	1,667
OXYDEMETON-METHYL	200,171	193,453	189,015	206,751	173,480	164,094	161,835	140,760	82,368	86,131
OXYTHIOQUINOX	250	182	71	137	14	10	9	5	4	4
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	2	6	<1	0	0	0	0	<1	0
PROPARGITE	606,737	524,439	558,056	543,728	519,412	287,261	261,953	186,581	174,063	136,385

Table 5: (continued) *The reported cumulative acres treated with pesticides that are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity."*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
RESMETHRIN	35	32	66	209	1	1	18	3	11	<1
SODIUM DIMETHYL DITHIO CARBAMATE	60	0	0	<1	<1	<1	2	1	3	12
SODIUM TETRATHIOCARBONATE	13,574	11,558	6,832	8,497	7,977	6,170	11,485	10,725	7,180	7,301
STREPTOMYCIN SULFATE	62,184	52,180	63,445	37,461	52,061	57,295	38,468	27,011	24,453	28,915
TAU-FLUVALINATE	10,893	9,046	7,939	7,313	5,879	5,438	4,777	5,708	5,015	4,515
THIOPHANATE-METHYL	53,990	64,340	121,339	112,501	135,296	108,408	100,015	71,867	92,429	121,486
TRIADIMEFON	9,501	6,747	7,625	6,752	8,585	2,949	1,806	2,043	1,007	1,172
TRIBUTYLTIN METHACRYLATE	<1	<1	0	0	0	0	0	0	0	0
TRIFORINE	244	203	196	61	181	102	373	11	10	22
VINCLOZOLIN	38,570	27,795	21,692	18,207	3,899	440	258	212	85	86
WARFARIN	101	449	632	1,504	430	473	3,165	1,118	365	290
TOTAL	3,010,779	2,737,234	2,645,096	2,431,290	2,299,597	1,936,745	1,800,466	1,628,896	1,497,343	1,496,574

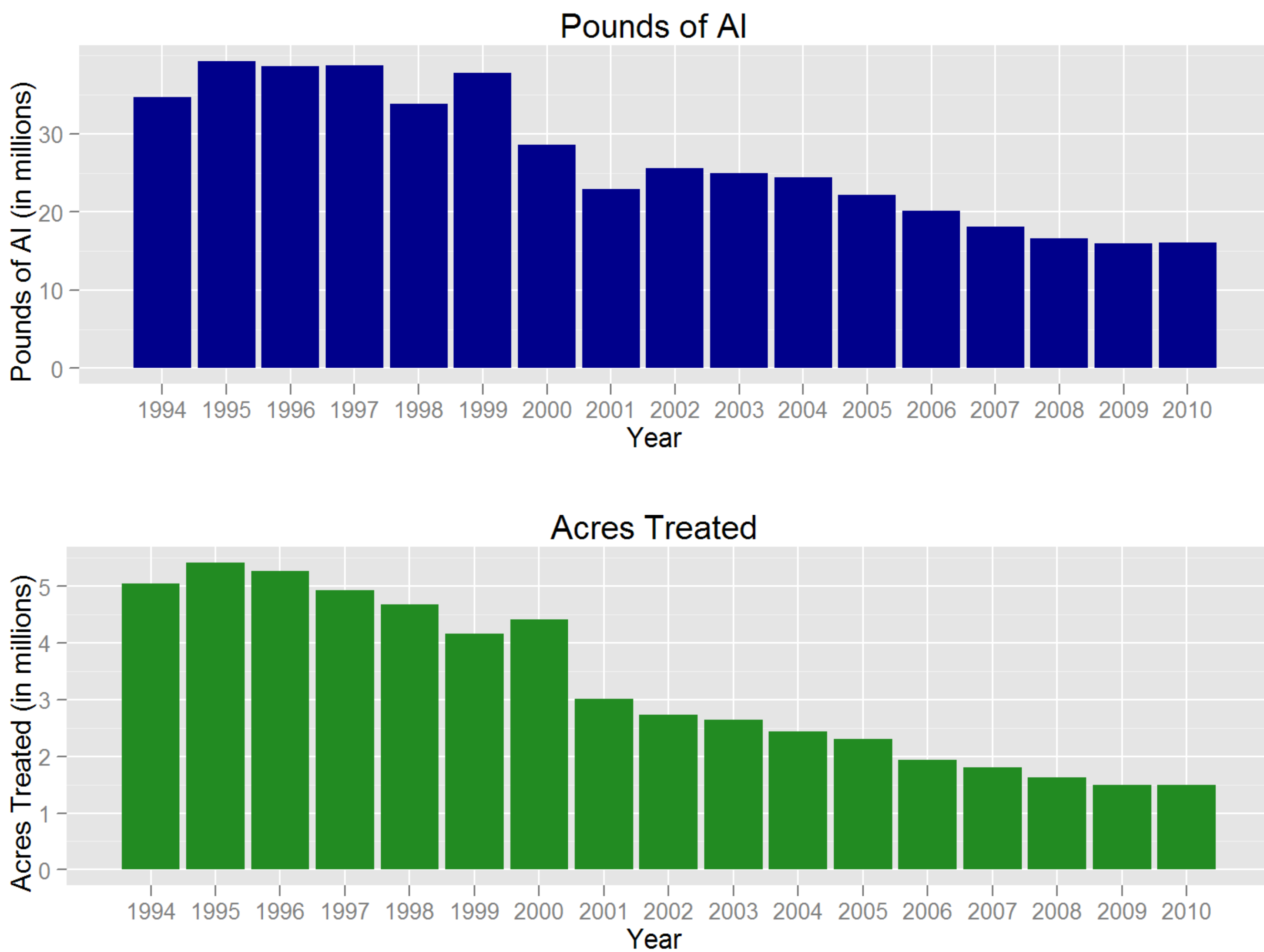

Figure 1: *Use trends of pesticides that are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity." Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF PESTICIDES LISTED BY U.S. EPA AS B2 CARCINOGENS OR ON THE STATE'S PROPOSITION 65 LIST OF CHEMICALS THAT ARE "KNOWN TO CAUSE CANCER."

Table 6: *The reported pounds of pesticides used that are listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer." Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1,3-DICHLOROPROPENE	4,141,173	5,413,807	7,003,873	8,945,145	9,355,308	8,733,270	9,594,517	9,704,804	6,392,604	8,771,323
ACIFLUORFEN, SODIUM SALT	1	3	<1	18	<1	0	0	0	0	<1
ALACHLOR	29,057	28,666	24,913	27,229	21,052	13,740	3,911	4,343	6,362	9,936
ARSENIC ACID	12,023	4,976	318	223	68	3	0	0	0	0
ARSENIC PENTOXIDE	259,400	194,650	129,889	12,705	180,505	474,517	7,805	7,433	400	16,144
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CACODYLIC ACID	3,981	1,792	207	115	131	20	41	43	<1	3
CAPTAN	399,146	395,575	498,445	370,418	468,413	508,939	449,328	361,867	329,623	439,879
CARBARYL	286,199	256,098	205,102	240,135	190,633	157,000	142,010	126,665	135,313	113,050
CHLOROTHALONIL	521,581	601,060	713,226	571,622	765,150	824,391	734,650	566,773	715,136	949,565
CHROMIC ACID	363,225	272,300	182,022	17,753	252,176	662,927	10,904	10,384	559	22,555
CREOSOTE	4,700	9,018	3,385	1,048	<1	0	3	<1	<1	0
DAMINOZIDE	11,309	10,077	10,111	9,586	8,793	7,805	7,099	7,094	6,570	9,357
DDVP	12,833	8,477	3,446	3,807	4,914	6,577	6,376	6,859	4,164	4,157
DIOCTYL PHTHALATE	640	604	521	397	583	1,016	484	340	186	453
DIPROPYL ISOCINCHOMERONATE	1	0	1	<1	<1	52	2	<1	<1	1
DIURON	1,105,536	1,302,603	1,344,596	1,398,123	955,983	1,051,245	860,492	734,757	621,930	583,070
ETHOPROP	19,046	16,531	28,419	23,130	18,924	24,485	24,241	26,897	20,793	5,495
ETHYLENE OXIDE	3	0	0	0	0	0	2	3	7	0
FENOXYCARB	86	53	32	34	30	8	4	8	5	3
FOLPET	0	2	<1	0	<1	<1	0	<1	0	<1
FORMALDEHYDE	28,612	14,035	18,690	111,151	48,968	73,392	47,733	24,306	3,972	5,511
IPRODIONE	304,716	247,090	287,850	261,218	284,984	302,300	251,171	252,212	248,877	348,540
LINDANE	2,388	1,630	908	775	40	379	2	21	8	18
MANCOZEB	428,738	396,912	535,600	379,539	642,444	660,848	408,312	330,238	281,608	750,169
MANEB	816,548	851,819	1,026,804	954,085	1,122,684	1,175,939	1,055,375	861,006	656,527	369,668
METAM-SODIUM	12,562,799	15,116,768	14,822,689	14,698,228	12,991,279	11,422,382	9,923,453	9,489,335	9,027,455	11,000,336
METIRAM	2	0	1	5	0	<1	0	0	0	0
NITRAPYRIN	16	89	117	12	171	0	9	0	84	211
ORTHO-PHENYLPHENOL	4,016	15,129	4,936	21,740	9,454	2,083	5,128	4,389	2,133	2,271
ORTHO-PHENYLPHENOL, SODIUM SALT	27,071	25,029	20,536	5,898	4,979	6,948	2,266	3,211	2,294	2,129
ORYZALIN	110,122	155,909	429,224	574,783	703,007	787,725	656,453	604,932	529,498	601,810
OXADIAZON	15,905	16,692	12,566	12,979	13,762	11,714	12,512	9,402	8,738	12,314
OXYTHIOQUINOX	145	117	34	27	8	90	166	170	45	6
PARA-DICHLOROBENZENE	11	1	25	10	139	0	15	1	17	0

Table 6: (continued) *The reported pounds of pesticides used that are listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer."*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
PENTACHLOROPHENOL	14	17	3	2	3	27	22	4	0	3
POLYACRYLAMIDE POLYMER	5,725	11,812	5,660	5,288	5,247	6,277	5,093	4,606	4,168	5,189
POTASSIUM DICHROMATE	1	<1	11	71	40	0	0	0	0	0
PROPARGITE	1,159,792	972,382	1,054,691	1,010,874	995,038	570,560	529,536	389,492	380,651	294,109
PROPOXUR	611	450	306	223	220	212	191	188	202	298
PROPYLENE OXIDE	99,727	99,674	99,396	151,484	147,324	133,028	109,936	105,600	111,609	300,008
PROPYZAMIDE	108,987	107,663	104,222	118,952	116,132	121,005	114,479	104,077	73,811	51,350
SODIUM DICHROMATE	329	633	217	0	0	0	0	0	0	0
TERRAZOLE	25	6	575	1,099	750	946	750	1,534	1,140	1,500
THIODICARB	9,042	5,195	8,392	2,249	1,872	894	686	410	511	152
VINCLOZOLIN	32,208	22,170	18,581	14,863	3,574	402	390	512	476	217
TOTAL	22,887,489	26,577,512	28,600,541	29,947,045	29,314,784	27,743,144	24,965,547	23,743,914	19,567,477	24,670,801

Table 7: *The reported cumulative acres treated with pesticides that are listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer." Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1,3-DICHLOROPROPENE	30,817	42,172	48,944	56,618	51,486	49,885	53,937	57,922	38,374	54,049
ACIFLUORFEN, SODIUM SALT	<1	11	<1	2	<1	0	0	0	0	<1
ALACHLOR	11,453	14,467	10,004	9,888	7,935	5,192	1,500	1,635	2,261	3,276
ARSENIC ACID	<1	<1	<1	<1	<1	<1	0	0	0	0
ARSENIC PENTOXIDE	56	<1	<1	48	<1	<1	<1	<1	<1	<1
ARSENIC TRIOXIDE	<1	0	<1	<1	1	<1	<1	<1	<1	<1
CACODYLIC ACID	31,283	12,648	757	100	82	121	<1	<1	<1	<1
CAPTAN	215,969	215,412	271,140	211,028	252,040	262,936	215,787	198,022	173,133	240,177
CARBARYL	147,612	106,616	97,811	103,261	99,086	87,789	97,016	95,982	107,458	80,067
CHLOROTHALONIL	312,726	347,736	361,203	331,710	418,600	438,373	389,497	292,385	377,954	484,883
CHROMIC ACID	56	<1	<1	<1	<1	<1	<1	<1	<1	<1
CREOSOTE	1	<1	<1	<1	<1	0	1	1	2	0
DAMINOZIDE	6,146	5,417	3,103	2,667	2,376	2,220	2,291	2,471	2,111	4,356
DDVP	3,954	4,327	2,576	1,637	7,445	1,526	2,733	2,231	2,685	1,880
DIOCTYL PHTHALATE	10,776	6,649	3,880	6,249	13,858	13,231	13,258	3,582	4,928	7,921
DIPROPYL ISOCINCHOMERONATE	<1	0	<1	<1	1	18	<1	<1	<1	19
DIURON	788,559	796,904	843,897	971,628	894,073	886,032	702,939	514,554	405,137	515,936
ETHOPROP	3,542	4,152	6,078	4,917	4,296	4,815	4,283	4,159	4,293	1,318
ETHYLENE OXIDE	<1	0	0	0	0	0	<1	2	60	0
FENOXYCARB	3,241	1,242	812	1,011	1,398	828	210	489	353	100
FOLPET	0	<1	<1	0	<1	<1	0	<1	0	<1
FORMALDEHYDE	53	33	18	23	2	265	57	67	5	1
IPRODIONE	501,033	364,809	445,511	409,250	450,354	468,465	412,699	436,226	434,326	575,831
LINDANE	13,832	8,010	8,828	9,437	557	9	0	37	10	31
MANCOZEB	228,275	197,196	276,093	194,219	370,266	348,360	212,354	169,422	145,616	427,923
MANEB	535,105	554,904	660,011	601,360	730,254	675,941	655,235	558,506	471,321	289,377
METAM-SODIUM	125,417	141,415	142,406	128,427	97,562	102,451	78,030	71,815	74,132	70,431
METIRAM	7	0	<1	2	0	1	0	0	0	0
NITRAPYRIN	<1	169	258	42	143	0	35	0	88	111
ORTHO-PHENYLPHENOL	59	82	726	272	429	65	149	22	49	58
ORTHO-PHENYLPHENOL, SODIUM SALT	60	40	9	<1	<1	<1	<1	<1	<1	<1
ORYZALIN	37,586	71,985	208,230	298,712	359,076	400,237	313,343	272,273	236,523	217,073
OXADIAZON	2,637	1,838	1,904	3,120	2,209	2,144	2,991	2,747	1,451	1,667
OXYTHIOQUINOX	250	182	71	137	14	10	9	5	4	4
PARA-DICHLOROBENZENE	<1	<1	<1	<1	<1	0	<1	0	<1	<1
PENTACHLOROPHENOL	38	<1	<1	20	3	0	10	46	0	4
POLYACRYLAMIDE POLYMER	482,365	385,995	461,617	495,213	551,014	645,781	445,134	470,192	441,024	580,109

Table 7: (continued) *The reported cumulative acres treated with pesticides that are listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer."*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
POTASSIUM DICHROMATE	<1	20	<1	<1	10	0	0	0	0	0
PROPARGITE	606,737	524,439	558,056	543,728	519,412	287,261	261,953	186,581	174,063	136,385
PROPOXUR	4	23	1	7	8	2	<1	10	356	<1
PROPYLENE OXIDE	<1	<1	<1	22	185	20	<1	12	<1	<1
PROPYZAMIDE	145,325	140,803	132,819	147,631	148,376	153,045	148,399	133,426	102,176	69,324
SODIUM DICHROMATE	<1	<1	<1	0	0	0	0	0	0	0
TERRAZOLE	132	47	266	253	495	884	879	1,419	711	5,107
THIODICARB	13,382	8,258	12,113	3,684	2,965	1,293	1,196	673	680	192
VINCLOZOLIN	38,570	27,795	21,692	18,207	3,899	440	258	212	85	86
TOTAL	4,284,406	3,978,403	4,572,069	4,545,129	4,989,350	4,839,640	4,016,184	3,477,125	3,201,370	3,767,694

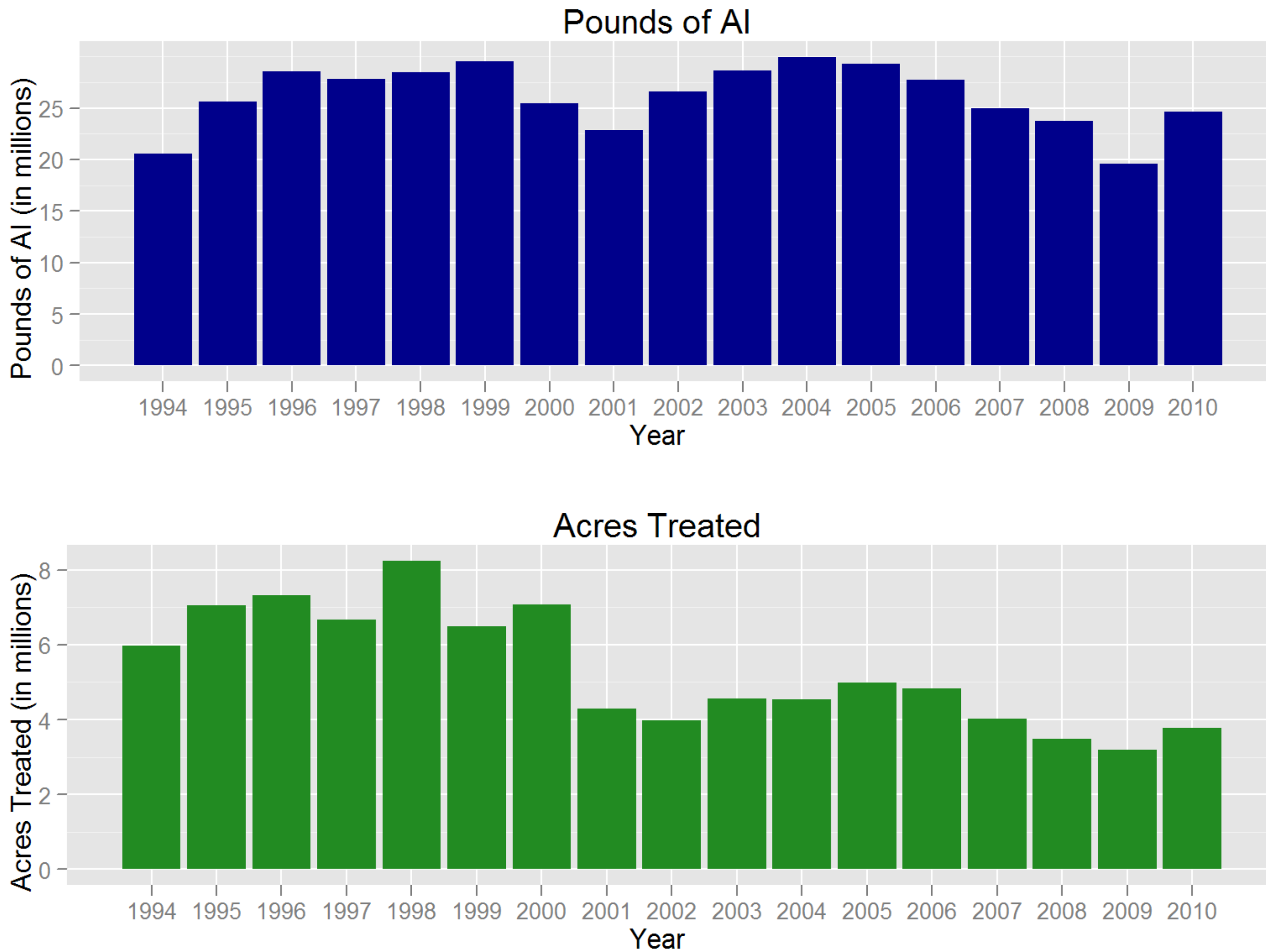

Figure 2: *Use trends of pesticides that are listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer." Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF CHOLINESTERASE-INHIBITING PESTICIDES.

Table 8: *The reported pounds of pesticides used that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients. Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
3-IODO-2-PROPYNYL BUTYLCARBAMATE	<1	0	0	0	0	0	0	0	<1	2,675
ACEPHATE	240,132	217,397	221,781	204,824	195,507	163,909	142,474	152,303	112,556	134,214
ALDICARB	297,244	244,786	262,103	231,012	230,409	176,624	115,088	75,767	31,579	64,626
AZINPHOS-METHYL	163,121	151,612	213,892	50,562	55,179	38,775	25,418	16,269	13,045	1,619
BENDIOCARB	62	32	23	9	6	2	8	2	<1	1
BENSULIDE	186,908	192,220	228,739	237,290	246,396	284,533	258,164	244,526	247,733	270,282
BUTYLATE	27,640	19,412	26,826	20,323	9,923	2,671	945	27	0	299
CARBARYL	286,199	256,098	205,102	240,135	190,633	157,000	142,010	126,665	135,313	113,050
CARBOFURAN	95,863	81,486	49,276	30,354	28,093	25,790	24,306	16,389	10,117	4
CHLORPROPHAM	3,504	1,380	6,191	2,861	2,822	3,704	1,532	4,384	4,497	767
CHLORPYRIFOS	1,673,097	1,419,665	1,545,670	1,778,342	2,006,062	1,922,547	1,430,082	1,368,555	1,246,237	1,285,630
COUMAPHOS	97	62	64	63	1	3	<1	0	0	<1
CYCLOATE	31,785	34,387	30,012	43,209	39,709	41,447	31,344	21,242	25,284	27,292
DDVP	12,833	8,477	3,446	3,807	4,914	6,577	6,376	6,859	4,164	4,157
DEMETON	3	42	<1	0	1	<1	1	0	2	0
DESMEDIPHAM	3,750	3,398	3,636	3,842	3,921	2,954	1,902	1,598	1,257	1,385
DIAZINON	999,578	690,375	523,957	492,148	398,620	385,923	350,730	258,544	142,059	126,788
DICROTOPHOS	2	27	41	0	2	6	0	0	0	0
DIMETHOATE	285,548	309,371	294,368	332,049	310,502	294,027	314,056	292,119	251,726	209,952
DISULFOTON	51,545	54,567	46,815	41,317	31,799	22,601	23,850	8,028	10,233	9,085
EPTC	276,724	253,634	141,552	182,532	181,825	108,209	152,707	129,470	128,993	118,509
ETHEPHON	620,075	538,403	574,377	637,205	642,137	584,613	427,248	296,421	207,788	369,780
ETHION	5	12	13	<1	261	13	0	2	28	72
ETHOPROP	19,046	16,531	28,419	23,130	18,924	24,485	24,241	26,897	20,793	5,495
FENAMIPHOS	66,330	70,939	59,421	58,691	46,336	33,511	39,677	17,482	11,493	8,978
FENTHION	61	79	3	36	15	2	4	4	9	4
FONOFOS	580	465	182	30	15	0	0	1	0	<1
FORMETANATE HYDROCHLORIDE	45,280	35,798	28,420	30,651	30,684	33,738	33,694	44,704	32,670	30,313
MALATHION	554,872	624,604	654,155	492,548	423,529	410,866	461,200	484,228	531,874	555,412
METHAMIDOPHOS	46,615	30,645	36,987	31,332	37,806	30,570	18,867	24,224	17,934	9,396
METHIDATHION	93,521	68,389	54,398	61,204	48,857	56,691	45,633	47,203	47,319	51,190
METHIOCARB	2,265	1,858	2,256	2,789	2,313	1,798	1,749	2,068	3,093	3,503
METHOMYL	378,131	295,237	359,050	262,195	347,010	317,302	305,071	251,382	221,248	230,646
METHYL PARATHION	59,620	53,955	73,365	71,525	78,821	84,785	75,368	34,110	25,770	21,427
MEVINPHOS	393	40	114	1	160	18	30	4	9	24
MEVINPHOS, OTHER RELATED	249	23	76	<1	107	12	20	3	6	16
MEXACARBATE	0	0	0	0	0	0	0	0	0	0

Table 8: (continued) *The reported pounds of pesticides used that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MOLINATE	733,534	877,572	539,871	367,155	171,362	141,421	75,241	19,653	12,516	24
NALED	276,651	177,102	185,611	152,479	223,725	185,444	132,073	172,632	162,465	174,151
O,O-DIMETHYL O-(4-NITRO-M-TOLYL) PHOSPHOROTHIOATE	0	0	0	0	0	<1	0	0	0	0
OXAMYL	76,971	80,315	93,781	112,603	153,167	116,639	44,843	100,000	48,994	116,979
OXYDEMETON-METHYL	99,756	96,363	93,774	102,563	121,910	119,717	122,018	111,612	68,576	71,256
PARATHION	2,589	3,205	611	240	855	1,542	479	33	118	285
PEBULATE	45,619	71,721	35,755	10,118	1,154	210	441	68	0	0
PHENMEDIPHAM	4,249	4,351	5,021	4,576	5,171	4,046	2,838	2,305	2,516	2,448
PHORATE	70,645	76,482	64,947	60,162	48,981	38,066	33,776	32,408	17,686	14,156
PHOSALONE	0	0	0	0	0	0	0	0	0	0
PHOSMET	482,481	405,236	341,541	658,087	547,813	628,892	421,109	341,422	132,647	114,995
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	22	28	293	0	0	0	0	<1	0
PROFENOFOS	22,011	24,452	12,871	15,620	23,924	20,885	3,638	216	0	1,552
PROPAMOCARB HYDROCHLORIDE	2,288	828	83	5	0	364	137,418	116,725	106,078	99,456
PROPETAMPHOS	3,991	2,464	721	315	148	207	136	116	352	213
PROPOXUR	611	450	306	223	220	212	191	188	202	298
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	257,062	190,149	233,640	179,690	100,210	78,084	45,757	16,335	8,161	18,427
SODIUM DIMETHYL DITHIO CARBAMATE	173	0	0	10,693	30,440	23,414	9,073	9,800	8,963	11,053
SULFOTEP	267	77	8	29	17	1	7	4	2	0
SULPROFOS	<1	0	0	0	0	0	0	0	0	0
TEMEPHOS	0	0	0	356	1,102	803	1,173	684	83	99
TETRACHLORVINPHOS	4,746	3,285	1,262	722	788	1,203	667	1,012	1,306	1,072
THIOBENCARB	644,625	839,962	587,211	521,586	448,208	308,497	289,046	263,499	320,643	258,402
THIODICARB	9,042	5,195	8,392	2,249	1,872	894	686	410	511	152
TRICHLORFON	3,004	1,545	1,068	1,035	1,222	1,003	336	961	25	34
TOTAL	9,262,992	8,536,181	7,881,229	7,766,817	7,495,586	6,887,250	5,774,742	5,141,565	4,376,672	4,541,641

Table 9: *The reported cumulative acres treated with pesticides that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients. Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
3-IODO-2-PROPYNYL BUTYLCARBAMATE	40	0	0	0	0	0	0	0	0	<1
ACEPHATE	266,278	232,949	223,408	211,892	198,982	172,119	148,887	147,910	115,063	143,957
ALDICARB	282,453	225,820	231,090	217,540	214,260	158,000	108,892	66,829	31,977	66,192
AZINPHOS-METHYL	117,544	94,035	117,060	38,622	37,622	25,534	16,636	9,888	7,849	1,724
BENDIOCARB	2	<1	8	<1	1	<1	6	<1	<1	<1
BENSULIDE	62,859	60,883	66,376	70,367	70,625	82,280	76,748	75,695	73,306	78,451
BUTYLATE	6,270	4,598	5,450	3,940	1,954	610	236	6	0	60
CARBARYL	147,612	106,616	97,811	103,261	99,086	87,789	97,016	95,982	107,458	80,067
CARBOFURAN	246,149	182,567	91,801	50,138	55,488	43,417	39,795	24,651	7,331	15
CHLORPROPHAM	112	80	124	166	88	115	178	147	159	38
CHLORPYRIFOS	1,355,172	1,235,816	1,478,783	1,323,331	1,681,634	1,538,958	1,154,681	1,162,654	934,438	1,095,218
COUMAPHOS	809	1,073	17	49	<1	2	<1	0	0	<1
CYCLOATE	15,918	17,228	16,713	20,699	19,319	19,886	15,601	10,581	12,058	13,799
DDVP	3,954	4,327	2,576	1,637	7,445	1,526	2,733	2,231	2,685	1,880
DEMETON	56	<1	2	0	35	<1	10	0	10	0
DESMEDIPHAM	34,738	32,344	35,435	37,152	35,795	30,883	24,780	16,787	16,073	19,264
DIAZINON	437,934	489,230	483,344	509,233	440,839	439,814	422,244	310,125	140,620	104,451
DICROTOPHOS	<1	<1	64	0	<1	110	0	0	0	0
DIMETHOATE	639,271	681,367	621,074	701,470	672,935	613,479	608,819	576,286	499,889	435,599
DISULFOTON	45,258	48,723	39,182	34,481	25,320	18,926	20,315	4,723	7,591	6,167
EPTC	99,953	94,240	56,639	64,194	64,263	38,871	51,706	45,560	49,708	44,289
ETHEPHON	631,330	550,256	601,503	660,356	679,253	640,720	490,361	362,926	261,211	448,207
ETHION	5	<1	1	<1	66	32	0	6	15	184
ETHOPROP	3,542	4,152	6,078	4,917	4,296	4,815	4,283	4,159	4,293	1,318
FENAMIPHOS	36,999	38,397	36,293	34,142	29,314	18,918	22,618	10,730	7,537	5,873
FENTHION	<1	<1	<1	18	<1	<1	<1	<1	<1	<1
FONOFOS	497	234	116	20	15	0	0	<1	0	3
FORMETANATE HYDROCHLORIDE	45,234	36,131	29,411	33,167	31,775	35,293	35,383	45,715	32,678	30,898
MALATHION	290,933	314,683	287,467	249,319	226,729	218,196	250,823	288,852	277,523	432,695
METHAMIDOPHOS	63,046	37,012	41,506	38,874	45,835	37,585	23,022	27,532	20,408	10,420
METHIDATHION	64,785	48,554	38,516	45,281	37,751	34,786	37,301	43,010	54,227	49,662
METHIOCARB	1,866	2,000	1,757	3,064	2,501	3,072	2,649	2,439	2,131	2,333
METHOMYL	627,264	510,006	615,669	437,673	612,989	529,347	502,384	406,030	377,954	409,026
METHYL PARATHION	39,449	37,514	51,252	48,640	49,771	51,184	45,173	21,574	15,198	13,046
MEVINPHOS	142	160	192	3	215	8	198	34	69	11
MEVINPHOS, OTHER RELATED	142	160	192	3	215	8	198	34	69	11
MEXACARBATE	0	0	0	0	0	0	0	0	0	0

Table 9: (continued) *The reported cumulative acres treated with pesticides that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
MOLINATE	190,488	222,044	134,120	89,593	40,535	33,045	17,476	4,529	2,942	6
NALED	234,184	155,295	148,776	110,218	191,906	159,851	107,774	105,505	128,415	145,091
O,O-DIMETHYL O-(4-NITRO-M-TOLYL) PHOSPHOROTHIOATE	0	0	0	0	0	<1	0	0	0	0
OXAMYL	100,294	98,313	115,275	135,832	178,893	137,541	60,773	116,202	59,118	133,468
OXYDEMETON-METHYL	200,171	193,453	189,015	206,751	173,480	164,094	161,835	140,760	82,368	86,131
PARATHION	2,977	7,026	1,006	392	717	713	414	101	195	76
PEBULATE	15,122	21,491	10,680	4,319	297	35	163	151	0	0
PHENMEDIPHAM	35,477	34,452	38,265	38,964	38,675	33,208	26,762	18,198	18,837	21,366
PHORATE	63,160	58,390	50,290	47,488	35,938	27,676	23,557	10,933	10,236	8,396
PHOSALONE	0	0	0	0	0	0	0	0	0	0
PHOSMET	189,517	159,065	128,037	209,843	170,683	200,531	142,712	116,516	51,514	40,270
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	2	6	<1	0	0	0	0	<1	0
PROFENOFOS	23,700	25,997	13,598	11,657	25,096	20,563	4,509	289	0	1,635
PROPAMOCARB HYDROCHLORIDE	2,625	1,041	22	10	0	187	144,949	123,699	109,027	103,699
PROPETAMPHOS	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
PROPOXUR	4	23	1	7	8	2	<1	10	356	<1
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	187,153	129,570	158,604	133,535	74,538	52,330	31,408	10,850	7,182	15,785
SODIUM DIMETHYL DITHIO CARBAMATE	60	0	0	<1	<1	<1	2	1	3	12
SULFOTEP	314	57	3	8	9	<1	5	2	3	0
SULPROFOS	<1	0	0	0	0	0	0	0	0	0
TEMEPHOS	0	0	0	<1	<1	<1	<1	<1	<1	<1
TETRACHLORVINPHOS	232	125	6	291	1,518	1	200	5	<1	5
THIOBENCARB	169,056	222,606	154,952	136,132	118,786	79,109	74,271	67,483	83,567	75,172
THIODICARB	13,382	8,258	12,113	3,684	2,965	1,293	1,196	673	680	192
TRICHLORFON	51	18	8	<1	<1	<1	<1	<1	<1	<1
TOTAL	6,960,273	6,395,707	6,396,055	6,034,805	6,362,725	5,725,402	4,976,388	4,462,136	3,597,594	4,106,670

