Summary of
Pesticide Use Report Data
2014

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For information on obtaining electronic data files, see Page ii.
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 1989-2014 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 amount of pesticide used for each chemical, the number of agricultural applications, and the acres/units treated.

The *Annual Pesticide Use Report Data* (the complete database of reported pesticide applications for 1989 to 2014) are available on CD and on DPR's FTP site at <ftp://pestreg.cdpr.ca.gov/pub/outgoing/pur_archives/>. The FTP site also includes data for years 1974 to 1989. The files are in text (comma-delimited) format.

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 916-324-4271, or you may request copies of the data by contacting <Larry.Wilhoit@cdpr.ca.gov>.

1 Introduction

California's pesticide use reporting program is recognized as the most comprehensive in the world. California has had pesticide use reporting in some form since at least 1950. In 1990, California became the first state to require full reporting of agricultural pesticide use to have more realistic and comprehensive pesticide data to better inform DPR's pesticide regulatory programs. Over the years, these data have been used by many individuals and groups including government officials, scientists, growers, legislators, and public interest groups. All pesticide use data required to be reported must be sent to county agricultural commissioners (CACs), who, in turn, report the data to DPR. In the last few years, DPR has annually collected and processed more than three million records of pesticide applications. (A single application creates more than one record if multiple pesticide products are applied at the same time.)

California has a broad legal definition of "agricultural use," so the reporting requirements include pesticide applications in production agriculture, parks, golf courses, cemeteries, rangeland, pastures, and along roadside and railroad rights-of-way. In addition, all postharvest pesticide treatments of agricultural commodities must be reported along with all pesticide treatments in poultry and fish production and some livestock applications. All applications made by licensed applicators and outdoor applications of pesticides with the potential to pollute ground water must be reported. The primary exceptions to the reporting requirements are home-and-garden use and most industrial and institutional uses.

In addition to requiring pesticide use reporting, California law (Food and Agricultural Code [FAC] section 12979) prescribes how DPR will use the reports in setting priorities for monitoring food, enforcing pesticide use, protecting the safety of farm workers, monitoring the environment for unanticipated residues, researching pest control practices, monitoring and researching public health issues, and similar activities. These activities help DPR achieve another mandated activity: to develop an orderly program for the continuous evaluation of currently registered pesticides (FAC section 12824). Information gathered during continuous evaluation is used to gauge the performance of DPR's regulatory programs and justify additional measures, including development of new regulations or reevaluation or cancellation of pesticide registrations. Regulations (California Code of Regulations Title 3, sections 6624 et seq.) further describe pesticide use record keeping and reporting requirements.

Continuous Evaluation of Pesticides

The Pesticide Use Report (PUR) greatly increased the accuracy and efficiency of continuous evaluation of pesticides by providing details on each application, including date, location, site (e.g., crop), time, acres or units treated, and the identity and quantity of each pesticide product applied. These data allow scientists and others to identify trends in pesticide use, compare use locations with other geographical information and data, and perform quantitative assessments and evaluations of risks pesticides may pose to human health and the environment.

DPR uses the PUR throughout its pesticide regulatory programs in ways that can be broadly grouped as temporal (time), geospatial (place), and quantitative (amount), and often combines elements of each.

Temporal analyses can pinpoint specific applications or span many years. Investigations into suspected worker illnesses, spray drift, fish or wildlife losses, or other enforcement inquiries frequently begin with a review of the PUR to see what applications were made in an area at a particular time. Protection of ground and surface waters, assessments of risks to human health with accurate potential acute and chronic exposure scenarios, and allocation of monitoring and enforcement resources often begin with analyses of PUR data spanning many years to evaluate pesticide use trends.

Geospatial analyses may be local or expansive in scale. Local analyses are used to help set priorities for surface and ground water monitoring programs by determining pesticide use and runoff potential in specific watersheds or other defined areas. DPR scientists calculate pesticides' contributions of smog-forming volatile organic compounds (VOCs) in the atmosphere using reliable pesticide use data and emissions data on products. They further refine their analyses to specific air basins that are particularly vulnerable to air pollution and determine whether pesticide-related VOC emissions are below required targets or whether additional restrictions on use may be warranted to protect air quality. More expansive analyses relate areas of pesticide use to habitats of endangered species and provide a means to guide growers with use practices that better protect these species. The results of such analyses are very valuable when assessing regulatory responses or evaluating the performance of voluntary stewardship efforts.

Quantitative assessments are broadly used to model risks of pesticide use to humans and the environment. The quality and depth of the PUR often allows researchers to apply realistic assumptions when modeling pesticide exposures, for example, of residents near agricultural lands, workers in the field, handlers preparing and applying pesticides, or aquatic organisms inhabiting waterways that receive agricultural runoff. The result is well-informed and realistic assessments on which to base 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 the U.S. Environmental Protection Agency (U.S. EPA), groups representing California's various agricultural commodities, and other stakeholders. The FQPA contained a new food safety standard against which all pesticide tolerances (amounts of pesticide residue allowed by federal law to remain on a harvested crop) must be measured. DPR provides recent use data and summaries to commodity groups, University of California (UC) specialists, U.S. EPA, and other interested parties as they reassess tolerances and calculate dietary risks from pesticides.

Data on types and rates of pesticide use in various crops and at other sites help researchers understand how various pest management options are implemented and devise strategies that reduce environmental risks. Analyses of these data support and assess grant projects DPR funds to promote the development and adoption of integrated pest management practices in both agricultural and urban settings.

The PUR data are used by many state, regional, and local agencies; scientists; and public interest groups to better understand pesticide use and to find better ways to protect human health and the environment while producing food and fiber and maintaining our shelters and surroundings.

Data Collection

Partial reporting of agricultural pesticide use has been in place in California since at least the 1950s. In those years, CACs required agricultural pest control operators to submit monthly reports. County requirements varied, but many reports included a statement for each application that showed the grower's name; treatment location and date; crop; acres or other units treated; target pest; and the kind, strength, and amount of the pesticide applied. Only statistics on aerial pesticide applications were forwarded to the state for tabulation. In 1955, state regulators asked for reports on ground application acreage but dropped requirements for detailed reporting of pesticides used and commodities treated. In 1970, DPR required farmers to report all applications of restricted use pesticides and pest control operators to report all pesticides used, whether restricted or nonrestricted. Both kinds of reports had to include the date, location, site (e.g., crop), acres or units treated, and the identity and quantity of each pesticide applied. Production agricultural applications included records for each application and the location to a square mile area (section, township, and range); all other applications were reported as a monthly summary by county. The reports were filed with the CAC, who forwarded the data to the state, where it was entered into a database and summarized in annual publications.

The Food Safety Act of 1989 (Chapter 12001, Assembly Bill 2161) gave DPR statutory authority to require full reporting of pesticide use. That year, the department adopted regulations and full use reporting began in 1990.

The first years of full use reporting nearly overwhelmed the department's capacity to process data. Use reports were on paper, and staff had to hand-enter data representing more than a million records each year. DPR began almost immediately to search for ways to automate reporting from pesticide users to CACs and, in turn, from the counties to DPR. However, it was difficult to find an approach that suited the diversity of use reporting and differing budget resources among the counties. Starting in 1991, various automated programs were developed and modified by DPR and the CACs. Meanwhile, technological progress and increasing use of the Internet by businesses fed expectations for more Web-based functionality for pesticide use reporting.

CalAgPermits

In 2011, the counties worked together to implement a new standardized county system, called CalAgPermits, that operates over the Internet. It helps CACs issue restricted materials permits and provides an automated platform for electronically validating pesticide use reports and transmitting them to DPR. It accepts pesticide use reports electronically from individuals and subscriber-based firms and allows pesticide use reporting directly via the Web. CalAgPermits allows pesticide use data to flow back and forth electronically between DPR and CACs for quality assurance. It also offers more robust data quality assurances that prevent coding mistakes and transcription errors (e.g., drop down menus and requisite data fields that must be filled before records are accepted). CalAgPermits has enhanced the efficiency of data entry and data transfer and the accuracy and integrity of the database.

Improving Accuracy

The use report data are checked for accuracy at several steps in the process. Beginning at data entry, CalAgPermits checks for several kinds of errors. For example, if the pesticide that was used is a restricted material, CalAgPermits compares the pesticide's reported use to the grower's restricted materials permit to ensure that the pesticide is listed on the permit. Later, when data are sent to DPR to be loaded into DPR's database, more than 50 different validity checks are made against the data. In particular, the U.S. EPA or California registration number is verified, and a check is made to confirm the commodity reported is an acceptable use of the pesticide product. The database contains some products that are no longer registered since continued use is often allowed while existing stocks remain with end-users. Records with suspected errors are flagged and returned electronically to the county for resolution.

After data are transmitted to DPR, additional data checks are performed. A statistical method, developed by DPR in the late 1990s, detects probable errors in the data fields that contain values for acres treated and the pounds of pesticide used. If a reported rate of use (amount of pesticide per area treated) is so large it is probably an error, the rate is replaced with an estimated rate equal to the median rate of all other applications of the pesticide product on the same crop or site. This is still flagged as an error and sent back to the counties for checking. Since the error could have been in the amount reported or the area or unit treated, the value that is most unusual is replaced with an estimate. Although less than one percent of the reports are flagged as this type of error, some are so large that if included they would significantly affect total amount applied of the pesticide. (For example, in 2007 an application of the insecticide imidacloprid was inaccurately reported as 108,000 pounds on one acre of cabbage. The median rate of imidacloprid use in 2007 was 0.05 pounds an acre. These types of errors, while rare, can occur.)

Improving Access to the Data

Annual reports present only a summary of the use reporting database (typically a 450-megabyte file for each year's data). In the late 1990s, DPR took steps to improve public access to the data and present it in a more meaningful context. Summaries of the statewide data indexed by chemical and by commodity, previously available only on paper and compact disk, were posted on DPR's Web site. Summaries of use in each of the state's 58 counties, previously available only on request, were also posted online. The entire database starting with the 1974 data is also available on DPR's Web site.

In 2003, DPR launched the Web-based California Pesticide Information Portal (CalPIP) database to increase public access to the nation's most extensive source of pesticide use information. CalPIP provides pesticide use information including date, site or crop treated, pounds used, acres treated, pesticide product name, chemical name (active ingredient), application pattern (ground, air, or other), county, ZIP code, and location where the application was made to within a one-square-mile area.

DPR also began examining trends in pesticide use (starting with 1996 data) analyzing critical crops, pest problems and trends in pounds used, number of applications, and acres treated. Each year, the pesticide use report summary charts use of pesticides over several years in specific categories:

- Reproductive toxins.
- Carcinogens.
- Insecticide organophosphate and carbamate chemicals.
- Chemicals classified by DPR as ground water contaminants.
- Chemicals listed by DPR as toxic air contaminants.
- Fumigants.
- Oil pesticides derived from petroleum distillation. (Some may be on the state's Proposition 65 list of chemicals "known to cause cancer," but most serve as alternatives to high-toxicity pesticides).
- Biopesticides (including microorganisms, naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest, such as pheromones).

DPR scientists review changes in pesticide use for about a dozen crops selected based on the amount of pesticide used or acreage treated. To compile this information, staff reviews publications and conducts telephone interviews with pest control advisers, growers, researchers, commodity association representatives, and UC Cooperative Extension farm advisers and specialists. Based on their knowledge of pesticides, California agriculture, pests, and pest management practices, DPR scientists propose explanations for year-to-year changes in pesticide use.

Pesticide use trend analyses can help agencies understand where efforts to promote reduced-risk pest management strategies are succeeding or failing. Information on long-term trends also helps researchers better identify emerging challenges and direct research to finding solutions.

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.)
- *Acres treated* - Cumulative number of acres treated. More detailed information is given below under "Acres Treated."

Agricultural and Nonagricultural Pesticide Use

Many pesticide licensing, sales, and use requirements are tied to California's definition of agricultural use, and pesticide labels differentiate between agricultural, industrial, or institutional uses. California law (FAC section 11408) identifies agricultural use as all use except that specifically identified as nonagricultural use, which is specified as:

- *Home* - Use in or in the immediate environment of a household.
- *Industrial* - Use in or on property necessary to operate factories, processing plants, packinghouses, or similar buildings or use for or in a manufacturing, mining, or chemical processing. In California, industrial use does not include use on rights-of-way. Postharvest commodity fumigations at buildings or on trucks, vans, or railcars are normally industrial use.

- *Institutional* - Use in or on property necessary to operate buildings such as hospitals, office buildings, libraries, auditoriums, or schools. When a licensed structural pest control operator treats these buildings, it is structural use. Use on landscaping and around walkways, parking lots, and other areas bordering such buildings is institutional use, but use on landscaping not affiliated with such buildings is not.
- *Structural* - Use by licensed structural pest control operators within the scope of their licenses.
- *Vector control* - Use by certain vector control (e.g., mosquito abatement) districts.
- *Veterinarian* - Use according to a written prescription of a licensed veterinarian.

Agricultural use of pesticides includes:

- *Production agricultural use* - Any use to produce a plant or animal agricultural product (food, feed, fiber, ornamental, or forest) that will be distributed in the channels of trade. (While production agricultural use includes various agricultural products, some requirements—most notably those that address worker safety and use reporting—apply only to plant product production.)
- *Nonproduction agricultural use* - Any use to areas such as watersheds, rights-of-way, and landscaped areas (e.g., golf courses, parks, recreation areas, and cemeteries) not covered by the definitions of home and institutional uses. There are some pesticide products labeled for dual-use, that is, they have both agricultural and nonagricultural uses.

The reporting requirements apply to a range of uses partly due to the California legal definition of agricultural use. With implementation of full use reporting in 1990, the following pesticide uses are required to be reported to the CAC who, in turn, reports the data to DPR:

- Production of any agricultural commodity except livestock.
- Treatment of postharvest agricultural commodities.
- Landscape maintenance in parks, golf courses, cemeteries, and similar sites defined in the FAC as agricultural use.
- Roadside and railroad rights-of-way.
- Poultry and fish production.
- Application of a restricted material.
- Application of a pesticide listed in regulation as having the potential to pollute ground water when used outdoors in industrial and institutional settings.
- Application by licensed pest control operators, which include agricultural and structural applicators and maintenance gardeners.

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

Operator and site identification numbers. An operator identification number, sometimes called a "grower ID," is issued by CACs to property operators. The number is needed to report pesticide use and to buy agricultural- or restricted-use pesticides. Pest control professionals do not have to get operator ID numbers. A site identification code must be assigned for each location or field where pesticides will be used for production of an agricultural commodity. This alphanumeric code is also recorded on any restricted material permit the grower gets for the location.

What must be reported. The PUR contains two kinds of records: production agricultural records and all others. For the PUR, production agricultural records represent applications made while producing agricultural commodities. Growers must submit their production agricultural pesticide use reports to the CAC monthly, and pest control businesses must submit theirs seven days after the application. Production agricultural pesticide use reports include:

- Date and time of application.
- Geographic location including the section, township, range, and base line/meridian.
- Operator identification number.
- Operator name and address (although this information is not submitted to DPR).
- Site identification number.
- Commodity, crop, or site treated.
- Acres or units planted and treated.
- Whether the application was by air, ground, or other means.
- For field fumigations in ozone nonattainment areas, details on fumigation method (for example, shallow shank injection with a tarp). This is to allow DPR to estimate pesticide VOC emissions. (VOCs contribute to the formation of atmospheric ozone, an important air pollutant.)
- Amount of product applied with its name and U.S. EPA registration number or, if the product was an adjuvant, its California registration number. (The U.S. EPA does not require registration of adjuvants.)

Reports of all other kinds of pesticide use, which are mostly nonagricultural, are monthly summaries that include pesticide product name, the product registration number, amount used, number of applications, the kind of site treated (e.g., roadside, structure), the month of application, and county.