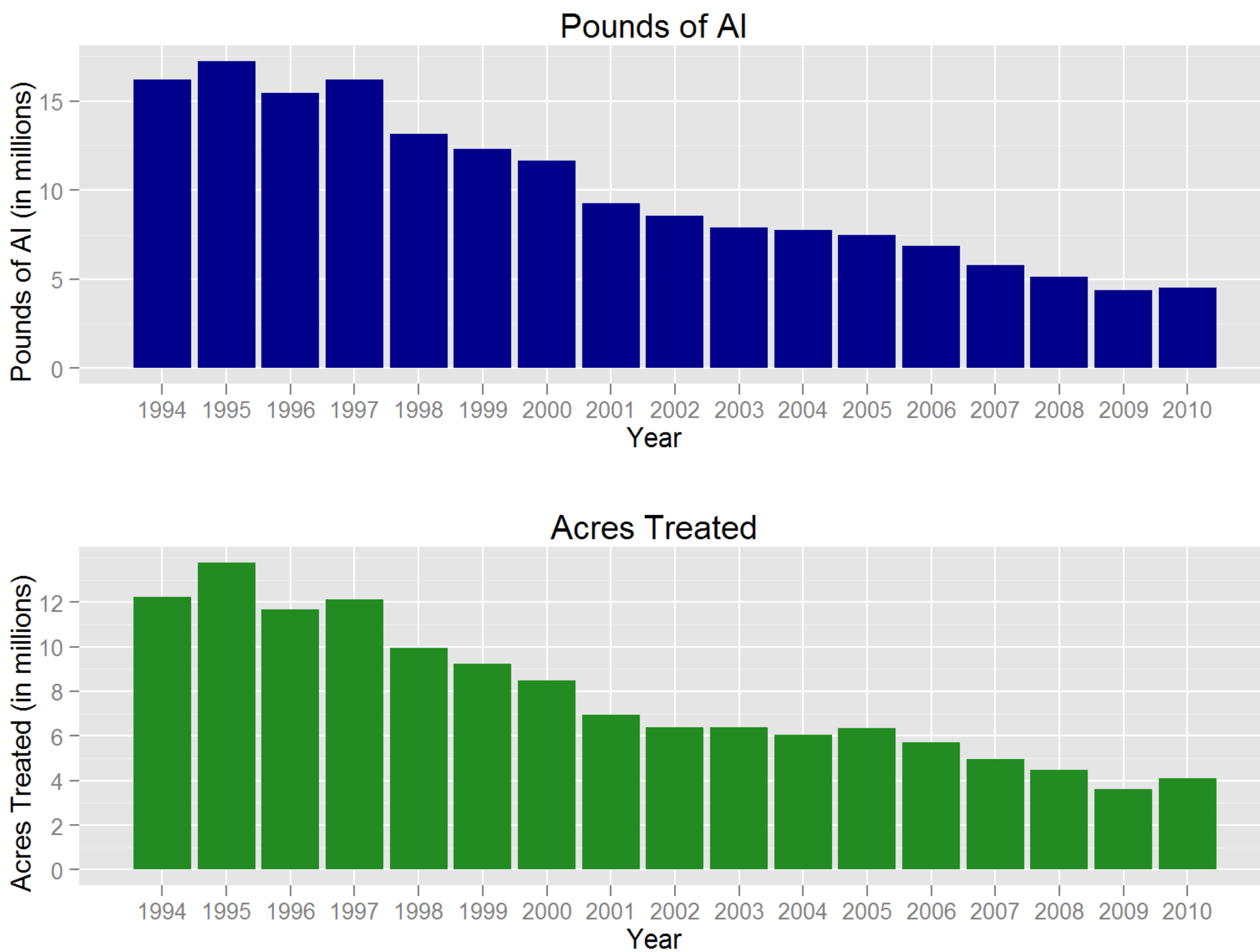

Figure 3: *Use trends of pesticides that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients. Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF PESTICIDES ON THE “A” PART OF DPR’S GROUNDWATER PROTECTION LIST.

Table 10: *The reported pounds of pesticides used that are on the “a” part of DPR’s groundwater protection list. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800(a). Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation’s Pesticide Use Reports.*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
ATRAZINE	62,879	59,292	58,248	38,776	33,015	35,291	27,546	28,491	23,260	28,937
ATRAZINE, OTHER RELATED	1,314	1,237	1,213	812	695	732	571	600	482	607
BENTAZON, SODIUM SALT	393	1,045	1,216	1,370	2,272	2,633	4,858	8,075	9,589	6,517
BROMACIL	56,128	55,821	56,427	56,476	48,929	62,774	85,097	68,162	52,049	67,759
BROMACIL, LITHIUM SALT	3,217	4,016	3,025	1,801	1,059	2,529	1,172	1,851	896	1,835
DIURON	1,105,536	1,302,603	1,344,596	1,398,123	955,983	1,051,245	860,492	734,757	621,930	583,070
NORFLURAZON	208,667	187,927	146,408	139,960	94,037	107,763	77,615	58,590	44,762	43,686
PROMETON	2	21	2	20	3	8	3	3	1	6
SIMAZINE	585,400	632,901	670,916	729,850	623,806	635,486	538,627	438,952	419,423	378,072
TOTAL	2,023,534	2,244,862	2,282,050	2,367,187	1,759,800	1,898,460	1,595,981	1,339,482	1,172,392	1,110,489

Table 11: *The reported cumulative acres treated with pesticides that are on the "a" part of DPR's groundwater protection list. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800(a). Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ATRAZINE	33,376	28,589	29,966	26,989	24,085	21,834	17,382	16,766	15,767	19,990
ATRAZINE, OTHER RELATED	33,376	28,589	29,966	26,989	24,085	21,834	17,382	16,766	15,767	19,990
BENTAZON, SODIUM SALT	432	1,094	987	1,279	2,218	2,217	4,215	6,631	6,424	5,561
BROMACIL	30,149	29,585	27,974	26,204	21,886	19,132	20,455	21,471	24,420	28,757
BROMACIL, LITHIUM SALT	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
DIURON	788,559	796,904	843,897	971,628	894,073	886,032	702,939	514,554	405,137	515,936
NORFLURAZON	192,305	161,746	125,619	125,802	81,589	91,035	74,085	58,866	44,503	45,638
PROMETON	<1	174	49	171	6	168	4	35	2	20
SIMAZINE	515,419	561,349	546,678	588,016	463,244	480,142	411,719	320,992	339,117	288,896
TOTAL	1,532,564	1,552,171	1,548,690	1,716,706	1,466,859	1,483,320	1,212,529	919,200	812,098	876,869

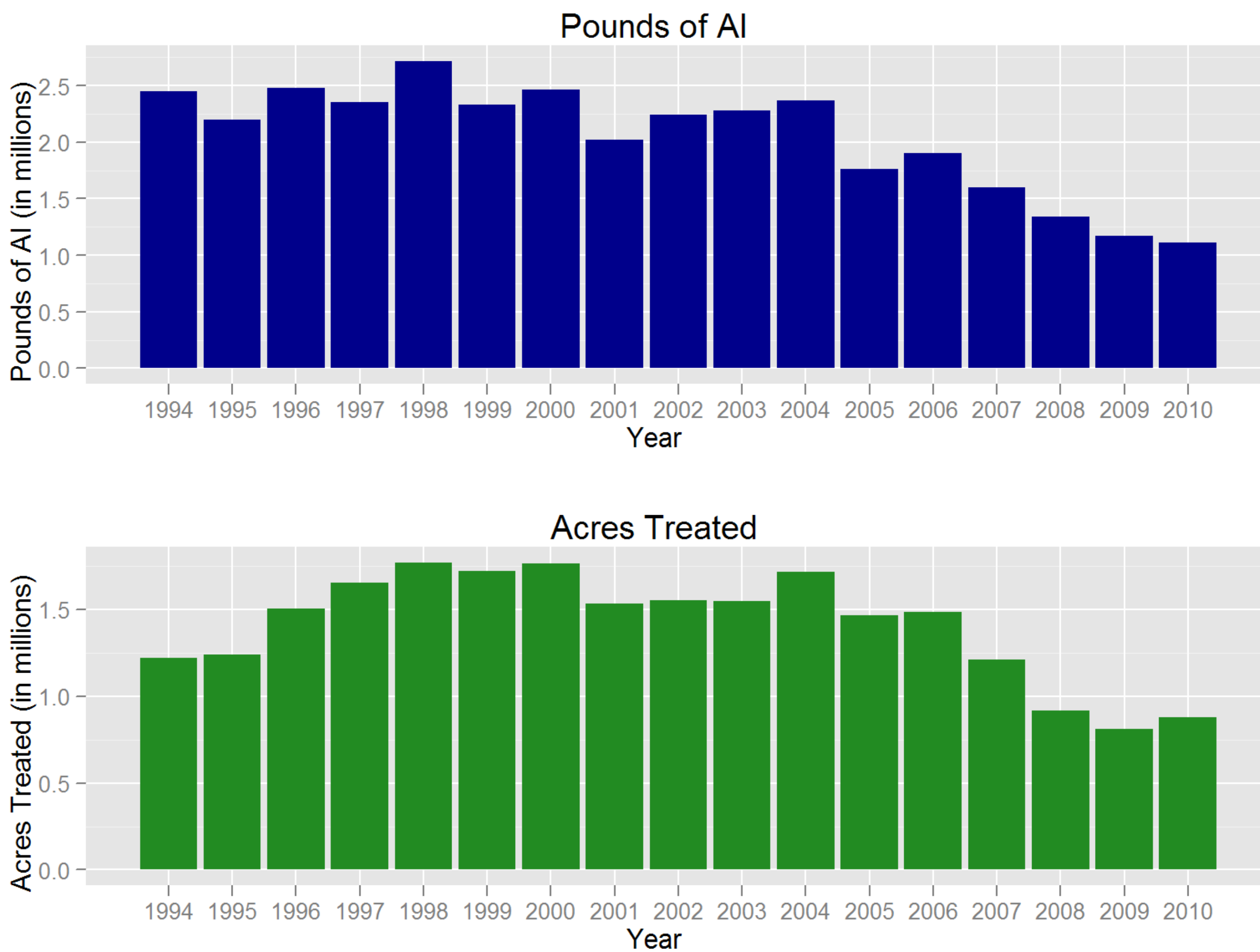

Figure 4: *Use trends of pesticides that are on the "a" part of DPR's groundwater protection list. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800(a). Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF PESTICIDES ON DPR'S TOXIC AIR CONTAMINANTS LIST.

Table 12: *The reported pounds of pesticides used that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860. Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1,3-DICHLOROPROPENE	4,141,173	5,413,807	7,003,873	8,945,145	9,355,308	8,733,270	9,594,517	9,704,804	6,392,604	8,771,323
2,4-D	1,787	1,733	1,732	1,796	1,552	1,735	2,755	11,619	10,787	12,066
2,4-D, 2-ETHYLHEXYL ESTER	13,706	15,801	19,715	21,130	26,632	21,062	15,029	20,464	15,103	73,700
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	674	452	1,357	624	458	16	29	25	131	516
2,4-D, BUTOXYETHANOL ESTER	5,336	3,556	3,812	4,782	8,190	1,720	843	1,775	2,751	618
2,4-D, BUTOXYPROPYL ESTER	3	0	0	0	0	<1	0	13	0	0
2,4-D, BUTYL ESTER	<1	593	2	0	10	15	9	0	2	3
2,4-D, DIETHANOLAMINE SALT	6,667	8,080	8,831	5,022	3,961	2,947	4,025	5,533	4,913	6,840
2,4-D, DIMETHYLAMINE SALT	395,537	425,706	511,519	470,871	454,762	438,864	395,887	466,872	446,575	482,689
2,4-D, DODECYLAMINE SALT	257	322	0	0	0	0	0	0	0	0
2,4-D, HEPTYLAMINE SALT	0	<1	0	0	0	0	0	0	0	0
2,4-D, ISOOCTYL ESTER	15,828	12,380	12,366	10,039	10,314	10,627	11,572	9,603	4,446	4,021
2,4-D, ISOPROPYL ESTER	6,584	7,833	8,319	9,066	10,825	10,559	10,057	10,671	13,123	11,603
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	0	0	0	0	0	0	0	0	0	0
2,4-D, OCTYL ESTER	0	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	391	634	326	472	382	398	212	141	99	57
2,4-D, TETRADECYLAMINE SALT	60	75	0	0	0	0	0	0	0	0
2,4-D, TRIETHYLAMINE SALT	634	426	435	386	203	1,614	383	332	472	2,829
2,4-D, TRIISOPROPANOLAMINE SALT	0	565	550	742	672	1,133	985	1,140	1,930	2,092
2,4-D, TRIISOPROPYLAMINE SALT	5	9	6	0	0	458	636	472	1,941	1,613
ACROLEIN	233,928	282,590	272,733	211,014	257,189	246,659	201,112	215,822	161,637	121,861
ALUMINUM PHOSPHIDE	99,856	169,218	119,512	131,303	135,751	150,555	104,840	132,296	108,083	106,370
ARSENIC ACID	12,023	4,976	318	223	68	3	0	0	0	0
ARSENIC PENTOXIDE	259,400	194,650	129,889	12,705	180,505	474,517	7,805	7,433	400	16,144
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
CAPTAN	399,146	395,575	498,445	370,418	468,413	508,939	449,328	361,867	329,623	439,879
CAPTAN, OTHER RELATED	9,014	9,020	11,309	8,271	10,540	11,748	10,325	8,297	7,498	9,900
CARBARYL	286,199	256,098	205,102	240,135	190,633	157,000	142,010	126,665	135,313	113,050
CHLORINE	296,469	502,944	619,735	516,546	613,837	730,986	857,144	1,278,580	585,673	1,011,376
CHROMIC ACID	363,225	272,300	182,022	17,753	252,176	662,927	10,904	10,384	559	22,555
DAZOMET	44,299	45,020	34,848	58,492	48,263	34,310	37,537	40,272	65,725	60,106
DDVP	12,833	8,477	3,446	3,807	4,914	6,577	6,376	6,859	4,164	4,157

Table 12: (continued) *The reported pounds of pesticides used that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ENDOSULFAN	153,479	142,524	134,080	153,339	83,275	92,757	52,403	59,917	41,840	35,877
ETHYLENE OXIDE	3	0	0	0	0	0	2	3	7	0
FORMALDEHYDE	28,612	14,035	18,690	111,151	48,968	73,392	47,733	24,306	3,972	5,511
HYDROGEN CHLORIDE	4,276	4,256	3,222	2,529	14,755	2,464	1,470	4,318	3,976	2,240
LINDANE	2,388	1,630	908	775	40	379	2	21	8	18
MAGNESIUM PHOSPHIDE	2,492	4,824	2,844	2,621	3,156	3,931	4,984	10,507	8,009	12,232
MANCOZEB	428,738	396,912	535,600	379,539	642,444	660,848	408,312	330,238	281,608	750,169
MANEB	816,548	851,819	1,026,804	954,085	1,122,684	1,175,939	1,055,375	861,006	656,527	369,668
META-CRESOL	1	1	1	2	1	<1	<1	<1	<1	<1
METAM-SODIUM	12,562,799	15,116,768	14,822,689	14,698,228	12,991,279	11,422,382	9,923,453	9,489,335	9,027,455	11,000,336
METHANOL	0	0	0	0	0	0	0	0	0	0
METHIDATHION	93,521	68,389	54,398	61,204	48,857	56,691	45,633	47,203	47,319	51,190
METHOXYCHLOR	41	144	3	1	13	130	6	0	8	270
METHOXYCHLOR, OTHER RELATED	<1	0	0	<1	<1	0	0	0	0	0
METHYL BROMIDE	6,625,336	7,008,644	7,289,389	7,105,612	6,504,576	6,541,159	6,438,044	5,693,325	5,615,653	3,867,829
METHYL ISOTHIOCYANATE	2,871	3,512	547	1,357	1,549	1,073	388	0	0	73
METHYL PARATHION	59,620	53,955	73,365	71,525	78,821	84,785	75,368	34,110	25,770	21,427
METHYL PARATHION, OTHER RELATED	3,126	2,833	3,857	3,763	4,145	4,447	3,959	1,792	1,355	1,127
NAPHTHALENE	0	<1	23	0	<1	0	0	0	0	1
PARA-DICHLOROBENZENE	11	1	25	10	139	0	15	1	17	0
PARATHION	2,589	3,205	611	240	855	1,542	479	33	118	285
PCNB	50,937	43,450	38,989	34,176	37,942	32,786	30,688	29,188	24,637	37,022
PCP, OTHER RELATED	2	2	<1	<1	<1	3	2	1	0	<1
PCP, SODIUM SALT	<1	0	0	0	0	0	<1	0	0	0
PCP, SODIUM SALT, OTHER RELATED	0	0	0	0	0	0	<1	0	0	0
PENTACHLOROPHENOL	14	17	3	2	3	27	22	4	0	3
PHENOL	30	0	<1	9	71	<1	0	0	2	0
PHOSPHINE	44	901	1,141	1,664	2,688	2,774	5,262	48,243	29,527	11,261
PHOSPHORUS	3	1	1	1	<1	2	<1	<1	<1	1
POTASSIUM N-METHYLDITHIOCARBAMATE	464,882	1,175,168	1,911,698	851,181	1,994,072	3,202,884	3,785,436	5,524,647	4,102,412	4,830,188
POTASSIUM PERMANGANATE	0	0	0	0	0	0	0	0	109	0
PROPOXUR	611	450	306	223	220	212	191	188	202	298
PROPYLENE OXIDE	99,727	99,674	99,396	151,484	147,324	133,028	109,936	105,600	111,609	300,008
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	257,062	190,149	233,640	179,690	100,210	78,084	45,757	16,335	8,161	18,427
SODIUM CYANIDE	2,437	2,542	2,808	2,865	3,086	2,853	2,670	3,406	2,579	2,502
SODIUM DICHROMATE	329	633	217	0	0	0	0	0	0	0
SODIUM TETRATHIOCARBONATE	375,487	352,342	212,308	259,542	330,886	171,194	386,876	354,294	249,580	233,949

Table 12: (continued) *The reported pounds of pesticides used that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SULFURYL FLUORIDE	2,585,680	3,047,882	3,138,687	3,270,698	3,394,126	2,880,853	2,152,451	2,120,860	2,184,823	2,698,254
TRIFLURALIN	934,018	1,091,597	1,061,631	1,023,142	1,027,804	1,041,805	899,604	676,346	533,305	472,480
XYLENE	9,544	2,680	4,349	2,109	1,598	1,418	1,173	576	517	1,078
ZINC PHOSPHIDE	1,116	981	1,253	1,924	2,371	3,794	3,215	1,299	20,898	1,702
TOTAL	32,173,409	37,714,758	40,323,686	40,365,436	40,623,517	39,882,274	37,345,228	37,859,040	31,275,556	36,000,798

Table 13: *The reported cumulative acres treated with pesticides that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860. Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1,3-DICHLOROPROPENE	30,817	42,172	48,944	56,618	51,486	49,885	53,937	57,922	38,374	54,049
2,4-D	3,952	2,304	2,562	3,377	1,466	2,824	7,405	33,344	25,244	21,910
2,4-D, 2-ETHYLHEXYL ESTER	6,919	10,260	22,426	20,642	21,360	15,303	8,362	15,047	9,020	11,089
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	359	264	630	1,475	403	6	23	55	270	172
2,4-D, BUTOXYETHANOL ESTER	5,633	2,655	2,539	3,835	2,950	1,600	1,297	3,648	5,110	691
2,4-D, BUTOXYPROPYL ESTER	8	0	0	0	0	<1	0	<1	0	0
2,4-D, BUTYL ESTER	0	101	<1	0	8	1	10	0	6	<1
2,4-D, DIETHANOLAMINE SALT	27,705	36,290	39,046	22,729	18,739	13,826	13,339	19,085	18,931	26,872
2,4-D, DIMETHYLAMINE SALT	475,796	491,242	595,235	553,369	567,143	523,912	487,361	543,863	527,098	514,416
2,4-D, DODECYLAMINE SALT	262	276	0	0	0	0	0	0	0	0
2,4-D, HEPTYLAMINE SALT	0	<1	0	0	0	0	0	0	0	0
2,4-D, ISOOCTYL ESTER	16,375	6,964	9,476	7,502	6,532	7,638	7,143	4,708	2,673	2,424
2,4-D, ISOPROPYL ESTER	88,849	108,908	116,840	117,870	144,377	146,090	137,055	135,797	132,302	137,727
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	0	0	0	0	0	0	0	0	0	0
2,4-D, OCTYL ESTER	0	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	5,200	7,468	5,509	8,680	5,261	5,660	3,348	1,955	1,750	895
2,4-D, TETRADECYLAMINE SALT	262	276	0	0	0	0	0	0	0	0
2,4-D, TRIETHYLAMINE SALT	1,257	688	1,035	677	243	815	473	679	740	165
2,4-D, TRIISOPROPANOLAMINE SALT	0	<1	5	209	396	392	108	952	541	720
2,4-D, TRIISOPROPYLAMINE SALT	<1	<1	<1	0	0	<1	204	<1	<1	<1
ACROLEIN	1,409	2,206	642	575	73	18	141	1,027	1,497	12
ALUMINUM PHOSPHIDE	67,422	70,367	73,869	74,762	63,289	79,951	84,963	80,989	112,023	100,859
ARSENIC ACID	<1	<1	<1	<1	<1	<1	0	0	0	0
ARSENIC PENTOXIDE	56	<1	<1	48	<1	<1	<1	<1	<1	<1
ARSENIC TRIOXIDE	<1	0	<1	<1	1	<1	<1	<1	<1	<1
CAPTAN	215,969	215,412	271,140	211,028	252,040	262,936	215,787	198,022	173,133	240,177
CAPTAN, OTHER RELATED	215,958	215,362	270,968	209,571	251,846	262,860	215,152	197,855	173,083	240,177
CARBARYL	147,612	106,616	97,811	103,261	99,086	87,789	97,016	95,982	107,458	80,067
CHLORINE	95	150	650	2,137	<1	431	1,201	14,414	24,644	88,144
CHROMIC ACID	56	<1	<1	<1	<1	<1	<1	<1	<1	<1
DAZOMET	224	136	326	298	113	124	700	183	301	274
DDVP	3,954	4,327	2,576	1,637	7,445	1,526	2,733	2,231	2,685	1,880
ENDOSULFAN	177,030	162,460	156,711	180,387	97,745	111,338	56,627	64,695	48,639	46,513

Table 13: (continued) *The reported cumulative acres treated with pesticides that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ETHYLENE OXIDE	<1	0	0	0	0	0	<1	2	60	0
FORMALDEHYDE	53	33	18	23	2	265	57	67	5	1
HYDROGEN CHLORIDE	27	590	273	1	17	18	4	46	49	116
LINDANE	13,832	8,010	8,828	9,437	557	9	0	37	10	31
MAGNESIUM PHOSPHIDE	373	7	167	1	23	29	6	143	32	145
MANCOZEB	228,275	197,196	276,093	194,219	370,266	348,360	212,354	169,422	145,616	427,923
MANEB	535,105	554,904	660,011	601,360	730,254	675,941	655,235	558,506	471,321	289,377
META-CRESOL	517	267	244	288	164	50	54	38	108	79
METAM-SODIUM	125,417	141,415	142,406	128,427	97,562	102,451	78,030	71,815	74,132	70,431
METHANOL	0	0	0	0	0	0	0	0	0	0
METHIDATHION	64,785	48,554	38,516	45,281	37,751	34,786	37,301	43,010	54,227	49,662
METHOXYCHLOR	88	24	<1	44	26	395	43	0	75	90
METHOXYCHLOR, OTHER RELATED	<1	0	0	<1	<1	0	0	0	0	0
METHYL BROMIDE	60,892	53,140	55,254	57,385	45,700	50,677	45,675	35,685	39,587	28,062
METHYL ISOTHIOCYANATE	<1	<1	<1	<1	<1	<1	<1	0	0	<1
METHYL PARATHION	39,449	37,514	51,252	48,640	49,771	51,184	45,173	21,574	15,198	13,046
METHYL PARATHION, OTHER RELATED	39,209	37,244	51,177	48,609	49,644	50,762	45,165	21,331	15,053	13,029
NAPHTHALENE	<1	20	<1	0	2	0	0	0	0	3
PARA-DICHLOROBENZENE	<1	<1	<1	<1	<1	0	<1	0	<1	<1
PARATHION	2,977	7,026	1,006	392	717	713	414	101	195	76
PCNB	25,832	9,533	7,759	3,817	3,001	1,496	1,764	1,656	1,400	4,429
PCP, OTHER RELATED	38	<1	<1	20	3	0	10	46	0	4
PCP, SODIUM SALT	<1	0	0	0	0	0	<1	0	0	0
PCP, SODIUM SALT, OTHER RELATED	0	0	0	0	0	0	<1	0	0	0
PENTACHLOROPHENOL	38	<1	<1	20	3	0	10	46	0	4
PHENOL	501	0	25	310	239	<1	0	0	15	0
PHOSPHINE	<1	<1	<1	349	22	23	3	1,751	50	643
PHOSPHORUS	252	<1	<1	<1	23	<1	10	<1	<1	<1
POTASSIUM N-METHYLDITHIOCARBAMATE	2,321	9,073	12,887	10,229	19,670	27,299	42,988	56,009	38,197	41,433
POTASSIUM PERMANGANATE	0	0	0	0	0	0	0	0	5	0
PROPOXUR	4	23	1	7	8	2	<1	10	356	<1
PROPYLENE OXIDE	<1	<1	<1	22	185	20	<1	12	<1	<1
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	187,153	129,570	158,604	133,535	74,538	52,330	31,408	10,850	7,182	15,785
SODIUM CYANIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
SODIUM DICHROMATE	<1	<1	<1	0	0	0	0	0	0	0
SODIUM TETRATHIOCARBONATE	13,574	11,558	6,832	8,497	7,977	6,170	11,485	10,725	7,180	7,301
SULFURYL FLUORIDE	<1	<1	50	2	<1	78	9	57	361	130

Table 13: (continued) *The reported cumulative acres treated with pesticides that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860.*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
TRIFLURALIN	800,893	944,407	903,654	920,545	886,258	901,629	772,753	556,256	492,498	438,011
XYLENE	9,665	4,533	7,502	3,375	2,722	1,824	2,021	1,418	1,387	609
ZINC PHOSPHIDE	11,069	7,234	8,387	14,150	9,038	15,284	9,301	11,478	14,512	12,476
TOTAL	3,352,494	3,388,615	3,735,305	3,516,643	3,655,334	3,566,012	3,110,186	2,800,867	2,571,554	2,700,429

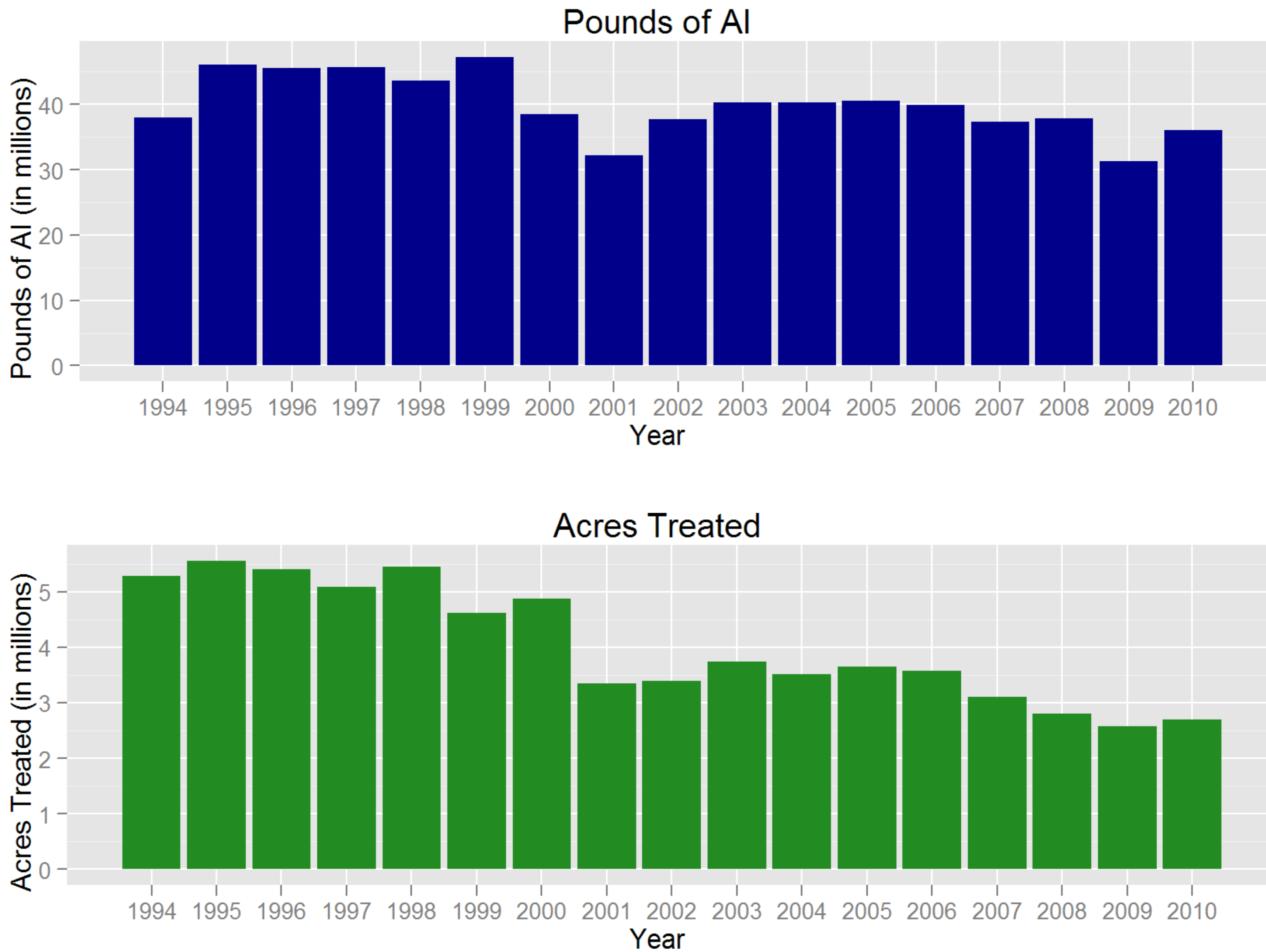

Figure 5: *Use trends of pesticides that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860. Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF PESTICIDES THAT ARE FUMIGANTS.

Table 14: *The reported pounds of pesticides used that are fumigants. Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1,2-DICHLOROPROPANE, 1,3-DICHLOROPROPENE AND RELATED C3 COMPOUNDS	110	331	393	22	0	182	10,532	0	0	0
1,3-DICHLOROPROPENE	4,141,173	5,413,807	7,003,873	8,945,145	9,355,308	8,733,270	9,594,517	9,704,804	6,392,604	8,771,323
ALUMINUM PHOSPHIDE	99,856	169,218	119,512	131,303	135,751	150,555	104,840	132,296	108,083	106,370
CARBON TETRACHLORIDE	2	5	1	<1	0	0	180	1,980	<1	0
CHLOROPICRIN	4,279,229	4,672,910	4,929,628	5,142,018	4,871,549	5,037,520	5,496,592	5,586,463	5,687,600	5,824,800
DAZOMET	44,299	45,020	34,848	58,492	48,263	34,310	37,537	40,272	65,725	60,106
ETHYLENE DIBROMIDE	2,593	<1	<1	3	0	0	3	127	<1	0
ETHYLENE DICHLORIDE	4	11	0	1	0	0	0	<1	0	0
ETHYLENE OXIDE	3	0	0	0	0	0	2	3	7	0
MAGNESIUM PHOSPHIDE	2,492	4,824	2,844	2,621	3,156	3,931	4,984	10,507	8,009	12,232
METAM-SODIUM	12,562,799	15,116,768	14,822,689	14,698,228	12,991,279	11,422,382	9,923,453	9,489,335	9,027,455	11,000,336
METHYL BROMIDE	6,625,336	7,008,644	7,289,389	7,105,612	6,504,576	6,541,159	6,438,044	5,693,325	5,615,653	3,867,829
PHOSPHINE	44	901	1,141	1,664	2,688	2,774	5,262	48,243	29,527	11,261
POTASSIUM N-METHYLDITHIOCARBAMATE	464,882	1,175,168	1,911,698	851,181	1,994,072	3,202,884	3,785,436	5,524,647	4,102,412	4,830,188
PROPYLENE OXIDE	99,727	99,674	99,396	151,484	147,324	133,028	109,936	105,600	111,609	300,008
SODIUM TETRATHIOCARBONATE	375,487	352,342	212,308	259,542	330,886	171,194	386,876	354,294	249,580	233,949
SULFURYL FLUORIDE	2,585,680	3,047,882	3,138,687	3,270,698	3,394,126	2,880,853	2,152,451	2,120,860	2,184,823	2,698,254
ZINC PHOSPHIDE	1,116	981	1,253	1,924	2,371	3,794	3,215	1,299	20,898	1,702
TOTAL	31,284,832	37,108,487	39,567,660	40,619,938	39,781,350	38,317,835	38,053,858	38,814,057	33,603,984	37,718,359

Table 15: *The reported cumulative acres treated with pesticides that are fumigants. Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1,2-DICHLOROPROPANE, 1,3-DICHLOROPROPENE AND RELATED C3 COMPOUNDS	370	44	45	9	0	32	108	0	0	0
1,3-DICHLOROPROPENE	30,817	42,172	48,944	56,618	51,486	49,885	53,937	57,922	38,374	54,049
ALUMINUM PHOSPHIDE	67,422	70,367	73,869	74,762	63,289	79,951	84,963	80,989	112,023	100,859
CARBON TETRACHLORIDE	<1	<1	<1	<1	0	0	<1	161	<1	0
CHLOROPICRIN	65,166	58,907	58,460	60,932	53,797	56,129	55,678	53,964	49,639	47,860
DAZOMET	224	136	326	298	113	124	700	183	301	274
ETHYLENE DIBROMIDE	52	<1	<1	<1	0	0	<1	<1	<1	0
ETHYLENE DICHLORIDE	<1	<1	0	<1	0	0	0	160	0	0
ETHYLENE OXIDE	<1	0	0	0	0	0	<1	2	60	0
MAGNESIUM PHOSPHIDE	373	7	167	1	23	29	6	143	32	145
METAM-SODIUM	125,417	141,415	142,406	128,427	97,562	102,451	78,030	71,815	74,132	70,431
METHYL BROMIDE	60,892	53,140	55,254	57,385	45,700	50,677	45,675	35,685	39,587	28,062
PHOSPHINE	<1	<1	<1	349	22	23	3	1,751	50	643
POTASSIUM N-METHYLDITHIOCARBAMATE	2,321	9,073	12,887	10,229	19,670	27,299	42,988	56,009	38,197	41,433
PROPYLENE OXIDE	<1	<1	<1	22	185	20	<1	12	<1	<1
SODIUM TETRATHIOCARBONATE	13,574	11,558	6,832	8,497	7,977	6,170	11,485	10,725	7,180	7,301
SULFURYL FLUORIDE	<1	<1	50	2	<1	78	9	57	361	130
ZINC PHOSPHIDE	11,069	7,234	8,387	14,150	9,038	15,284	9,301	11,478	14,512	12,476
TOTAL	315,720	341,296	356,352	356,814	300,847	337,084	333,549	333,467	331,212	323,446

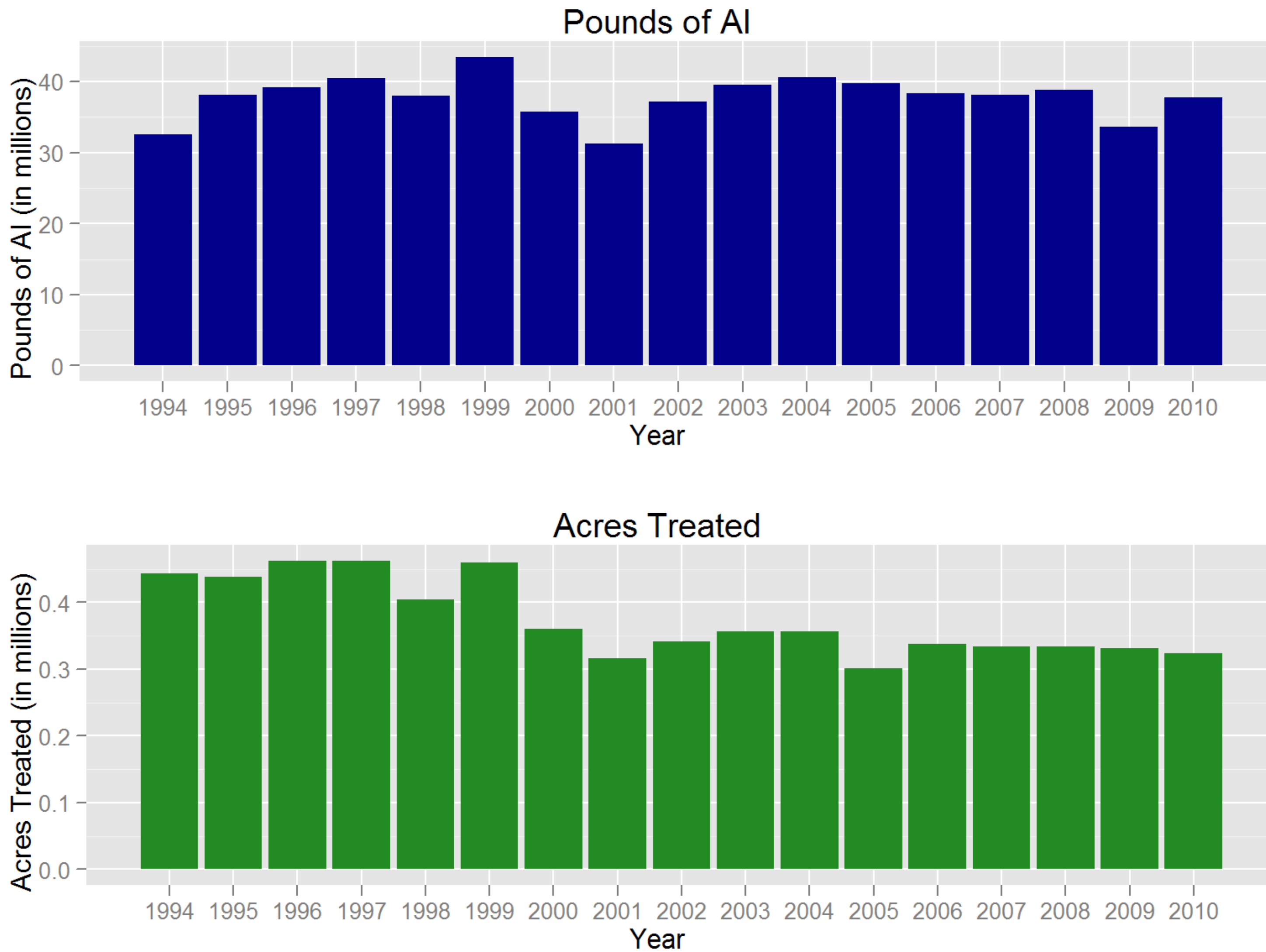

Figure 6: *Use trends of pesticides that are fumigants. Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF OIL PESTICIDES.

Table 16: *The reported pounds of pesticides used that are oils. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of B2 carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides that may not qualify as carcinogenic due to their degree of refinement. Many such oil pesticides also serve as alternatives to high-toxicity chemicals. For this reason, oil pesticide data was classified separately in this report. Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
COAL TAR HYDROCARBONS	50	<1	0	0	0	0	0	0	0	0
HYDROTREATED PARAFFINIC SOLVENT	189,538	206,552	283,768	320,019	244,114	252,134	274,358	247,676	248,774	224,394
ISOPARAFFINIC HYDROCARBONS	45,763	22,479	23,707	30,125	31,183	18,997	16,859	11,250	13,007	6,628
KEROSENE	49,037	20,973	17,144	14,243	7,983	11,373	12,137	22,269	148,476	96,146
MINERAL OIL	5,405,244	7,341,195	9,250,426	9,939,325	10,613,463	12,385,824	12,841,935	12,265,171	11,628,302	11,373,821
MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT REFINED LIGHT	0	0	0	0	0	169	139	219	124	401
NAPHTHA, HEAVY AROMATIC	29	0	2	53	0	0	0	0	0	0
PETROLEUM DERIVATIVE RESIN	1	<1	1	1	4	5	0	0	1	0
PETROLEUM DISTILLATES	1,730,640	1,120,617	828,663	714,744	609,729	297,049	342,854	504,035	548,178	341,001
PETROLEUM DISTILLATES, ALIPHATIC	7	49,237	15,163	30,638	34,152	34,017	18,323	16,390	10,493	15,479
PETROLEUM DISTILLATES, AROMATIC	2,851	6,182	2,916	5,486	2,092	2,136	1,160	367	103	243
PETROLEUM DISTILLATES, REFINED	846,418	318,728	371,411	1,023,900	779,702	1,175,944	1,237,632	1,487,043	1,222,830	2,005,083
PETROLEUM HYDROCARBONS	3,185	1,019	985	642	956	1,574	1,407	184	138	177
PETROLEUM NAPHTHENIC OILS	91	325	208	24	48	158	240	248	254	878
PETROLEUM OIL, PARAFFIN BASED	418,474	281,516	364,770	433,848	405,894	558,255	505,002	506,839	1,048,107	616,474
PETROLEUM OIL, UNCLASSIFIED	13,668,208	15,929,777	15,527,171	15,932,497	16,232,606	18,241,502	13,418,833	13,583,475	12,243,301	12,479,705
PETROLEUM SULFONATES	<1	<1	0	0	0	<1	<1	<1	0	0
TOTAL	22,359,538	25,298,602	26,686,335	28,445,546	28,961,925	32,979,137	28,670,881	28,645,166	27,112,088	27,160,431

Table 17: *The reported cumulative acres treated with pesticides that are oils. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of B2 carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides that may not qualify as carcinogenic due to their degree of refinement. Many such oil pesticides also serve as alternatives to high-toxicity chemicals. For this reason, oil pesticide data was classified separately in this report. Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
COAL TAR HYDROCARBONS	<1	<1	0	0	0	0	0	0	0	0
HYDROTREATED PARAFFINIC SOLVENT	192,296	220,789	306,243	327,022	252,863	270,421	261,415	226,988	232,299	227,294
ISOPARAFFINIC HYDROCARBONS	92,768	53,847	56,120	67,795	55,920	39,757	27,903	19,228	22,913	13,709
KEROSENE	199,672	194,210	291,162	264,266	314,821	348,522	254,279	284,440	303,415	317,190
MINERAL OIL	226,195	246,310	337,986	407,046	478,445	596,338	816,214	857,136	983,570	1,138,666
MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT REFINED LIGHT	0	0	0	0	0	959	522	1,010	850	1,255
NAPHTHA, HEAVY AROMATIC	10	0	<1	<1	0	0	0	0	0	0
PETROLEUM DERIVATIVE RESIN	<1	<1	<1	<1	10	<1	0	0	<1	0
PETROLEUM DISTILLATES	221,743	210,498	237,198	244,673	171,158	180,495	280,747	422,253	277,893	237,774
PETROLEUM DISTILLATES, ALIPHATIC	5,104	44,494	26,131	25,904	22,723	34,136	31,441	28,159	30,905	57,764
PETROLEUM DISTILLATES, AROMATIC	1,900	3,935	1,808	519	385	658	383	107	225	445
PETROLEUM DISTILLATES, REFINED	48,446	35,413	39,830	79,589	117,570	200,933	231,860	288,363	258,026	273,890
PETROLEUM HYDROCARBONS	4,029	3,269	2,869	108	430	260	546	334	309	159
PETROLEUM NAPHTHENIC OILS	5,118	13,241	11,314	2,484	358	11,125	17,950	18,093	22,435	44,459
PETROLEUM OIL, PARAFFIN BASED	448,032	417,941	488,928	555,670	605,289	724,671	738,037	658,709	631,120	671,924
PETROLEUM OIL, UNCLASSIFIED	572,825	657,135	615,742	653,743	717,903	807,931	674,659	702,988	693,284	759,882
PETROLEUM SULFONATES	<1	<1	0	0	0	<1	<1	<1	0	0
TOTAL	2,007,065	2,080,932	2,395,024	2,621,876	2,734,754	3,202,318	3,315,954	3,487,383	3,431,828	3,699,674

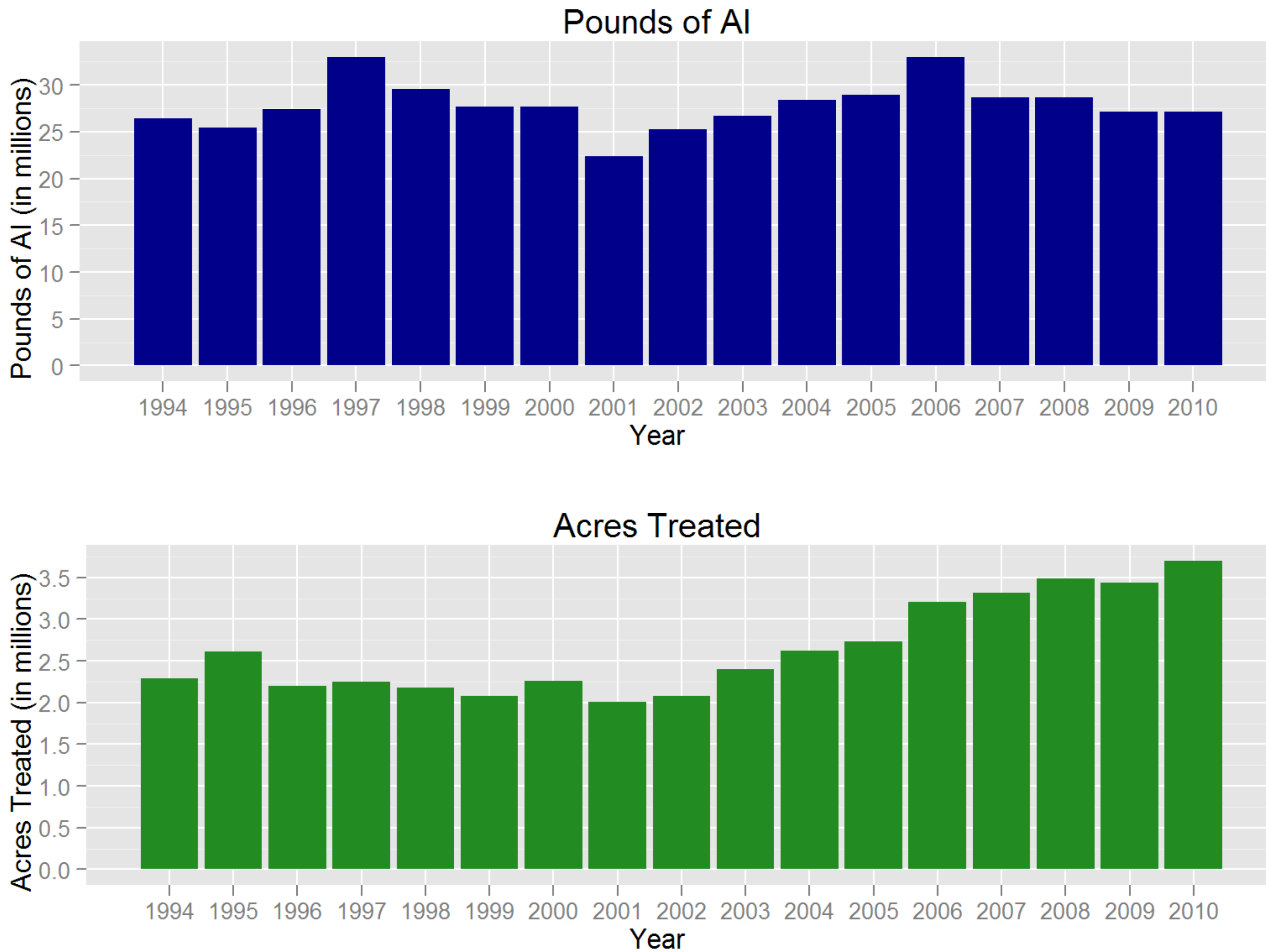

Figure 7: *Use trends of pesticides that are oils. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of B2 carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides that may not qualify as carcinogenic due to their degree of refinement. Many such oil pesticides also serve as alternatives to high-toxicity chemicals. For this reason, oil pesticide data was classified separately in this report. Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF BIOPESTICIDES.

Table 18: *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones). Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(3S, 6R)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	0	0	1	<1	<1	<1	0	0	<1	0
(3S, 6S)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	0	0	<1	<1	<1	<1	0	0	<1	0
(E)-4-TRIDECEN-1-YL-ACETATE	182	247	254	131	68	103	113	176	80	94
(E)-5-DECENOL	2	2	295	5	<1	4	2	2	1	1
(E)-5-DECENYL ACETATE	9	12	889	23	<1	17	7	8	4	5
(E,E)-9, 11-TETRADECADIEN-1-YL ACETATE	0	0	0	0	0	0	39	28	11	2
(E,Z)-7,9-DODECADIEN-1-YL ACETATE	0	0	0	0	0	0	0	0	0	50
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	0	<1	<1	0	0	0	0	0
(S)-KINOPRENE	311	327	418	359	289	201	235	252	276	277
(Z)-11-HEXADECEN-1-YL ACETATE	0	35	10	10	5	6	2	0	681	0
(Z)-11-HEXADECENAL	0	35	10	10	5	6	2	0	0	0
(Z)-4-TRIDECEN-1-YL-ACETATE	6	8	8	4	2	3	4	6	3	3
(Z)-9-DODECENYL ACETATE	0	0	0	0	<1	<1	1	<1	<1	<1
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	13	2	0	0	0	0	0	<1	3	2
(Z,Z)-11,13-HEXADECADIENAL	0	0	0	0	0	0	<1	<1	0	<1
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	<1	3	0	0	0	0	0	0	3	3
1,7-DIOXASPIRO-(5,5)-UNDECANE	0	0	<1	0	<1	<1	<1	<1	<1	<1
1-DECANOL	<1	0	0	0	0	0	0	0	0	0
1-METHYLCYCLOPROPENE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1-NAPHTHALENEACETAMIDE	213	88	119	113	55	30	49	55	32	25
3,13 OCTADECADIEN-1-YL ACETATE	0	0	0	0	0	0	0	44	0	1
3,7-DIMETHYL-6-OCTEN-1-OL	0	0	0	0	0	0	0	1	5	23
ACETIC ACID	<1	<1	<1	<1	<1	0	1	21	79	1,732
AGROBACTERIUM RADIOBACTER	114	144	211	183	27	291	371	32	142	124
AGROBACTERIUM RADIOBACTER, STRAIN K1026	<1	1	<1	<1	<1	6	<1	<1	1	<1
ALLYL ISOTHIOCYANATE	<1	<1	<1	<1	<1	<1	0	0	0	0
ALMOND, BITTER	0	0	0	0	0	<1	<1	<1	<1	<1

Table 18: (continued) *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AMINO ETHOXY VINYL GLYCINE HYDROCHLORIDE	1	1	0	0	24	703	894	1,073	543	1,024
AMMONIUM BICARBONATE	0	0	10	0	<1	2	7	2	<1	9
AMPELOMYCES QUISQUALIS	2	<1	<1	<1	<1	<1	<1	0	<1	<1
ANIMAL GLAND EXTRACTS	44	0	0	0	0	0	0	0	0	0
ASPERGILLUS FLAVUS STRAIN AF36	0	0	0	0	<1	0	0	0	0	0
AZADIRACHTIN	1,523	1,474	1,366	2,915	1,340	2,407	2,224	2,246	2,500	1,872
BACILLUS PUMILUS, STRAIN QST 2808	0	0	<1	2	3,546	5,636	6,981	8,138	6,987	6,783
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	7,941	4,667	10,158	14,187	34,154	45,430	20,192	21,441	18,178	13,013
BACILLUS SUBTILIS GB03	1	4	5	7	15	14	6	1	<1	<1
BACILLUS THURINGIENSIS (BERLINER)	115	16	11	12	16	35	27	16	4	6
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	3,953	3,980	5,024	4,088	11,255	9,377	20,474	20,484	27,539	20,397
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	5,511	3,889	7,548	3,014	2,335	1,752	2,877	2,361	894	752
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	24,711	8,226	11,327	9,251	11,864	14,309	8,259	9,433	17,202	11,401
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	7,132	23,432	27,174	16,576	16,580	16,042	22,702	12,325	12,128	7,424
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	31,046	3,423	6,161	3,916	1,931	2,272	987	460	402	150
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	2,743	1,481	222	107	211	281	147	369	118	66
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	58	19	39	2	5	1	0	0	0	<1
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	13,540	22,282	19,683	20,348	53,051	54,234	63,851	66,612	80,565	75,023
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	8	1	2	1	<1	2	2	0	<1	<1

Table 18: (continued) *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	79	164	130	10	1	3	0	764	118	14
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	8,739	681	1,503	344	338	3,872	632	277	42	1
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	<1	0	<1	0	0	0	<1	0	<1	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	14,734	439	1,527	930	1,919	1,384	154	442	95	0
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN ABTS-1857	0	10,540	21,956	27,075	33,336	28,878	32,526	39,464	31,043	26,238
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	498	1,322	562	347	315	432	563	256	243	130
BACILLUS THURINGIENSIS, SUBSP. ISRAELENSIS, STRAIN AM 65-52	271	9,485	29,326	23,001	41,734	59,018	40,376	52,969	53,778	70,957
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN ABTS-351, FERMENTATION SOLIDS AND SOLUBLES	3,021	15,491	38,034	46,754	57,985	53,346	70,079	78,527	69,545	96,986
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	17,828	10,655	7,173	4,731	3,185	6,139	2,261	2,068	3,747	3,576
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	2,211	258	54	5	3	<1	1	26	28	<1
BALSAM FIR OIL	0	0	0	0	0	0	0	0	0	<1
BEAUVERIA BASSIANA STRAIN GHA	678	1,041	715	863	824	570	711	569	378	357
BUFFALO GOURD ROOT POWDER	0	0	0	0	0	0	137	279	1	11
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	0	0	0	0	0	0
CANOLA OIL	5	<1	1	4	1	4	29	25	17	131
CAPSICUM OLEORESIN	73	3	5	49	2	2	10	5	2	4
CASTOR OIL	297	504	1,281	363	79	37	4	4	21	7

Table 18: (continued) *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CHENOPODIUM AMBROSIODES NEAR AMBROSIODES	0	0	0	0	0	0	0	0	20,329	10,335
CHITOSAN	0	0	0	<1	0	0	0	0	0	0
CINNAMALDEHYDE	4,704	806	238	326	34	12	3	354	0	0
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	83,664	301,512	60,498	84,880	111,921	95,441	110,306	104,822	106,271	116,490
CODLING MOTH GRANULOSIS VIRUS	0	0	0	0	0	<1	<1	<1	<1	<1
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08	0	103	171	198	6	11	6	0	127	80
CORN GLUTEN MEAL	2,744	1,430	8	18	2	1	0	<1	0	0
CORN SYRUP	0	0	0	0	0	0	81	1,893	2,891	3,026
COYOTE URINE	0	0	0	0	0	0	0	0	0	<1
CYTOKININ	<1	0	<1	0	0	0	0	0	0	0
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
DIHYDRO-5-PENTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
E,E-8,10-DODECADIEN-1-OL	6,390	5,107	1,802	1,113	2,193	2,126	2,203	2,030	1,426	1,942
E-11-TETRADECEN-1-YL ACETATE	65	122	132	91	79	99	2,397	744	312	93
E-8-DODECENYL ACETATE	73	61	113	122	110	225	229	265	754	898
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	6,442	2,948	445	114	7	6	32	18	18	0
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	1	6	0	2	1	0	0	0	0	0
ESSENTIAL OILS	<1	<1	<1	1	<1	4	<1	0	<1	<1
ETHYLENE	6	3	24	32	0	0	0	0	0	97
EUCALYPTUS OIL	0	0	0	0	50	<1	0	0	0	22
EUGENOL	0	0	0	3	<1	<1	0	0	0	0
FARNESOL	15	10	9	7	10	4	2	2	3	10
FENUGREEK	0	0	0	0	0	5	31	6	17	1
FORMIC ACID	0	0	0	0	0	1	1,509	499	280	223
FOX URINE	0	0	0	0	0	0	0	0	0	<1
GAMMA AMINOBUTYRIC ACID	23	3,102	6,077	8,402	8,081	4,201	1,739	944	177	118
GARLIC	1,490	667	295	174	203	89	142	212	36	423
GERANIOL	0	0	0	0	0	<1	0	1	5	23
GERMAN COCKROACH PHEROMONE	0	<1	<1	<1	<1	<1	<1	<1	<1	<1
GIBBERELLINS	19,435	24,946	20,415	20,372	23,443	22,916	22,694	23,516	22,913	21,307
GIBBERELLINS, POTASSIUM SALT	1	<1	<1	1	<1	15	<1	<1	0	<1

Table 18: (continued) *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
GLIOCLADIUM VIRENS GL-21 (SPORES)	314	110	48	30	19	1	152	945	356	945
GLUTAMIC ACID	23	3,102	6,077	8,402	8,081	4,201	1,739	944	177	118
HARPIN PROTEIN	77	314	208	147	118	60	32	16	14	4
HEPTYL BUTYRATE	0	0	0	0	0	0	0	0	0	<1
HYDROGEN PEROXIDE	1,754	2,713	2,618	2,822	5,552	17,524	11,860	20,740	21,750	69,172
HYDROPRENE	1,380	1,656	1,043	1,309	2,910	11,970	2,282	2,383	1,664	6,367
IBA	18	16	13	19	11	31	20	11	6	7
IRON PHOSPHATE	617	545	859	1,256	1,645	1,484	1,633	1,901	1,435	2,350
LACTOSE	3,125	3,346	3,123	3,915	7,852	10,664	8,855	11,341	9,160	7,967
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	1	0	0	58	<1	0	<1	<1	0	0
LAURYL ALCOHOL	302	249	257	295	873	386	466	830	432	736
LAVANDULYL SENECIOATE	0	0	0	0	0	0	0	140	462	437
LIMONENE	40,703	37,393	28,072	14,349	45,877	32,843	68,949	45,536	56,495	56,403
LINALOOL	173	274	280	174	176	170	113	63	62	1,104
MENTHOL	0	0	58	0	93	<1	0	0	0	5
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	15	22	<1	<1	<1	<1	<1	<1	0	<1
METHOPRENE	2,483	5,117	7,875	8,874	9,900	6,941	3,357	2,620	1,568	1,491
METHYL ANTHRANILATE	37	85	34	534	151	449	152	118	312	343
METHYL SALICYLATE	<1	0	0	0	0	<1	<1	0	<1	0
MONTOK PEPPER	0	0	<1	0	0	0	0	0	0	0
MUSCALURE	2	1	11	10	14	15	22	19	20	15
MYRISTYL ALCOHOL	62	51	52	60	177	79	95	169	88	150
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	45,917	36,104	47,037	39,789	27,977	25,039	29,951	23,867	23,273	22,813
N6-BENZYL ADENINE	56	35	53	174	124	446	198	153	168	217
NAA	10	6	5	9	13	9	4	31	3	5
NAA, AMMONIUM SALT	1,617	1,796	1,758	1,356	1,543	1,100	1,253	1,193	1,203	976
NAA, ETHYL ESTER	7	13	15	1	3	1	2	8	3	6
NAA, SODIUM SALT	11	4	22	10	8	3	3	1	2	0
NEROLIDOL	12	8	7	6	8	3	2	2	6	24
NITROGEN, LIQUIFIED	478,466	561,505	321,182	79,369	82,298	57,121	15,741	11,945	2,181	135
NONANOIC ACID	14,890	11,559	7,886	7,224	8,845	11,138	10,949	11,093	9,042	17,205
NONANOIC ACID, OTHER RELATED	784	608	415	380	466	586	576	584	476	905
NOSEMA LOCUSTAE SPORES	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
OIL OF ANISE	<1	<1	<1	<1	<1	<1	<1	<1	0	0
OIL OF BERGAMOT	0	0	0	0	0	<1	0	0	0	0

Table 18: (continued) *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
OIL OF CEDARWOOD	0	0	0	0	0	0	0	0	0	<1
OIL OF CITRONELLA	33	0	10	0	<1	<1	<1	3	0	5
OIL OF CITRUS	0	0	0	0	<1	0	0	0	0	0
OIL OF GERANIUM	0	0	0	0	0	0	0	0	0	<1
OIL OF JOJOBA	1,397	1,386	1,417	3,031	3,540	9,572	7,238	12,070	3,418	4,176
OIL OF LEMONGRASS	0	0	2	0	<1	<1	0	0	0	0
OIL OF MUSTARD	0	0	0	0	0	0	0	0	0	0
OIL OF PEPPERMINT	<1	0	<1	<1	<1	0	<1	<1	0	<1
OXYPURINOL	<1	0	0	0	<1	0	<1	0	0	0
PAECILOMYCES FUMOSOROSEUS APOPKA STRAIN 97	5	0	0	0	0	0	0	0	0	0
PAECILOMYCES LILACINUS STRAIN 251	0	0	0	0	0	0	0	0	0	252
PANTOEA AGGLOMERANS STRAIN E325, NRRL B-21856	0	0	0	0	0	0	0	0	33	4
PERFUME	0	0	0	<1	0	0	0	0	0	0
POLYHEDRAL OCCLUSION BODIES (OB'S) OF THE NUCLEAR POLYHEDROSIS VIRUS OF HELICOVERPA ZEA (CORN EARWORM)	0	0	1	1	0	0	0	<1	1	1
POTASSIUM BICARBONATE	121,796	180,072	283,920	159,772	388,854	162,836	114,163	109,171	180,858	274,679
PROPYLENE GLYCOL	56,899	60,567	50,356	44,235	47,765	42,348	28,168	24,132	25,792	54,085
PSEUDOMONAS FLUORESCENS, STRAIN A506	1,102	1,361	1,972	841	896	1,004	614	390	328	217
PSEUDOMONAS SYRINGAE STRAIN ESC-11	0	<1	0	20	<1	<1	0	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	0	0	0	0	0	<1	0	0	0	<1
PUTRESCENT WHOLE EGG SOLIDS	140	184	186	110	60	69	20	1	143	3
QST 713 STRAIN OF DRIED BACILLUS SUBTILIS	7,201	18,957	17,323	16,619	14,039	17,135	16,976	16,703	16,175	21,290
QUILLAJA	0	0	0	0	0	83	272	1,183	410	682
REYNOUTRIA SACHALINENSIS	0	0	0	0	0	0	0	0	179	8,996
S-ABSCISIC ACID	0	0	0	0	0	0	0	7	66	864
S-METHOPRENE	366	867	762	530	1,138	1,391	1,726	3,520	3,284	3,921
SAWDUST	3	1	1	1	<1	2	<1	1	<1	1
SESAME OIL	0	0	0	0	0	35	883	529	851	1,309
SILVER NITRATE	0	0	0	0	0	0	0	0	0	<1
SODIUM BICARBONATE	230	2,063	0	126	0	0	0	67	27	3
SODIUM LAURYL SULFATE	9	<1	<1	3	15	274	400	340	146	96