Commodity Codes

DPR's pesticide product label database is used to cross-check pesticide use report entries to determine if the reported product is registered for use on the reported commodity. The DPR product label database uses a crop coding system based on crop names used by U.S. EPA to prepare official label information. However, this system caused some problems until DPR modified it in the early 1990s to account for situations when U.S. EPA would group specific crops under generic crop names. When, for example, a grower reported use of a product on almond, but the product was labeled for use on "nuts" but not "almond," the pesticide product label database and the pesticide use report were not aligned and an error occurred. A cross-reference table was created associating each specific crop name with a general crop name that might appear on a product label. This cross-reference table also associates the crop name used in the PUR with all the different names for a crop in the label database. For example, the PUR uses one name for "cotton," but the label database has several names for cotton, such as "cotton (fiber crop)," "cotton (forage - fodder)," "cotton (all or unspec)," and "cotton, general." This system greatly reduces the number of rejected reports.

Reporting pesticide use on plants and commodities grown in greenhouse and nursery operations is a challenge because the sites are very diverse. Six commodity groupings reflect terminology that is generally known and accepted: 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 were 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 submitted to the county was in error: that is, either the pesticide or the commodity was inaccurately reported. DPR's computer program validated that the commodity is listed on the label, but nonetheless such errors appear in the PUR, possibly because of errors in the pesticide product 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) use was 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 in rodent burrows. For example, reporting the use of the herbicide glyphosate on tomatoes when it was actually applied to emerging weeds 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. In 2015, an option was added in CalAgPermits that allows the user to designate any application as "pre-plant," and the program allows the user to enter the crop planted without generating any error messages.

Adjuvants

Data on spray adjuvants (e.g., 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.)

Cumulative Acres Treated

One of the measures of pesticide use in this report is cumulative area treated, where area is expressed as acres. The cumulative area treated is the sum total of the area treated with an active ingredient and integrates situations where the same field may be treated with the same active ingredient more than once in a year. For example, if a 20-acre field is treated three times in a calendar year with an active ingredient, the active ingredient would have been applied to 60 acres. Thus the total cumulative area treated for a crop could be greater than the planted area of the crop.

A similar situation 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 and possibly 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, the summary tables will reflect that three different active ingredients were applied—20 acres each. Adding these values results in a total of 60 acres as being treated instead of the 20 acres actually treated.

Number of Applications

The 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 reported, so they are no longer included in the annual totals. (In the annual PUR reports before 1997, each monthly summary record was counted as one application.) In the annual summary report arranged 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, and one application of the product would be tallied as one application of *each* 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.

3 Data Summary

This report is a summary of 2014 data submitted to DPR as of September 21, 2015. PUR data is continually being updated and corrected so the numbers in this report may differ from the final numbers, but any differences should be minor.

Pesticide Use in California

In 2014, 189 million pounds of pesticide active ingredients were reported as 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 196 million pounds in 2005, 158 million pounds in 2009, and 195 million pounds in 2013.

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 pesticide 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 used, respectively, without indicating an increased reliance on pesticides.

As in previous years, in 2014, 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 during 2013 and 2014*

	2013 Pesticide Use		2014 Pesticide Use	
County	Pounds Applied	Rank	Pounds Applied	Rank
Alameda	320,177	38	305,138	38
Alpine	266	58	271	58
Amador	77,428	46	95,998	43
Butte	2,984,674	17	2,987,804	17
Calaveras	33,471	48	58,683	47
Colusa	2,849,497	18	2,484,881	18
Contra Costa	389,713	36	412,703	36
Del Norte	308,627	39	25,006	52
El Dorado	143,503	42	155,546	41
Fresno	34,343,074	1	31,828,231	1
Glenn	2,159,514	22	2,085,121	21
Humboldt	27,265	51	36,655	50
Imperial	4,620,545	12	5,005,430	11
Inyo	15,783	54	12,114	55
Kern	31,518,004	2	27,181,424	2
Kings	7,431,201	8	6,886,134	9
Lake	594,730	34	581,234	34
Lassen	136,408	43	116,873	42
Los Angeles	2,444,589	19	2,077,656	22
Madera	10,195,362	5	9,584,260	5
Marin	84,925	45	76,885	46
Mariposa	17,782	53	8,748	57
Mendocino	991,301	30	889,088	31
Merced	8,541,414	6	8,953,045	7
Modoc	87,922	44	91,581	44
Mono	11,228	56	9,885	56

Table 1: (continued) *Total pounds of pesticide active ingredients reported in each county and rank during 2013 and 2014*

	2013 Pesticide Use		2014 Pesticide Use	
County	Pounds Applied	Rank	Pounds Applied	Rank
Monterey	8,536,773	7	9,389,183	6
Napa	1,254,737	26	1,372,525	26
Nevada	47,894	47	53,695	48
Orange	1,075,950	29	919,351	30
Placer	303,443	40	308,111	37
Plumas	25,684	52	26,863	51
Riverside	2,434,845	20	2,234,831	19
Sacramento	3,654,687	13	4,025,246	13
San Benito	653,924	33	660,448	33
San Bernardino	571,095	35	577,939	35
San Diego	1,628,489	25	1,617,591	24
San Francisco	28,727	49	39,882	49
San Joaquin	10,941,368	4	12,025,375	4
San Luis Obispo	3,088,808	16	3,029,013	15
San Mateo	266,421	41	260,261	39
Santa Barbara	4,666,313	11	4,782,176	12
Santa Clara	956,499	31	1,319,606	27
Santa Cruz	1,743,406	24	1,907,983	23
Shasta	322,145	37	247,099	40
Sierra	4,937	57	12,384	54
Siskiyou	1,846,556	23	1,615,802	25
Solano	1,197,064	28	1,282,937	28
Sonoma	2,238,715	21	2,211,222	20
Stanislaus	6,969,007	9	7,076,448	8
Sutter	3,185,191	15	3,020,090	16
Tehama	857,274	32	857,848	32
Trinity	12,041	55	22,317	53
Tulare	14,686,564	3	14,908,389	3
Tuolumne	28,381	50	83,290	45
Ventura	6,268,816	10	6,532,477	10
Yolo	3,578,591	14	3,471,719	14
Yuba	1,254,145	27	1,031,791	29
Total	194,656,893		188,874,287	

Table 2: *Pounds of pesticide active ingredients, 1998 – 2014, by general use categories.*

Year	Production Agriculture	Post Harvest Fumigation	Structural Pest Control	Landscape Maintenance	All Others	Total Pounds
1998	208,001,692	1,760,324	5,931,471	1,407,577	6,874,111	223,975,175
1999	189,358,522	2,059,858	5,673,549	1,412,248	7,906,798	206,410,974
2000	175,775,763	2,167,778	5,187,122	1,414,848	6,854,672	191,400,182
2001	142,958,014	1,462,160	4,922,709	1,290,208	6,324,210	156,957,301
2002	159,204,410	1,852,668	5,469,430	1,449,912	6,834,190	174,810,609
2003	161,040,989	1,785,747	5,177,461	1,975,868	7,526,922	177,506,988
2004	165,908,708	1,874,210	5,120,268	1,612,069	6,995,148	181,510,402
2005	178,355,565	2,260,932	5,625,437	1,775,676	8,517,091	196,534,701
2006	168,670,607	2,216,042	5,273,692	2,286,673	10,269,025	188,716,039
2007	157,483,400	2,279,532	3,967,352	1,672,399	7,337,067	172,739,750
2008	149,459,816	2,540,189	3,202,933	1,589,055	7,236,389	164,028,382
2009	146,533,304	1,479,776	2,911,101	1,344,886	6,015,587	158,284,654
2010	160,437,343	2,164,627	3,699,144	1,734,513	8,025,357	176,060,984
2011	177,346,161	1,525,307	3,149,032	1,722,205	8,724,083	192,466,788
2012	171,854,994	1,230,631	3,465,543	1,554,604	9,082,651	187,188,423
2013	178,758,836	1,521,519	3,788,393	1,464,607	9,123,539	194,656,893
2014	173,509,784	1,296,735	4,019,005	1,624,626	8,424,137	188,874,287

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.

There were 635 million pounds of pesticide active ingredients sold in 2013, 603 million pounds sold in 2012, 619 million pounds sold in 2011, 629 million pounds sold in 2010, 594 million pounds sold in 2009, 713 million pounds sold in 2008, and 678 million pounds sold in 2007. 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 Pesticide Use in Certain Pesticide Categories

This report discusses two different measures of pesticide use: amount of active ingredient (AI) applied in pounds and cumulative area treated in acres (for an explanation of cumulative area treated see page 10). Because different AIs are often used at very different rates, the picture of pesticide use may look quite different using the two measures, amount applied and area treated. 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 other AIs are applied at rates of hundreds of pounds per acre. This difference can be seen by looking at the use of different non-adjuvant pesticide types (Figures 1 and 2). By amount applied, the most-used pesticide types were fungicide/insecticides (including sulfur, which is applied at very high rates), fumigants, and insecticides. By cumulative area treated the most-used types were insecticides, herbicides, and fungicides. When comparing use among different AIs, area treated is often the more useful measure; pounds will emphasize pesticides used at high rates, such as fumigants. However, the trends in use for any AI will be very similar regardless of the measure of use.

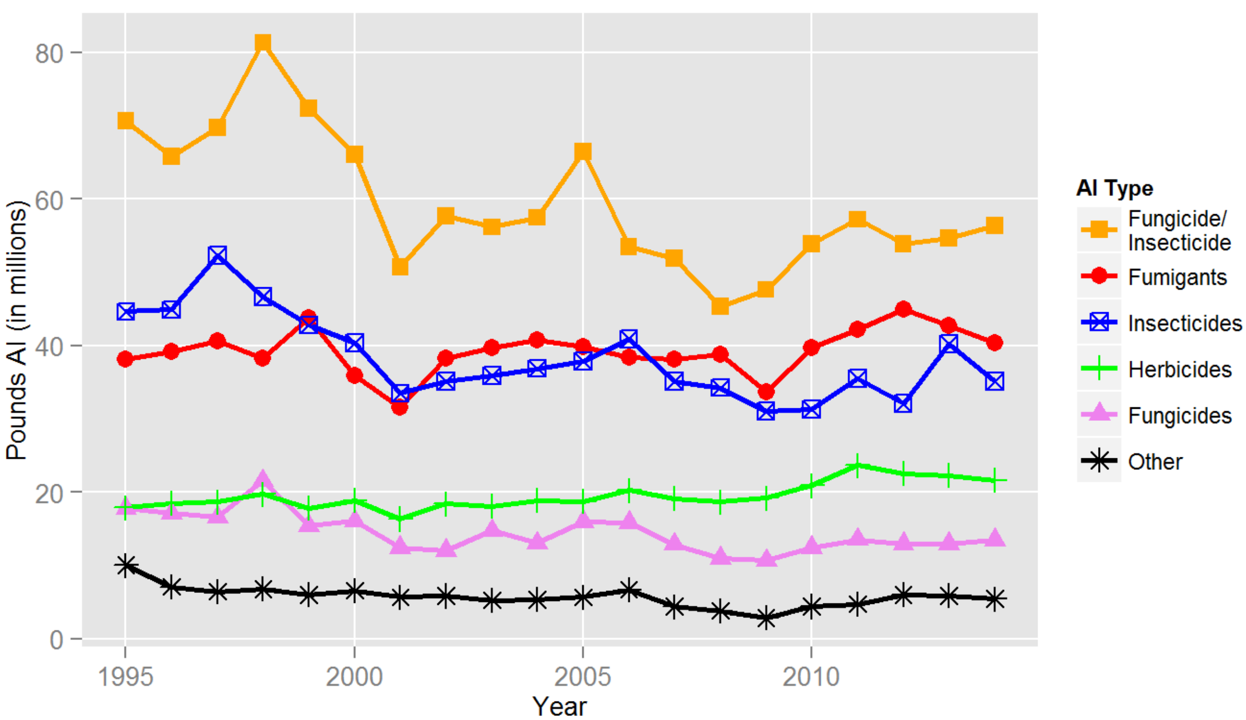

Figure 1: *Pounds of all AIs in the major types of pesticides from 1995 to 2014.*

Reported pesticide use in California in 2014 totaled 189 million pounds, a decrease of 5.8 million pounds (3.0 percent) from 2013. Production agriculture, the major category of use subject to reporting requirements, accounted for most of the decrease. Applications decreased by 5.2 million pounds for production agriculture and 225,000 pounds for post-harvest treatments. In contrast, there was a 231,000-pound increase for structural pest control and a 160,000-pound increase for landscape maintenance. Additionally, there was a 700,000-pound decrease for 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.

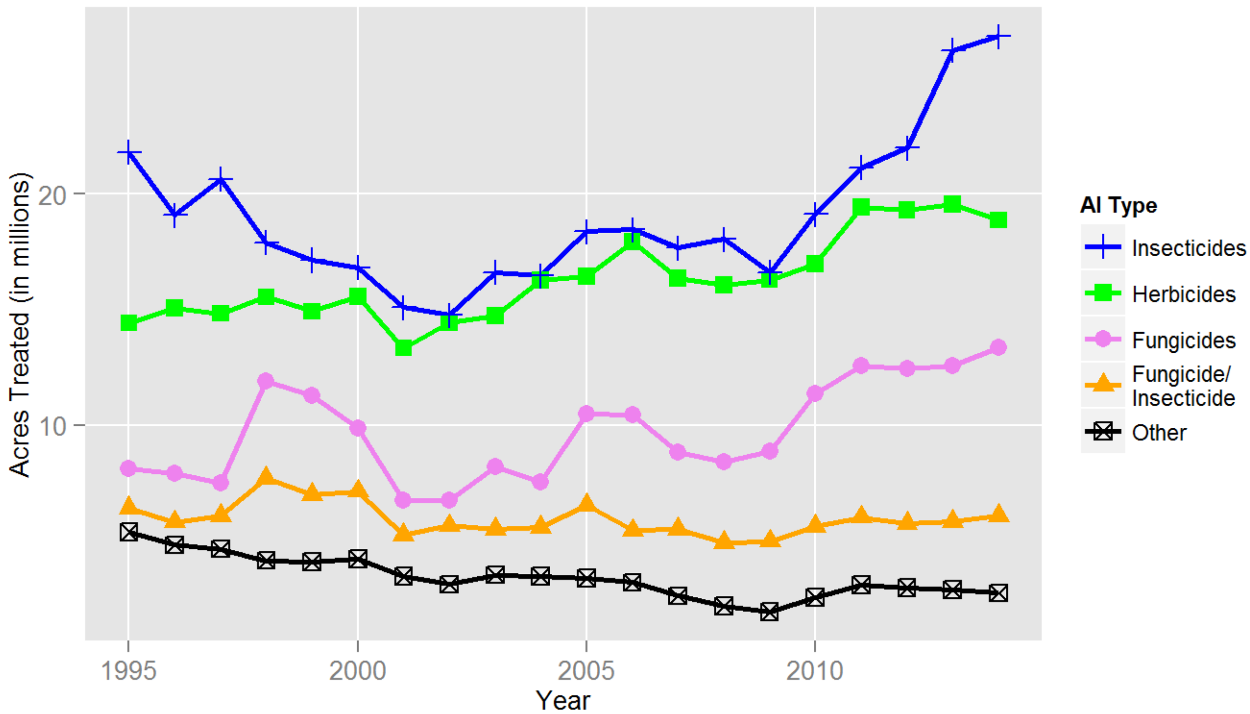

Figure 2: *Acres treated by all AIs in the major types of pesticides from 1995 to 2014.*

The AIs with the largest use amounts were sulfur, petroleum and mineral oils, 1,3-dichloropropene, glyphosate, and chloropicrin. The amount of sulfur accounted for 26 percent of all reported pesticide use in 2014.