Table 18: (continued) *The reported pounds of pesticides used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
SOYBEAN OIL	27,651	31,726	33,006	50,301	20,587	70,398	14,747	12,005	28,359	23,804
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	2	1	1	<1	<1	1	<1	<1	<1	<1
STREPTOMYCES LYDICUS WYEC 108	0	0	0	0	0	<1	<1	<1	1	2
SUCROSE OCTANOATE	0	0	0	0	0	2	0	1,685	4,003	1,128
THYME	0	0	0	0	0	171	485	593	775	1,310
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	116	55	43	37	16	24	38	20	11	504
VANILLIN	0	0	0	0	0	1	5	1	3	<1
VEGETABLE OIL	94,164	110,241	133,680	248,679	208,860	256,605	154,128	270,375	196,078	322,688
XANTHINE	<1	0	0	0	<1	0	<1	0	0	0
XANTHOMONAS CAMPESTRIS PV. POANNUA	0	0	0	0	0	<1	0	0	0	0
YEAST	1,452	1,729	1,787	1,085	1,106	1,159	1,030	999	926	470
YUCCA SCHIDIGERA	0	0	0	0	0	0	0	5	145	471
Z,E-9,12-TETRADECADIEN-1-YL ACETATE	0	<1	0	0	0	0	1	0	6,149	1
Z-11-TETRADECEN-1-YL ACETATE	9	18	19	14	12	14	228	9	9	8
Z-8-DODECENOL	13	11	20	22	19	41	40	47	130	157
Z-8-DODECENYL ACETATE	1,127	935	1,738	1,875	1,693	3,398	3,542	4,055	11,550	13,964
Z-9-TETRADECEN-1-OL	0	<1	0	0	0	0	0	0	0	0
TOTAL	1,179,240	1,542,015	1,238,692	993,472	1,315,978	1,180,830	942,425	1,051,133	1,093,208	1,418,751

Table 19: *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones). Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(3S, 6R)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	0	0	15	86	1,604	1,484	0	0	3	0
(3S, 6S)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	0	0	15	86	1,604	1,484	0	0	3	0
(E)-4-TRIDECEN-1-YL-ACETATE	9,159	11,739	10,902	5,555	3,226	4,870	5,193	7,672	3,942	3,905
(E)-5-DECENOL	1,316	1,206	1,360	809	70	385	737	262	118	249
(E)-5-DECENYL ACETATE	1,316	1,206	1,360	809	70	385	737	262	118	249
(E,E)-9, 11-TETRADECADIEN-1-YL ACETATE	0	0	0	0	0	0	22	956	3	474
(E,Z)-7,9-DODECADIEN-1-YL ACETATE	0	0	0	0	0	0	0	0	0	5,168
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	0	15	<1	0	0	0	0	0
(S)-KINOPRENE	847	872	755	1,864	494	440	453	575	510	490
(Z)-11-HEXADECEN-1-YL ACETATE	0	1,053	476	365	164	183	116	0	1,622	0
(Z)-11-HEXADECENAL	0	1,053	476	365	164	423	72	0	0	0
(Z)-4-TRIDECEN-1-YL-ACETATE	9,159	11,739	10,902	5,555	3,226	4,870	5,193	7,672	3,942	3,905
(Z)-9-DODECENYL ACETATE	0	0	0	0	570	96	5,342	1,304	123	74
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	128	87	0	0	0	0	0	1	93	1
(Z,Z)-11,13-HEXADECADIENAL	0	0	0	0	0	0	200	109	0	763
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	128	87	0	0	0	0	0	0	93	1
1,7-DIOXASPIRO-(5,5)-UNDECANE	0	0	313	0	49	4	55	<1	6	<1
1-DECANOL	<1	0	0	0	0	0	0	0	0	0
1-METHYLCYCLOPROPENE	3	<1	9	4	8	2	6	13	61	3
1-NAPHTHALENEACETAMIDE	3,690	1,705	2,354	2,201	1,100	666	927	870	607	408
3,13 OCTADECADIEN-1-YL ACETATE	0	0	0	0	0	0	0	85	0	50
3,7-DIMETHYL-6-OCTEN-1-OL	0	0	0	0	0	0	0	67	349	1,531
ACETIC ACID	1,182	1,146	734	290	60	0	10	2	226	110
AGROBACTERIUM RADIOBACTER	514	500	365	493	306	698	555	217	215	362
AGROBACTERIUM RADIOBACTER, STRAIN K1026	325	355	716	524	292	335	366	1,935	5,086	81
ALLYL ISOTHIOCYANATE	0	<1	36	<1	20	<1	0	0	0	0
ALMOND, BITTER	0	0	0	0	0	328	2,068	87	471	74

Table 19: (continued) *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
AMINO ETHOXY VINYL GLYCINE HYDROCHLORIDE	6	10	0	0	229	6,453	9,238	10,253	5,611	10,173
AMMONIUM BICARBONATE	0	0	313	0	49	4	55	<1	6	<1
AMPELOMYCES QUISQUALIS	2,193	540	332	696	247	10	14	0	22	2
ANIMAL GLAND EXTRACTS	135	0	0	0	0	0	0	0	0	0
ASPERGILLUS FLAVUS STRAIN AF36	0	0	0	0	258	0	0	0	0	0
AZADIRACHTIN	73,876	92,145	79,581	64,488	55,657	68,244	91,385	86,813	82,652	70,661
BACILLUS PUMILUS, STRAIN QST 2808	0	0	1	4	34,748	64,333	79,802	91,795	75,509	72,518
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	<1	<1	<1	<1	<1	<1	<1	<1	<1	9
BACILLUS SUBTILIS GB03	<1	<1	<1	379	23	3	2	5	2	<1
BACILLUS THURINGIENSIS (BERLINER)	644	535	2	441	100	2,939	1,129	41	82	127
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	71,531	73,992	90,283	63,504	62,244	39,077	53,040	40,440	48,842	40,395
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	41,378	31,487	54,037	24,160	19,190	15,784	24,379	20,390	7,888	6,439
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	931	824	2,114	1,048	3,480	543	833	4,719	501	1,873
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	11,773	43,337	54,540	28,485	34,533	29,505	35,513	21,008	19,700	10,721
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	141,868	56,879	65,654	69,454	31,406	42,279	16,522	8,671	7,812	2,269
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	21,987	10,416	1,931	737	1,625	2,913	1,271	2,147	1,302	688
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	439	134	338	18	54	7	0	0	0	<1
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	168,496	180,621	158,448	123,796	156,026	125,390	119,055	100,581	101,522	111,567
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	7	2	3	1	<1	<1	<1	0	<1	<1

Table 19: (continued) *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	1,913	6,279	3,013	268	20	93	0	1,898	310	73
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	55,515	5,061	8,479	1,766	1,160	6,684	1,225	451	62	3
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	<1	0	1	0	0	0	<1	0	<1	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	76,935	2,571	8,493	6,456	8,724	3,021	479	1,298	250	0
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN ABTS-1857	0	13,835	34,164	38,718	47,071	41,546	43,209	49,890	41,724	37,187
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	4,718	10,897	4,989	3,465	3,025	4,235	4,766	2,343	2,136	1,057
BACILLUS THURINGIENSIS, SUBSP. ISRAELENSIS, STRAIN AM 65-52	<1	5	1	3	313	4,809	25	2,497	270	756
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN ABTS-351, FERMENTATION SOLIDS AND SOLUBLES	6,938	33,146	75,373	94,559	109,681	100,697	133,297	134,290	120,656	162,442
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	170,574	110,540	62,367	44,536	29,129	23,346	20,045	15,173	20,295	18,333
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	4,622	546	111	7	<1	<1	<1	25	52	2
BALSAM FIR OIL	0	0	0	0	0	0	0	0	0	<1
BEAUVERIA BASSIANA STRAIN GHA	2,853	3,702	2,887	4,019	3,531	2,743	2,481	2,091	2,188	1,686
BUFFALO GOURD ROOT POWDER	0	0	0	0	0	0	1,694	3,227	8	138
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	0	0	0	0	0	0
CANOLA OIL	2	2	2	<1	2	5	33	1,388	1,541	4,786
CAPSICUM OLEORESIN	254	149	318	379	71	247	277	528	325	388
CASTOR OIL	<1	<1	<1	<1	<1	2	<1	4	12	<1

Table 19: (continued) *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
CHENOPODIUM AMBROSIODES NEAR AMBROSIODES	0	0	0	0	0	0	0	0	6,355	9,265
CHITOSAN	0	0	0	<1	0	0	0	0	0	0
CINNAMALDEHYDE	1,534	295	105	137	18	10	2	556	0	0
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	36,602	34,157	38,357	51,009	69,051	73,386	71,278	64,156	47,422	42,313
CODLING MOTH GRANULOSIS VIRUS	0	0	0	0	0	1,479	2,141	1,487	1,139	984
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08	0	935	1,301	1,781	26	62	120	0	1,204	395
CORN GLUTEN MEAL	7	3	<1	<1	<1	<1	0	3	0	0
CORN SYRUP	0	0	0	0	0	0	1,132	7,991	14,316	12,877
COYOTE URINE	0	0	0	0	0	0	0	0	0	<1
CYTOKININ	<1	0	<1	0	0	0	0	0	0	0
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
DIHYDRO-5-PENTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
E,E-8,10-DODECADIEN-1-OL	10,381	11,841	21,255	17,383	21,896	20,728	27,784	21,536	14,885	15,283
E-11-TETRADECEN-1-YL ACETATE	14,063	16,870	10,335	8,836	7,351	6,637	6,189	5,996	5,592	4,628
E-8-DODECENYL ACETATE	33,383	33,602	39,198	41,752	33,419	37,412	49,086	54,291	47,172	49,591
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	15,188	7,529	1,160	143	33	9	35	91	37	0
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	4	<1	0	1	0	0	0	0	0	0
ESSENTIAL OILS	268	<1	<1	1	<1	<1	1	0	<1	4
ETHYLENE	<1	<1	<1	7	0	0	0	0	0	4
EUCALYPTUS OIL	0	0	0	0	150	<1	0	0	0	2
EUGENOL	0	0	0	15	<1	<1	0	0	0	0
FARNESOL	8,495	6,584	5,451	4,294	4,369	1,246	652	422	503	1,596
FENUGREEK	0	0	0	0	0	328	2,068	87	471	74
FORMIC ACID	0	0	0	0	0	<1	1	51	10	60
FOX URINE	0	0	0	0	0	0	0	0	0	<1
GAMMA AMINOBUTYRIC ACID	320	43,682	87,153	117,477	114,189	58,586	24,697	12,905	1,786	835
GARLIC	2,407	2,756	828	259	513	363	346	288	374	1,123
GERANIOL	0	0	0	0	0	<1	0	67	349	1,531
GERMAN COCKROACH PHEROMONE	0	<1	<1	<1	6	<1	<1	<1	<1	<1
GIBBERELLINS	387,488	423,337	431,001	414,093	462,231	458,764	454,509	490,530	513,328	491,218
GIBBERELLINS, POTASSIUM SALT	188	22	59	170	65	348	32	8	0	34

Table 19: (continued) *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
GLIOCLADIUM VIRENS GL-21 (SPORES)	768	6	<1	<1	18	<1	5	1,090	716	1,401
GLUTAMIC ACID	320	43,682	87,153	117,477	114,189	58,586	24,697	12,905	1,786	835
HARPIN PROTEIN	6,847	39,669	19,651	17,949	12,232	6,089	3,721	1,998	1,562	435
HEPTYL BUTYRATE	0	0	0	0	0	0	0	0	0	<1
HYDROGEN PEROXIDE	485	636	802	1,057	985	9,952	7,744	9,361	14,521	23,204
HYDROPRENE	1	<1	<1	<1	<1	7	2	200	82	<1
IBA	124	244	252	1,566	79	27,670	44,093	3,862	150	227
IRON PHOSPHATE	1,036	1,929	1,253	2,148	3,910	4,197	7,145	6,569	4,561	6,345
LACTOSE	37,971	45,903	36,654	45,293	79,734	95,549	80,366	99,526	77,363	80,273
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	<1	0	0	24	2	0	<1	<1	0	0
LAURYL ALCOHOL	6,429	4,635	4,791	6,009	6,719	5,488	9,358	7,782	4,705	5,495
LAVANDULYL SENECIOATE	0	0	0	0	0	0	0	4,316	2,375	7,025
LIMONENE	34,695	39,562	48,939	49,320	62,359	75,333	79,012	64,151	55,465	29,621
LINALOOL	<1	<1	<1	<1	<1	<1	<1	7	1	<1
MENTHOL	0	0	<1	0	150	<1	0	0	0	2
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	<1	<1	<1	<1	<1	<1	<1	<1	0	<1
METHOPRENE	50	<1	359	1	<1	157	51	42	211	4
METHYL ANTHRANILATE	<1	80	56	1,458	448	1,557	298	219	550	380
METHYL SALICYLATE	<1	0	0	0	0	<1	1	0	<1	0
MONTOK PEPPER	0	0	<1	0	0	0	0	0	0	0
MUSCALURE	189	121	2,283	307	2,715	476	1,179	<1	739	300
MYRISTYL ALCOHOL	6,429	4,635	4,791	6,009	6,719	5,488	9,358	7,782	4,705	5,495
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	4,392	3,926	4,390	8,348	4,680	4,478	5,097	5,257	5,331	4,840
N6-BENZYL ADENINE	1,620	967	1,510	4,544	1,552	7,711	2,628	1,775	2,072	3,352
NAA	102	72	75	1,096	49	26,799	43,507	3,331	47	38
NAA, AMMONIUM SALT	14,790	14,313	15,620	12,889	12,569	11,174	11,709	10,445	9,024	9,140
NAA, ETHYL ESTER	64	78	58	<1	<1	<1	<1	73	1	23
NAA, SODIUM SALT	2,076	470	1,856	642	858	452	340	37	257	0
NEROLIDOL	8,495	6,584	5,451	4,294	4,369	1,246	652	422	503	1,596
NITROGEN, LIQUIFIED	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
NONANOIC ACID	495	443	476	1,075	675	883	1,275	498	703	412
NONANOIC ACID, OTHER RELATED	495	443	476	1,075	675	877	1,275	498	701	412
NOSEMA LOCUSTAE SPORES	9	<1	35	37	1	<1	254	30	132	12
OIL OF ANISE	<1	<1	<1	<1	<1	<1	<1	<1	0	0
OIL OF BERGAMOT	0	0	0	0	0	<1	0	0	0	0

Table 19: (continued) *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
OIL OF CEDARWOOD	0	0	0	0	0	0	0	0	0	15
OIL OF CITRONELLA	<1	0	<1	0	<1	<1	<1	2	0	34
OIL OF CITRUS	0	0	0	0	<1	0	0	0	0	0
OIL OF GERANIUM	0	0	0	0	0	0	0	0	0	15
OIL OF JOJOBA	308	556	379	1,259	4,705	9,029	7,846	11,566	7,203	8,255
OIL OF LEMONGRASS	0	0	36	0	20	<1	0	0	0	0
OIL OF MUSTARD	0	0	0	0	0	0	0	0	0	0
OIL OF PEPPERMINT	<1	0	<1	<1	<1	0	<1	<1	0	15
OXYPURINOL	<1	0	0	0	<1	0	1	0	0	0
PAECILOMYCES FUMOSOROSEUS APOPKA STRAIN 97	13	0	0	0	0	0	0	0	0	0
PAECILOMYCES LILACINUS STRAIN 251	0	0	0	0	0	0	0	0	0	1,115
PANTOEA AGGLOMERANS STRAIN E325, NRRL B-21856	0	0	0	0	0	0	0	0	698	55
PERFUME	0	0	0	<1	0	0	0	0	0	0
POLYHEDRAL OCCLUSION BODIES (OB'S) OF THE NUCLEAR POLYHEDROSIS VIRUS OF HELICOVERPA ZEA (CORN EARWORM)	0	0	293	742	0	0	0	98	254	302
POTASSIUM BICARBONATE	52,654	74,151	106,988	64,994	143,968	61,465	47,299	41,899	69,155	100,920
PROPYLENE GLYCOL	812,714	746,000	763,898	778,321	754,665	738,448	520,537	420,161	381,957	587,374
PSEUDOMONAS FLUORESCENS, STRAIN A506	11,668	13,126	16,945	6,559	7,176	11,929	4,801	1,943	2,463	1,472
PSEUDOMONAS SYRINGAE STRAIN ESC-11	0	<1	0	<1	<1	<1	0	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	0	0	0	0	0	<1	0	0	0	3
PUTRESCENT WHOLE EGG SOLIDS	<1	<1	<1	<1	<1	<1	<1	<1	33	2
QST 713 STRAIN OF DRIED BACILLUS SUBTILIS	15,205	40,786	54,547	58,871	56,342	64,606	67,563	75,619	81,252	99,091
QUILLAJA	0	0	0	0	0	3,591	18,584	27,814	22,595	22,916
REYNOUTRIA SACHALINENSIS	0	0	0	0	0	0	0	0	1,297	70,363
S-ABSCISIC ACID	0	0	0	0	0	0	0	34	502	5,195
S-METHOPRENE	951	166	21	49	2,395	9,552	30,635	47,284	47,190	65,114
SAWDUST	252	<1	<1	<1	23	<1	10	19	<1	<1
SESAME OIL	0	0	0	0	0	<1	888	846	1,448	1,912
SILVER NITRATE	0	0	0	0	0	0	0	0	0	<1
SODIUM BICARBONATE	<1	<1	0	100	0	0	0	17	57	1
SODIUM LAURYL SULFATE	<1	29	<1	<1	<1	<1	<1	14	<1	<1

Table 19: (continued) *The reported cumulative acres treated with pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones).*

AI	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SOYBEAN OIL	11,254	18,627	15,359	9,870	6,344	3,675	3,277	2,460	3,792	6,160
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	50	17	14	5	20	29	12	<1	<1	<1
STREPTOMYCES LYDICUS WYEC 108	0	0	0	0	0	50	96	1,910	4,009	6,998
SUCROSE OCTANOATE	0	0	0	0	0	4	0	448	930	1,172
THYME	0	0	0	0	0	<1	<1	<1	68	<1
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	1,048	293	466	833	406	286	311	201	320	7,253
VANILLIN	0	0	0	0	0	328	2,068	87	471	74
VEGETABLE OIL	85,656	103,798	125,724	214,183	211,388	275,541	144,591	231,954	211,586	291,930
XANTHINE	<1	0	0	0	<1	0	1	0	0	0
XANTHOMONAS CAMPESTRIS PV. POANNUA	0	0	0	0	0	14	0	0	0	0
YEAST	4,034	5,106	6,708	4,630	4,835	5,262	4,694	4,560	3,957	1,306
YUCCA SCHIDIGERA	0	0	0	0	0	0	0	18	598	2,316
Z,E-9,12-TETRADECADIEN-1-YL ACETATE	0	13	0	0	0	0	44	0	1,622	<1
Z-11-TETRADECEN-1-YL ACETATE	14,063	16,870	10,335	8,836	7,351	6,637	6,166	5,040	5,589	4,154
Z-8-DODECENOL	33,383	33,602	39,198	41,752	33,419	37,412	49,086	54,291	47,172	49,591
Z-8-DODECENYL ACETATE	33,383	33,602	39,198	41,752	33,419	37,412	49,086	54,291	47,172	49,591
Z-9-TETRADECEN-1-OL	0	13	0	0	0	0	0	0	0	0
TOTAL	2,486,855	2,427,975	2,585,729	2,526,848	2,698,117	2,681,867	2,385,565	2,351,286	2,221,166	2,637,566

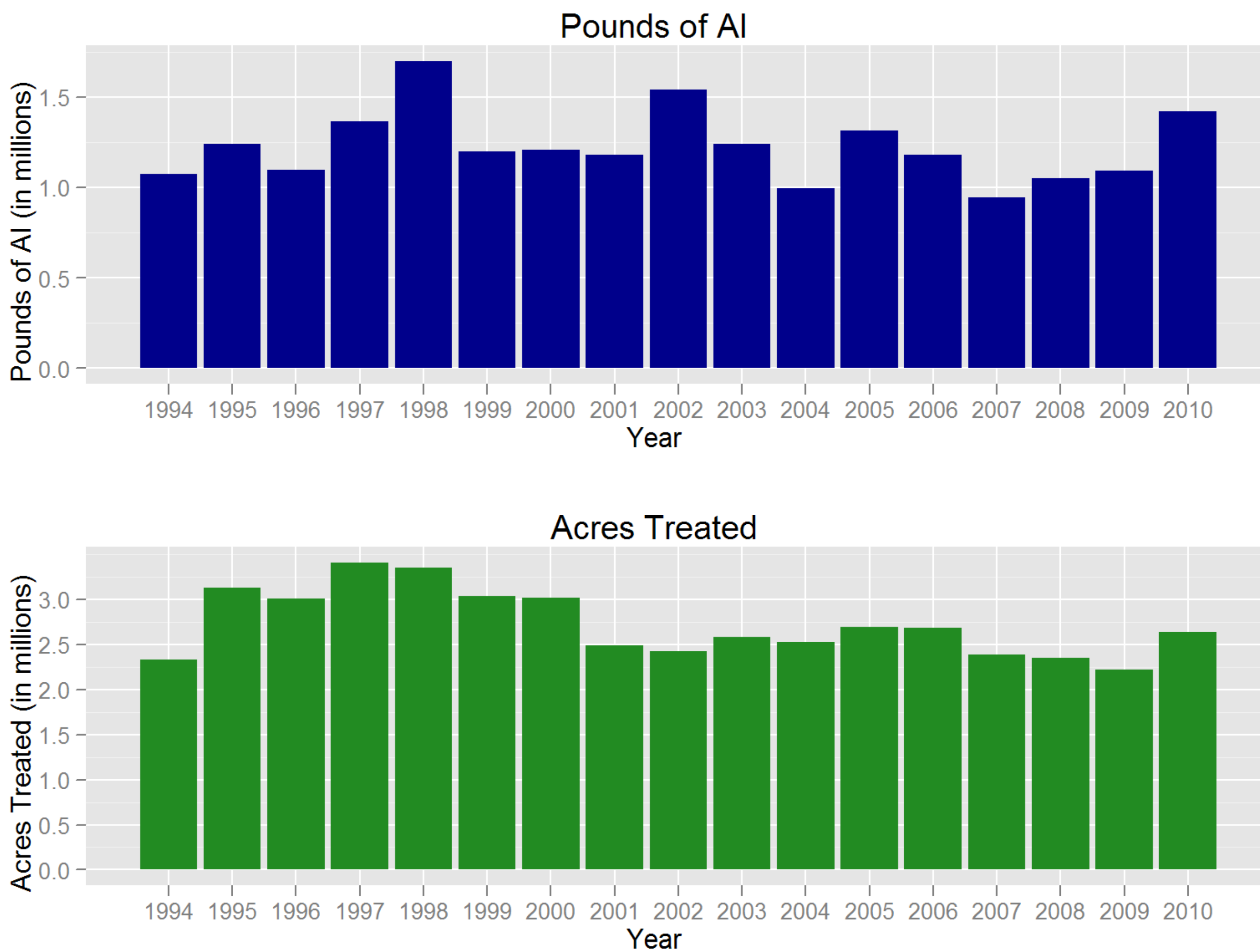

Figure 8: *Use trends of pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones). Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

5 Trends In Pesticide Use In Certain Commodities

This summary describes possible reasons for changes in pesticide use from 2009 to 2010 for the following commodities: almonds, wine grapes, cotton, alfalfa, table and raisin grapes, processing tomatoes, rice, oranges, pistachios, walnuts, strawberries, peaches and nectarines, and carrots. These 13 commodities were chosen because each were treated with more than 3 million pounds of active ingredients (AIs) or cumulatively treated on more than 2 million acres. Collectively, this represents 72 percent of all reported pesticide pounds used (78 percent of all pounds used on agricultural fields) and 72 percent of the acres treated in 2010.

Information used to develop this section was drawn from several publications and phone interviews with pest control advisors, growers, University of California Cooperative Extension farm advisors and specialists, researchers, and commodity association representatives. DPR staff analyzed the information, using their knowledge of pesticides, California agriculture, pests, and pest management practices to draw conclusions about possible explanations for changes in pesticide use. However, it is important to note these explanations are based on anecdotal information, not rigorous statistical analyses.

Reported pesticide use in California in 2010 totaled 173 million pounds, an increase of 15 million pounds from 2009 (9.5 percent). The AIs with the largest uses by pounds were sulfur, petroleum and mineral oils, metam-sodium, 1,3-dichloropropene (1,3-D), and glyphosate. By pounds, sulfur accounted for 27 percent of all reported pesticide use in 2010. Sulfur use increased 4.4 million pounds (10 percent increase) from 2009 to 2010 and was the AI with the largest increase in pounds of AI. Sulfur is a natural fungicide favored by both conventional and organic farmers and is used mostly to control powdery mildew on grapes and processing tomatoes. Other pesticides with large increases in pounds applied include 1,3-D (2.4 million-pound increase, 37 percent), metam-sodium (2.0 million-pound increase, 22 percent), glyphosate (1.5 million-pound increase, 20 percent), potassium N-methyldithiocarbamate, also called metam-potassium, (728,000-pound increase, 18 percent), and kaolin (662,000-pound increase, 28 percent). The fumigant 1,3-D was used mostly for strawberries, almonds, sweet potatoes, carrots, and table and raisin grapes. Metam-sodium is a fumigant used mostly for carrots, processing tomatoes, and potatoes. Glyphosate is an herbicide used mostly for almonds and rights-of-way. Metam-potassium is a fumigant used mostly for processing tomatoes, sweet potatoes, and carrots. Kaolin is a fungicide and insecticide used mostly in pomegranates and walnuts.

In contrast, use of many major pesticides decreased. The largest decrease was use of methyl bromide, which decreased 1.7 million pounds (31 percent). Other non-adjuvant pesticides with decreases in pounds applied were oxyfluorfen (386,000-pound decrease, 40 percent), maneb (287,000-pound increase, 44 percent), propanil (146,000-pound decrease, 6.8 percent), and propargite (87,000-pound decrease, 23 percent). Methyl bromide is a fumigant used mostly in fields before planting strawberries. Oxyfluorfen is an herbicide used mostly for almonds, wine grapes, and pistachio. Maneb is a fungicide used mostly in lettuce. Propanil is an herbicide used almost exclusively in rice. Propargite is a miticide used mostly in corn, almonds, and walnuts.

Different pesticides are used at different rates. In California, most pesticides are applied at rates of around 1 to 2 pounds per acre. However, some AIs are applied at rates of ounces per acre, while fumigants are usually applied at rates of hundreds of pounds per acre. Thus, comparing use by pounds will emphasize fumigants. Comparing use among different pesticides using acres treated gives a different picture of which AIs are most used.

Acres treated with all pesticides in 2010 totaled 75 million, an increase from 2009 of 9.7 million acres (15 percent). By acres treated, the non-adjuvant pesticides with the greatest use in 2010 were sulfur, glyphosate, petroleum and mineral oils, copper-based pesticides, and oxyfluorfen. Most of the increase in total acres treated was from increases in sulfur, boscalid, pyraclostrobin, and copper-based pesticides. The AIs with the largest decrease in acres treated were maneb, dimethoate, paraquat dichloride, trifluralin, and spiromesifen. Oils are used mostly as insecticides and miticides in orchards. Most copper-based pesticides are used as fungicides or algaecides and are used in rice, walnuts, oranges, and almonds. Boscalid and pyraclostrobin are fungicides used mostly in almonds, grapes, and strawberries; they are usually applied as products containing both AIs.

DPR data analyses have shown that pesticide use varies from year to year depending upon pest problems, weather, acreage and types of crops planted, economics, and other factors. The winter and spring of 2009/2010 were relatively cool and wet which probably resulted in more plant disease pressure and thus greater fungicide use. Summer and fall temperatures were also below average, which resulted in late harvests for some crops. During mild summers, insect pest populations generally do not increase as quickly as they do in hot ones, but some insects are able to thrive. In some cases the late harvest resulted in more insect damage.

In the following tables, use is given by pounds of AI applied and by acres treated. Acres treated means the cumulative number of acres treated; the acres treated in each application are summed even when the same field is sprayed more than once in a year. (For example, if the same acre is treated three times in a calendar year with an individual AI, it is counted as three acres treated). However, in tables where acres treated is summed over different AIs, such as the first table in each crop section, if individual applications involved products that contain more than one AI, the acres treated during that application are only tallied once.

Almond

Almond is California's largest nut crop economically and the United States' largest specialty crop in export value. Almond acreage has been consistently increasing the last 15 years. Total acres planted in 2010 were 825,000 acres of which 740,000 acres were bearing. Based on Almond Board Almond Almanac data, the total production of almond in California in 2010 was about 1.79 billion meat pounds, which was a 32.6 percent increase over the 1.35 billion meat pounds produced in 2009. The increased production was partially due to cooler weather and increased bearing acreage. There are three distinct almond growing regions in California: the Sacramento Valley, Central San Joaquin Valley, and Southern San Joaquin Valley. Weather conditions and pest pressure vary greatly among the regions, as do the choices of pesticide products and their rates.

Table 20: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for almond each year from 2006 to 2010. Planted acres from 2005 to 2010 are from NASS, April 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	21,373,891	19,665,258	19,520,389	18,887,106	20,498,411
Acres Treated	11,226,899	10,464,229	10,170,113	10,510,687	12,384,242
Acres Planted	755,000	765,000	795,000	810,000	825,000
Price/lb	$ 2.06	$ 1.75	$ 1.45	$ 1.65	$ 1.75

Table 21: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for almond each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	24	-8	-1	-3	9
Acres Treated	26	-7	-3	3	18
Acres Planted	8	1	4	2	2
Price/lb	-27	-15	-17	14	6

In 2010 total pesticide use was close to 21 million pounds and 12 million acres treated (Table 20). Pounds of AI used increased 9 percent, while acres treated increased 18 percent from 2009 to 2010. Bearing acres of almond increased 1.5 percent, planted acres increased 2 percent, and the price of almond increased 6 percent from 2009 to 2010 (Table 21).

While acres treated with herbicides was similar in 2009 and 2010, insecticide and fungicide uses both increased. By acres treated, herbicide use increased 1percent, insecticide use increased 15 percent, and fungicide use increased 61 percent (Figure 9).

The most prominent insecticides in 2010 by acres treated were oils, abamectin, methoxyfenozide, bifenthrin, and esfenvalerate. Acres treated with bifenthrin, oil, abamectin, and methoxyfenozide

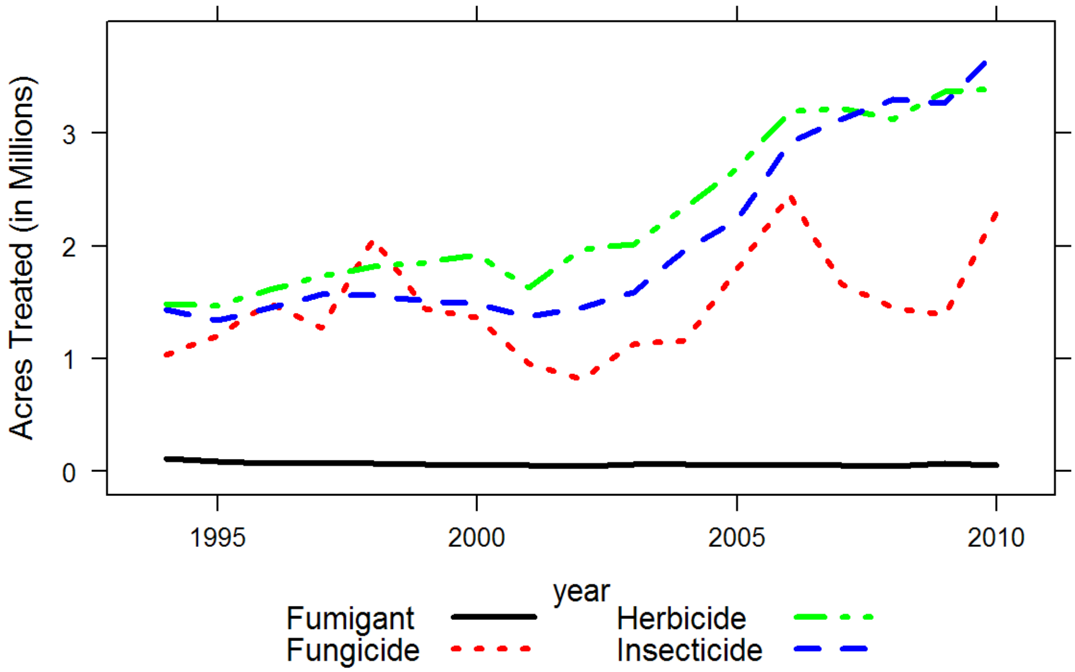

Figure 9: *Acres of almond treated by all AIs in the major types of pesticides from 1995 to 2010.*

increased 66, 8, 11, and 43 percent, respectively, from 2009 to 2010 (Table 22). Esfenvalerate increased 8 percent while pyriproxyfen decreased 13 percent. These insecticide data show a shift in the products used for worm control, including navel orangeworm (NOW) and peach twig borer (PTB). The shift in insecticides used reflects the regulatory focus on the use of organophosphate insecticides and the development of effective replacements. Additionally, the cool summer weather and resulting prolonged harvest period increased pest pressure and thus prompted growers to apply more insecticides.