Reported pesticide use by cumulative area treated in 2014 was 91 million acres, an increase of 878,000 acres (1.0 percent) from 2013. By this measure the non-adjuvant pesticides with the greatest use in 2014 were sulfur, glyphosate, petroleum and mineral oils, abamectin, and lambda-cyhalothrin (Figures 3, 4, and A-1). The most-used fumigant by area treated was aluminum phosphide.

To provide an overview, pesticide use is summarized for eight different pesticide categories from 2006 to 2014 (Tables 3 – 18) and from 1995 to 2014 (Figures 5 – 12). These categories classify pesticides according to certain characteristics such as reproductive toxins, carcinogens, or reduced-risk characteristics. Use of pesticides in these different categories varied from 2013 to 2014. Use of pesticides identified as reproductive toxins, carcinogens, cholinesterase-inhibiting pesticides, ground water contaminants, and oils decreased; use of biopesticides increased. The amount of fumigants and air contaminants decreased, but their area treated increased. Some of the major changes from 2013 to 2014 include:

- Use of chemicals classified as reproductive toxins decreased in amount applied from 2013

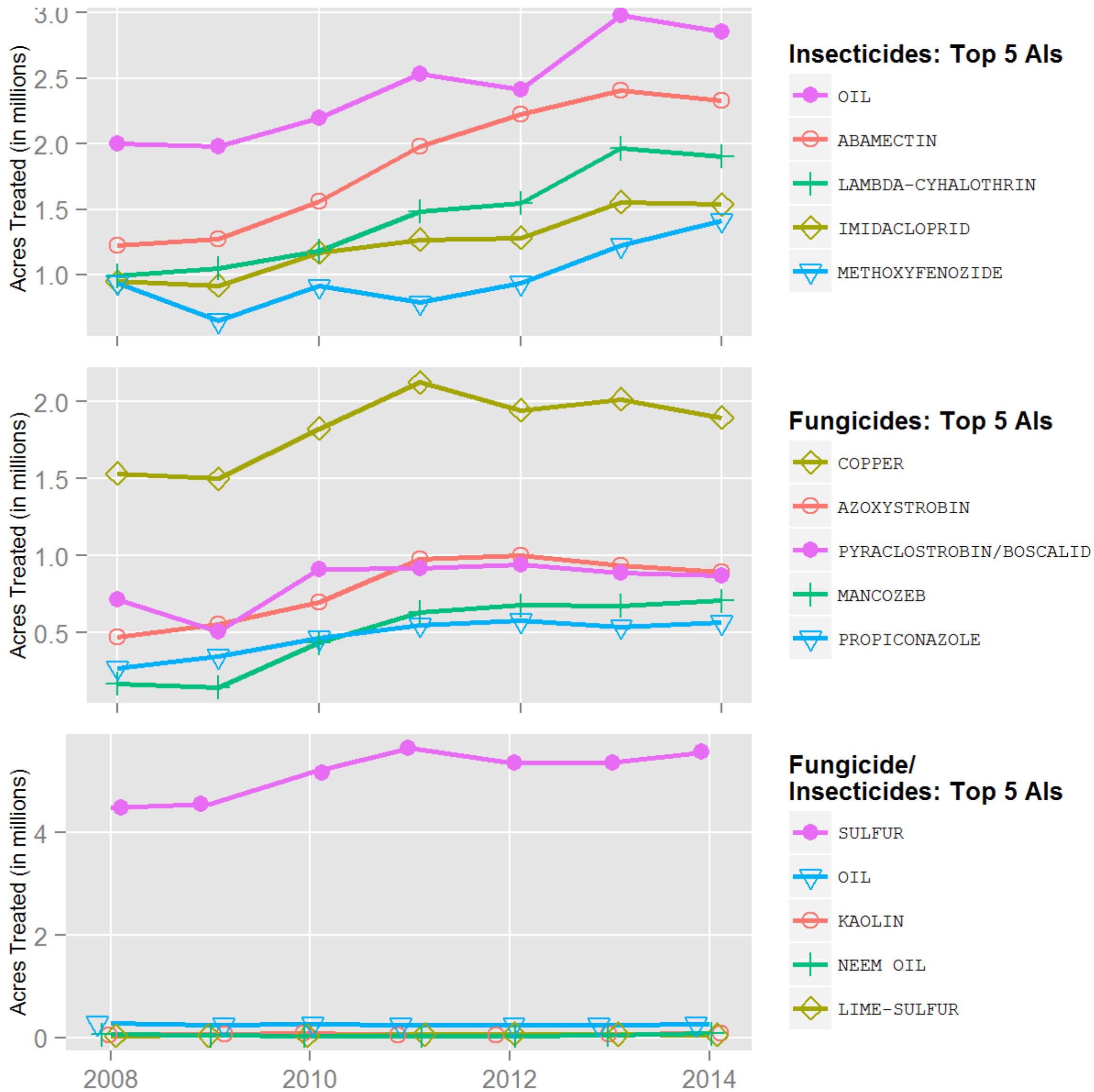

Figure 3: *Acres treated by the top 5 AIs in each of the major types of pesticides from 2008 to 2014.*

to 2014 (1.3 million-pound decrease, 13 percent) and area treated (56,000-acres treated decrease, 1.5 percent). The decreased amount was mainly due to less use of the fumigants metam-sodium and methyl bromide. 2014 was the fourth year reporting a decrease in the pounds applied in this category. The decrease in area was mostly from decreased use of the miticide/insecticide abamectin (also called avermectin). Pesticides in this category are listed on the State's Proposition 65 list of chemicals "known to cause reproductive toxicity."

- Use of chemicals classified as carcinogens decreased from 2013 to 2014 (2.1 million-pound decrease, 6.5 percent; 63,000-acre decrease, 2.1 percent). 2014 was the second year reporting a decrease in the pounds applied in this category. The decrease in amount was mainly due to less use of the fumigants metam-potassium (potassium

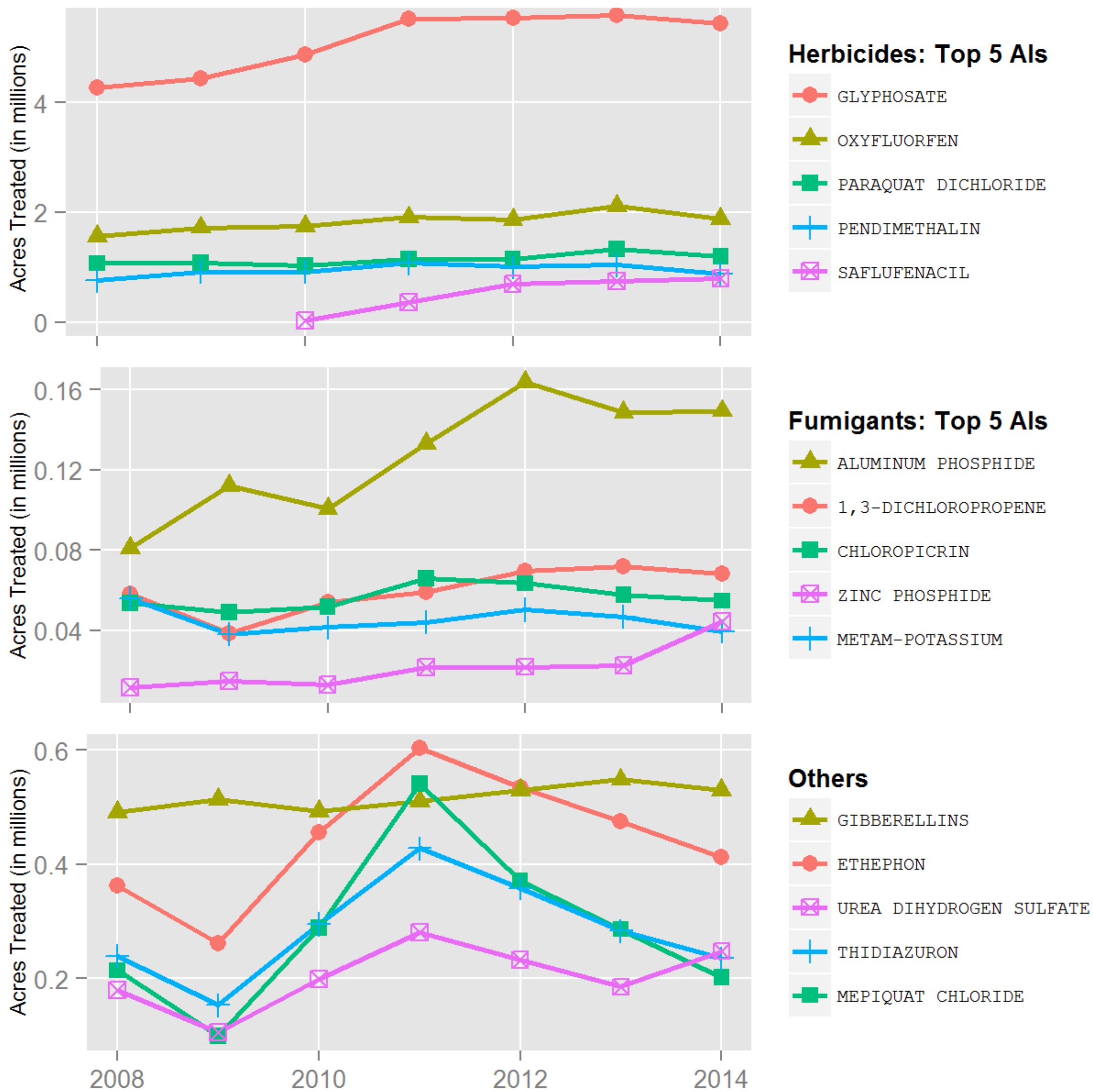

Figure 4: *Acres treated by the top 5 AIs in each of the major types of pesticides from 2008 to 2014.*

n-methyldithiocarbamate) and metam-sodium and the decrease in area treated was mainly due to less use of the herbicide diuron and the fungicide iprodione. However, the decrease in use of metam-potassium and metam-sodium was accompanied by an increase in use of the fumigant 1,3-dichloropropene. The pesticides in this category are listed by U.S. EPA as A or B 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, decreased from the previous year (10,000-pound decrease, 0.22 percent; 188,000-acre decrease, 4.5 percent). Most of the decrease in both amount and area treated was with the insecticide chlorpyrifos.

Other AIs with large decreases were the insecticide acephate and the defoliant ethephon, which is not a classical organophosphate and has only mild cholinergic potential. Use of some AIs, such as dimethoate and thiobencarb, increased.

- Use of chemicals categorized as ground water contaminants decreased in both amount and area treated (156,000-pound decrease, 18 percent; 140,000-acre decrease, 20 percent). The decreases were mostly from less use of the herbicides diuron, simazine, bromacil, norflurazon, and atrazine.

- The amount of chemicals categorized as toxic air contaminants decreased (2.7 million-pound decrease, 5.7 percent) but the area treated increased (77,000-acre increase, 3.2 percent). By pounds, most toxic air contaminants are fumigants which are used at high rates and whose overall amount used decreased. The increase in area treated was mainly due to increased uses of the fungicide mancozeb and the herbicide trifluralin.

- The amount of fumigant chemicals applied decreased (2.3 million-pound decrease, 5.4 percent), but the area treated increased (3,400-acre increase, 1.0 percent). The largest decreases in amount were in metam-sodium, metam-potassium, and methyl bromide, and most of the increase in area treated was due to zinc phosphide. Fumigants with increased amounts include chloropicrin and 1,3-dicloropropene, but the area treated with each decreased.

- Use of oil pesticides decreased in both amount and area treated (5.7 million-pound decrease, 16 percent; 60,000-acre decrease, 1.4 percent). Oils include many different chemicals, but the category used here includes only those 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.

- Use of biopesticides increased in both amount and area treated (1.0 million-pound increase, 23 percent; 325,000-acre treated increase, 5.1 percent). Use of most biopesticide AIs increased. The most-used biopesticide AI by amount used was kaolin, and it also accounted for most of the increased use in this category. Citric acid, propylene glycol, and ammonium nitrate were the most-used biopesticides by area treated, and the first two AIs accounted for most of the increase in area treated. Kaolin is used both as a fungicide and an insecticide, and citric acid, propylene glycol, and ammonium nitrate are used as adjuvants. In general, biopesticides are derived from or synthetically mimic natural materials such as animals, plants, bacteria, and minerals and fall into three major classes: microbial, plant-incorporated protectant, or naturally occurring substances that control pests by non-toxic mechanisms.

Since 1990, 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 1996 to 2014 do not indicate a significant trend of either increase or decrease in total pesticide use.

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 "Continuous Evaluation of Pesticides" on page 1.)

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

Table 3: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
1080	<1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-DB ACID	9,733	9,185	11,416	13,523	4,570	55	5,826	10,807	10,547
ABAMECTIN	10,941	12,362	12,846	16,624	19,384	26,705	32,945	40,071	36,948
AMITRAZ	12	0	0	7	0	0	0	1,486	20
ARSENIC PENTOXIDE	474,517	7,805	7,433	400	16,144	8,034	9,240	8,480	16,719
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	0	<1
BENOMYL	898	590	100	56	31	28	32	3	10
BROMACIL, LITHIUM SALT	2,529	1,172	1,851	896	1,835	1,486	1,422	1,145	2,472
BROMOXYNIL OCTANOATE	37,406	41,406	65,375	50,300	43,643	47,810	56,495	49,705	44,017
CARBARYL	156,997	142,010	126,742	135,301	114,077	74,944	113,904	117,358	130,576
CYANAZINE	0	0	0	0	0	1	<1	0	1
CYCLOATE	41,488	31,868	21,242	25,284	27,292	31,037	33,562	30,619	36,568
DICLOFOP-METHYL	174	157	0	15	0	7	0	0	0
DINOCAP	2	2	2	2	0	<1	0	0	0
DINOSEB	213	81	166	816	26	75	60	22	374
DIOCTYL PHTHALATE	1,016	610	340	186	453	248	262	198	73
DISODIUM CYANODITHIOIMIDO CARBONATE	0	0	0	0	0	0	80	<1	0
EPTC	108,228	152,707	129,470	128,993	118,509	139,605	168,665	187,349	235,271
ETHYLENE GLYCOL MONOMETHYL ETHER	4,186	2,653	1,986	2,257	5,187	4,324	3,782	6,202	5,593
ETHYLENE OXIDE	0	2	3	7	0	0	8	0	<1
FENOXAPROP-ETHYL	196	153	219	11	<1	8	0	0	0
FLUAZIFOP-BUTYL	26	5	3	21	11	8	6	17	42
FLUAZIFOP-P-BUTYL	11,104	10,192	11,287	7,903	9,573	9,075	10,458	20,013	14,108
HYDRAMETHYLNON	1,231	887	825	393	609	1,096	485	444	6,024
LINURON	59,164	58,592	60,247	51,265	48,424	54,530	57,630	52,525	54,156
METAM-SODIUM	11,422,382	9,929,803	9,497,379	9,027,455	11,428,818	10,861,059	8,428,341	4,846,389	4,142,910
METHYL BROMIDE	6,542,161	6,448,643	5,693,325	5,615,653	4,809,311	4,036,362	4,002,785	3,535,174	2,964,438
METIRAM	<1	0	0	0	0	15	34	17	1
MOLINATE	141,421	75,241	19,653	12,516	24	<1	3	<1	<1
MYCLOBUTANIL	74,365	68,403	61,550	59,056	65,604	65,512	64,476	61,130	64,819
NABAM	23,414	9,073	9,635	8,963	10,518	13,358	13,485	22,187	16,535
NICOTINE	<1	<1	<1	<1	<1	7	<1	0	0
NITRAPYRIN	0	9	0	84	211	0	<1	2	0
OXADIAZON	11,714	12,517	9,402	8,741	12,382	7,782	7,266	6,746	4,893

Table 3: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
OXYDEMETON-METHYL	119,891	122,723	111,612	68,576	71,290	26,017	17,619	10,656	8,407
OXYTHIOQUINOX	90	166	170	45	6	<1	1	<1	1
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	0	0	<1	0	0	0	0	0
PROPARGITE	580,630	537,439	389,492	380,651	295,309	296,384	252,510	291,210	246,254
RESMETHRIN	676	452	269	211	206	122	46	49	233
SODIUM DIMETHYL DITHIO CARBAMATE	23,414	9,073	9,800	8,963	11,053	13,358	13,485	22,187	16,535
STREPTOMYCIN SULFATE	7,598	5,809	4,394	3,233	4,040	4,651	4,053	4,794	5,138
TAU-FLUVALINATE	1,104	1,028	1,068	1,179	869	834	1,084	1,057	1,258
THIOPHANATE-METHYL	114,191	99,497	74,903	89,882	115,025	87,607	109,731	103,499	112,107
TRIADIMEFON	1,116	873	1,503	1,056	2,153	1,940	2,427	1,614	1,983
TRIBUTYLTIN METHACRYLATE	0	0	0	0	0	0	0	1	0
TRIFORINE	452	64	69	4	42	22	2	4	1
VINCLOZOLIN	402	392	512	476	217	328	470	151	219
WARFARIN	9	1	<1	<1	1	2	2	1	1
TOTAL	19,985,093	17,793,649	16,336,288	15,721,007	17,236,848	15,814,435	13,412,681	9,433,312	8,179,250

Table 4: *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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1080	22	170	<1	67	176	127	<1	111	4
2,4-DB ACID	16,303	15,080	19,457	21,629	6,980	121	11,301	13,739	14,776
ABAMECTIN	1,131,758	1,257,542	1,225,216	1,274,898	1,556,401	1,980,214	2,222,385	2,405,350	2,327,490
AMITRAZ	<1	0	0	74	0	0	0	348	315
ARSENIC PENTOXIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	0	<1
BENOMYL	1,674	568	221	162	0	26	19	1	<1
BROMACIL, LITHIUM SALT	<1	<1	<1	<1	<1	<1	<1	<1	<1
BROMOXYNIL OCTANOATE	134,283	136,831	186,026	146,301	125,926	139,567	153,503	132,272	118,054
CARBARYL	87,789	97,016	96,136	107,458	81,683	68,272	97,188	96,642	107,687
CYANAZINE	0	0	0	0	0	4	<1	0	<1
CYCLOATE	19,886	15,601	10,581	12,058	13,799	14,895	17,565	16,045	19,126
DICLOFOP-METHYL	186	224	0	30	0	20	0	0	0
DINOCAP	9	8	7	7	0	1	0	0	0
DINOSEB	72	16	453	304	111	427	81	55	450
DIOCTYL PHTHALATE	13,231	13,258	3,582	4,928	7,921	4,741	5,311	3,188	1,900
DISODIUM CYANODITHIOIMIDO CARBONATE	0	0	0	0	0	0	235	<1	0
EPTC	38,871	51,706	45,560	49,708	44,289	47,805	56,872	69,989	89,135
ETHYLENE GLYCOL MONOMETHYL ETHER	25,655	26,412	14,857	14,573	35,802	37,642	35,682	34,566	35,864
ETHYLENE OXIDE	0	<1	2	60	0	0	<1	0	<1
FENOXAPROP-ETHYL	3,418	2,552	3,444	142	<1	61	0	0	0
FLUAZIFOP-BUTYL	<1	<1	6	2	80	<1	<1	40	3
FLUAZIFOP-P-BUTYL	34,591	31,920	31,045	25,517	27,997	27,077	35,810	56,340	48,994
HYDRAMETHYLNON	657	931	1,138	1,280	4,689	1,514	6,876	1,376	1,653
LINURON	81,535	81,041	81,244	68,604	68,058	77,029	81,948	73,475	76,349
METAM-SODIUM	102,451	78,030	71,815	74,132	72,748	70,875	58,998	28,153	23,767
METHYL BROMIDE	50,677	45,675	35,685	39,587	32,293	47,042	30,178	26,622	16,581
METIRAM	1	0	0	0	0	<1	<1	<1	<1
MOLINATE	33,045	17,476	4,529	2,942	6	<1	<1	3	<1
MYCLOBUTANIL	644,490	599,368	545,175	512,906	588,750	569,386	574,520	537,233	562,513
NABAM	<1	2	1	3	12	<1	<1	<1	<1
NICOTINE	<1	<1	<1	<1	<1	<1	<1	0	0
NITRAPYRIN	0	35	0	88	111	0	<1	1	0
OXADIAZON	2,144	2,991	2,747	1,451	1,712	927	1,159	1,511	1,237
OXYDEMETON-METHYL	164,094	161,835	140,760	82,368	86,131	27,447	18,204	12,163	9,096
OXYTHIOQUINOX	10	9	5	4	4	1	1	<1	<1

Table 4: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	0	0	<1	0	0	0	0	0
PROPARGITE	287,261	261,953	186,581	174,063	137,106	142,352	114,331	121,952	104,211
RESMETHRIN	1	18	3	11	<1	6	4	436	18
SODIUM DIMETHYL DITHIO CARBAMATE	<1	2	1	3	12	<1	<1	<1	<1
STREPTOMYCIN SULFATE	57,295	38,468	27,011	24,453	28,966	39,190	34,894	37,997	39,657
TAU-FLUVALINATE	5,438	4,777	5,708	5,015	4,583	5,058	5,001	5,396	5,344
THIOPHANATE-METHYL	108,408	100,011	71,867	92,429	122,563	85,801	124,096	120,547	134,529
TRIADIMEFON	2,949	1,806	2,043	1,007	1,172	2,469	1,341	904	1,282
TRIBUTYLTIN METHACRYLATE	0	0	0	0	0	0	0	<1	0
TRIFORINE	102	373	11	10	22	3	<1	<1	3
VINCLOZOLIN	440	258	212	85	86	100	34	11	5
WARFARIN	473	3,165	1,118	365	290	1,290	3,115	381	435
TOTAL	3,049,219	3,047,123	2,814,244	2,738,722	3,050,466	3,391,489	3,690,654	3,796,845	3,740,476

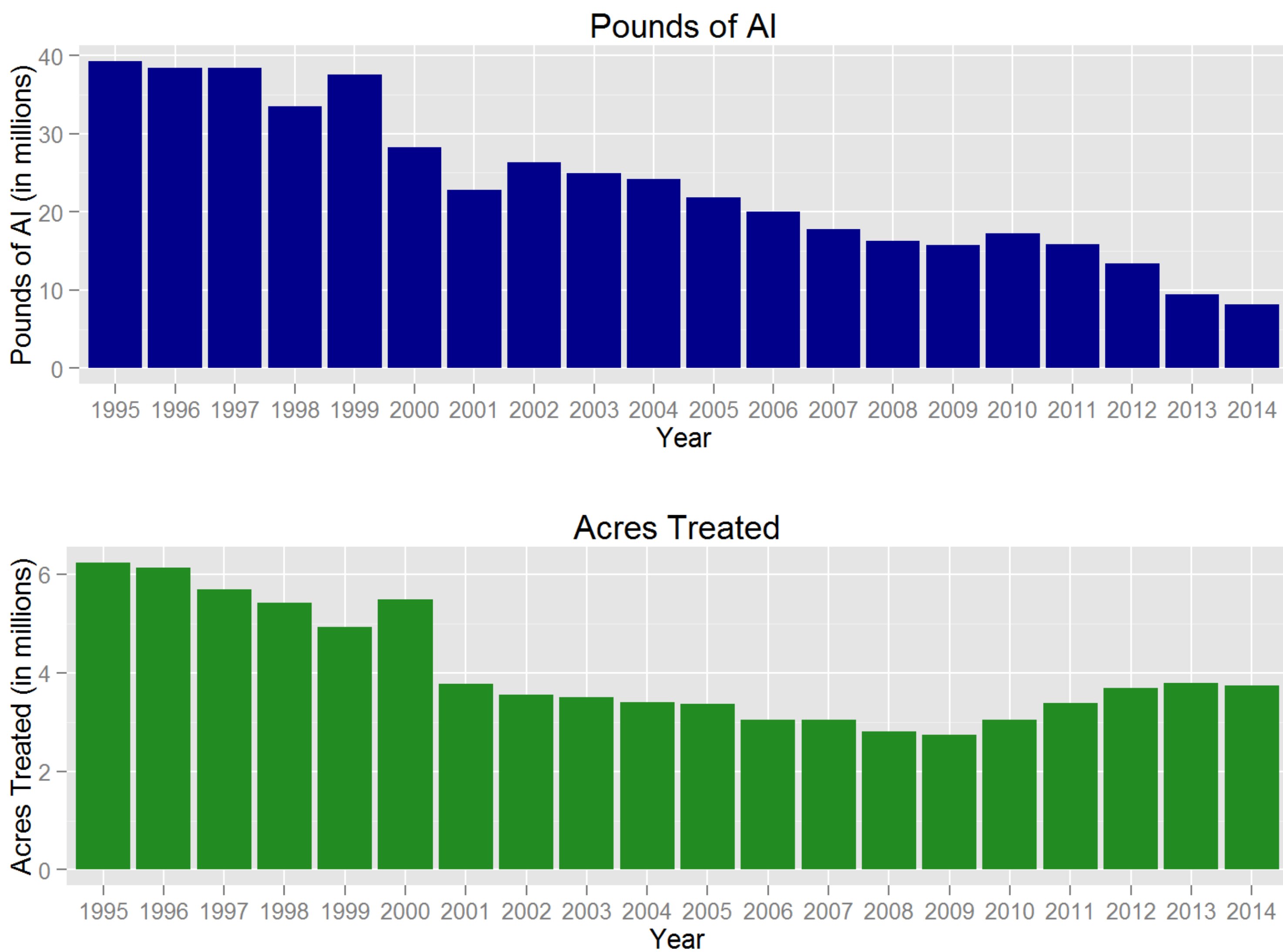

Figure 5: *Use trends of pesticides that are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity." Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

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

Table 5: *The reported pounds of pesticides used that are listed by U.S. EPA as A or B 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	2006	2007	2008	2009	2010	2011	2012	2013	2014
1,3-DICHLOROPROPENE	8,735,190	9,595,625	9,706,640	6,399,515	8,796,457	10,910,167	11,928,106	12,929,964	13,212,360
ACIFLUORFEN, SODIUM SALT	0	0	0	0	<1	0	<1	<1	<1
ALACHLOR	13,740	3,911	4,343	6,362	9,936	9,294	8,836	6,562	5,118
ARSENIC ACID	3	0	0	0	0	17	0	0	0
ARSENIC PENTOXIDE	474,517	7,805	7,433	400	16,144	8,034	9,240	8,480	16,719
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	0	<1
CACODYLIC ACID	20	41	43	<1	3	<1	<1	0	<1
CAPTAN	510,661	456,475	362,757	329,747	450,225	376,607	403,834	350,056	368,557
CARBARYL	156,997	142,010	126,742	135,301	114,077	74,944	113,904	117,358	130,576
CHLOROTHALONIL	824,949	736,173	566,773	715,152	961,481	1,148,072	1,182,792	1,113,103	1,209,492
CHROMIC ACID	662,927	10,904	10,384	559	22,555	11,224	12,908	11,847	23,358
CREOSOTE	0	3	<1	<1	0	0	0	3	0
DAMINOZIDE	7,812	7,192	7,094	6,570	9,361	8,451	8,252	8,552	8,335
DDVP	6,577	6,376	6,859	4,164	4,169	5,325	4,686	4,619	4,006
DIOCTYL PHTHALATE	1,016	610	340	186	453	248	262	198	73
DIPROPYL ISOCINCHOMERONATE	52	2	<1	<1	1	1	<1	<1	<1
DIURON	1,054,075	860,510	734,757	622,598	588,905	674,531	554,604	413,159	323,676
ETHOPROP	24,485	24,241	26,897	20,793	5,645	7,475	2,077	2,454	1,228
ETHYLENE OXIDE	0	2	3	7	0	0	8	0	<1
FENOXYCARB	8	4	8	5	3	3	2	1	1
FOLPET	<1	0	<1	0	<1	0	<1	<1	<1
FORMALDEHYDE	73,392	47,733	24,306	3,972	5,511	4,615	3,847	11,165	52,989
IMAZALIL	21,624	14,421	23,415	13,255	26,181	25,767	26,004	25,572	19,142
IPRODIONE	304,219	255,123	252,212	248,877	349,532	353,671	297,795	257,294	240,309
LINDANE	379	2	21	8	18	1	0	2	0
MANCOZEB	662,040	408,652	330,238	281,639	757,664	1,045,741	1,130,499	1,149,305	1,277,899
MANEB	1,181,738	1,061,028	861,006	656,648	370,333	53,964	6,260	1,382	1,202
METAM-SODIUM	11,422,382	9,929,803	9,497,379	9,027,455	11,428,818	10,861,059	8,428,341	4,846,389	4,142,910
METHYL IODIDE	0	0	0	0	0	1,157	21	0	0
METIRAM	<1	0	0	0	0	15	34	17	1
NITRAPYRIN	0	9	0	84	211	0	<1	2	0
ORTHO-PHENYLPHENOL	2,083	5,128	4,389	2,133	2,271	2,582	2,964	1,713	1,777
ORTHO-PHENYLPHENOL, SODIUM SALT	6,948	2,266	3,211	2,294	2,129	5,192	3,586	4,375	3,611
ORYZALIN	1,008,320	664,266	604,932	529,508	602,260	768,864	686,142	588,653	577,113
OXADIAZON	11,714	12,517	9,402	8,741	12,382	7,782	7,266	6,746	4,893

Table 5: (continued) *The reported pounds of pesticides used that are listed by U.S. EPA as A or B carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer."*

AI	2006	2007	2008	2009	2010	2011	2012	2013	2014
OXYTHIOQUINOX	90	166	170	45	6	<1	1	<1	1
PARA-DICHLOROBENZENE	0	15	1	17	0	<1	18	<1	0
PENTACHLOROPHENOL	27	22	4	0	3	18	224	274	11
POTASSIUM DICHROMATE	0	0	0	0	0	0	0	<1	0
POTASSIUM N-METHYLDITHIOCARBAMATE	3,202,884	3,785,436	5,524,647	4,102,412	4,832,615	5,673,371	8,320,255	9,484,467	7,707,984
PROPARGITE	580,630	537,439	389,492	380,651	295,309	296,384	252,510	291,210	246,254
PROPOXUR	212	191	188	202	298	808	359	373	251
PROPYLENE OXIDE	133,028	110,068	105,600	111,609	300,008	431,192	385,340	410,360	388,282
PROPYZAMIDE	121,711	114,882	104,077	73,811	51,384	49,678	47,273	42,022	42,260
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	2
TERRAZOLE	946	872	1,534	1,140	1,500	642	503	390	444
THIODICARB	894	686	410	511	152	472	145	156	0
VINCLOZOLIN	402	392	512	476	217	328	470	151	219
TOTAL	31,208,688	28,803,004	29,298,216	23,686,848	30,018,216	32,817,696	33,829,366	32,088,373	30,011,052