The increased use of pyrethroids such as bifenthrin and esfenvalerate may contribute to spider mite outbreaks. That in turn may be the cause for the increased use of abamectin. Regionally, red imported fire ant was a problematic invasive species in the southern San Joaquin Valley; most growers controlled ants with growth regulators in the form of baits.

Key pests in almond are NOW, San Jose scale (SJS), PTB, web-spinning mites, and ants. Winter sanitation to eliminate mummy nuts has become a standard practice to reduce overwintering NOW larva. Almond can be treated with oil alone in the dormant season to control low to moderate populations of SJS and brown and European mites. It is likely that other insecticides were added with oil to control higher population of SJS and PTB. As a general rule, insecticide treatments in the dormant season and during bloom target PTB, in July and August they target mostly NOW, and in May they may target either PTB or NOW. Most May treatments north of

Table 22: *The non-adjuvant pesticides with the largest change in acres treated of almond from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
PYRACLO-STROBIN	FUNGICIDE	473,272	271,130	241,382	156,195	323,067	166,872	107
BOSCALID	FUNGICIDE	473,272	271,143	241,382	156,195	323,067	166,872	107
IPRODIONE	FUNGICIDE	270,871	243,803	226,199	252,477	369,926	117,449	47
METCONAZOLE	FUNGICIDE					87,810	87,810	
PROPICONAZOLE	FUNGICIDE	216	128	58,658	143,624	231,177	87,553	61
AZOXYSTROBIN	FUNGICIDE	219,046	79,259	39,527	39,398	122,528	83,130	211
BIFENTHRIN	INSECTICIDE	32,456	96,955	103,113	123,986	205,399	81,412	66
OIL	INSECTICIDE	841,640	891,780	975,495	1,018,205	1,094,713	76,508	8
ABAMECTIN	INSECTICIDE	514,773	625,930	644,537	660,701	734,160	73,459	11
GLUFOSINATE-AMMONIUM	HERBICIDE	62,777	129,008	204,604	272,551	340,318	67,767	25
METHOXY-FENOZIDE	INSECTICIDE	192,689	216,235	240,609	145,275	208,000	62,726	43
ZIRAM	FUNGICIDE	155,830	90,259	59,365	55,892	111,388	55,496	99
COPPER	FUNGICIDE	221,267	146,403	152,664	118,757	170,747	51,990	44
CHLORO-THALONIL	FUNGICIDE	55,077	35,410	36,215	34,475	77,045	42,570	123
PARAQUAT DICHLORIDE	HERBICIDE	349,596	335,509	261,623	251,819	209,706	-42,113	-17

Fresno target PTB; those south of Fresno target NOW.

The main fungicides by acres treated in 2010 were the same as those in 2009. In descending order of prominence, they were iprodione, boscalid, pyraclostrobin, propiconazole, and cyprodinil. Fungicide acres treated increased 61 percent from 2009 to 2010 due to 2010's wet and cool spring weather. Boscalid, pyraclostrobin, propiconazole, and iprodione acres treated increased 107 percent, 107 percent, 61 percent, and 47 percent, respectively, while the use of cyprodinil decreased 7 percent. Because some diseases were becoming resistance to some fungicides, growers tended to rotate fungicides to reduce use of any single class of fungicide. Use of copper-based fungicides in the dormant season increased 44 percent due to the wet weather. The use of propiconazole and fenbuconazole increased, possibly because they are relatively new in the market and they are from a different class of fungicides, making them useful in rotation strategies to forestall resistance.

The main herbicides by acres treated in 2010 were glyphosate, oxyfluorfen, glufosinate-ammonium, paraquat dichloride, and 2,4-D. Acres treated with glufosinate- ammonium, glyphosate, and 2,4-D increased 25, 3, and 1 percent from 2009 to 2010, respectively, while the use of paraquat dichloride and pendimethalin decreased 17 and 9 percent, respectively.

Oxyfluorfen use remained almost the same. Glufosinate-ammonium use has increased as concerns with glyphosate resistant weeds increased. Also, it was reformulated and priced lower starting in 2007. Oxyfluorfen is often used with glyphosate as a pre-emergent for broadleaf weeds. Increase in glyphosate use may reflect increased bearing acreage of almond. The overall slight increase of herbicide use in 2010 could be due to the increased almond acreage and the wetter spring weather.

Wine grape

In 2010, roughly 64 percent of California vineyards produced wine grapes. Chardonnay and Cabernet Sauvignon are the two most widely-planted wine grape varieties in California. There are four major wine grape production regions: 1) North Coast (Lake, Mendocino, Napa, Sonoma, and Solano counties); 2) Central Coast (Alameda, Monterey, San Luis Obispo, Santa Barbara, San Benito, Santa Cruz, and Santa Clara counties); 3) Northern San Joaquin Valley (San Joaquin, Calaveras, Amador, Sacramento, Merced, Stanislaus, and Yolo counties); and 4) Southern San Joaquin Valley (Fresno, Kings, Tulare, Kern, and Madera counties). The total pounds of pesticide active ingredients applied to wine grape increased from 22 million in 2009 to 26 million in 2010 (19 percent increase) and acres treated increased from 7.7 million in 2009 to 8.9 million acres in 2010 (15 percent) (Tables 23 and 24).

Factors that influence changes in pesticide use on wine grape include weather, topography, pest pressures (which vary by region), competition from newer pesticide products, application restrictions, efforts by growers to reduce costs, and increasing emphasis on sustainable farming. The pooled figures in this report may not reflect differences in pesticide use patterns between production regions.

Table 23: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for wine grape each year from 2006 to 2010. Planted acres from 2005 to 2009 are from CDFA, 2010; planted acres in 2010 are from NASS, March 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	24,211,288	24,469,709	21,286,863	22,100,162	26,209,924
Acres Treated	7,842,768	7,867,022	7,173,088	7,740,566	8,874,461
Acres Planted	527,000	523,000	526,000	531,000	535,000
Price/ton	$ 582	$ 564	$ 609	$ 613	$ 574

Insecticide use in wine grape increased significantly in 2010: pounds applied increased 34 percent, while acres treated increased 24 percent (Figure 10). The major insecticides applied in 2010 by acres treated were oils, imidacloprid, methoxyfenozide, abamectin, buprofezin, and chlorpyrifos. Chlorpyrifos is used before budbreak and after harvest to control mealybug infestations; imidacloprid is used during warmer weather between budbreak and harvest. Acres treated with chlorantraniliprole, which was first used in 2008, increased dramatically: from 100

Table 24: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for wine grape each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	-29	1	-13	4	19
Acres Treated	-10	0	-9	8	15
Acres Planted	1	-1	1	1	1
Price/ton	0	-3	8	1	-6

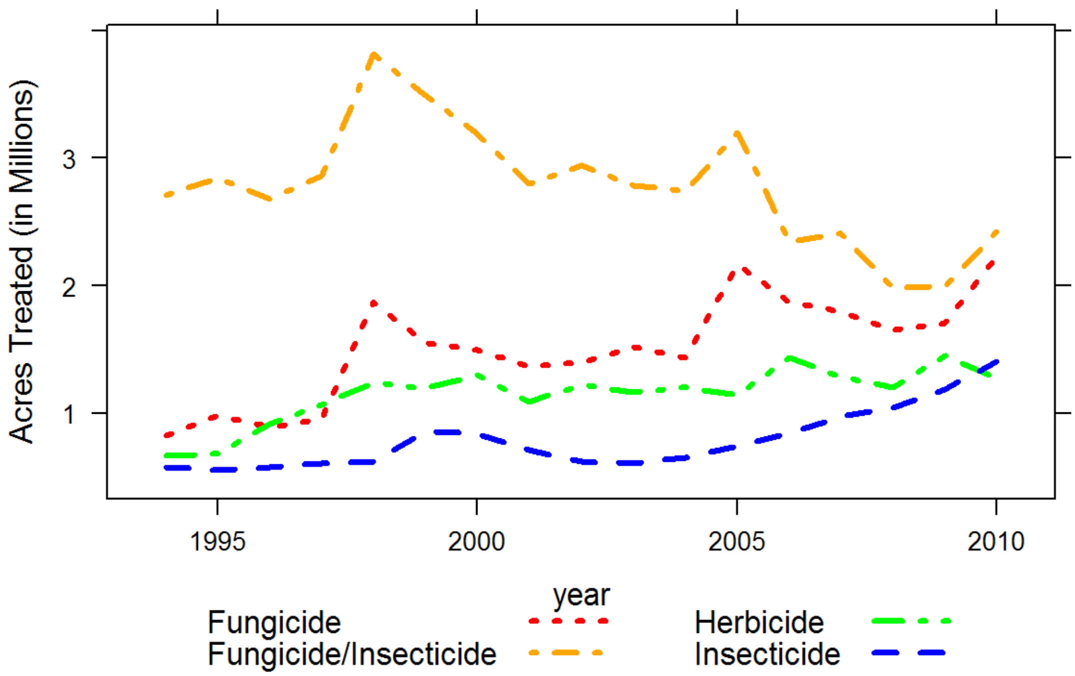

Figure 10: *Acres of wine grape treated by all AIs in the major types of pesticides from 1995 to 2010.*

acres in 2009 to 49,372 acres in 2010 (Table 25). Acres treated with methoxyfenozide increased 252 percent in 2010. Chlorantraniloprole and methoxyfenozide are both selective for lepidopterous pests and are used in the control of the new invasive pest, European grapevine moth. In 2010, acreage treated with oils increased 25 percent. Oils have many attractive, broad-spectrum properties and are low-risk. Increasingly mixed with fungicides, oils can replace a surfactant and eradicate mildew growth, as well as suppress mites and insects such as grape leafhoppers.

Acres treated with sulfur increased 21 percent from 2009, while acres treated with all other fungicides increased 31 percent (Table 25). Sulfur, copper-based products, trifloxystrobin, myclobutanil, quinoxyfen, boscalid, and pyraclostrobin were the most-used fungicides in terms of

Table 25: *The non-adjuvant pesticides with the largest change in acres treated of wine grape from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
SULFUR	FUNGICIDE/ INSECTICIDE	2,320,783	2,388,461	1,973,333	1,983,469	2,409,197	425,729	21
METHOXY-FENOZIDE	INSECTICIDE	72,533	88,820	86,226	75,440	190,131	114,691	152
BOSCALID	FUNGICIDE	212,581	211,982	209,288	138,511	237,926	99,415	72
PYRACLO-STROBIN	FUNGICIDE	212,080	211,959	209,288	138,507	236,683	98,176	71
MYCLOBUTANIL	FUNGICIDE	269,688	224,571	180,712	124,807	200,678	75,871	61
TETRACONAZOLE	FUNGICIDE				2,730	70,133	67,404	2,469
CHLOR-ANTRANILIPROLE	INSECTICIDE			60	100	49,372	49,272	49,272
OIL	INSECTICIDE	259,721	314,909	409,971	427,239	471,670	44,431	10
OXYFLUORFEN	HERBICIDE	223,591	202,006	196,561	222,466	179,189	-43,278	-19
GLYPHOSATE	HERBICIDE	473,164	471,086	410,636	454,655	411,828	-42,827	-9
COPPER	FUNGICIDE	368,455	329,304	318,593	272,878	310,458	37,580	14
PARAQUAT DICHLORIDE	HERBICIDE	177,339	128,737	78,714	120,537	87,020	-33,517	-28
BACILLUS THURINGIENSIS	INSECTICIDE	35,993	23,249	9,653	10,607	43,069	32,462	306
SIMAZINE	HERBICIDE	143,447	96,437	69,102	85,381	54,668	-30,713	-36
POTASSIUM BICARBONATE	FUNGICIDE	37,270	20,482	18,906	37,670	67,364	29,694	79

acres treated. Acres treated with lime sulfur in early 2010 against overwintering disease inoculum increased 26 percent from 2009. Overall disease pressure was relatively high in 2010 due to cool weather and a wet spring and summer and accounts for the marked increase in fungicide use. Copper-based pesticides, used to treat downy mildew and botrytis bunch rot, were applied to 38 percent more acres in 2010.

The acres treated with herbicides decreased 12 percent from 2009 to 2010. In terms of acres treated, herbicides used most in wine grape were glyphosate, oxyfluorfen, glufosinate-ammonium, paraquat, flumioxazin, and simazine. The acres treated with simazine, paraquat, and flumioxazin decreased 36, 28, and 17 percent, respectively. Acreage treated with glufosinate-ammonium increased 3 percent. This is likely due to the increased prevalence of glyphosate-resistant weeds, such as marestail and fleabane, in vineyards: glufosinate-ammonium is used specifically to control these weed species.

Acres treated with plant growth regulators (PGR) increased 22 percent from 2009 to 2010, though the total number of acres treated was small. The most common PGRs were gibberellins, which are applied in early spring in order to lengthen and loosen grape clusters. Less compact clusters may be less vulnerable to berry splitting and bunch rot. Acres treated with gibberellins increased 12 percent in 2010.

Cotton

Cotton is grown for fiber, oil, and animal feed. In 2010, for the first time since 2004, total planted acres increased, up 61 percent from 2009 (Table 27). This increase was because of favorable cotton prices and the planting of alternative crops, such as processing tomatoes, appeared financially more risky to growers. Two main kinds of cotton are grown: upland and Pima. In the last several years, the percent of cotton acres in Pima has generally increased. In 2010, 59 percent of cotton acreage was in Pima. Most upland and Pima cotton have also been genetically modified to be tolerant to the herbicide glyphosate. Most cotton is grown in the southern San Joaquin Valley, but a small percentage is grown in Imperial and Riverside counties and a few counties in the Sacramento Valley.

Table 26: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for cotton each year from 2006 to 2010. Planted acres from 2005 to 2010 are from NASS, August 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Roundup Ready acres planted in 2010 are from USDA, 2010. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	5,731,935	3,477,099	2,435,870	1,467,837	3,079,154
Acres Treated	9,767,050	6,306,290	4,950,596	2,887,558	6,086,780
Acres Planted Upland	285,000	195,000	120,000	71,000	124,000
Acres Planted Pima	275,000	260,000	155,000	119,000	182,000
Acres Planted RR	114,000	99,450	54,000	38,340	223,370
Acres Planted Total	560,000	455,000	275,000	190,000	306,000
Price Upland/lb	$0.58	$0.72	$0.59	$0.72	$1.05
Price Pima/lb	$0.95	$0.99	$0.99	$1.17	$1.82
Price All/lb	$0.76	$0.88	$0.82	$1.00	$1.51

Total pounds of pesticide use on cotton increased from 1.5 million to 3.1 million from 2009 to 2010 (Table 26), a 110 percent; use per acre planted also increased. Use in all cotton-growing counties increased. Use of all major AIs and AI types increased more than the increase in acres planted, except for the use of fungicides, which increased 46 percent in pounds of AI and 32 percent in acres treated (Figure 11). The greatest increase was use of insecticides, which increased 147 percent by pounds of AI and 161 percent by acres treated.

Insecticide use increased partly because of increased area planted but also because of increased pest problems. The most-used insecticides by acres treated in 2010 were flonicamid, abamectin, acetamiprid, imidacloprid, chlorpyrifos, bifenthrin, and indoxacarb. The applications of all the most-used AIs increased more than 100 percent (Table 28) except flonicamid which increased 59

Table 27: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for cotton each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	-20	-39	-30	-40	110
Acres Treated	-14	-35	-21	-42	111
Acres Planted Upland	-34	-32	-38	-41	75
Acres Planted Pima	20	-5	-40	-23	53
Acres Planted RR	-34	-13	-46	-29	483
Acres Planted Total	-15	-19	-40	-31	61
Price Upland/lb	-5	4	0	18	56
Price Pima/lb	-17	24	-18	21	46
Price All/lb	-4	10	1	10	54

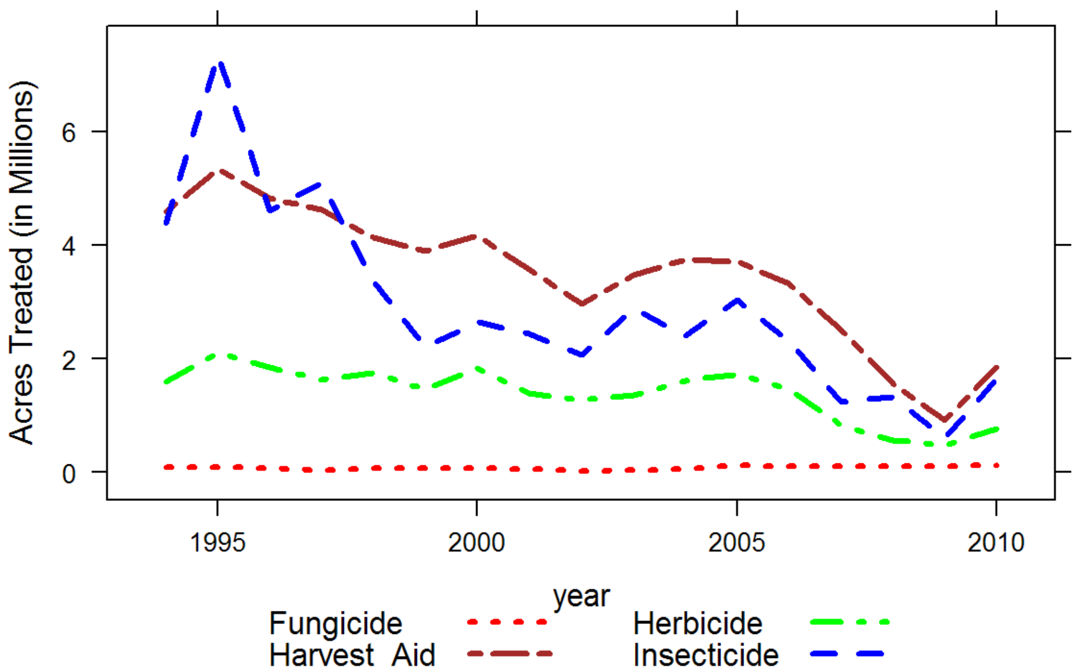

Figure 11: *Acres of cotton treated by all AIs in the major types of pesticides from 1995 to 2010.*

percent by acres treated. Use of chlorpyrifos increased the most, 215 percent. Of the major insecticides the biggest percent increases in acres treated were flubendiamide (increased 1,460 percent), novaluron (1,130 percent), and beta-cyfluthrin (864 percent). By pounds the largest percent increases were flubendiamide (1,370 percent), methoxyfenozide (840 percent), and novaluron (740 percent). Bifenthrin decreased or increased only slightly in most counties, but pounds increased 3,600 percent in Kern. Novaluron was first used in 2010 in most counties,

Table 28: *The non-adjuvant pesticides with the largest change in acres treated of cotton from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
GLYPHOSATE	HERBICIDE	431,057	263,930	210,913	183,253	445,867	262,614	143
MEPIQUAT CHLORIDE	HARVEST AID	583,147	338,816	213,817	99,132	286,024	186,891	189
ETHEPHON	HARVEST AID	487,576	385,164	244,343	150,197	290,169	139,972	93
THIDIAZURON	HARVEST AID	465,903	370,921	238,852	152,781	291,649	138,868	91
DIURON	HARVEST AID	477,647	373,162	233,184	152,484	286,773	134,290	88
UREA DIHYDROGEN SULFATE	HARVEST AID	317,537	266,547	155,050	94,090	188,094	94,004	100
PYRAFLUFEN-ETHYL	HARVEST AID	362,964	292,443	212,506	143,257	235,633	92,376	64
ABAMECTIN	INSECTICIDE	250,327	211,551	121,842	76,135	168,317	92,182	121
CHLORPYRIFOS	INSECTICIDE	256,851	46,862	74,817	39,943	125,865	85,922	215
IMIDACLOPRID	INSECTICIDE	88,624	101,962	116,317	49,903	135,252	85,348	171
ACETAMIPRID	INSECTICIDE	289,300	98,057	67,957	55,880	139,941	84,061	150
OXAMYL	INSECTICIDE	92,916	17,904	69,043	12,008	95,623	83,615	696
PARAQUAT DICHLORIDE	HARVEST AID	424,408	264,366	182,235	131,255	214,154	82,899	63
FLONICAMID	INSECTICIDE		184,070	184,789	107,873	171,994	64,121	59
BIFENTHRIN	INSECTICIDE	45,893	28,333	84,941	39,609	101,168	61,559	155

except for Kings where it has been used since 2007. Imidacloprid use increased in most counties, but decreased in Kings. *Bacillus thuringiensis* use was high in Kings. Flubendiamide was first used in 2009. By far most use of flubendiamide was in Kern; the only other county with any use was Fresno.

The season started cool and rainy, which delayed planting. This was a bigger problem for Pima than for upland cotton because Pima has a longer season. This also resulted in conditions favorable to lygus bugs, which were a problem in many areas nearly all season. The cotton harvest was delayed in the fall because of unusually cool temperatures. This resulted in more cotton vegetative growth, which led togreater aphid and whitefly populations. Late season aphids and whiteflies are a serious concern because they produce sugary excretions, which drop on the cotton lint creating ”sticky cotton.” Flonicamid, imidacloprid, bifenthrin, indoxacarb, oxamyl, beta-cyfluthrin, cyfluthrin, novaluron, methoxyfenozide, and flubendiamide were all applied from mid-June through August; these applications were mostly for lygus bugs, except for flubendiamide and methoxyfenozide, which are used for caterpillars. Acetamiprid, chlorpyrifos, and naled were applied in August and September and were used mostly for aphids and whiteflies. Abamectin was used mostly for mites.

Herbicide use increased 79 percent in pounds of AI and 61 percent in acres treated. The most used herbicides by acres treated in 2010 were glyphosate, pendimethalin, oxyfluorfen, paraquat dichloride, and flumioxazin. Glyphosate was by far the most used herbicide, accounting for 68 percent of all herbicide use by pounds. Glyphosate also had the greatest increase in use of major herbicides, increasing by 156 percent in pounds and 143 percent in acres treated (Table 28). Most other herbicides increased less than 50 percent; however, trifluralin decreased 2 percent in acres treated. Also, flumioxazin increased only in Fresno County; in all other major counties its use decreased or remained about the same. Some AIs, such as paraquat dichloride, are used both as harvest aids and herbicides. Here it is assumed if use occurred between August and November it was used as a harvest aid, otherwise as an herbicide. The increase in herbicide use was due mostly to the increase in acres planted. The increased use of glyphosate was probably due to increased plantings of Roundup-Ready cotton, which is genetically engineered to be resistant to the glyphosate.

Harvest aid use increased 98 percent in pounds of AI and 105 percent in acres treated. Harvest aids are chemicals used to defoliate or desiccate cotton plants before harvest. Although mepiquat chloride is included here among the harvest aids, it is actually a growth regulator and is typically used mid-season. The most used harvest aids by acres treated were thidiazuron, ethephon, diuron, mepiquat chloride, and pyraflufen-ethyl. The use of mepiquat chloride increased about 200 percent and the other main harvest aids increased between 70 to 100 percent (Table 28). Use increased in all counties. Use of harvest aids increased relative to the area planted in 2010 because the late start in the growing season and cool temperatures in the fall made it difficult to defoliate the plants before harvest.

Fungicide use increased 46 percent in pounds of AI and 32 percent in acres treated. The use per acre planted decreased in 2010 mostly because use was unusually high in 2009; use per acre planted in 2010 was the second highest during the last than 10 years. The most used fungicides by acres treated were azoxystrobin, iprodione, and pyraclostrobin. Most of the fungicides were applied in Kings and there it was mostly azoxystrobin and iprodione; pyraclostrobin was applied mostly in Riverside County in June and July. Fungicides are not widely used in cotton, but their use had been increasing in recent years because of increased problems with seedling diseases, mostly *Rhizoctonia*. Azoxystrobin and iprodione are applied to cotton fields at planting in March and April to control seedling diseases. Pyraclostrobin is also applied to agricultural fields, but most of the other fungicides are used as seed treatments and are not applied to the field.

Alfalfa

Alfalfa hay is produced for animal feed in California. Most counties produce some alfalfa hay, but more than half of the state's production comes from Fresno, Kern, Imperial, Merced, and Tulare counties. Harvested alfalfa acres decreased 6 percent from 2009 to 2010, but the price received per ton of hay increased 24 percent (Table 30). The dairy industry remains the biggest market for alfalfa hay in California. The increased price was due to reduced acreage and increased demand for locally grown hay. High fuel costs reduced imports from other western states that usually ship large quantities of hay into California to augment local production. The total pounds of pesticide active ingredients applied to California alfalfa decreased from 3.4 million to 2.7 million (19 percent) between 2009 and 2010 (Table 29); however, the acres treated with pesticides increased 2 percent.

Table 29: *Total reported pounds of all active ingredients (AI), acres treated, acres harvested, and prices for alfalfa each year from 2006 to 2010. Harvested acres from 2005 to 2010 are from NASS, August 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	3,035,356	2,927,319	3,223,496	3,362,212	2,709,918
Acres Treated	5,559,141	4,445,444	5,349,955	4,413,271	4,517,892
Acres Harvested	1,120,000	1,015,000	1,050,000	1,020,000	960,000
Price/ton	$ 116	$ 165	$ 204	$ 107	$ 133

Table 30: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for alfalfa each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	6	-4	10	4	-19
Acres Treated	8	-20	20	-18	2
Acres Harvested	7	-9	3	-3	-6
Price/ton	-15	42	24	-48	24

Statewide, insecticide use on alfalfa decreased 23 percent in pounds of AI between 2009 and 2010, whereas the acres treated increased 11 percent. The increase in acres treated was mainly from increased uses of chlorpyrifos (15 percent increase), indoxacarb (27 percent), malathion (27 percent), methoxyfenozide (191 percent), s-cypermethrin (56 percent), and gamma-cyhalothrin (207 percent) and the introduction of chlorantraniliprole in 2010 (Table 31). In contrast, the acres treated with lambda-cyhalothrin, dimethoate and beta-cyfluthrin was down 3, 33 and 24 percent, respectively, in 2010. The apparent discrepancy between decreased use in pounds of AI applied and increased acres treated occurred because newly registered insecticides are used at about 10 percent of the rates of the older products. Growers generally deal with three major pest groups in alfalfa production: the weevil complex in late winter to spring, an aphid complex starting in the spring and continuing throughout summer, and a complex of lepidopterious larvae in the summer. In 2010, weevil problems were less than normal, due to the cool, rainy late winter and spring. The rains affected emergence and development of weevil pests; and also made it difficult for growers to treat with insecticides. This accounted for the decline in the use of some pyrethroids like lambda-cyhalothrin and cyfluthrin. Aphid problems were severe in the summer of 2010. Chlorpyrifos is the recommended AI for aphids and explains its increased use. Chlorpyrifos is also used for weevils but growers have largely switched to alternatives products that are not

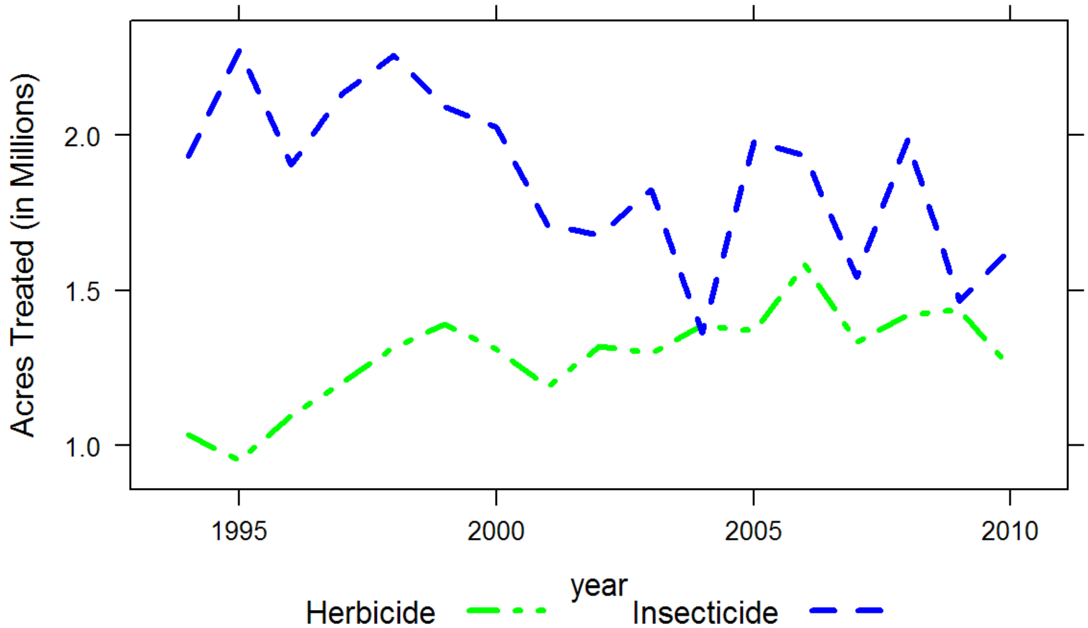

Figure 12: *Acres of alfalfa treated by all AIs in the major types of pesticides from 1995 to 2010.*

expected to have adverse effects on the environment and water quality. The summer lepidoptera complex presented problems to growers and accounted for the increased use of indoxacarb, methoxyfenozide, and chlorantraniliprole. The uncertainty surrounding hay prices, water availability and reduced shipments from other states affected management practices in 2010. Growers chose to spray for summer armyworm control and sell at a higher price in 2010.

The reported decrease in beta-cyfluthrin use was most considerable in the Sacramento, San Joaquin and Imperial Valleys. Lambda-cyhalothrin use declined most significantly in the Sacramento and Imperial Valleys. Dimethoate use decreased predominantly in the San Joaquin and Imperial Valleys. Increased use of chlorpyrifos was mainly in the San Joaquin Valley. Malathion use increased mainly in the Sacramento and San Joaquin Valleys, while the applications of indoxacarb and s-cypermethrin increased predominantly in the San Joaquin and Imperial Valleys. Insecticide use is a reflection of the intensity of pest pressure during the season and variations with the price of hay. The statewide decrease in insecticide use in pounds and increase in acres treated was due to insect pressure and growers' switch to new products that are generally applied at lower rates per acre than older products. This was especially true for western yellow striped armyworm, beet armyworm, alfalfa caterpillar, and Egyptian alfalfa weevil. Also, as the price of hay increased, growers let the hay grow longer before cutting and sprayed more frequently to avoid insect damage.