Table 6: *The reported cumulative acres treated with pesticides that are listed by U.S. EPA as A or B 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	2006	2007	2008	2009	2010	2011	2012	2013	2014
1,3-DICHLOROPROPENE	49,885	53,937	57,922	38,374	54,209	59,059	69,390	71,787	67,986
ACIFLUORFEN, SODIUM SALT	0	0	0	0	<1	0	<1	<1	4
ALACHLOR	5,192	1,500	1,635	2,261	3,276	3,385	3,284	2,670	2,033
ARSENIC ACID	<1	0	0	0	0	<1	0	0	0
ARSENIC PENTOXIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	0	<1
CACODYLIC ACID	121	<1	<1	<1	<1	<1	<1	0	<1
CAPTAN	262,936	215,864	198,262	173,133	245,464	209,979	209,637	188,179	210,475
CARBARYL	87,789	97,016	96,136	107,458	81,683	68,272	97,188	96,642	107,687
CHLOROTHALONIL	438,373	389,497	292,385	377,954	493,216	588,428	571,780	529,832	562,648
CHROMIC ACID	<1	<1	<1	<1	<1	<1	<1	<1	<1
CREOSOTE	0	1	1	2	0	0	0	<1	0
DAMINOZIDE	2,220	2,291	2,471	2,111	4,357	2,441	2,982	2,526	2,410
DDVP	1,526	2,733	2,231	2,685	1,880	5,184	6,528	5,593	3,307
DIOCTYL PHTHALATE	13,231	13,258	3,582	4,928	7,921	4,741	5,311	3,188	1,900
DIPROPYL ISOCINCHOMERONATE	18	<1	<1	<1	19	<1	<1	<1	<1
DIURON	886,032	702,939	514,554	405,583	520,587	691,391	555,454	440,276	341,148
ETHOPROP	4,815	4,283	4,159	4,293	1,348	1,892	541	662	581
ETHYLENE OXIDE	0	<1	2	60	0	0	<1	0	<1
FENOXYCARB	828	210	489	353	100	106	110	37	58
FOLPET	<1	0	<1	0	<1	0	<1	<1	<1
FORMALDEHYDE	265	57	67	5	1	6	4	52	2
IMAZALIL	<1	<1	668	<1	26	2	<1	<1	32
IPRODIONE	468,465	412,699	436,226	434,326	578,691	638,580	530,013	478,643	458,657
LINDANE	9	0	37	10	31	1	0	<1	0
MANCOZEB	348,360	212,349	169,422	145,616	433,887	634,575	678,919	675,932	708,100
MANEB	675,941	655,235	558,506	471,395	290,266	40,588	4,559	1,522	815
METAM-SODIUM	102,451	78,030	71,815	74,132	72,748	70,875	58,998	28,153	23,767
METHYL IODIDE	0	0	0	0	0	278	37	0	0
METIRAM	1	0	0	0	0	<1	<1	<1	<1
NITRAPYRIN	0	35	0	88	111	0	<1	1	0
ORTHO-PHENYLPHENOL	65	149	22	49	58	117	85	130	104
ORTHO-PHENYLPHENOL, SODIUM SALT	<1	<1	<1	<1	<1	<1	<1	<1	<1
ORYZALIN	400,237	313,343	272,273	236,523	217,193	294,505	263,623	203,850	201,559
OXADIAZON	2,144	2,991	2,747	1,451	1,712	927	1,159	1,511	1,237
OXYTHIOQUINOX	10	9	5	4	4	1	1	<1	<1
PARA-DICHLOROBENZENE	0	<1	0	<1	<1	<1	<1	<1	0

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

AI	2006	2007	2008	2009	2010	2011	2012	2013	2014
PENTACHLOROPHENOL	0	10	46	0	4	1	15	170	2
POTASSIUM DICHROMATE	0	0	0	0	0	0	0	<1	0
POTASSIUM N-METHYLDITHIOCARBAMATE	27,299	42,988	56,009	38,197	41,444	44,078	50,361	46,861	39,438
PROPARGITE	287,261	261,953	186,581	174,063	137,106	142,352	114,331	121,952	104,211
PROPOXUR	2	<1	10	356	<1	3	<1	4	178
PROPYLENE OXIDE	20	<1	12	<1	<1	<1	288	9	<1
PROPYZAMIDE	153,045	148,399	133,426	102,176	69,328	61,014	57,625	51,921	51,008
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	<1
TERRAZOLE	884	879	1,419	711	5,107	443	579	414	660
THIODICARB	1,293	1,196	673	680	192	656	206	247	0
VINCLOZOLIN	440	258	212	85	86	100	34	11	5
TOTAL	4,221,157	3,614,111	3,064,004	2,799,064	3,262,053	3,563,979	3,283,043	2,952,773	2,890,011

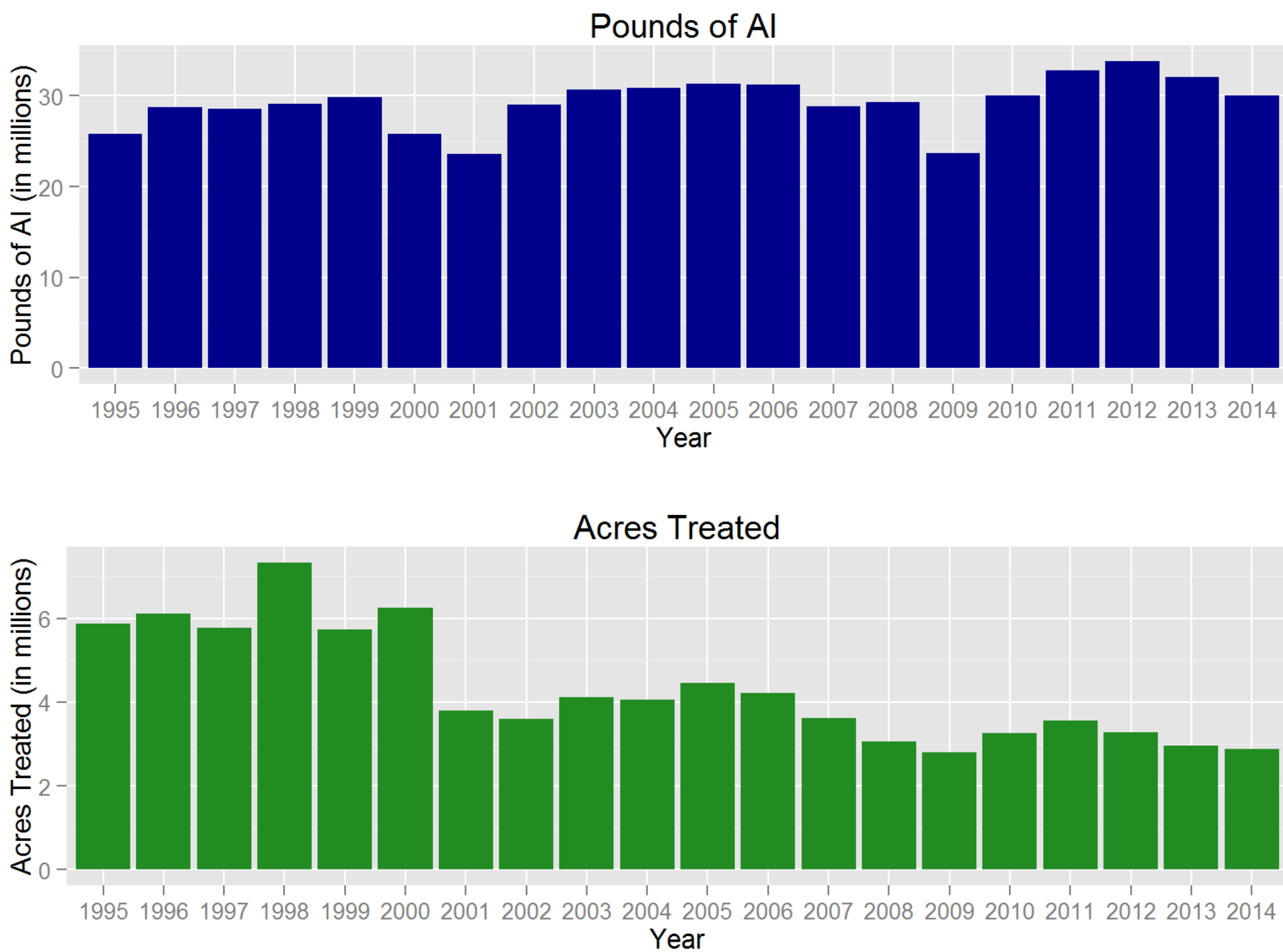

Figure 6: *Use trends of pesticides that are listed by U.S. EPA as A or B carcinogens or on the State's Proposition 65 list of chemicals that are "known to cause cancer." Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative 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 7: *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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
3-IODO-2-PROPYNYL BUTYLCARBAMATE	0	0	0	<1	2,675	102	<1	<1	<1
ACEPHATE	167,705	143,073	152,303	112,562	134,993	152,588	130,447	185,157	143,699
ALDICARB	176,624	115,475	75,767	31,579	64,626	24,167	1,489	1,487	126
AZINPHOS-METHYL	38,775	25,418	16,269	13,045	1,619	1,582	1,232	32	0
BENDIOCARB	2	8	2	<1	1	3	3	2	4
BENSULIDE	288,048	259,548	244,526	247,733	271,835	288,427	267,050	285,471	318,705
BUTYLATE	2,671	945	27	0	299	0	0	88	53
CARBARYL	156,997	142,010	126,742	135,301	114,077	74,944	113,904	117,358	130,576
CARBOFURAN	25,790	25,467	16,389	10,117	4	1	0	0	0
CHLORPROPHAM	3,704	1,532	4,384	4,675	6,990	3,093	2,969	27,455	4,396
CHLORPYRIFOS	1,928,989	1,442,521	1,368,568	1,246,560	1,290,982	1,300,353	1,106,401	1,469,182	1,307,788
COUMAPHOS	3	<1	0	0	<1	3	3	14	0
CYCLOATE	41,488	31,868	21,242	25,284	27,292	31,037	33,562	30,619	36,568
DDVP	6,577	6,376	6,859	4,164	4,169	5,325	4,686	4,619	4,006
DEMETON	<1	1	0	2	0	0	0	0	0
DESMEDIPHAM	2,954	1,905	1,598	1,257	1,385	1,345	1,482	1,017	530
DIAZINON	386,244	353,098	258,544	142,061	126,804	86,647	78,524	61,746	60,234
DICROTOPHOS	6	0	0	0	0	0	0	0	5
DIMETHOATE	294,736	315,358	292,119	251,726	210,431	226,379	183,196	270,112	335,357
DISULFOTON	22,601	24,558	8,028	10,233	9,085	4,351	5,479	1,924	2,007
EPTC	108,228	152,707	129,470	128,993	118,509	139,605	168,665	187,349	235,271
ETHEPHON	587,954	430,522	296,421	207,788	375,561	548,940	484,292	397,057	346,796
ETHION	13	0	2	28	72	1	44	0	<1
ETHOPROP	24,485	24,241	26,897	20,793	5,645	7,475	2,077	2,454	1,228
FENAMIPHOS	33,511	39,677	17,482	11,493	8,978	2,964	5,254	2,244	865
FENTHION	2	4	4	9	4	<1	0	0	<1
FONOFOS	0	0	1	0	<1	0	0	0	0
FORMETANATE HYDROCHLORIDE	33,738	34,127	44,704	32,670	30,313	20,952	20,446	26,912	28,333
MALATHION	411,505	468,614	484,322	531,966	561,398	512,004	405,480	446,779	501,174
METHAMIDOPHOS	30,570	18,867	24,224	17,934	9,664	6,037	<1	55	0
METHIDATHION	56,691	45,666	47,203	47,319	51,343	29,545	23,396	6,375	3,614
METHIOCARB	1,798	1,767	2,068	3,093	3,506	2,710	3,786	3,678	3,603
METHOMYL	318,089	307,169	251,382	221,248	231,690	219,990	273,328	260,483	278,721
METHYL PARATHION	84,785	75,385	34,110	25,770	21,427	22,970	25,408	21,520	481
MEVINPHOS	18	30	4	9	24	118	3	<1	8
MEVINPHOS, OTHER RELATED	12	20	3	6	16	79	2	0	5
MEXACARBATE	0	0	0	0	0	0	0	1	0

Table 7: (continued) *The reported pounds of pesticides used that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients.*

AI	2006	2007	2008	2009	2010	2011	2012	2013	2014
MOLINATE	141,421	75,241	19,653	12,516	24	<1	3	<1	<1
MONOCROTOPHOS	0	0	0	0	0	0	0	0	0
NALED	196,369	132,528	172,658	162,530	175,118	199,189	153,040	218,728	224,821
O,O-DIMETHYL O-(4-NITRO-M-TOLYL) PHOSPHOROTHIOATE	<1	0	0	0	0	0	0	0	0
OXAMYL	123,109	45,096	100,000	48,994	121,725	136,967	52,112	73,005	65,562
OXYDEMETON-METHYL	119,891	122,723	111,612	68,576	71,290	26,017	17,619	10,656	8,407
PARATHION	1,542	479	33	118	248	196	25	<1	22
PEBULATE	210	441	68	0	0	0	0	0	0
PHENMEDIPHAM	4,046	2,841	2,305	2,516	2,448	2,087	2,059	1,195	811
PHORATE	38,066	33,776	32,408	17,686	14,775	46,430	61,545	30,909	31,139
PHOSALONE	0	0	0	0	0	0	0	0	0
PHOSMET	628,892	424,874	341,422	132,647	115,008	95,781	53,587	60,847	44,321
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	0	0	<1	0	0	0	0	0
PROFENOFOS	20,885	3,638	216	0	1,552	0	58	0	0
PROPAMOCARB HYDROCHLORIDE	364	137,589	116,725	106,078	99,482	92,304	107,139	94,353	99,099
PROPETAMPHOS	207	136	116	352	213	139	171	127	3,047
PROPOXUR	212	191	188	202	298	808	359	373	251
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	78,084	45,757	16,335	8,161	18,427	30,328	21,820	19,077	11,683
SODIUM DIMETHYL DITHIO CARBAMATE	23,414	9,073	9,800	8,963	11,053	13,358	13,485	22,187	16,535
SULFOTEP	1	7	4	2	0	1	0	0	0
SULPROFOS	0	0	0	0	0	0	0	0	0
TEMEPHOS	803	1,173	684	83	99	34	17	8	10
TETRACHLORVINPHOS	1,203	667	1,012	1,306	1,086	912	665	2,660	629
THIOBENCARB	310,352	289,046	263,499	320,643	258,402	246,927	280,678	289,946	373,403
THIODICARB	894	686	410	511	152	472	145	156	0
TRIALLATE	0	0	0	0	879	2,671	3,752	4,353	5,886
TRICHLORFON	1,003	336	961	25	34	40	29	25	11
TOTAL	6,926,282	5,814,258	5,141,773	4,377,326	4,577,730	4,608,398	4,110,915	4,639,798	4,629,787

Table 8: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
3-IODO-2-PROPYNYL BUTYLCARBAMATE	0	0	0	0	<1	<1	<1	<1	<1
ACEPHATE	172,119	148,887	147,910	115,063	144,134	150,256	132,387	183,254	121,580
ALDICARB	158,000	108,892	66,829	31,977	66,192	29,363	1,451	1,882	166
AZINPHOS-METHYL	25,534	16,636	9,888	7,849	1,724	1,809	1,639	24	0
BENDIOCARB	<1	6	<1	<1	<1	<1	<1	<1	<1
BENSULIDE	82,280	76,748	75,695	73,306	78,736	84,201	79,195	84,383	85,372
BUTYLATE	610	236	6	0	60	0	0	20	12
CARBARYL	87,789	97,016	96,136	107,458	81,683	68,272	97,188	96,642	107,687
CARBOFURAN	43,417	39,795	24,651	7,331	15	30	0	0	0
CHLORPROPHAM	115	178	147	159	38	82	76	44	100
CHLORPYRIFOS	1,538,958	1,154,681	1,162,654	934,562	1,098,958	1,188,269	1,055,911	1,296,904	1,104,071
COUMAPHOS	2	<1	0	0	<1	<1	<1	1	0
CYCLOATE	19,886	15,601	10,581	12,058	13,799	14,895	17,565	16,045	19,126
DDVP	1,526	2,733	2,231	2,685	1,880	5,184	6,528	5,593	3,307
DEMETON	<1	10	0	10	0	0	0	0	0
DESMEDIPHAM	30,883	24,780	16,787	16,073	19,264	19,349	17,100	9,307	4,797
DIAZINON	439,814	422,244	310,125	140,620	104,443	71,156	48,594	35,119	32,001
DICROTOPHOS	110	0	0	0	0	0	0	0	23
DIMETHOATE	613,479	608,819	576,286	499,889	436,845	532,718	422,157	594,294	724,874
DISULFOTON	18,926	20,315	4,723	7,591	6,167	1,621	2,595	1,042	1,104
EPTC	38,871	51,706	45,560	49,708	44,289	47,805	56,872	69,989	89,135
ETHEPHON	640,720	490,361	362,926	261,211	455,338	602,823	533,738	475,454	412,134
ETHION	32	0	6	15	184	81	332	0	<1
ETHOPROP	4,815	4,283	4,159	4,293	1,348	1,892	541	662	581
FENAMIPHOS	18,918	22,618	10,730	7,537	5,873	2,127	2,690	1,437	465
FENTHION	<1	<1	<1	<1	<1	<1	0	0	<1
FONOFOS	0	0	<1	0	3	0	0	0	0
FORMETANATE HYDROCHLORIDE	35,293	35,383	45,715	32,678	30,898	22,038	21,821	27,894	28,234
MALATHION	218,196	250,823	288,852	277,523	434,717	281,026	271,652	289,762	284,122
METHAMIDOPHOS	37,585	23,022	27,532	20,408	10,731	6,464	<1	69	0
METHIDATHION	34,786	37,301	43,010	54,227	49,968	34,918	31,741	9,046	3,564
METHIOCARB	3,072	2,649	2,439	2,131	2,335	2,061	2,801	3,378	2,411
METHOMYL	529,347	502,384	406,030	377,954	410,186	395,773	473,027	439,701	449,933
METHYL PARATHION	51,184	45,173	21,574	15,198	13,046	13,343	15,551	12,486	<1
MEVINPHOS	8	198	34	69	11	108	2	<1	51
MEVINPHOS, OTHER RELATED	8	198	34	69	11	108	2	0	51
MEXACARBATE	0	0	0	0	0	0	0	<1	0

Table 8: (continued) *The reported cumulative acres treated with pesticides that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients.*

AI	2006	2007	2008	2009	2010	2011	2012	2013	2014
MOLINATE	33,045	17,476	4,529	2,942	6	<1	<1	3	<1
MONOCROTOPHOS	0	0	0	0	0	0	0	0	0
NALED	159,851	107,774	105,505	128,415	145,673	163,486	108,978	160,907	139,461
O,O-DIMETHYL O-(4-NITRO-M-TOLYL) PHOSPHOROTHIOATE	<1	0	0	0	0	0	0	0	0
OXAMYL	137,541	60,773	116,202	59,118	138,801	150,265	61,967	83,585	75,091
OXYDEMETON-METHYL	164,094	161,835	140,760	82,368	86,131	27,447	18,204	12,163	9,096
PARATHION	713	414	101	195	51	68	15	<1	1
PEBULATE	35	163	151	0	0	0	0	0	0
PHENMEDIPHAM	33,208	26,762	18,198	18,837	21,366	20,767	18,329	9,692	5,425
PHORATE	27,676	23,557	10,933	10,236	8,719	32,863	47,176	22,469	25,441
PHOSALONE	0	0	0	0	0	0	0	0	0
PHOSMET	200,531	142,991	116,516	51,514	40,276	33,692	18,923	23,686	21,114
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	0	0	<1	0	0	0	0	0
PROFENOFOS	20,563	4,509	289	0	1,635	0	155	0	0
PROPAMOCARB HYDROCHLORIDE	187	144,949	123,699	109,027	103,734	95,929	112,181	101,771	105,749
PROPETAMPHOS	<1	<1	<1	<1	<1	<1	<1	<1	3,621
PROPOXUR	2	<1	10	356	<1	3	<1	4	178
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	52,330	31,408	10,850	7,182	15,785	27,139	21,894	22,774	15,139
SODIUM DIMETHYL DITHIO CARBAMATE	<1	2	1	3	12	<1	<1	<1	<1
SULFOTEP	<1	5	2	3	0	1	0	0	0
SULPROFOS	0	0	0	0	0	0	0	0	0
TEMEPHOS	<1	<1	<1	<1	<1	<1	<1	<1	<1
TETRACHLORVINPHOS	1	200	5	<1	5	5	8	4	3
THIOBENCARB	79,109	74,271	67,483	83,567	75,172	71,824	79,689	84,728	107,526
THIODICARB	1,293	1,196	673	680	192	656	206	247	0
TRIALLATE	0	0	0	0	867	1,854	2,715	2,879	3,918
TRICHLORFON	<1	<1	<1	<1	<1	<1	<1	<1	<1
TOTAL	5,725,402	4,976,667	4,462,290	3,597,718	4,131,807	4,184,125	3,766,475	4,170,002	3,981,713

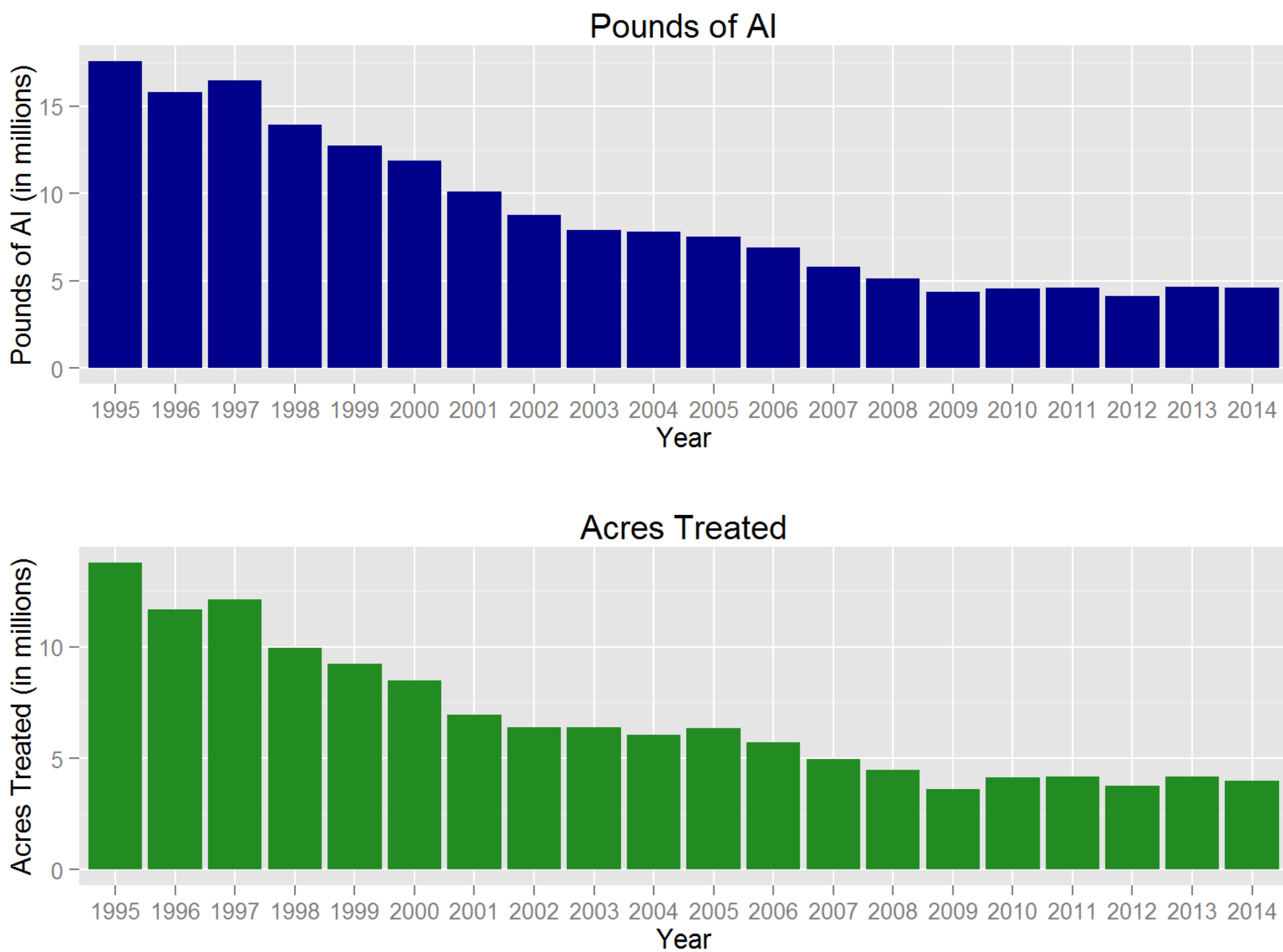

Figure 7: *Use trends of pesticides that are cholinesterase-inhibiting pesticides. These pesticides are organophosphate and carbamate active ingredients. Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated 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 9: *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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
ATRAZINE	35,291	27,546	28,491	23,260	28,937	22,654	32,173	23,763	20,896
ATRAZINE, OTHER RELATED	732	571	600	482	607	475	676	488	434
BENTAZON, SODIUM SALT	2,633	4,858	8,075	9,589	7,447	5,800	7,060	8,250	8,498
BROMACIL	62,774	85,097	68,162	52,049	67,784	92,437	82,485	68,294	61,717
BROMACIL, LITHIUM SALT	2,529	1,172	1,851	896	1,835	1,486	1,422	1,145	2,472
DIURON	1,054,075	860,510	734,757	622,598	588,905	674,531	554,604	413,159	323,676
NORFLURAZON	107,826	78,150	58,590	44,762	43,686	30,697	42,045	29,946	29,807
PROMETON	8	3	3	1	6	3	8	34	2
SIMAZINE	637,691	541,296	438,952	419,423	378,661	425,564	368,622	300,201	242,208
TOTAL	1,903,558	1,599,204	1,339,482	1,173,061	1,117,868	1,253,649	1,089,094	845,280	689,710

Table 10: *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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
ATRAZINE	21,834	17,382	16,766	15,767	19,990	17,236	23,827	18,305	15,439
ATRAZINE, OTHER RELATED	21,834	17,382	16,766	15,767	19,990	17,236	23,827	18,305	15,439
BENTAZON, SODIUM SALT	2,217	4,215	6,631	6,424	6,258	4,846	6,539	7,466	7,941
BROMACIL	19,132	20,455	21,471	24,420	28,757	32,183	28,746	16,608	12,610
BROMACIL, LITHIUM SALT	<1	<1	<1	<1	<1	<1	<1	<1	<1
DIURON	886,032	702,939	514,554	405,583	520,587	691,391	555,454	440,276	341,148
NORFLURAZON	91,035	74,085	58,866	44,503	45,638	30,601	31,693	23,424	24,950
PROMETON	168	4	35	2	20	<1	<1	234	150
SIMAZINE	480,142	411,719	320,992	339,117	289,198	324,529	241,365	205,154	164,660
TOTAL	1,483,320	1,212,529	919,200	812,543	882,518	1,069,235	859,272	695,172	554,648