Table 31: *The non-adjuvant pesticides with the largest change in acres treated of alfalfa from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
INDOXACARB	INSECTICIDE	481,660	246,318	424,764	201,822	257,273	55,451	27
CHLORPYRIFOS	INSECTICIDE	443,628	386,498	406,013	327,938	378,316	50,378	15
DIMETHOATE	INSECTICIDE	137,847	145,513	152,695	151,948	101,894	-50,055	-33
METHOXY-FENOZIDE	INSECTICIDE	5,725	330	80,119	25,054	72,930	47,876	191
CHLOR-ANTRANILIPROLE	INSECTICIDE					42,660	42,660	
PARAQUAT DICHLORIDE	HERBICIDE	251,477	196,254	228,496	260,997	218,363	-42,634	-16
TRIFLURALIN	HERBICIDE	317,191	276,815	210,591	149,079	114,289	-34,790	-23
HEXAZINONE	HERBICIDE	159,994	124,286	110,872	124,611	96,113	-28,499	-23
BETA-CYFLUTHRIN	INSECTICIDE	2,137	66,154	92,130	107,306	81,994	-25,312	-24
(S)-CYPERMETHRIN	INSECTICIDE	139,030	82,439	94,775	42,037	65,407	23,369	56
GAMMA-CYHALOTHRIN	INSECTICIDE	7,372	13,625	14,350	11,039	33,842	22,803	207
DIURON	HERBICIDE	186,563	148,747	101,539	92,718	70,441	-22,277	-24
CLETHODIM	HERBICIDE	109,659	97,803	107,196	95,517	113,941	18,424	19
MALATHION	INSECTICIDE	77,755	81,333	90,492	66,838	84,815	17,977	27
2,4-DB ACID	HERBICIDE	16,299	15,080	19,457	21,629	6,980	-14,649	-68

Statewide, herbicide use declined 13 percent in pounds of AI between 2009 and 2010 and acres treated also declined 13 percent. The reduced use of herbicides may be more related to reduced hay acreage harvested (6 percent lower than in 2009) than to reduced weed pressure. Applications of the most-used herbicides, by acres treated, decreased except for clethodim and 4-(2,4-DB), dimethylamine salt, which increased. The increased use of clethodim, a selective post-emergence herbicide used to control annual and perennial grasses and 4-(2,4-DB), dimethylamine salt, also a selective herbicide used to control many broadleaf weeds, may reflect the growers' goal to produce premium hay for a higher price. The decreased use of pendimethalin may reflect increased planting of Roundup Ready alfalfa. Although the reasons for selecting certain herbicides over others were unclear, efforts to use materials that are unlikely to contaminate groundwater (diuron and hexazinone are known ground water contaminates) may have played a role in the selection process.

Fungicide use for alfalfa is minimal and insignificant compared to that of insecticides and herbicides.

Table and raisin grape

Table and raisin grape comprised approximately 36 percent of California's total grape crop in 2010, the rest being wine grape. These categories shift depending on market conditions, since some grape varieties can be used for more than one purpose. Thompson Seedless is the leading raisin grape variety, while Crimson Seedless is the leading table grape variety. California produced 2,079,000 tons of raisin grapes and 1,008,000 tons of table grapes in 2010. Statewide table grape and raisin tonnage increased 15 percent and 7 percent, respectively, relative to 2009 production. Total acreage of table and raisin grapes decreased from 312,000 to 307,000 acres (2 percent decrease) from 2009 to 2010 (Tables 32 and 33).

Table 32: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for table and raisin grape each year from 2006 to 2010. Planted acres from 2005 to 2009 are from CDFA, 2010; planted acres in 2010 are from NASS, March 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	15,314,637	16,594,213	13,879,151	12,832,242	14,037,795
Acres Treated	5,731,725	5,522,968	5,536,012	5,500,788	5,872,653
Acres Planted	333,000	325,000	318,000	312,000	307,000
Price/ton	$ 450	$ 422	$ 306	$ 346	$ 359

Table 33: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for table and raisin grape each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	-22	8	-16	-8	9
Acres Treated	-3	-4	0	-1	7
Acres Planted	-2	-2	-2	-2	-2
Price/ton	45	-6	-28	13	4

The major insecticides applied in 2010 by acres treated were oils, imidacloprid, methoxyfenozide, cryolite, *Bacillus thuringiensis*, abamectin, and buprofezin. The acres treated with insecticides decreased 6 percent from 2009 (Figure 13). Imidacloprid and buprofezin are used during warm weather between budbreak and harvest to control mealybug infestations. Cryolite is a stomach poison applied early in the season to control lepidopterous pests, such as omnivorous leafroller. Methoxyfenozide controls similar pests, but can be used later in the growing season than cryolite. Chlorantraniliprole treatments increased 467 percent from 2009 (Table 34); this insecticide is selective for lepidopterous pests and is used to control the invasive pest European grapevine moth.

Acres treated with sulfur increased 9 percent (Table 34), while acres treated with all other fungicides increased nearly 19 percent. Sulfur, copper products, myclobutanil, trifloxystrobin,

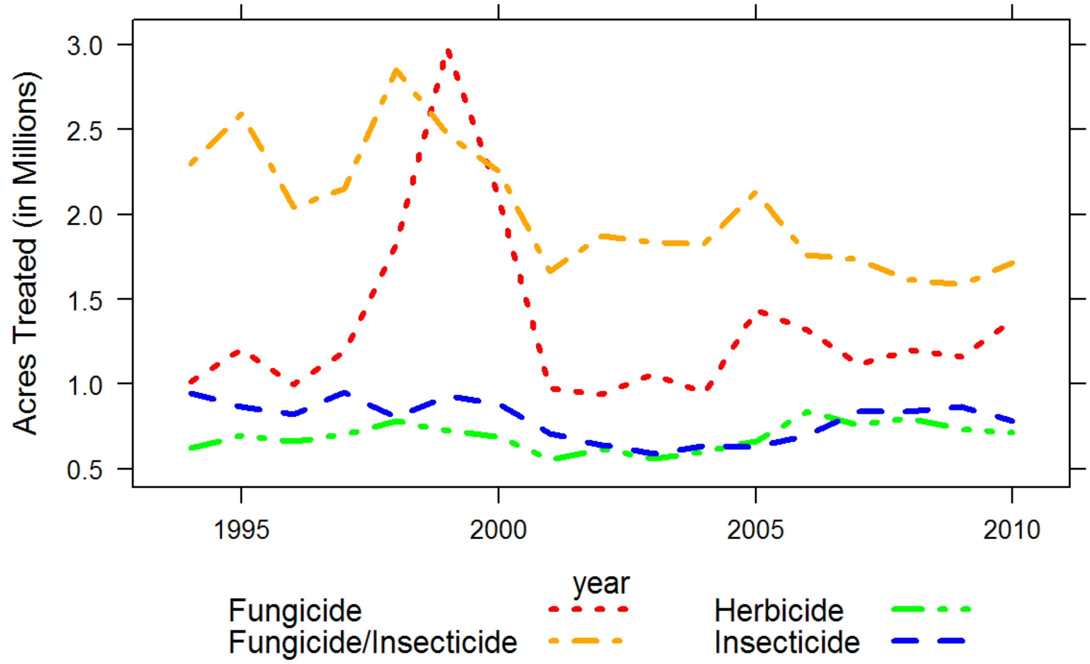

Figure 13: *Acres of table and raisin grape treated by all AIs in the major types of pesticides from 1995 to 2010.*

tebuconazole, boscalid, and pryaclostrobin were the most-used fungicides in terms of acres treated. Acres treated with lime sulfur in early 2010 against overwintering disease inoculum decreased 44 percent. Copper, used to treat downy mildew and botrytis bunch rot, was applied to 22 percent more acres compared to 2009. The overall increase in fungicide use can be attributed to a cool, wet spring: these conditions increased the need for applications early in the season.

The acres treated with herbicides decreased 3 percent from 2009 to 2010. Herbicides used most in table and raisin grape by acres treated were glyphosate products, glufosinate-ammonium, paraquat dichloride, oxyfluorfen, simazine, and pendimethalin. The acres treated with glyphosate, paraquat dichloride, and glufosinate-ammonium decreased 8, 25, and 3 percent, respectively. In contrast, oxyfluorfen and pendimethalin-treated acreage increased 27 and 19 percent, respectively. Decreased use of glyphosate is likely due to the increased prevalence of glyphosate-resistant weeds, such as marestail and fleabane, in vineyards. It is likely that pendimethalin is being used as a cheaper alternative to oryzalin.

Acres treated with plant growth regulators (PGRs) decreased roughly 3 percent in 2010 compared to 2009. The most commonly used PGRs were gibberellins, which are applied in early spring to lengthen and loosen grape clusters. Less compact clusters may be less vulnerable to berry splitting and bunch rot. Gibberellin-treated acres decreased 8 percent in 2010. Ethephon use

Table 34: *The non-adjuvant pesticides with the largest change in acres treated of table and raisin grape from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
SULFUR	FUNGICIDE/ INSECTICIDE	1,742,570	1,714,833	1,595,586	1,558,697	1,700,524	141,826	9
COPPER	FUNGICIDE	366,782	262,204	252,507	227,212	277,953	50,741	22
OIL	INSECTICIDE	94,006	132,809	162,690	134,202	90,015	-44,188	-33
TEBUCONAZOLE	FUNGICIDE	95,468	92,743	97,753	89,373	127,830	38,457	43
GIBBERELLINS	PLANT GROWTH REGULATOR	341,024	339,481	382,892	388,359	356,719	-31,640	-8
KRESOXIM-METHYL	FUNGICIDE	46,512	31,938	23,471	54,187	78,768	24,581	45
PYRACLO-STROBIN	FUNGICIDE	108,949	103,593	113,656	87,196	110,137	22,941	26
BOSCALID	FUNGICIDE	108,953	103,604	113,675	87,268	110,143	22,875	26
PARAQUAT DICHLORIDE	HERBICIDE	156,655	119,499	89,902	79,835	60,119	-19,716	-25
GLYPHOSATE	HERBICIDE	249,602	223,529	221,809	2e+05	183,902	-16,120	-8
OXYFLUORFEN	HERBICIDE	77,098	70,969	69,351	58,216	74,155	15,938	27
FLUMIOXAZIN	HERBICIDE	40,506	57,494	65,773	43,586	28,841	-14,746	-34
CHLOR-ANTRANILIPROLE	INSECTICIDE			193	2,919	16,538	13,619	467
TRIFLOXY-STROBIN	FUNGICIDE	106,542	101,991	128,330	127,347	140,370	13,023	10
ETHEPHON	PLANT GROWTH REGULATOR	60,012	58,980	60,432	56,052	68,136	12,083	22

increased 22 percent.

Processing tomato

Processing tomato growers planted 271,000 acres in 2010, a 13 percent decrease from 2009 (Tables 35 and 36). Total tons of processing tomatoes produced in 2010 decreased 8 percent from 2009. The price of processing tomato decreased 17 percent in 2010 compared to 2009. The highest concentration of processing tomato acreage continues to be in the southern San Joaquin Valley. Fresno County leads the state in production with 37 percent (101,000 acres) of the statewide acres, followed by Kings County (34,000 acres), Yolo County (32,000 acres), and San Joaquin County (24,000 acres).

Pesticide use, in terms of pounds of active ingredient (AI), decreased 5 percent, from 14.5 million pounds in 2009 to 13.8 million pounds in 2010 (Tables 35 and 36). Total acres of processing tomato treated decreased 2 percent. Sulfur, metam-sodium, and potassium

Table 35: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for processing tomato each year from 2006 to 2010. Planted acres from 2005 to 2010 are from NASS, August 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	12,271,712	10,680,084	11,588,304	14,550,788	13,812,845
Acres Treated	2,962,484	2,683,605	2,666,926	3,269,116	3,209,410
Acres Planted	283,000	301,000	281,000	312,000	271,000
Price/ton	$ 65.40	$ 70.30	$ 78.60	$ 86.10	$ 71.40

Table 36: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for processing tomato each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	8	-13	9	26	-5
Acres Treated	7	-9	-1	23	-2
Acres Planted	6	6	-7	11	-13
Price/ton	10	7	12	10	-17

Table 37: *The non-adjuvant pesticides with the largest change in acres treated of processing tomato from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
COPPER	FUNGICIDE	74,214	26,846	14,931	39,273	131,460	92,187	235
PYRACLO-STROBIN	FUNGICIDE	53,634	66,297	95,678	132,326	59,871	-72,455	-55
MANCOZEB	FUNGICIDE	48,129	21,975	11,006	16,262	78,876	62,614	385
SULFUR	FUNGICIDE/ INSECTICIDE	303,982	267,344	265,339	376,396	340,725	-35,670	-9
MYCLOBUTANIL	FUNGICIDE	31,505	37,307	68,747	86,764	54,928	-31,835	-37
TRIFLURALIN	HERBICIDE	202,205	198,929	141,364	155,207	128,229	-26,978	-17
CARBARYL	INSECTICIDE	12,302	28,164	34,616	56,426	32,921	-23,505	-42
GLYPHOSATE	HERBICIDE	118,161	76,016	86,792	123,514	145,060	21,546	17
IMIDACLOPRID	INSECTICIDE	42,070	67,052	73,530	91,867	111,664	19,798	22
PENDIMETHALIN	HERBICIDE			32,780	35,550	54,868	19,318	54
RIMSULFURON	HERBICIDE	113,644	96,173	81,490	76,266	58,545	-17,721	-23
OXYFLUORFEN	HERBICIDE	22,542	9,506	9,918	21,798	39,146	17,347	80
FAMOXADONE	FUNGICIDE	10,811	4,408	2,271	7,199	22,785	15,586	217
CYMOXANIL	FUNGICIDE	10,811	4,408	2,271	7,199	22,785	15,586	217
DIMETHOATE	INSECTICIDE	92,309	121,219	95,731	95,603	80,931	-14,672	-15

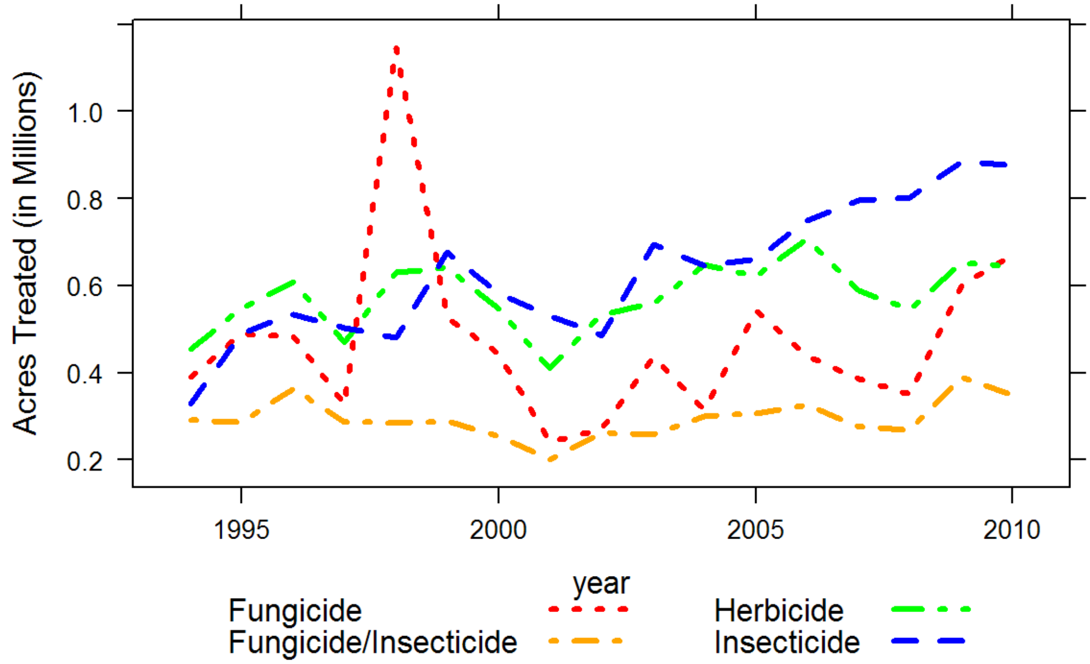

Figure 14: *Acres of processing tomato treated by all AIs in the major types of pesticides from 1995 to 2010.*

N-methyldithiocarbamate (metam-potassium) accounted for 85 percent of the total pounds of pesticide AI applied to processing tomato in 2010. Non-adjuvant pesticides used most in 2010, as measured by acres treated, were sulfur, glyphosate, s-metolachlor, copper-based pesticides, trifluralin, chlorothalonil, and imidacloprid. The most-used pesticide category for processing tomato, in terms of acres treated, was insecticides, which decreased 5 percent from 2009 to 2010 (Figure 14). In terms of pounds of AI applied, fungicide/insecticide (which is nearly all sulfur and kaolin) was the pesticide type most used, although use decreased 2 percent.

Fungicide use, in terms of acres treated, increased 3 percent (Figure 14) while pounds AI increased 34 percent. The most-used fungicides were sulfur, copper-based pesticides, chlorothalonil, azoxystrobin, mancozeb, pyraclostrobin, myclobutanil, difenoconazole, and mefenoxam. Sulfur, azoxystrobin, difenoconazole, and myclobutanil are used to control mildews. Sulfur use in acres treated decreased 9 percent and myclobutanil 37 percent, while difenoconazole increased 48 percent and azoxystrobin 7 percent (Table 37). Use of copper-based pesticides increased sharply, from 39,000 acres treated in 2009 to 131,000 acres in 2010, as bacterial speck was a major issue due to late spring rains. Mancozeb use also increased significantly, from 16,000 acres treated in 2009 to 79,000 acres in 2010. Chlorothalonil-treated acres decreased 6 percent in 2010 from 2009. Mefenoxam, pyraclostrobin, and azoxystrobin are used for controlling late blight. Use of mefenoxam and pyraclostrobin decreased 3 percent and 55 percent, respectively, in terms of acres treated. Pyraclostrobin use may have decreased due to the availability of alternative products. The overall increase in fungicide use may have been due to preventive treatments made in response to difficult-to-control fungal disease or powdery mildew problems during the previous year.

Herbicide use decreased 1 percent from 2009 to 2010, in terms of acres treated (Figure 14); there was a 4 percent increase in pounds of AI. The main herbicides used in processing tomato production were glyphosate, s-metolachlor, trifluralin, rimsulfuron, pendimethalin and oxyfluorfen; among the most troublesome weeds are nightshades and bindweed. Acres treated with glyphosate, commonly used for preplant treatments in late winter and early spring, increased 17 percent. Acres treated with s-metolachlor, used to control nutsedge, decreased 8 percent. Trifluralin and pendimethalin are used to control bindweed. Acres treated with trifluralin decreased 17 percent while acres treated with pendimethalin increased 54 percent, suggesting that use of pendimethalin is replacing trifluralin. Rimsulfuron acres treated, used as a pre-emergence treatment for nightshades, decreased 23 percent. Acres treated with oxyfluorfen, often used in conjunction with glyphosate for difficult-to-control winter and early spring weeds, increased 80 percent.

In 2010, 800,000 acres were treated with insecticides, a 5 percent decrease from 2009 (Figure 14). In terms of pounds AI, insecticide use increased 16 percent. Recurring arthropod pests in processing tomato are russet mites, tomato fruitworms, armyworms, and potato aphid. Imidacloprid, dimethoate, chlorantraniliprole, bifenthrin, lambda-cyhalothrin, oil, methoxyfenozide, indoxacarb, and esfenvalerate were the most-used insecticides in 2010. Acres treated with imidacloprid increased 22 percent to control western flower thrips, a vector of tomato spotted wilt, which increased in 2010 (Table 37). Dimethoate, used for aphid control, remained the most-used insecticide in pounds of AI in 2010; although acres treated decreased 15 percent and pounds of AI decreased 18 percent. The use of chlorantraniliprole, a new AI used to control lepidopterous pests, increased 1 percent in terms of acres treated from 2009 to 2010. Bifenthrin, the use of which increased 20 percent in acres treated, is also used to manage western flower thrips and tomato spotted wilt, as well as mites and stinkbugs. Application of lambda-cyhalothrin, also used to control thrips, decreased 9 percent in acres treated. Acres treated with oil increased 21 percent, while indoxacarb acres increased 4 percent. Methoxyfenozide saw a 7 percent increase in acres treated. Although not one of the most highly used insecticides, malathion had the largest increase in use from 39 acres treated in 2009 to 2,719 acres in 2010. Carbaryl use decreased 42 percent in terms of acres treated.

Processing tomato growers use three main fumigants, metam-potassium, metam-sodium, and 1,3-dichloropropene (1,3-D), to manage root-knot nematodes and weeds, particularly those of the nightshade family. In 2010, fumigant use in pounds AI decreased 21 percent from 2009 and accounted for about 21 percent of the total pounds of pesticide AIs applied. In terms of acres treated, fumigant use decreased 18 percent (Figure 14). The number of acres treated with metam-potassium and metam-sodium decreased 17 and 22 percent, respectively. The decrease in metam-sodium use may have resulted in increased use of preplant herbicides. Acres treated with1,3-D increased 32 percent. Aluminum phosphide use was eliminated in 2010. The overall decrease in fumigant use may be due to difficulty with permits and restrictions, as well as increased availability of alternatives.

Rice

Ninety five percent of California's rice is grown in the Sacramento Valley. The leading rice-producing counties are Colusa, Sutter, Glenn, Butte, Yuba, and Yolo. Approximately 500,000 acres in the Sacramento Valley are of a soil type restricting the crops to rice or pasture. Pesticide use decreased from 5.6 million pounds of AI in 2009 to 4.7 million pounds in 2010 (17 percent decrease) and from 2.8 million to 2.6 million acres treated (6 percent decrease) (Tables 38 and 39). The total acres planted and price also decreased, 1 and 4 percent, respectively.

Table 38: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for rice each year from 2006 to 2010. Planted acres from 2005 to 2010 are from NASS, August 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	5,474,319	4,937,750	4,731,653	5,634,595	4,667,104
Acres Treated	2,100,371	2,292,628	2,468,221	2,805,673	2,634,971
Acres Planted	526,000	534,000	519,000	561,000	558,000
Price/cwt	$ 13.00	$ 16.20	$ 27.50	$ 19.60	$ 17.80

Table 39: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for rice each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	5	-10	-4	19	-17
Acres Treated	5	9	8	14	-6
Acres Planted	0	2	-3	8	-1
Price/cwt	29	25	70	-29	-9

As in 2009, herbicides were the most used pesticide type in 2010 (Figure 15). They accounted for 77 percent of non-adjuvant pesticide acres treated and 66 percent of the total pounds of non-adjuvant AIs applied. Although the acres treated with herbicides have been generally increasing over the last five years, there was very little change from 2009 to 2010, and total pounds of herbicide AI decreased 8 percent.

Of the pesticides with the largest change in acres treated from 2009 to 2010, 10 were herbicides (Table 40). Acres treated with propanil, thiobencarb, carfentrazone-ethyl, fenoxaprop-p-ethyl, 2,4-D, and molinate decreased 5, 10, 34, 44, 54, and 100 percent, respectively, while those treated

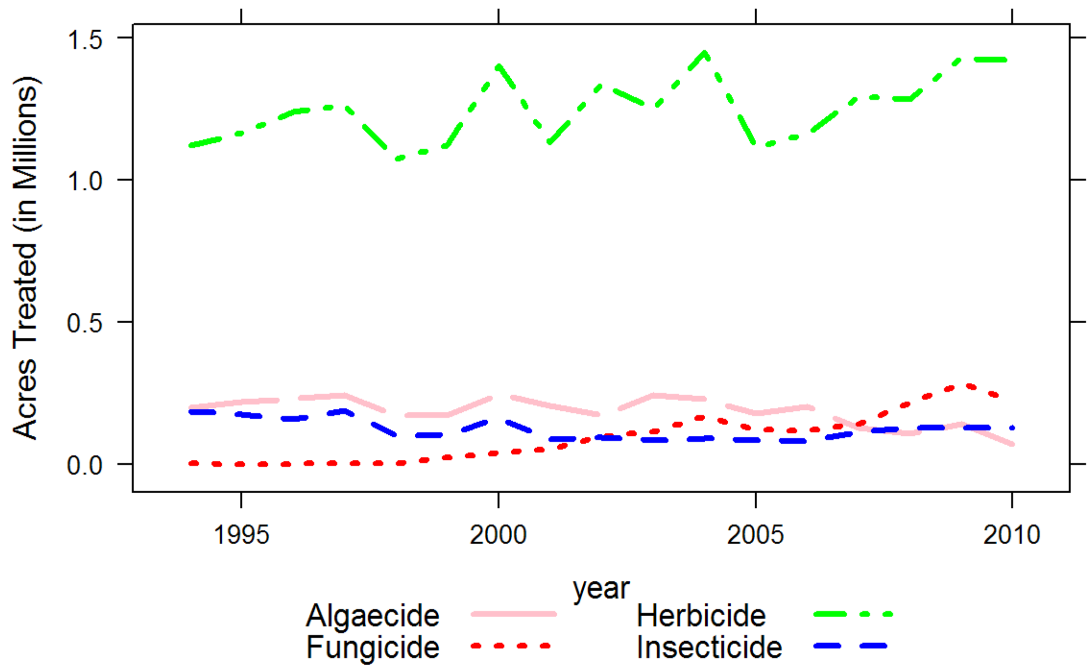

Figure 15: *Acres of rice treated by all AIs in the major types of pesticides from 1995 to 2010.*

with glyphosate, penoxsulam, cyhalofop-butyl, and clomazone increased 77, 42, 7, and 4 percent. The 100 percent decrease in molinate use reflects the end of the five-year phase-out of the herbicide, while the decrease in thiobencarb use is attributed to the long (30-day) post-application water holding requirement, which makes the herbicide less compatible with other weed control products. In December 2009, Bayer CropScience decided to discontinue the sale of fenoxaprop-p-ethyl beginning in 2010. In addition, the registrant bought back existing inventory. It has largely been replaced by cyhalofop-butyl. The increase in glyphosate use may partly reflect the trend to use pre-plant applications in the stale-seedbed technique to control herbicide-resistant watergrass. The increase in penoxsulam use may be due to increasing resistance issues in ricefield bulrush to broad-spectrum herbicides. Although penoxsulam is an acetolactate-inhibiting herbicide, resistence among sedges and broadleaf weeds is not as widespread as it is to other ALS-inhibiting herbicides (e.g., bensulfuron-methyl and halosulfuron).

Acreage treated with fungicides decreased 21 percent, causing a dip in a generally increasing trend since the late 1990s. The biggest change in fungicide use between 2009 and 2010 was a 21 percent decrease in acres treated with azoxystrobin. Azoxystrobin is a reduced-risk fungicide often used as a preventative treatment for rice blast and aggregate sheath spot. However, it delays crop maturity, and because of the cool, wet spring in 2010, some growers may have been hesitant to apply the product on an already late crop, potentially pushing the harvest back into undesirable conditions in late fall. By the time it was clear that 2010 would have a high incidence of rice

Table 40: *The non-adjuvant pesticides with the largest change in acres treated of rice from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
COPPER	ALGAECIDE	2e+05	127,024	106,035	140,368	70,126	-70,242	-50
AZOXYSTROBIN	FUNGICIDE	105,448	139,787	202,683	248,038	196,265	-51,773	-21
PENOXSULAM	HERBICIDE	77,151	82,492	79,515	90,565	128,850	38,285	42
PROPANIL	HERBICIDE	317,521	377,903	382,926	415,344	392,929	-22,416	-5
2,4-D	HERBICIDE	12,893	19,946	10,754	29,454	13,571	-15,883	-54
(S)-CYPERMETHRIN	INSECTICIDE	38,257	48,412	37,142	36,796	25,824	-10,973	-30
LAMBDA-CYHALOTHRIN	INSECTICIDE	39,618	59,505	85,828	87,355	97,877	10,522	12
SODIUM CHLORATE	DEFOLIANT	906	622	346	779	10,747	9,968	1,280
THIOBENCARB	HERBICIDE	79,109	74,251	67,483	83,517	75,172	-8,345	-10
CLOMAZONE	HERBICIDE	119,166	159,161	191,798	197,208	205,176	7,968	4
CYHALOFOP BUTYL	HERBICIDE	107,917	119,979	98,322	83,896	90,180	6,283	7
FENOXAPROP-P-ETHYL	HERBICIDE	28,253	28,099	14,161	12,932	7,236	-5,696	-44
CARFENTRA-ZONE-ETHYL	HERBICIDE	33,442	16,090	14,438	16,563	10,967	-5,596	-34
MOLINATE	HERBICIDE	33,044	17,471	4,529	2,942		-2,942	-100
GLYPHOSATE	HERBICIDE	11,070	6,135	2,084	3,440	6,090	2,650	77

blast, it was past the optimal time for effective treatment.

Algaecides continued a general downward trend over the last five years with a 48 percent decrease in acres treated from 2009 to 2010. Copper sulfate was the predominant algaecide used, although it had a 50 percent decrease in acres treated and a 46 percent decrease in pounds of AI used. Copper sulfate's primary use is for algae control in rice fields, although it also is used to control tadpole shrimp. It is known to bind to organic matter such as straw residue making it less effective. In contrast, sodium carbonate peroxyhydrate increased in pounds of AI used 153 percent.

There was little change in the acres treated with insecticides from 2009 to 2010. Of the pesticides with the largest change in acres treated from 2009 to 2010, two were insecticides: lambda-cyhalothrin increased 12 percent while (s)-cypermethrin decreased 30 percent. Both insecticides are used to control primarily rice water weevil control, and secondarily armyworm and tadpole shrimp. The rice water weevil is the number one insect pest in California rice. Growers often rely on pyrethroids to control rice water weevil and tadpole shrimp soon after flooding. Finally, use of the pre-harvest desiccant, sodium chlorate increased 1280 percent in acres treated and 1120 percent in pounds of AI from 2009 to 2010, which is understandable given the late planting season, cool summer, and inevitable delayed harvest.

Orange

California accounts for 26 percent of the citrus production in the United States. Orange on average accounted for about two-thirds of California's citrus crop. Eighty-six percent of California orange acres are grown in the San Joaquin Valley (Fresno, Kern, and Tulare counties); the rest are grown in the interior region (Riverside and San Bernardino counties) and on the south coast (Ventura and San Diego counties). Orange had higher yields in 2010 because bearing acres declined while production increased. The number of bearing acres declined slightly (2 percent) in 2010 from 2009 (Table 42). Orange production was 13 percent higher in 2010 compared to 2009 (navel production was up 21percent and Valencia production was down 8 percent) and the resulting price per box decreased 11 percent.

Table 41: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for orange each year from 2006 to 2010. Bearing acres from 2005 to 2009 are from CDFA, 2010; bearing acres in 2010 are from NASS, September 2010; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	12,220,757	10,276,606	9,417,674	8,493,497	8,798,083
Acres Treated	2,520,099	2,397,546	2,329,284	2,252,967	2,412,580
Acres Bearing	190,000	190,000	188,000	186,000	183,000
Price/box	$ 10.38	$ 11.27	$ 9.82	$ 12.82	$ 12.67

Table 42: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres bearing, and prices for orange each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	-1	-16	-8	-10	4
Acres Treated	-4	-5	-3	-3	7
Acres Bearing	-1	0	-1	-1	-2
Price/box	11	9	-13	31	-1

The drought conditions of 2009 ended and were replaced by cold and wet weather in the spring of 2010. Late December rains and fog in the San Joaquin Valley caused rot and early dropping. Picking was delayed due to flooding and mud in the orchards.

Total pounds of pesticides used increased 4 percent from 2009 to 2010 (304,586 pounds), however the pounds used in 2010 decreased 9 percent from the five year average from 2006 to 2010 (Table 41). Acres treated increased 7 percent in 2010 (159,613 acres).

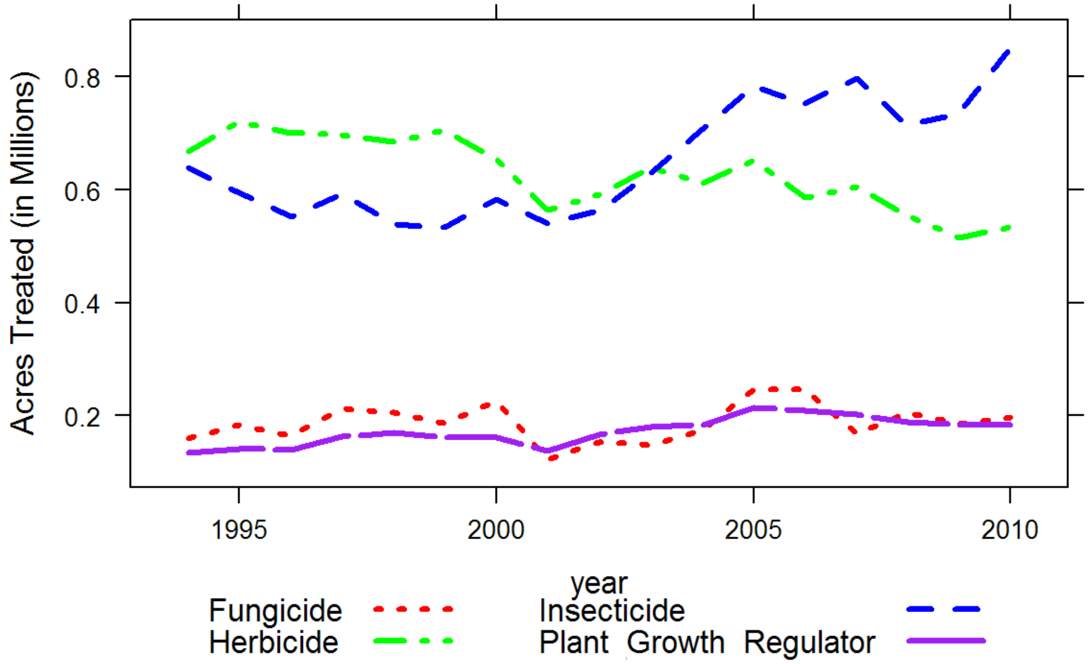

Figure 16: *Acres of orange treated by all AIs in the major types of pesticides from 1995 to 2010.*

Overall, pounds of insecticides used in 2010 increased less than 1 percent relative to 2009 (Figure 16). Acres treated with insecticides increased 19 percent (the largest number of acres since before 2002). The majority of the increase in acres was from increases in the use of malathion and hydrolyzed corn product.