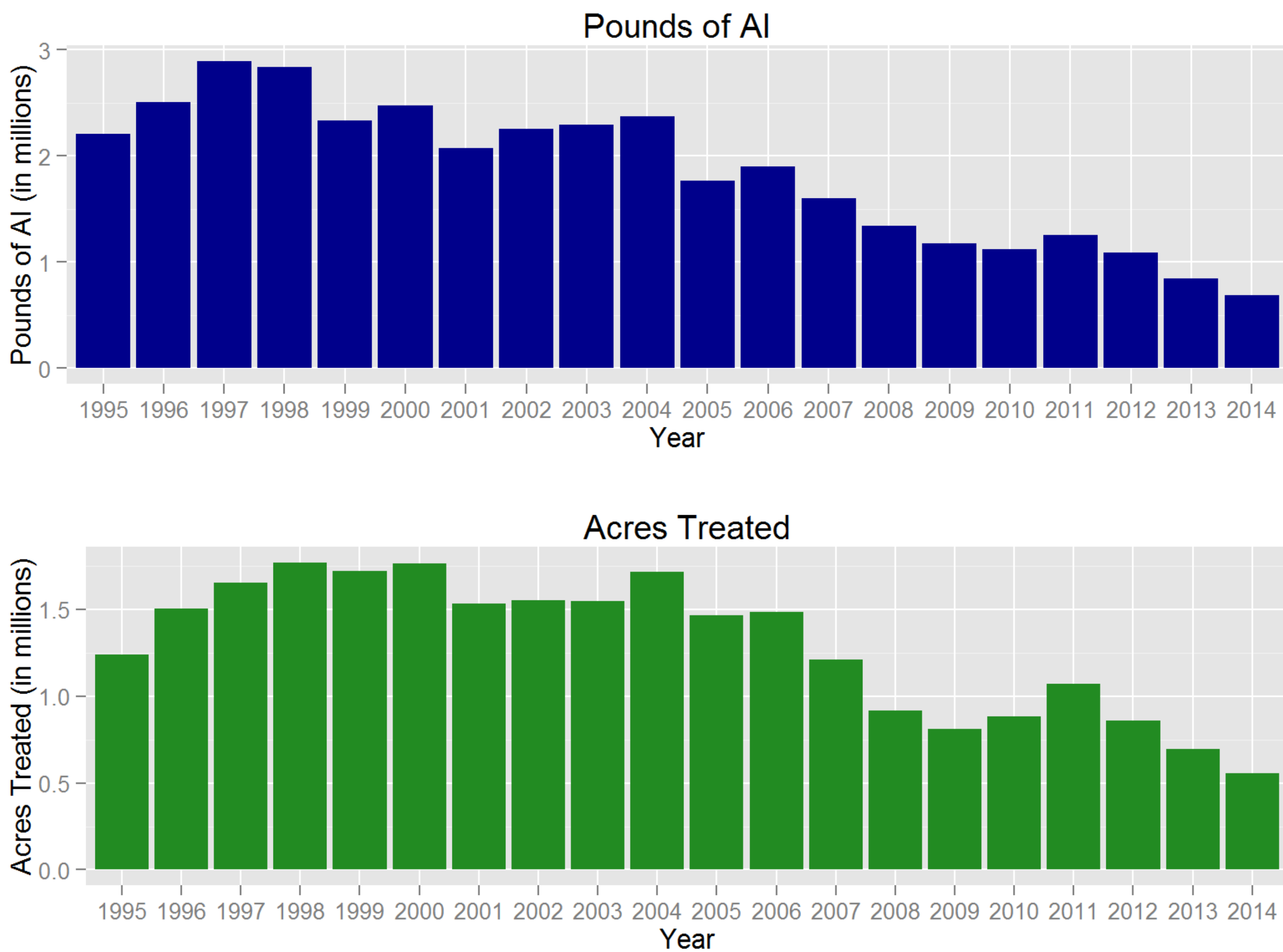

Figure 8: *Use trends of pesticides that are on the "a" part of DPR's groundwater protection list. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800(a). Reported pounds of active ingredient (AI) 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 11: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
1,3-DICHLOROPROPENE	8,735,190	9,595,625	9,706,640	6,399,515	8,796,457	10,910,167	11,928,106	12,929,964	13,212,360
2,4-D	1,735	2,755	11,619	10,788	12,526	5,400	4,281	5,949	6,384
2,4-D, 2-ETHYLHEXYL ESTER	21,062	15,029	20,464	15,113	74,398	25,794	27,685	25,694	21,434
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	16	29	25	131	516	1	16	18	<1
2,4-D, BUTOXYETHANOL ESTER	1,720	843	1,775	2,751	1,368	1,757	1,807	2,988	2,870
2,4-D, BUTOXYPROPYL ESTER	<1	0	13	0	0	0	0	0	0
2,4-D, BUTYL ESTER	15	9	0	2	3	4	7	26	0
2,4-D, DIETHANOLAMINE SALT	2,947	4,025	5,533	4,913	6,872	3,165	2,649	2,875	3,943
2,4-D, DIMETHYLAMINE SALT	439,100	397,197	466,872	446,575	488,863	408,926	371,696	352,074	328,326
2,4-D, DODECYLAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, HEPTYLAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, ISOOCTYL ESTER	10,627	11,572	9,603	4,446	4,214	5,361	4,623	2,156	764
2,4-D, ISOPROPYL ESTER	10,863	10,578	10,671	13,123	11,682	19,073	13,467	11,750	10,278
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, OCTYL ESTER	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	398	212	141	99	57	0	0	6	0
2,4-D, TETRADECYLAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, TRIETHYLAMINE SALT	1,614	383	332	472	2,829	106	5	<1	23
2,4-D, TRIISOPROPANOLAMINE SALT	1,133	985	1,140	1,930	2,092	2,741	1,746	1,588	2,439
2,4-D, TRIISOPROPYLAMINE SALT	458	636	472	1,941	1,655	1,971	770	1,263	1,871
ACROLEIN	246,659	201,156	215,822	161,637	123,660	101,425	114,130	99,023	84,220
ALUMINUM PHOSPHIDE	151,037	105,169	132,296	108,084	108,406	157,112	148,814	138,517	109,688
ARSENIC ACID	3	0	0	0	0	17	0	0	0
ARSENIC PENTOXIDE	474,517	7,805	7,433	400	16,144	8,034	9,240	8,480	16,719
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	0	<1
CAPTAN	510,661	456,475	362,757	329,747	450,225	376,607	403,834	350,056	368,557
CAPTAN, OTHER RELATED	11,217	10,131	8,031	7,374	10,002	8,395	8,918	5,982	4,680
CARBARYL	156,997	142,010	126,742	135,301	114,077	74,944	113,904	117,358	130,576
CHLORINE	730,986	857,144	1,278,580	585,673	1,011,383	834,152	1,437,637	1,323,645	800,013
CHLOROPICRIN	5,036,411	5,501,992	5,586,157	5,683,908	6,394,837	7,309,227	8,930,375	8,218,442	8,988,621
CHROMIC ACID	662,927	10,904	10,384	559	22,555	11,224	12,908	11,847	23,358
DAZOMET	34,310	37,537	40,272	65,725	60,539	59,245	39,229	63,920	58,577

Table 11: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
DDVP	6,577	6,376	6,859	4,164	4,169	5,325	4,686	4,619	4,006
ENDOSULFAN	92,757	52,403	59,917	41,840	37,799	15,679	11,113	1,833	8,136
ETHYLENE OXIDE	0	2	3	7	0	0	8	0	<1
FORMALDEHYDE	73,392	47,733	24,306	3,972	5,511	4,615	3,847	11,165	52,989
HYDROGEN CHLORIDE	2,464	1,470	4,318	3,976	2,240	504	336	395	412
LINDANE	379	2	21	8	18	1	0	2	0
MAGNESIUM PHOSPHIDE	3,931	5,132	10,507	8,009	12,233	12,757	11,497	12,372	7,550
MANCOZEB	662,040	408,652	330,238	281,639	757,664	1,045,741	1,130,499	1,149,305	1,277,899
MANEB	1,181,738	1,061,028	861,006	656,648	370,333	53,964	6,260	1,382	1,202
META-CRESOL	<1	<1	<1	<1	<1	1	2	7	<1
METAM-SODIUM	11,422,382	9,929,803	9,497,379	9,027,455	11,428,818	10,861,059	8,428,341	4,846,389	4,142,910
METHANOL	0	0	0	0	0	0	0	0	0
METHIDATHION	56,691	45,666	47,203	47,319	51,343	29,545	23,396	6,375	3,614
METHOXYCHLOR	130	6	0	8	270	39	0	<1	0
METHOXYCHLOR, OTHER RELATED	0	0	0	0	0	0	0	0	0
METHYL BROMIDE	6,542,161	6,448,643	5,693,325	5,615,653	4,809,311	4,036,362	4,002,785	3,535,174	2,964,438
METHYL ISOTHIOCYANATE	1,073	388	0	0	73	476	764	0	92
METHYL PARATHION	84,785	75,385	34,110	25,770	21,427	22,970	25,408	21,520	481
METHYL PARATHION, OTHER RELATED	4,447	3,960	1,792	1,355	1,127	1,195	1,334	1,131	<1
NAPHTHALENE	0	0	0	0	1	<1	0	<1	0
PARA-DICHLOROBENZENE	0	15	1	17	0	<1	18	<1	0
PARATHION	1,542	479	33	118	248	196	25	<1	22
PCNB	32,786	30,689	29,188	24,637	37,378	11,841	17,414	26,131	23,191
PCP, OTHER RELATED	3	2	1	0	<1	3	32	39	2
PCP, SODIUM SALT	0	<1	0	0	0	<1	0	0	<1
PCP, SODIUM SALT, OTHER RELATED	0	<1	0	0	0	0	0	0	0
PENTACHLOROPHENOL	27	22	4	0	3	18	224	274	11
PHENOL	<1	0	0	2	0	0	0	5	3
PHENOL, FERROUS SALT	0	0	0	0	0	0	0	0	<1
PHOSPHINE	3,491	5,286	48,243	29,527	11,291	122,424	51,143	20,783	11,313
PHOSPHORUS	2	<1	<1	<1	1	0	4	3	0
POTASSIUM N-METHYLDITHIOCARBAMATE	3,202,884	3,785,436	5,524,647	4,102,412	4,832,615	5,673,371	8,320,255	9,484,467	7,707,984
POTASSIUM PERMANGANATE	0	0	0	109	0	0	0	0	15
PROPOXUR	212	191	188	202	298	808	359	373	251
PROPYLENE OXIDE	133,028	110,068	105,600	111,609	300,008	431,192	385,340	410,360	388,282
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	78,084	45,757	16,335	8,161	18,427	30,328	21,820	19,077	11,683
SODIUM CYANIDE	2,853	2,670	3,406	2,579	2,502	1,073	2,588	2,593	2,611

Table 11: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	2
SODIUM TETRATHIOCARBONATE	171,204	391,303	354,294	249,580	233,949	168,761	49,713	385	120
SULFURYL FLUORIDE	2,880,853	2,152,451	2,120,860	2,184,823	2,728,977	2,356,623	2,660,628	3,048,445	2,793,063
TRIFLURALIN	1,049,147	908,614	676,386	533,307	473,502	497,778	485,852	503,789	513,208
XYLENE	1,418	1,173	576	517	1,060	282	372	1,181	1,693
ZINC PHOSPHIDE	3,794	3,215	1,299	20,898	1,745	2,543	2,249	2,201	3,596
TOTAL	44,938,875	42,894,223	43,455,817	36,966,528	43,859,702	45,712,316	49,224,158	46,785,395	44,096,479

Table 12: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
1,3-DICHLOROPROPENE	49,885	53,937	57,922	38,374	54,209	59,059	69,390	71,787	67,986
2,4-D	2,824	7,405	33,344	25,244	23,856	7,565	7,764	11,406	11,041
2,4-D, 2-ETHYLHEXYL ESTER	15,303	8,362	15,047	9,020	11,797	10,396	7,769	11,686	8,470
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	6	23	55	270	172	1	36	26	<1
2,4-D, BUTOXYETHANOL ESTER	1,600	1,297	3,648	5,110	2,542	1,206	1,054	1,609	1,949
2,4-D, BUTOXYPROPYL ESTER	<1	0	<1	0	0	0	0	0	0
2,4-D, BUTYL ESTER	1	10	0	6	<1	<1	7	<1	0
2,4-D, DIETHANOLAMINE SALT	13,826	13,339	19,085	18,931	27,009	11,075	7,033	8,859	7,527
2,4-D, DIMETHYLAMINE SALT	523,912	487,361	543,863	527,098	519,534	446,062	378,178	351,873	310,794
2,4-D, DODECYLAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, HEPTYLAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, ISOOCTYL ESTER	7,638	7,143	4,708	2,673	2,424	2,903	414	1,409	30
2,4-D, ISOPROPYL ESTER	146,090	137,055	135,797	132,302	138,826	145,544	161,009	149,976	134,371
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, OCTYL ESTER	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	5,660	3,348	1,955	1,750	895	0	0	128	0
2,4-D, TETRADECYLAMINE SALT	0	0	0	0	0	0	0	0	0
2,4-D, TRIETHYLAMINE SALT	815	473	679	740	165	117	3	<1	10
2,4-D, TRIISOPROPANOLAMINE SALT	392	108	952	541	720	623	308	524	936
2,4-D, TRIISOPROPYLAMINE SALT	<1	204	<1	<1	<1	25	37	653	585
ACROLEIN	18	141	1,027	1,497	12	45	56	68	306
ALUMINUM PHOSPHIDE	79,951	84,963	80,989	112,063	100,859	133,235	163,763	148,874	149,451
ARSENIC ACID	<1	0	0	0	0	<1	0	0	0
ARSENIC PENTOXIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	<1	<1	0	<1
CAPTAN	262,936	215,864	198,262	173,133	245,464	209,979	209,637	188,179	210,475
CAPTAN, OTHER RELATED	262,860	215,229	198,095	173,083	245,464	209,979	205,623	144,601	118,277
CARBARYL	87,789	97,016	96,136	107,458	81,683	68,272	97,188	96,642	107,687
CHLORINE	431	1,201	14,414	24,644	88,144	24,253	24,097	<1	38,381
CHLOROPICRIN	55,944	55,490	53,408	49,089	51,805	65,968	63,433	57,843	54,726
CHROMIC ACID	<1	<1	<1	<1	<1	<1	<1	<1	<1
DAZOMET	124	700	183	301	274	243	594	768	152
DDVP	1,526	2,733	2,231	2,685	1,880	5,184	6,528	5,593	3,307

Table 12: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
ENDOSULFAN	111,338	56,627	64,695	48,639	48,023	19,812	11,134	1,856	8,330
ETHYLENE OXIDE	0	<1	2	60	0	0	<1	0	<1
FORMALDEHYDE	265	57	67	5	1	6	4	52	2
HYDROGEN CHLORIDE	18	4	46	49	116	<1	5	0	155
LINDANE	9	0	37	10	31	1	0	<1	0
MAGNESIUM PHOSPHIDE	29	6	143	32	145	80	29	19	14
MANCOZEB	348,360	212,349	169,422	145,616	433,887	634,575	678,919	675,932	708,100
MANEB	675,941	655,235	558,506	471,395	290,266	40,588	4,559	1,522	815
META-CRESOL	50	54	38	108	79	144	857	614	6
METAM-SODIUM	102,451	78,030	71,815	74,132	72,748	70,875	58,998	28,153	23,767
METHANOL	0	0	0	0	0	0	0	0	0
METHIDATHION	34,786	37,301	43,010	54,227	49,968	34,918	31,741	9,046	3,564
METHOXYCHLOR	395	43	0	75	90	58	0	<1	0
METHOXYCHLOR, OTHER RELATED	0	0	0	0	0	0	0	0	0
METHYL BROMIDE	50,677	45,675	35,685	39,587	32,293	47,042	30,178	26,622	16,581
METHYL ISOTHIOCYANATE	<1	<1	0	0	<1	<1	<1	0	<1
METHYL PARATHION	51,184	45,173	21,574	15,198	13,046	13,343	15,551	12,486	<1
METHYL PARATHION, OTHER RELATED	50,762	45,165	21,331	15,053	13,029	13,326	15,337	12,440	<1
NAPHTHALENE	0	0	0	0	3	<1	0	<1	0
PARA-DICHLOROBENZENE	0	<1	0	<1	<1	<1	<1	<1	0
PARATHION	713	414	101	195	51	68	15	<1	1
PCNB	1,496	1,764	1,656	1,400	4,429	879	331	605	1,347
PCP, OTHER RELATED	0	10	46	0	4	1	15	170	2
PCP, SODIUM SALT	0	<1	0	0	0	47	0	0	1
PCP, SODIUM SALT, OTHER RELATED	0	<1	0	0	0	0	0	0	0
PENTACHLOROPHENOL	0	10	46	0	4	1	15	170	2
PHENOL	<1	0	0	15	0	0	0	114	315
PHENOL, FERROUS SALT	0	0	0	0	0	0	0	0	2
PHOSPHINE	23	3	1,751	50	643	824	687	110	2
PHOSPHORUS	<1	10	<1	<1	<1	0	74	108	0
POTASSIUM N-METHYLDITHIOCARBAMATE	27,299	42,988	56,009	38,197	41,444	44,078	50,361	46,861	39,438
POTASSIUM PERMANGANATE	0	0	0	5	0	0	0	0	4
PROPOXUR	2	<1	10	356	<1	3	<1	4	178
PROPYLENE OXIDE	20	<1	12	<1	<1	<1	288	9	<1
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	52,330	31,408	10,850	7,182	15,785	27,139	21,894	22,774	15,139
SODIUM CYANIDE	<1	<1	<1	<1	<1	<1	<1	<1	<1
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	<1

Table 12: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
SODIUM TETRATHIOCARBONATE	6,170	11,485	10,725	7,180	7,301	4,826	1,672	<1	4
SULFURYL FLUORIDE	78	9	57	361	130	537	532	63	585
TRIFLURALIN	901,629	772,753	556,306	492,498	438,784	467,063	466,361	478,247	530,974
XYLENE	1,824	2,021	1,418	1,387	584	633	1,010	2,157	1,708
ZINC PHOSPHIDE	15,284	9,301	11,478	14,512	12,751	21,417	21,685	22,425	44,477
TOTAL	3,571,082	3,116,678	2,807,846	2,578,071	2,740,258	2,551,679	2,535,891	2,382,003	2,458,984