Oil, chlorpyrifos, cryolite, hydrolyzed corn product, imidacloprid, *Bacillus thuringiensis*, and malathion were the insecticides used the most based on pounds of active ingredients applied. Chlorpyrifos, hydrolyzed corn product, imidacloprid, *B. thuringiensis* and malathion use increased, while use of oil and cryolite decreased. The largest increase was seen in pounds used of chlorpyrifos which increased 51,646 pounds (43 percent). Hydrolyzed corn product is a new active ingredient and its use increased 25,011 pounds. Imidacloprid use increased 8,736 pounds (57 percent) while *B. thuringiensis* and malathion use increased 2,575 pounds and 2,718 pounds, respectively.

Chlorpyrifos is a broad-spectrum insecticide used in citrus primarily for citricola scale control. Growers were drawn to apply chlorpyrifos in 2010 because the rainy and cool winter and spring caused an increase in citricola scale. However, imidacloprid use has steadily increased since 2007. It is increasingly being used to help suppress populations of citricola scale that have developed a resistance to chlorpyrifos. Imidacloprid is also used to manage glassy-winged sharpshooter populations. Orange growers are required to treat for the pest to prevent the spread

Table 43: *The non-adjuvant pesticides with the largest change in acres treated of orange from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
MALATHION	INSECTICIDE	8,718	10,842	5,710	5,192	87,161	81,969	1,579
CORN PRODUCT, HYDROLYZED	INSECTICIDE				8	78,840	78,832	985,394
OIL	INSECTICIDE	255,459	255,480	192,137	190,654	165,705	-24,950	-13
METALDEHYDE	OTHER	26,098	27,249	27,861	24,823	43,181	18,358	74
IMIDACLOPRID	INSECTICIDE	13,502	11,105	33,741	37,388	54,913	17,525	47
COPPER	FUNGICIDE	240,070	163,984	199,270	175,150	191,670	16,519	9
PYRIPROXYFEN	INSECTICIDE	43,323	57,139	40,268	49,714	34,600	-15,113	-30
CHLORPYRIFOS	INSECTICIDE	77,852	46,149	43,917	46,343	58,189	11,846	26
GLYPHOSATE	HERBICIDE	351,848	364,657	316,841	308,445	319,634	11,189	4
FENPROPATHRIN	INSECTICIDE	17,411	19,787	19,597	22,073	10,901	-11,172	-51
ACETAMIPRID	INSECTICIDE	3,767	23,303	12,399	8,856	19,543	10,686	121
SPINOSAD	INSECTICIDE	102,534	119,426	67,634	86,055	78,357	-7,697	-9
DIMETHOATE	INSECTICIDE	25,209	34,785	27,222	17,471	10,229	-7,242	-41
FORMETANATE HYDROCHLORIDE	INSECTICIDE	11,974	15,931	18,876	14,396	7,445	-6,951	-48
DIURON	HERBICIDE	82,848	79,547	83,496	74,182	68,876	-5,306	-7

of Pierce's disease in grapes. Despite these efforts, sharpshooter populations are increasing in some areas. Acetamiprid is also used by the sharpshooter treatment program; its use increased 169 percent (1,915 pounds) in 2010.

Oil, malathion, hydrolyzed corn product, spinosad, chlorpyrifos, and imidacloprid were the insecticides used the most by acres treated. The use of oils by acres treated decreased 24,950 acres (13 percent) in 2010, continuing a trend of declining use that began in 2006 (Table 43). Oils are most commonly used in combination with other pesticides as adjuvants. Oil is a broad spectrum pesticide that kills soft-bodied insects such as aphids, immature whiteflies, immature scales, psyllids, immature true bugs, thrips, and some insect eggs as well as mites. Oils also control powdery mildew and other fungi. The increase in oil prices result in lower rates of oils applied.

Acres treated with malathion increased 1,579 percent (81,969 acres) and hydrolyzed corn product was used on 78,832 more acres (985,394 percent increase). Hydrolyzed corn product is used as a bait. The increases in malathion and hydrolyzed corn product can be attributed to the outbreak of Melon fruit fly in the southeast area of the San Joaquin Valley. There was a quarantine that required treatments with these products within the quarantine area. In addition, some growers outside the area opted to treat. The number of acres is elevated because bait was applied to the borders of a block but use was reported as if the entire block had been treated.

Spinosad and spinetoram are primarily used to treat citrus thrips. The introduction in 2008 of spinetoram, which is more effective against thrips, has resulted in less use of spinosad. Acres treated with spinosad decreased 9 percent; spinetoram use increased 3 percent to 25,631 acres in 2010.

Dimethoate is used for a variety of pests such as scales and thrips. Reduced use is likely due to replacement insecticides such as neonicotinoids (imidacloprid and acetamiprid) and spinetoram. Acres treated with dimethoate declined 41 percent (7,242 acres) in 2010. Fenpropathrin and formetanate are primarily used to treat citrus thrips, and their use is declining as they are being replaced by spinosad and spinetoram. Acres treated with fenpropathrin declined 51 percent (11,171 acres). Formetanate use declined 48 percent (6,951 acres).

Acres treated with pyriproxyfen decreased 30 percent in 2010. Pyriproxyfen is used almost exclusively for California red scale control. Citricola scale densities have been heavy in the San Joaquin Valley in the past two seasons and this scale out-competes California red scale. The use of spirotetramat to control California red scale decreased slightly (6 percent) after a 237 percent increase in 2009. The use of hexythiazox to treat mites increased 14 percent. These newly registered insecticides are very selective, allowing natural enemies to survive. They may eventually replace older insecticides and miticides.

Acres treated with fungicides increased 6 percent between 2009 and 2010 and pounds applied increased 11 percent. The increase was primarily due to increased use of copper-based pesticides; 9 percent increase in acres treated and 10 percent increase in terms of pounds AI applied. Copper-based pesticides are the most widely used fungicides on orange. They are used to prevent Phytophthora gummosis, Phytophthora root rot, and fruit diseases such as brown rot and Septoria spot. These diseases are exacerbated by wet, cool weather during harvest which occurred in the spring and winter of 2010. Copper treatments are required for citrus exported to Korea to control Septoria spot fungus. Similarly, imazalil is used as a post-harvest treatment to control storage decay and its use in pounds applied increased 44 percent in 2010.

Acres treated with herbicides increased 18,726 acres (4 percent) between 2009 and 2010 and the pounds of herbicides increased 86,421 (12 percent). The wet weather in 2010 increased weed pressure so more herbicides were needed. The increase in pounds of herbicide used was predominantly due to the increase in glyphosate, oryzalin, and pendimethalin; the increase in herbicide acres treated was due mostly to the increase in glyphosate and rimsulfuron. Glyphosate, a post-emergence herbicide, was the most-used herbicide. The pounds of glysophate applied in 2010 increased 10 percent. The pounds of oryzalin used increased 15,602 pounds (113 percent) and pendimethalin use increased 12,512 pounds (29 percent). Oryzalin is a pre-emergence herbicide as are simazine and diuron. In terms of pounds applied, use of simazine decreased 2 percent in 2010 and diuron decreased 9 percent. Diuron use has been steadily decreasing since 2005 (124,111 pounds were used in 2010 compared to 182,593 pounds applied in 2005). Oryzalin is probably replacing diuron as pre-emergence herbicides. The acres treated with rimsulfuron increased 4,822 acres (29 percent) and the pounds used increased 298 pounds (22 percent). The increase is most likely due to growers trying new products in lieu of some older herbicides. There is an increasing problem with resistance of horseweed and fleabane to glyphosate. Decreased use of some herbicides is partially due to ground water regulations, particularly those that affect the use of simazine and diuron, which are classified as ground water contaminates and regulated accordingly. Paraquat dichloride is associated with acute inhalation toxicity and worker safety issues.

Acres treated with diphacinone decreased 4,856 acres (38 percent) between 2009 and 2010. Diphacinone is used for ground squirrel control. There has been a steady decrease in the use of this rodenticide since 2001.

Acres treated with metaldehyde increased 18,358 acres (74 percent) in 2010. The pounds used increased 9,753 pounds (110 percent). Metaldehyde is used for snails and slugs and the rainy, cool spring and winter caused an increase in these pests.

Pistachio

In 2010, California accounted for more than 137,000 bearing acres of pistachio, or almost 99 percent of the U.S. crop. Worldwide, U.S. pistachio production in 2009 ranked second to that of Iran. In California, pistachios are grown from San Bernardino County in the south to Tehama County in the north. In 2010, 97 percent of all pistachio acreage in California was located in the San Joaquin Valley (Kern, Madera, Fresno, Tulare, Kings, Merced, Stanislaus, Alameda, San Joaquin, and Contra Costa counties), 2 percent in the Sacramento Valley (Colusa, Glenn, Butte, Yolo, Tehama, and Sutter counties), and 1 percent in Santa Barbara, San Bernardino, San Luis Obispo, Placer, Calaveras, and Riverside counties. In 2010, the counties with the highest number of bearing acres were Kern, 41 percent; Madera, 19 percent; and Fresno, 13 percent. The southern San Joaquin Valley counties of Kern, Madera, Fresno, Tulare, Kings, and Merced comprise 96 percent of the bearing acres in California.

Table 44: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for pistachio each year from 2006 to 2010. Bearing acres from 2005 to 2009 are from CDFA, 2010; bearing acres in 2010 are from NASS, July 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	4,465,185	2,660,069	2,415,057	3,016,924	2,862,812
Acres Treated	1,811,114	1,526,327	1,400,233	1,767,390	2,165,162
Acres Bearing	112,000	115,000	118,000	126,000	137,000
Price/lb	$ 1.89	$ 1.41	$ 2.05	$ 1.67	$ 2.22

Pistachio trees alternate between high and low production each year. Projected as an off year, California's 2010 pistachio crop had the highest total production and yield ever recorded. The

Table 45: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres bearing, and prices for pistachio each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	69	-40	-9	25	-5
Acres Treated	29	-16	-8	26	23
Acres Bearing	7	3	3	7	9
Price/lb	-8	-25	45	-19	33

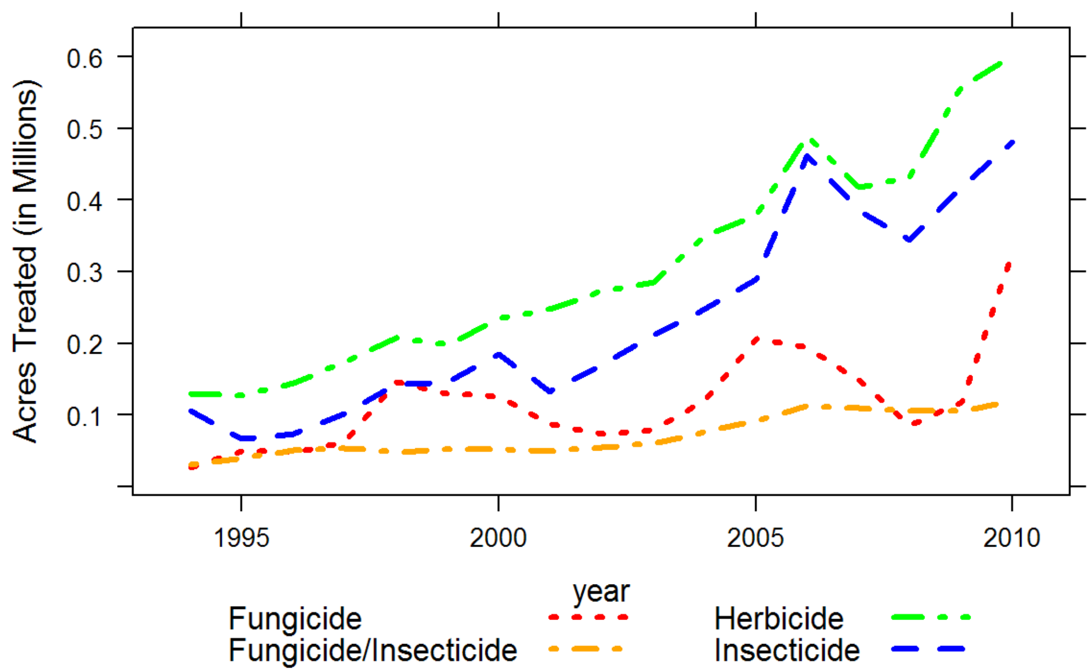

Figure 17: *Acres of pistachio treated by all AIs in the major types of pesticides from 1995 to 2010.*

wet, mild spring and early summer encouraged a heavy flush of growth. From 2009 to 2010 the number of bearing acres increased by 9 percent (Tables 44 and 45). The increase in bearing acres will continue over the next few years due to a surge in planting around 2005.

Pesticide use on pistachio fluctuated from 2005 through 2009 (Table 44). Use of all classes of pesticide as measured by acres treated increased 23 percent from 2009 to 2010 (Table 45). This increase may have resulted from the rise in bearing acres as well as a cool, wet spring and mild summer in the San Joaquin Valley. Although favorable to pistachio production, the weather conditions set up a higher potential for disease development and led to lusher growth of weeds, resulting in more use of fungicides and herbicides.

Table 46: *The non-adjuvant pesticides with the largest change in acres treated of pistachio from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
BOSCALID	FUNGICIDE	61,815	50,198	21,770	21,711	79,119	57,408	264
PYRACLO-STROBIN	FUNGICIDE	67,811	52,686	23,103	25,124	79,317	54,193	216
LAMBDA-CYHALOTHRIN	INSECTICIDE			14,701	48,162	91,568	43,406	90
GLUFOSINATE-AMMONIUM	HERBICIDE	766	1,580	38,917	55,841	94,666	38,825	70
METCONAZOLE	FUNGICIDE					29,667	29,667	
PYRIMETHANIL	FUNGICIDE	22,395	10,424	9,252	14,088	29,521	15,433	110
PENDIMETHALIN	HERBICIDE	42,380	50,828	59,376	56,048	41,357	-14,692	-26
SULFUR	FUNGICIDE/ INSECTICIDE	112,167	109,879	104,573	104,775	118,314	13,539	13
TRIFLOXY-STROBIN	FUNGICIDE	14,251	8,210	1,892	12,345	25,824	13,480	109
AZOXYSTROBIN	FUNGICIDE	2,597	5,113	1,472	2,592	15,371	12,779	493
THIOPHANATE-METHYL	FUNGICIDE	17,783	13,875	12,647	18,279	29,761	11,482	63
OIL	INSECTICIDE	111,375	84,114	70,985	69,232	79,820	10,588	15
GLYPHOSATE	HERBICIDE	238,602	184,859	185,604	246,098	256,499	10,401	4
FLUMIOXAZIN	HERBICIDE	23,377	44,076	32,084	23,820	31,483	7,663	32
CARFENTRA-ZONE-ETHYL	HERBICIDE	11,951	14,036	11,726	12,840	5,183	-7,657	-60

The major pesticides with the largest increase in acres treated were the insecticides lambda-cyhalothrin and oil; the fungicides boscalid, pyraclostrobin, metconazole, pyrimethanil, trifloxystrobin, azoxystrobin, and thiophanate-methyl; the miticide sulfur; and the herbicides glufosinate-ammonium, glyphosate, and flumioxazin (Table 46). Herbicides with the largest decreases were pendimethalin and carfentrazone-ethyl. During 2010, the top insecticides used (by acres treated) were permethrin, lambda-cyhalothrin, oil, bifenthrin, methoxyfenozide, and beta-cyfluthrin. Sulfur was the dominant miticide used. The main fungicides used were pyraclostrobin, boscalid, thiophanate-methyl, metconazole, pyrimethanil, and trifloxystrobin. Three herbicides dominated—glyphosate, oxyfluorfen, and glufosinate-ammonium. Aluminum phosphide, which is used for burrowing rodents, was the main fumigant.

Insecticide use, as measured by pounds, decreased 19 percent from 2009 to 2010, primarily due to ideal growing conditions that led to less insect pressure. A late, rainy spring encouraged weeds to grow in areas surrounding orchards, which may have offered adequate food for potential arthropod pests and also kept them from visiting pistachio trees later in the season. Oil made up 77 percent of insecticides used by pounds, yet its use in pounds AI decreased 48 percent from 2009 to 2010. Horticultural oil suppresses scale insects on pistachio when used during the dormant stage and in-season. Their labels specify use of several pounds per acre. While pounds of oil decreased from 2009 to 2010, its use by acres increased 15 percent, possibly because oil was used at a lower rate. As a result, insecticide use as measured by acres increased 14 percent.

Citrus flat mite feeds on the stems of nut clusters as well as the nuts themselves. As the weather warms up in June, mite populations thrive and peak in late July and August. In 2010, growers began applying sulfur for mites in April, applied most in May, and continued applications July through September. Sulfur application increased 13 percent from 2009 to 2010, as measured by acres.

Several species of true bugs cause early- and late-season damage to nuts. Plant bugs such as lygus fly into pistachio orchards from nearby weeds in early spring and may cause epicarp lesion, characterized by direct damage to the nut as shells harden during May. Like lygus bug, false chinch bugs may also migrate to pistachio orchards from cruciferous weeds during spring. Feeding can lead to leaf drop. Feeding by the leaffooted plant bug can cause epicarp lesion to the nuts shortly after bloom and lead to kernel necrosis after shell hardening in June, darkening and ruining the flavor of the nutmeat. These bugs usually appear late in the season during August and September. Stink bugs are also mostly late-season pests, causing kernel necrosis during July and August. Growers apply pyrethroids—permethrin, lambda-cyhalothrin, and beta-cyfluthrin—for all of the bugs. In Kern County, damage from bug feeding was noted in late May and early June. Use of permethrin and lambda-cyhalothrin peaked during May. From 2009 to 2010, acres treated with permethrin decreased 3 percent, while use of lambda-cyhalothrin increased 90 percent. Beta-cyfluthrin use peaked during June and its overall use increased 12 percent from 2009 to 2010.

Two lepidopteran pests can cause late-season damage. From June through August, the obliquebanded leafroller (OBLR) can feed on the stems of the nut clusters, causing them to dry and shrivel and reducing crop yield. Use of methoxyfenozide for OBLR peaked during August and its use decreased 6 percent from 2009 to 2010. The navel orangeworm (NOW) causes more damage than OBLR by feeding directly on the nutmeat. NOW attacks nuts beginning in July, but insecticide sprays target the third generation that coincides with the beginning of the nut harvest. NOW infestations were relatively light in 2010 and in late August and September growers applied about the same amount of bifenthrin that they did in 2009.

Although use of buprofezin for Gill's mealybug climbed 69 percent from 2009 to 2010, it was used on few acres. Most applications were made in May and June and targeted adult females found in clusters.

From 2009 to 2010, fungicide use increased 175 percent as measured by acres treated. Use of every major fungicide went up and use of some doubled or tripled. The cool, wet spring and mild summer delayed the crop by one to two weeks to late September. Rain during harvest would have encouraged diseases such as Alternaria, Botryosphaeria, and Botrytis, which could ruin the crop.

During 2010, fungicide applications peaked in April with additional applications during September and October of a product that combines pyraclostrobin and boscalid, which is highly effective against all three major diseases.

Herbicide use by acres treated increased 9 percent from 2009 to 2010. The post-emergence herbicides glyphosate and glufosinate-ammonium are applied year-round, but mostly during the summer months to manage weeds such as field bindweed and cheeseweed. From 2009 to 2010, use of glyphosate increased 4 percent; that of glufosinate-ammonium increased 70 percent. Use of the pre-emergence herbicide oxyfluorfen remained constant from 2009 to 2010, while that of pendimethalin, a pre-emergence herbicide for cool-weather weeds, decreased 26 percent. Use of flumioxazin and oryzalin, other pre-emergents used mostly during winter, increased. Use of flumioxazin has increased each year since 2006, when it was first registered for use on pistachio. From 2009 to 2010, its use rose 26 percent. Flumioxazin provides long-residual, pre-emergence control of annual grasses, hairy fleabane, and other annual broadleaf weeds.

Walnut

California produces 99 percent of the walnuts grown in the United States. In 2010, walnut production was up 15 percent from the previous year and totaled 503,000 tons, which is valued at over one billion dollars. While total bearing acreage remained constant from 2009 to 2010, price per ton, acres treated with pesticides, and pounds of AI all increased 21 to 24 percent (Table 48).

Table 47: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for walnut each year from 2006 to 2010. Bearing acres from 2005 to 2008 are from CDFA, 2010; bearing acres from 2009 to 2010 are from NASS, July 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	3,566,923	4,018,167	3,375,868	3,273,857	3,976,888
Acres Treated	1,950,913	2,084,581	1,781,200	1,856,211	2,303,846
Acres Bearing	216,000	218,000	223,000	227,000	227,000
Price/ton	$ 1,630	$ 2,290	$ 1,280	$ 1,710	$ 2,110

Table 48: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres bearing, and prices for walnut each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	-7	13	-16	-3	21
Acres Treated	-2	7	-15	4	24
Acres Bearing	0	1	2	2	0
Price/ton	4	40	-44	34	23

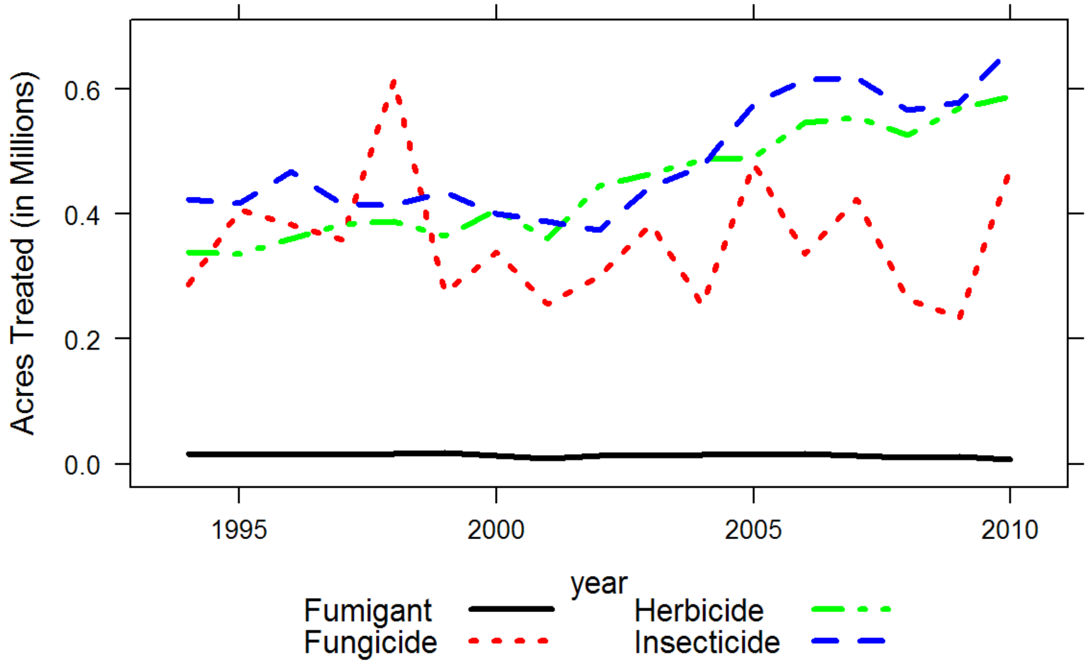

Figure 18: *Acres of walnut treated by all AIs in the major types of pesticides from 1995 to 2010.*

Ninety-nine percent of total pesticide use in walnut (both acres treated and pounds of AI) occurred in the Sacramento and San Joaquin Valleys in 2010, split nearly equally between the two valleys. Acres treated with low-risk pesticides increased 24 percent from 2009 to 2010, a slightly higher increase than the 22 percent increase in acres treated with high-risk pesticides. Low-risk pesticides include biopesticides, oils, and sulfur; high-risk pesticides include OPs, pyrethroids, carbamates, reproductive toxins, carcinogens, and pesticides on the groundwater and TAC lists.

Fungicides, insecticides, fumigants, and herbicides accounted for 99 percent of the non-adjuvant AI pounds used. Of these pesticides, fungicides showed the greatest increase from 2009 to 2010, with acres treated and pounds of AI increasing 103 percent and 85 percent, respectively (Figure 18). *Reynoutria sachalinensis* and mancozeb were used for the first time in 2010. *Reynoutria sachalinensis* is a plant extract thought to help control walnut blight especially when resistance to copper is a concern. Use of mancozeb was given a FIFRA section 18 emergency exemption to control blight in walnut after the emergency exemption for the use of maneb lapsed. The overall increase in fungicide use was associated with to the above average winter and spring rainfall, which established the environmental conditions highly conducive to walnut blight.

Use of insecticides also increased from 2009 to 2010. Chlorantraniliprole, oil, hydrolyzed corn product, abamectin, imidacloprid, permethrin, and acetamiprid were the non-adjuvant insecticides with the largest increase in acres treated (Table 49), while phosmet had a 97 percent increase in

Table 49: *The non-adjuvant pesticides with the largest change in acres treated of walnut from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
MANCOZEB	FUNGICIDE					162,591	162,591	
COPPER	FUNGICIDE	187,113	234,595	143,463	145,872	289,124	143,252	98
MANEB	FUNGICIDE	144,629	184,317	117,557	85,758	5	-85,753	-100
CHLOR-ANTRANILIPROLE	INSECTICIDE			67	7,685	32,528	24,843	323
OIL	INSECTICIDE	56,219	77,084	79,132	87,461	107,754	20,293	23
REYNOUTRIA SACHALINENSIS	FUNGICIDE				9	20,121	20,112	223,472
CORN PRODUCT, HYDROLYZED	INSECTICIDE	31,746	41,896	45,125	47,953	67,716	19,764	41
ABAMECTIN	INSECTICIDE	26,065	31,778	39,395	45,422	63,491	18,068	40
GLUFOSINATE-AMMONIUM	HERBICIDE	8,116	13,544	32,438	47,939	64,686	16,746	35
ETHEPHON	PLANT GROWTH REGULATOR	27,185	27,672	28,022	27,203	43,492	16,290	60
IMIDACLOPRID	INSECTICIDE		718	2,770	14,023	28,038	14,014	100
PROPARGITE	INSECTICIDE	64,765	50,909	30,352	25,821	14,661	-11,160	-43
OXYFLUORFEN	HERBICIDE	118,722	116,304	110,257	117,185	108,455	-8,730	-7
PERMETHRIN	INSECTICIDE	13,064	10,844	10,303	7,902	14,915	7,013	89
ACETAMIPRID	INSECTICIDE			3,580	6,140	12,741	6,601	108

pounds used, and chlorpyrifos saw a 7 percent decrease. The increase in acetamiprid and imidacloprid were likely in response to aphid pressure, while the increase in hydrolyzed corn product (an attractant typically mixed with an insecticide) and phosmet probably reflects a trend of increasing severity of walnut husk fly infestations, a trend which may be associated with decreased use of broad spectrum organophosphates such as chlorpyrifos for this pest. Codling moth pressure was relatively low in 2010, which could further account for the reduction in chlorpyrifos use. Chlorantraniliprole is a newer, more selective insecticide with relatively long residual activity and is predominantly used to control codling moth. The miticide propargite decreased in both pounds and acres treated.

The herbicides with the largest changes from 2009 to 2010 were glufosinate-ammonium, oryzalin, and oxyfluorfen (Table 49). Glufosinate-ammonium and oryzalin increased in acres treated by 35 and 12 percent, respectively, and in pounds of AI by 50 and 31 percent. Glufosinate-ammonium is largely used to control glyphosate-resistant weeds. It is considered by some to have better efficacy than paraquat and other contact materials, and does not have closed-system handling requirements like paraquat to protect worker safety. In contrast, oxyfluorfen decreased in acres treated and pounds by 7 percent and 31 percent, respectively.

The fumigants methyl bromide and chloropicrin decreased in pounds of AI by 89 and 56 percent, respectively, from 2009 to 2010. Seventy-three percent of methyl bromide use was as a soil fumigant, which represents a 92 percent decrease from 2009 to 2010. Post-harvest use decreased 23 percent. In contrast, there was a 24 percent increase in pounds applied of 1,3-dichloropropene, which tends to be less expensive to apply and is more available than methyl bromide.

Finally, the use of plant growth regulator ethephon increased 60 percent in acres treated and 55 percent in pounds applied. Ethephon accelerates hull dehiscence, maturity, and fruit abscission, allowing growers to maximize kernel quality while avoiding late season walnut husk fly and navel orangeworm damage.

Strawberry

California produced 2.58 billion pounds of strawberries in 2010, 91 percent of the total U.S. production, valued at more than $1.80 billion. Market prices determine the portion of a year's crop processed and the portion directed to the fresh market. About 38,600 acres of strawberries were planted and harvested in 2010 (Table 50); most of the crop, worth $1.66 billion, was grown for the fresh market. California strawberry production occurs primarily along the central and southern coast, with smaller but significant production occurring in the Central Valley.

Table 50: *Total reported pounds of all active ingredients (AI), acres treated, acres harvested, and prices for strawberry each year from 2006 to 2010. Harvested acres from 2005 to 2009 are from CDFA, 2010; harvested acres in 2010 are from NASS, July 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	9,394,745	9,669,764	9,918,143	10,041,462	10,972,995
Acres Treated	1,291,122	1,357,345	1,514,202	1,661,353	1,965,327
Acres Harvested	35,800	35,500	37,600	39,800	38,600
Price/cwt	$ 56.70	$ 65.50	$ 69.60	$ 69.40	$ 69.60

Table 51: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for strawberry each year from 2006 to 2010 .*

	2006	2007	2008	2009	2010
Lbs AI	2	3	3	1	9
Acres Treated	1	5	12	10	18
Acres Harvested	4	-1	6	6	-3
Price/cwt	4	16	6	0	0

Strawberry acres treated with pesticides increased 18 percent and pounds of pesticides applied increased 9 percent from 2009 to 2010, even though harvested acres declined 3 percent

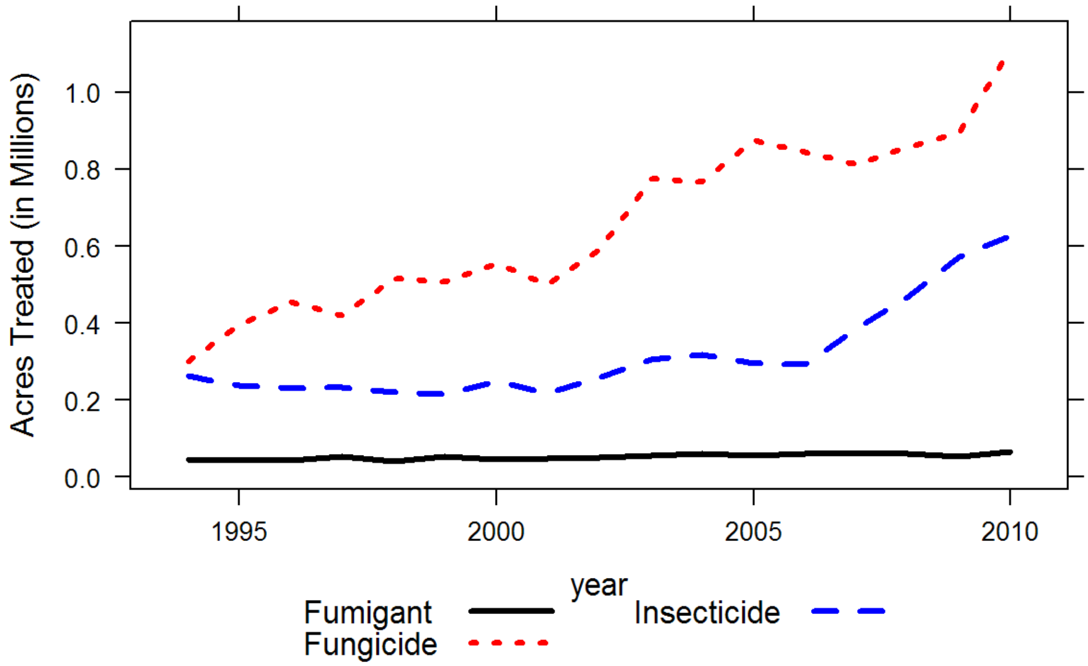

Figure 19: *Acres of strawberry treated by all AIs in the major types of pesticides from 1995 to 2010.*

(Table 51). Fungicides, followed by insecticides, account for the largest proportion of pesticides applied by acres treated: Fungicides increased 18 percent, while insecticides increased 8 percent, and herbicides increased 7 percent (Figure 19). The major pesticides with greatest increase in acres treated from 2009 to 2010 were captan, boscalid, pyraclostrobin, cyprodinil, fludioxonil, oil, novaluron, fenpyroximate, and sulfur. The major pesticides with decreased use by acres treated were naled, fenpropathrin, malathion, propiconazole, methomyl, thiamethoxam, and bifenthrin (Table 52).

Fungicides continue to be the most-used pesticides, as measured by acres treated. The major fungicides by acres treated in 2010 were captan, sulfur, pyraclostrobin, boscalid, fludioxonil, cyprodinil, fenhexamid, myclobutanil, pyrimethanil, quinoxyfen, triflumizole thiophanate-methyl, and propiconazole. The most important fungal diseases of strawberry are Botrytis and powdery mildew; in general, fungicides effective against Botrytis fruit rot and those used to control powdery mildew increased in 2010. Botrytis risk especially increases during warm wet conditions. The older registered fungicides, captan, boscalid, cyprodinil, fludioxonil, fenhexamid, thiophanate-methyl, thiram and chlorothalonil, and the more recently registered QST 713 strain *Bacillus subtilis*, pyrimethanil and propiconazole are generally used to control Botrytis fruit rot. Acres treated with all of these fungicides increased in 2010 except for those treated with chlorothalonil, which declined 97 percent; propiconazole, introduced in 2008, which declined 16

Table 52: *The non-adjuvant pesticides with the largest change in acres treated of strawberry from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
CAPTAN	FUNGICIDE	151,742	127,029	135,757	142,150	192,112	49,962	35
BOSCALID	FUNGICIDE	56,822	55,747	62,277	44,167	66,794	22,627	51
PYRACLO-STROBIN	FUNGICIDE	68,369	66,997	71,318	56,509	77,195	20,686	37
CYPRODINIL	FUNGICIDE	28,606	33,582	38,097	39,878	58,909	19,032	48
FLUDIOXONIL	FUNGICIDE	28,606	33,582	38,097	39,878	58,909	19,032	48
OIL	INSECTICIDE	690	7,408	20,204	36,957	53,860	16,903	46
NOVALURON	INSECTICIDE				24,497	41,149	16,652	68
FENPYROXIMATE	INSECTICIDE					12,085	12,085	
SULFUR	FUNGICIDE	129,069	139,486	134,076	146,790	157,125	10,335	7
PYRIMETHANIL	FUNGICIDE	30,419	16,080	22,270	24,659	33,391	8,732	35
NALED	INSECTICIDE	18,681	23,819	33,916	51,937	44,587	-7,351	-14
SPIROMESIFEN	INSECTICIDE	10,375	16,225	18,439	22,485	29,404	6,919	31
FENPROPATHRIN	INSECTICIDE	20,217	21,272	25,688	27,885	21,229	-6,656	-24
FENHEXAMID	FUNGICIDE	54,234	40,011	47,035	50,641	57,256	6,615	13
ABAMECTIN	INSECTICIDE	13,024	16,962	26,103	29,751	35,876	6,125	21

percent; and QST 713 *B. subtilis*, introduced in 2005, which declined 13 percent. Use continued to increase for pyrimethanil, introduced in 2006.

As in 2009, low free moisture on leaves but high humidity favored powdery mildew in 2010. Conventional strawberry growers primarily used sulfur, pyraclostrobin, boscalid, myclobutanil, quinoxyfen, triflumizole, and propiconazole to control powdery mildew. Sulfur is inexpensive and is also used by organic growers. In 2010 acres treated with sulfur increased 7 percent, pyraclostrobin 37 percent, boscalid 51 percent, myclobutanil 6 percent, triflumizole 16 percent, azoxystrobin 45 percent, potassium bicarbonate 93 percent and trifloxystrobin 70 percent. Use of the newer AIs quinoxyfen, introduced in 2007, remained relatively unchanged, and propiconazole, introduced in 2008, was down 16 percent. Quinoxyfen provides a new multi-site mode of action to control powdery mildew that is different from the demethylation inhibitors (DMIs) (e.g., propiconazole) and the strobilurins (e.g., azoxystrobin). It is generally used as a preventative treatment allowing use of other fungicides to be reduced. The newly introduced trifloxystrobin, like other strobilurins, acts on the mitochondrial respiratory pathway to inhibit sporulation and mycelial growth. Pyraclostrobin is frequently used in combination with boscalid. Acres treated with these two products and pounds AI applied increased in 2010 despite concerns about reduced efficacy. It is a fungistatic DMI like myclobutanil. Use of mefenoxam, effective against *Phytophthora fragariae* (red stele) and *P. cactorum* (leather rot and crown rot), decreased 19 percent in 2010. Some of the increased use of captan may have been due to its effectiveness on the plant collapse pathogens, *Macrophomina* and *Fusarium*.

The major insect pests of strawberry are lygus bugs and worms (various moth and beetle larvae), especially in the Central and South Coast growing areas. Until recently, lygus bugs were not considered a problem in the South Coast, but lygus has become a serious threat, probably because of increased diversity in the regional crop complex that support this pest. The major insecticides used in 2010 by acres treated were malathion, *Bacillus thuringiensis*, oil, naled, novaluron, bifenthrin, bifenazate, abamectin, spiromesifen, spinetoram, fenpropathrin, spinosad, acetamiprid methoxyfenozide, pyrethrins, chlorpyrifos, and fenpyroximate.

Acres treated with all of these major insecticides increased except malathion, naled, bifenthrin, and fenpropathrin. *B. thuringiensis* (up 9 percent), spinosad (up 43 percent), and the newly registered spinetoram (up 2 percent) are biological pesticides primarily used against lepidopteran larvae; spinosad and spinetoram are also effective against thrips. There were significant regional differences in use of these biological pesticides. In the South Coast, *B. thuringiensis* use decreased 7 percent while spinosad use increased 79 percent and spinetoram increased 40 percent. In the Central Coast region, both *B. thuringiensis* and spinosad increased (24 percent and 34 percent, respectively) while spinetoram use decreased 30 percent. Spinosad and spinetoram have longer residual action and are generally more effective so do not need to be applied as frequently as *B. thuringiensis*. Spinetoram, with the same mechanism of action as spinosad, appears to have partially replaced spinosad and *B. thuringiensis*.

Increased lygus bug populations in Southern Coastal growing areas and wide spread resistance to pyrethroid insecticides led to increased use of AIs with modes of action different from pyrethroids. Novaluron is an insect growth regulator acting on chitin synthesis in larvae of Coleoptera, Hemiptera, and Lepidoptera. Fenpropathrin (down 24 percent), malathion, spiromesifen (up 31 percent), bifenthrin, and pyriproxyfen (down 7 percent) are effective against whiteflies. Pyriproxyfen is an insect growth regulator registered in 2002. *B. thuringiensis* and spinosad, as well as pyrethrins (up 13 percent), are available for use by organic growers. Like *B. thuringiensis*, pyrethrins have short residual activity and so may require multiple sprays.

Increased two-spotted spider mite and red spider mite pressure resulted in 4 percent increased acres treated with bifenazate, which is effective and has low toxicity to predatory mites. The use of other pesticides in terms of acres treated also increased in response to mite pressure: spiromesifen (31 percent), acequinocyl (27 percent), abamectin (21 percent), and hexythiazox (13 percent). Most conventional growers have continued to use bifenazate since its introduction in 2003. Acequinocyl is effective against cyclamen mite which is not controlled by bifenazate. Increase in mite problems may be due to a warmer, dryer winter, but may also be due to carryover of mite populations from susceptible summer planted berries to winter planted berries.

Herbicide use increased 7 percent from 15,647 acres in 2009 to 16,715 acres in 2010. Flumioxazin use was up 55 percent, oxyfluorfen (3 percent), glyphosate (30 percent), and pendimethalin (which was first used in 2010), while napropamide use declined 57 percent.

Strawberry production relies on several fumigants. Fumigants accounted for about 84 percent of all pesticide AIs by pounds applied in strawberry in 2010, but only 2 percent of the acres treated. Even with that relatively small acreage treated, the acres treated with fumigants increased 27 percent. Acres treated with chloropicrin increased 20 percent, with 1,3-dichloropropene (1,3-D) 56 percent, and with metam-sodium 101 percent, while acres treated with methyl bromide decreased 15 percent. Newer formulations have shown increased effectiveness against soil borne fungal pathogens. Methyl bromide is used primarily to control pathogens and nut sedge. Metam-sodium is generally more effective in controlling weeds, but less effective than 1,3-D or 1,3-D plus chloropicrin against soil-borne diseases and nematodes. Fumigants usually are applied at higher rates than other pesticide types such as fungicides and insecticides because they target pests in a volume of space rather than on a surface such as leaves and stems of plants. Thus, the pounds applied are large relative to other pesticide types even though the number of applications or number of acres treated may be relatively small.

Peach and nectarine

California ranks first in the United States in peach and nectarine production. In 2010 the state grew 71 percent of all U.S. peach (including 54 percent of fresh market peach and about 98 percent of processed peach) and 90 percent of nectarine. Most freestone peaches and nectarines are produced in the central San Joaquin Valley and sold on the fresh market. Clingstone peach, largely grown in the Sacramento Valley, are used exclusively for processing into canned and frozen products including baby food and juice. Nectarine and freestone peach bearing acreage declined from 29,000 and 28,000 acres, respectively, in 2009 to 28,000 and 27,000 acres in 2010. Clingstone peach bearing acreage declined from 24,500 to 23,000 acres. Peach and nectarine are discussed together because pest management issues for the two crops are similar.

Table 53: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for peach and nectarine each year from 2006 to 2010. Bearing acres from 2005 to 2009 are from CDFA, 2010; bearing acres in 2010 are from NASS, July 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	6,800,154	5,162,860	5,371,367	5,032,695	4,468,777
Acres Treated	1,697,962	1,407,695	1,438,882	1,381,892	1,340,602
Acres Bearing	92,000	88,500	87,000	81,500	78,000
Price/ton	$ 429	$ 343	$ 351	$ 483	$ 428

Peach and nectarine acreage treated with the major categories of pesticides has fluctuated from year to year since 1994. Data for most types of pesticide do not show substantial increasing or decreasing trends (Figure 20). In 2010, there were 4 percent fewer bearing acres of peach and nectarine than in 2009. Total pounds of AI applied decreased from 5.0 million in 2009 to 4.5 million in 2010 (11 percent decrease) and total acres treated decreased from 1.4 million to 1.3

Table 54: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres bearing, and prices for peach and nectarine each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	3	-24	4	-6	-11
Acres Treated	7	-17	2	-4	-3
Acres Bearing	-10	-4	-2	-6	-4
Price/ton	11	-20	2	38	-11

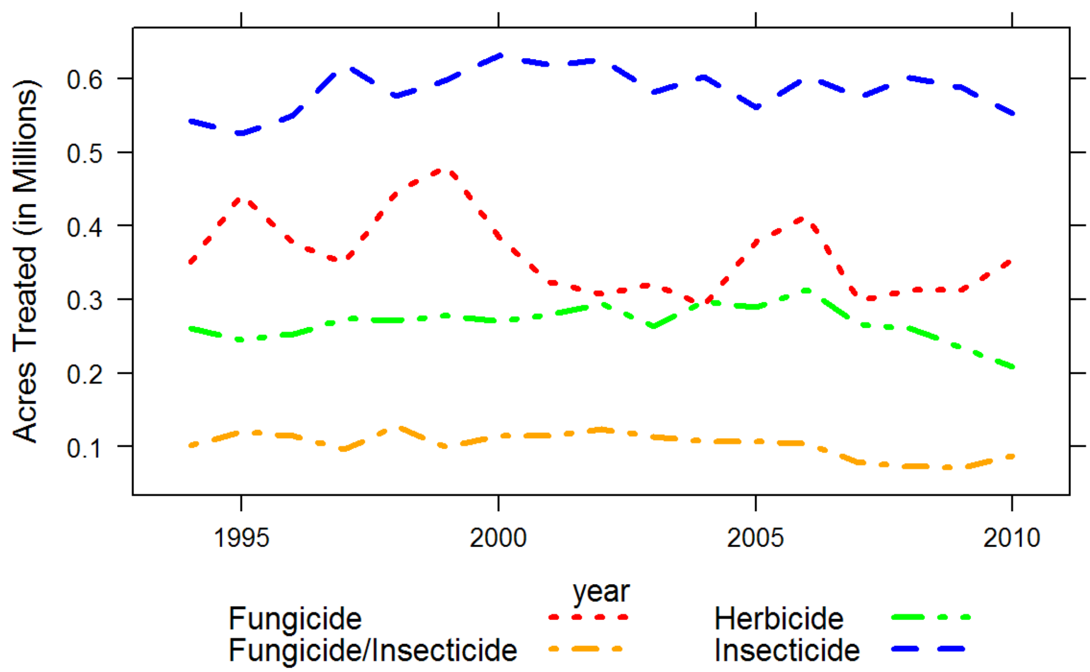

Figure 20: *Acres of peach and nectarine treated by all AIs in the major types of pesticides from 1995 to 2010.*

million (3 percent decrease) (Tables 53 and 54). Acres treated with fungicides and fungicide/insecticides increased while acres treated with herbicides and insecticides declined (Figure 20).

After three years of drought, total rainfall in California during winter 2009/10 was approximately normal. A long, cool, wet spring caused stone fruit to mature later than usual, but hail, wind, and low temperatures did only limited springtime damage and fruit quality was good. Clingstone peach yields per acre were high, the 2009 and 2010 seasons producing the best back-to-back crop yields in history. Price per ton retreated about 10 percent from the near-record 2009 level. Freestone peach and nectarine production increased 10 percent and 7 percent, respectively,

Table 55: *The non-adjuvant pesticides with the largest change in acres treated of peach and nectarine from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
GLYPHOSATE	HERBICIDE	152,461	126,486	116,495	107,693	85,108	-22,585	-21
ESFENVALERATE	INSECTICIDE	101,673	80,572	92,197	84,688	63,964	-20,724	-24
OIL	INSECTICIDE	135,009	115,740	127,964	125,071	105,012	-20,059	-16
COPPER	FUNGICIDE	70,637	43,875	40,659	60,431	43,838	-16,593	-27
SULFUR	FUNGICIDE/ INSECTICIDE	102,168	76,428	70,892	71,272	85,685	14,413	20
ABAMECTIN	INSECTICIDE				2	10,677	10,675	533,727
RIMSULFURON	HERBICIDE		2	6,159	6,304	14,711	8,407	133
CAPTAN	FUNGICIDE	3,135	632	1,174	443	7,622	7,179	1,621
SPIRODICLOFEN	INSECTICIDE		12,066	16,916	23,104	16,073	-7,030	-30
PROPICONAZOLE	FUNGICIDE	81,578	64,695	65,731	67,489	73,983	6,494	10
IPRODIONE	FUNGICIDE	36,395	27,132	29,121	29,485	35,852	6,367	22
HEXYTHIAZOX	INSECTICIDE	22,020	22,574	22,219	20,869	14,757	-6,113	-29
BETA-CYFLUTHRIN	INSECTICIDE		696	2,456	3,343	8,918	5,575	167
PHOSMET	INSECTICIDE	41,204	37,782	32,179	17,905	12,508	-5,397	-30
FENBUCONAZOLE	FUNGICIDE	3,967	4,460	5,508	6,022	11,308	5,286	88

compared to 2009. The delayed freestone peach harvest sharpened competition with the U.S. South and Southeast, and prices were low. Although the market for nectarine held up better, the overall price per ton for California peach and nectarine fell for a fourth consecutive year, to 12 percent below 2009 levels (Table 54). Growers continued to be strongly motivated to cut production costs.

Insect pest pressure was moderate, and moisture and mild summers generally lessen mite pressure. Total peach and nectarine acres treated with insecticides and miticides decreased about 6 percent in 2010, slightly more than the decrease in bearing acreage. The most-used insecticides by acres treated in peach and nectarine were: oils; esfenvalerate; and the Oriental fruit moth (OFM) mating disruption pheromones E-8-dodecenyl acetate, Z-8-dodecenyl acetate, and Z-8-dodecenol. Oils are applied during the dormant season to forestall outbreaks of scales, mites, and moth pests. Esfenvalerate is a broad-spectrum chemical that may be used in dormant applications or during the growing season, including as an alternative to OFM pheromones. Especially during an economic downturn, rebates and price reductions as well as efficacy affect choice of pesticide products. Table 55 lists AIs with the largest changes in acres treated from 2009 to 2010. Acres treated with five of the seven insecticide and miticide AIs on the list declined. The continuing decrease in phosmet use may reflect pesticide residue concerns, reduced-risk cannery guidelines for growers, and declining effectiveness for moth control. In contrast, abamectin and beta-cyfluthrin defied the general trend of reduced use, at least in part because of their low prices. Abamectin, a miticide that also controls flower thrips, went off patent in 2010, which drives product prices down. Beta-cyfluthrin is an effective broad-spectrum AI with 2010 product prices as low as $3/acre.

Relatively high rainfall and the long, wet spring promoted disease pressure in 2010. Accordingly, peach and nectarine acres treated with the fungicide/insecticide sulfur increased 20 percent (Table 55) and total acres treated with other fungicides increased 10 percent. Nevertheless, total pounds applied of fungicide AIs other than sulfur sank 8 percent. Newer, very effective lower-dose fungicides are being adopted as substitutes for older chemicals and as part of AI rotations to prevent the development of disease resistance to fungicides. The most-used fungicides by acres treated were sulfur, propiconazole, copper-based pesticides, ziram, iprodione, pyraclostrobin/boscalid, and tebuconazole. Sulfur is the standard treatment for powdery mildew. Propiconazole is a low-dose chemical applied against fungi and powdery mildew. Ziram and copper-based pesticides are effective for leaf curl and shot hole disease, and ziram also controls scab. Iprodione is reliable for brown rot control. Pyraclostrobin and boscalid are reduced-risk alternatives for mildew and fungus control. Tebuconazole provides excellent control of brown rot and is also effective against powdery mildew and rust. Fluctuations in product prices as well as the relative efficacy of different AIs influence fungicide application decisions. In 2010 there were sharp increases in acres treated with captan and fenbuconazole (Table 55), perhaps because scab and brown rot presented especially challenging problems. Some growers consider captan to be exceptionally effective for scab control. Fenbuconazole products have become less expensive and are excellent against brown rot. Contrary to the general trend of increased fungicide use, total acres treated with copper-based pesticides declined (Table 55). The prices of copper-based pesticides have gone up, and some growers may have favored broader-spectrum AIs.

In general, higher rainfall stimulates weed growth and greater herbicide use. When profit margins shrink, however, growers may cut back on weed control. Cost-cutting likely contributed to the continuing reduction in herbicide use in peach and nectarine. In spite of increased rainfall, 11 percent fewer total acres were treated with herbicides in 2010 than in 2009. The most-used herbicides by acres treated were glyphosate, oxyfluorfen, 2,4-D, and pendimethalin. Glyphosate use continued to decrease (Table 55), at least in part because weed resistance to glyphosate is causing growers to rely increasingly on alternatives. In contrast, acres treated with rimsulfuron more than doubled. Growers may have become more comfortable with rimsulfuron since 2008, the year of its first significant use in peach and nectarine. In addition, rimsulfuron became less expensive because its patent expired.

In peach and nectarine orchards, most fumigants are used for pre-plant soil treatments to suppress nematodes, pathogens, and weeds. The most widely applied pre-plant soil fumigant is 1,3-D, followed by chloropicrin and methyl bromide. Field use of methyl bromide is being phased out under international treaty because it depletes stratospheric ozone, and it is increasingly expensive. The post-plant fumigant sodium tetrathiocarbonate can also be used against soil pests, including ring nematode in response to bacterial canker problems. Total peach and nectarine acres treated with fumigants declined 5 percent in 2010. That change may be associated with industry programs to reduce acreage and bring production more in line with demand, the replanting of peach and nectarine acreage to other crops and environmental regulations. Growers appear to be reducing soil fumigant application rates and/or moving from broadcast application to spot or row treatments. Those changes save money, and also respond to regulatory encouragement to reduce emissions of volatile organic compounds (VOC), which are precursors to ground level ozone formation. Changing relationships between nematode infestations, rootstock choices, and application patterns also affect fumigant selection and use from year to year.

Methyl bromide is currently the only fumigant used to treat fresh peach and nectarine for export. In 2010, pounds of methyl bromide applied post-harvest increased 10 percent. As in 2009, about 24 percent of production was exported but the 2010 peach and nectarine crops were larger. In addition, there were invasive pest problems during summer 2010 and some quarantine protocols may have required fruit treatment with methyl bromide.

Carrot

California is the largest producer of fresh market carrot in the United States, accounting for 85 percent of the U.S. production of 2.3 billion pounds in 2010. California has four main production regions for carrot: the San Joaquin Valley (Kern County), the central coast in San Luis Obispo and Santa Barbara counties (Cuyama Valley) and Monterey County, the low desert (Imperial and Riverside counties), and the high desert (Los Angeles County). The San Joaquin Valley accounts for more than half the state's acreage.

Table 56: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for carrot each year from 2006 to 2010. Planted acres from 2005 to 2009 are from CDFA, 2010; planted acres in 2010 are from NASS, January 2011; marketing year average prices from 2005 to 2010 are from NASS, August 2011. Acres treated means cumulative acres treated (see explanation p. 8).*

	2006	2007	2008	2009	2010
Lbs AI	7,836,083	7,944,057	9,382,895	5,238,652	8,106,728
Acres Treated	453,099	523,431	601,827	427,434	444,552
Acres Planted	72,300	73,400	65,000	64,500	60,000
Price/cwt	$ 21.10	$ 22.40	$ 25.20	$ 25.70	$ 27.20

Total acres of carrot planted decreased 7 percent while pesticide use in carrot increased: acres treated increased from 427,000 acres in 2009 to 445,000 in 2010 (4 percent increase) and pounds of AI applied increased from 5.2 million in 2009 to 8.1 million in 2010 (55 percent), which brings pesticide use up to its pre-2009 level, as pounds of AI applied decreased by 44 percent from 2008 to 2009 (Tables 56 and 57).

Reported use of herbicides and insecticides decreased in terms of acres treated, by 4 and 7 percent, respectively, while use of fumigants and fungicides increased, by 59 and 7 percent,

Table 57: *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for carrot each year from 2006 to 2010.*

	2006	2007	2008	2009	2010
Lbs AI	-13	1	18	-44	55
Acres Treated	-15	16	15	-29	4
Acres Planted	1	2	-11	-1	-7
Price/cwt	-3	6	13	2	6

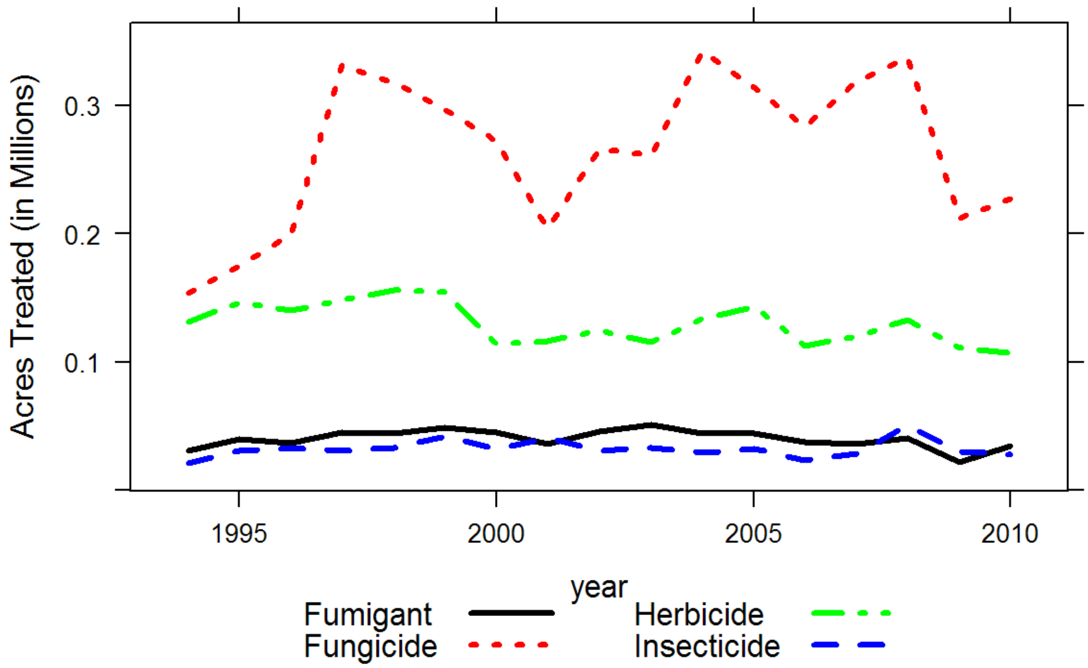

Figure 21: *Acres of carrot treated by all AIs in the major types of pesticides from 1995 to 2010.*

respectively (Figure 21). However, pounds of fungicides decreased 5 percent from the previous year. The most-used non-adjuvant pesticides in 2010 in pounds of AI were metam-sodium, chlorine, 1,3-dichloropropene (1,3-D), potassium N-methyldithiocarbamate (metam-potassium), and sulfur. By acres treated, mefenoxam, linuron, sulfur, metam-sodium, and pyraclostrobin were the most-used in 2010.

The most-applied fungicides in 2010, by acres treated, were mefenoxam, sulfur, pyraclostrobin, iprodione, chlorothalonil, boscalid, cyazofamid, copper-based pesticides, and fenamidone. Alternaria leaf blight, a foliar disease, is generally controlled using iprodione, chlorothalonil, pyraclostrobin, and azoxystrobin. In terms of acres treated, iprodione use increased 14 percent, pyraclostrobin 23 percent, and azoxystrobin 19 percent, whereas chlorothalonil decreased 9

Table 58: *The non-adjuvant pesticides with the largest change in acres treated of carrot from 2009 to 2010. This table shows acres treated with each AI in each year from 2006 to 2010, the change in acres treated and percent change from 2009 to 2010.*

AI	AI Type	2006	2007	2008	2009	2010	Change	Percent Change
METAM-SODIUM	FUMIGANT	24,750	24,156	27,445	16,610	26,035	9,425	57
CYAZOFAMID	FUNGICIDE			10	3,199	12,195	8,996	281
BOSCALID	FUNGICIDE	4,145	6,922	6,393	5,199	14,034	8,835	170
COPPER	FUNGICIDE	29,298	22,423	23,549	17,709	9,417	-8,293	-47
SULFUR	FUNGICIDE	32,527	78,574	82,856	44,931	52,721	7,789	17
MEFENOXAM	FUNGICIDE	82,459	77,159	87,561	64,019	59,604	-4,415	-7
PYRACLO-STROBIN	FUNGICIDE	23,938	23,844	27,799	18,403	22,634	4,231	23
QST 713 STRAIN OF DRIED *BACILLUS SUBTILIS*	FUNGICIDE	490	1,111	3,594	3,186	6,436	3,250	102
1,3-DICHLORO-PROPENE	FUMIGANT	8,339	9,866	9,501	3,424	5,969	2,545	74
EPTC	HERBICIDE	75	1,066	226	5,403	3,033	-2,370	-44
FLUAZIFOP-P-BUTYL	HERBICIDE	12,287	15,846	15,252	10,886	13,110	2,224	20
IPRODIONE	FUNGICIDE	29,414	33,657	30,364	15,374	17,558	2,184	14
PENDIMETHALIN	HERBICIDE	75	17,574	24,877	21,549	19,568	-1,981	-9
SPINOSAD	INSECTICIDE	1,008	1,108	4,065	2,819	842	-1,977	-70
CHLORO-THALONIL	FUNGICIDE	18,319	20,181	17,684	17,358	15,861	-1,497	-9

percent (Table 58). Powdery mildew is primarily controlled by sulfur, which is inexpensive and especially popular with organic growers. Sulfur use increased 17 percent. Higher incidence of powdery mildew in 2010 may have accounted for increased sulfur use. Copper-based pesticides, also used for powdery mildew, have a history of low efficacy, which may account for the 47 percent decrease in use. As in most recent years, cavity spot is a major, soil-borne fungal disease that is commonly controlled by applying mefenoxam, fenamidone, or the soil fumigant metam-sodium. In terms of acres treated, mefenoxam use decreased 7 percent and fenamidone increased 17 percent. Cyazofamid, another AI now used to control cavity spot, became available in 2008. It had the largest increase of fungicides used, from 3,200 treated acres in 2009 to 12,200 acres in 2010. Cyazofamid in particular has been highly effective against cavity spot, which may account for the significant increase in use. Mefenoxam has likely decreased due to the availability of fenamidone and cyazofamid. Boscalid use also increased significantly, from 5,200 treated in 2009 to 14,000 acres in 2010, due to increased cottony soft rot pressure in 2010.

The main herbicides used in carrot production in terms of acres treated were linuron, pendimethalin, fluazifop-p-butyl, trifluralin, clethodim, and EPTC. The use of linuron, a post-emergence herbicide that provides good control of broadleaf weeds and small grasses, was unchanged from 2009 to 2010. Trifluralin is a pre-emergence herbicide that complements linuron for weed management; its use decreased 10 percent. Pendimethalin, another selective herbicide, had a 9 percent decrease in use. Clethodim and EPTC use decreased 27 percent and 44 percent, respectively. Use of fluazifop-p-butyl, a selective post-emergence phenoxy herbicide used for control of annual and perennial grasses, increased 20 percent.

Insects are not generally a major problem in carrot production except for whiteflies, which are controlled with esfenvalerate and methomyl. The major insecticides used in 2010 in terms of acres treated were esfenvalerate, methomyl, diazinon, methoxyfenozide, s-cypermethrin, *Bacillus thuringiensis*, bifenthrin, beta-cyfluthrin, and spinosad. Acres treated with esfenvalerate decreased 5 percent and spinosad 70 percent from 2009 to 2010. Although generally used against whitefly, esfenvalerate and spinosad are also used to control flea beetles, leafhoppers, and cutworms. Diazinon use decreased 8 percent. The use of *B. thuringiensis* decreased 43 percent. Acres treated with methomyl increased 4 percent. This carbamate pesticide is effective against cutworms and leafhoppers as well as whiteflies. Bifenthrin, a pyrethroid used to control cutworms and crown root aphids, increased 16 percent. Beta-cyfluthrin had the largest increase of insecticides used, from 256 treated acres in 2009 to 1,296 acres in 2010. S-cypermethrin also increased significantly, from 724 treated acres in 2009 to 1,481 acres in 2010.

Carrot production relies on the fumigants metam-sodium, 1,3-dichloropropene (1,3-D), metam-potassium, and to a lesser extent, chloropicrin. These fumigants are used to manage nematodes and provide other benefits such as weed and soil-borne disease control. In 2010, fumigants accounted for about 78 percent of the total pounds of pesticide AIs applied to carrot. Fumigant use, in terms of pounds of AI, increased 52 percent from 2009 to 2010. Similarly, acres treated with fumigants increased 59 percent. The number of acres treated with metam-sodium, metam-potassium and 1,3-D increased 57, 53, and 74 percent, respectively. Chloropicrin, often used in conjunction with 1,3-D, increased from 144 acres in 2009 to 400 acres in 2010.

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