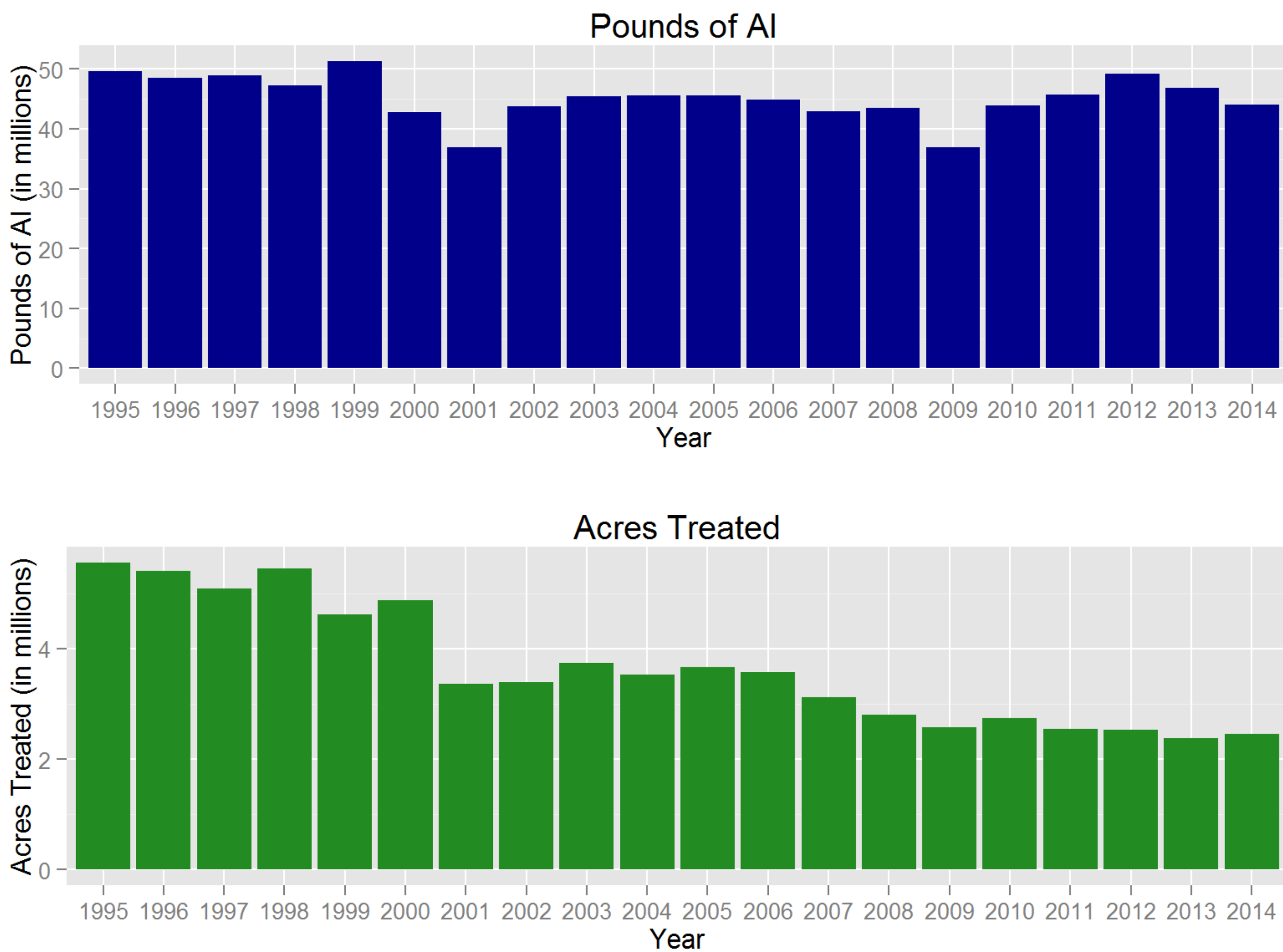

Figure 9: *Use trends of pesticides that are on DPR's toxic air contaminants list applied in California. These pesticides are the active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860. Reported pounds of active ingredient (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 13: *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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
1,2-DICHLOROPROPANE, 1,3-DICHLOROPROPENE AND RELATED C3 COMPOUNDS	182	10,532	0	0	0	0	6	0	1
1,3-DICHLOROPROPENE	8,735,190	9,595,625	9,706,640	6,399,515	8,796,457	10,910,167	11,928,106	12,929,964	13,212,360
ALUMINUM PHOSPHIDE	151,037	105,169	132,296	108,084	108,406	157,112	148,814	138,517	109,688
CARBON TETRACHLORIDE	0	180	1,980	<1	0	6	90	0	7
CHLOROPICRIN	5,036,411	5,501,992	5,586,157	5,683,908	6,394,837	7,309,227	8,930,375	8,218,442	8,988,621
DAZOMET	34,310	37,537	40,272	65,725	60,539	59,245	39,229	63,920	58,577
ETHYLENE DIBROMIDE	0	3	127	<1	0	0	6	0	0
ETHYLENE DICHLORIDE	0	0	<1	0	0	0	0	0	0
ETHYLENE OXIDE	0	2	3	7	0	0	8	0	<1
MAGNESIUM PHOSPHIDE	3,931	5,132	10,507	8,009	12,233	12,757	11,497	12,372	7,550
METAM-SODIUM	11,422,382	9,929,803	9,497,379	9,027,455	11,428,818	10,861,059	8,428,341	4,846,389	4,142,910
METHYL BROMIDE	6,542,161	6,448,643	5,693,325	5,615,653	4,809,311	4,036,362	4,002,785	3,535,174	2,964,438
METHYL IODIDE	0	0	0	0	0	1,157	21	0	0
PHOSPHINE	3,491	5,286	48,243	29,527	11,291	122,424	51,143	20,783	11,313
POTASSIUM N-METHYLDITHIOCARBAMATE	3,202,884	3,785,436	5,524,647	4,102,412	4,832,615	5,673,371	8,320,255	9,484,467	7,707,984
PROPYLENE OXIDE	133,028	110,068	105,600	111,609	300,008	431,192	385,340	410,360	388,282
SODIUM TETRATHIOCARBONATE	171,204	391,303	354,294	249,580	233,949	168,761	49,713	385	120
SULFURYL FLUORIDE	2,880,853	2,152,451	2,120,860	2,184,823	2,728,977	2,356,623	2,660,628	3,048,445	2,793,063
ZINC PHOSPHIDE	3,794	3,215	1,299	20,898	1,745	2,543	2,249	2,201	3,596
TOTAL	38,320,856	38,082,377	38,823,630	33,607,204	39,719,186	42,102,004	44,958,605	42,711,418	40,388,509

Table 14: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
1,2-DICHLOROPROPANE, 1,3-DICHLOROPROPENE AND RELATED C3 COMPOUNDS	32	108	0	0	0	0	18	0	8
1,3-DICHLOROPROPENE	49,885	53,937	57,922	38,374	54,209	59,059	69,390	71,787	67,986
ALUMINUM PHOSPHIDE	79,951	84,963	80,989	112,063	100,859	133,235	163,763	148,874	149,451
CARBON TETRACHLORIDE	0	<1	161	<1	0	<1	<1	0	<1
CHLOROPICRIN	55,944	55,490	53,408	49,089	51,805	65,968	63,433	57,843	54,726
DAZOMET	124	700	183	301	274	243	594	768	152
ETHYLENE DIBROMIDE	0	<1	<1	<1	0	0	<1	0	0
ETHYLENE DICHLORIDE	0	0	160	0	0	0	0	0	0
ETHYLENE OXIDE	0	<1	2	60	0	0	<1	0	<1
MAGNESIUM PHOSPHIDE	29	6	143	32	145	80	29	19	14
METAM-SODIUM	102,451	78,030	71,815	74,132	72,748	70,875	58,998	28,153	23,767
METHYL BROMIDE	50,677	45,675	35,685	39,587	32,293	47,042	30,178	26,622	16,581
METHYL IODIDE	0	0	0	0	0	278	37	0	0
PHOSPHINE	23	3	1,751	50	643	824	687	110	2
POTASSIUM N-METHYLDITHIOCARBAMATE	27,299	42,988	56,009	38,197	41,444	44,078	50,361	46,861	39,438
PROPYLENE OXIDE	20	<1	12	<1	<1	<1	288	9	<1
SODIUM TETRATHIOCARBONATE	6,170	11,485	10,725	7,180	7,301	4,826	1,672	<1	4
SULFURYL FLUORIDE	78	9	57	361	130	537	532	63	585
ZINC PHOSPHIDE	15,284	9,301	11,478	14,512	12,751	21,417	21,685	22,425	44,477
TOTAL	337,084	333,549	333,467	331,252	330,440	391,660	410,631	358,451	361,853

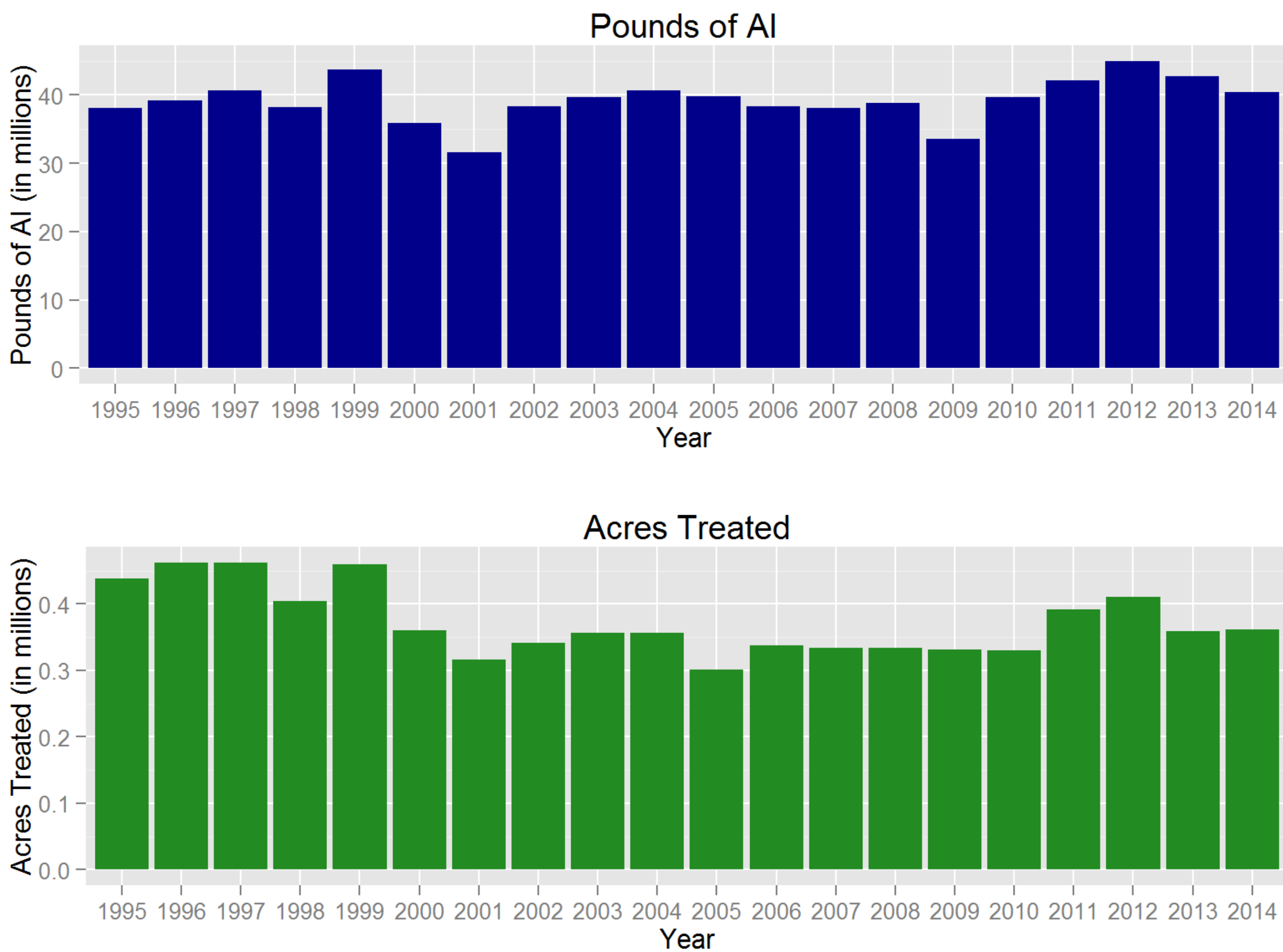

Figure 10: *Use trends of pesticides that are fumigants. Reported pounds of active ingredient (AI) applied include both agricultural and non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

USE TRENDS OF OIL PESTICIDES.

Table 15: *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 A or B 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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
COAL TAR HYDROCARBONS	0	0	0	0	0	0	0	0	0
HYDROTREATED PARAFFINIC SOLVENT	254,213	300,501	247,676	248,774	224,458	239,204	156,552	169,847	183,189
ISOPARAFFINIC HYDROCARBONS	18,997	16,859	11,250	13,007	6,628	13,823	9,822	7,290	2,191
KEROSENE	11,387	12,431	22,269	148,478	95,973	34,675	20,423	6,937	13,609
MINERAL OIL	12,416,585	12,861,981	12,341,868	11,656,594	11,437,478	10,320,634	11,559,950	16,148,650	15,717,827
MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT REFINED LIGHT	169	139	219	124	401	11	0	0	0
NAPHTHA, HEAVY AROMATIC	0	0	0	0	0	0	0	<1	0
PETROLEUM DERIVATIVE RESIN	5	0	0	1	0	<1	0	6	0
PETROLEUM DISTILLATES	297,335	343,123	504,035	548,178	341,843	279,636	247,408	207,278	158,743
PETROLEUM DISTILLATES, ALIPHATIC	34,017	18,323	16,390	10,493	15,637	8,987	6,638	7,680	15,232
PETROLEUM DISTILLATES, AROMATIC	2,136	1,160	367	103	247	12	100	303	434
PETROLEUM DISTILLATES, REFINED	1,204,247	1,237,891	1,487,043	1,222,830	2,005,527	1,987,440	1,909,143	1,900,644	1,723,677
PETROLEUM HYDROCARBONS	1,574	1,407	184	138	177	177	27	77	33
PETROLEUM NAPHTHENIC OILS	158	240	248	254	1,005	1,049	518	349	840
PETROLEUM OIL, PARAFFIN BASED	563,646	511,255	506,839	1,048,107	618,412	750,191	982,317	1,247,676	1,054,853
PETROLEUM OIL, UNCLASSIFIED	18,241,640	13,419,141	13,583,475	12,246,765	12,528,164	17,839,809	13,418,055	15,891,164	11,050,428
PETROLEUM SULFONATES	<1	<1	<1	0	0	<1	0	0	0
TOTAL	33,046,110	28,724,451	28,721,863	27,143,847	27,275,952	31,475,649	28,310,955	35,587,900	29,921,057

Table 16: *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 A or B 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	2006	2007	2008	2009	2010	2011	2012	2013	2014
COAL TAR HYDROCARBONS	0	0	0	0	0	0	0	0	0
HYDROTREATED PARAFFINIC SOLVENT	270,421	261,415	226,988	232,299	227,415	254,618	183,177	193,661	193,978
ISOPARAFFINIC HYDROCARBONS	39,757	27,903	19,228	22,913	13,709	19,129	15,023	8,637	4,657
KEROSENE	348,522	254,279	284,440	303,497	316,705	319,283	288,580	286,471	267,271
MINERAL OIL	607,575	823,500	875,257	1,009,841	1,193,988	1,272,871	1,385,871	1,820,084	1,919,748
MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT REFINED LIGHT	959	522	1,010	850	1,255	60	0	0	0
NAPHTHA, HEAVY AROMATIC	0	0	0	0	0	0	0	<1	0
PETROLEUM DERIVATIVE RESIN	<1	0	0	<1	0	<1	0	<1	0
PETROLEUM DISTILLATES	180,495	280,747	422,253	277,893	238,831	219,282	175,590	175,551	131,317
PETROLEUM DISTILLATES, ALIPHATIC	34,136	31,441	28,159	30,905	58,342	75,134	32,428	36,156	34,248
PETROLEUM DISTILLATES, AROMATIC	658	383	107	225	445	12	170	660	352
PETROLEUM DISTILLATES, REFINED	200,933	231,860	288,363	258,026	273,923	255,976	244,475	258,169	270,206
PETROLEUM HYDROCARBONS	260	546	334	309	159	35	5	75	80
PETROLEUM NAPHTHENIC OILS	11,125	17,950	18,093	22,435	44,879	65,431	27,369	30,539	21,176
PETROLEUM OIL, PARAFFIN BASED	724,671	738,037	658,709	631,120	673,568	712,351	716,298	651,049	726,646
PETROLEUM OIL, UNCLASSIFIED	807,931	674,659	702,988	693,354	766,352	1,041,996	852,993	984,062	805,802
PETROLEUM SULFONATES	<1	<1	<1	0	0	<1	0	0	0
TOTAL	3,213,555	3,323,241	3,505,504	3,458,251	3,764,414	4,170,692	3,894,446	4,414,543	4,354,264

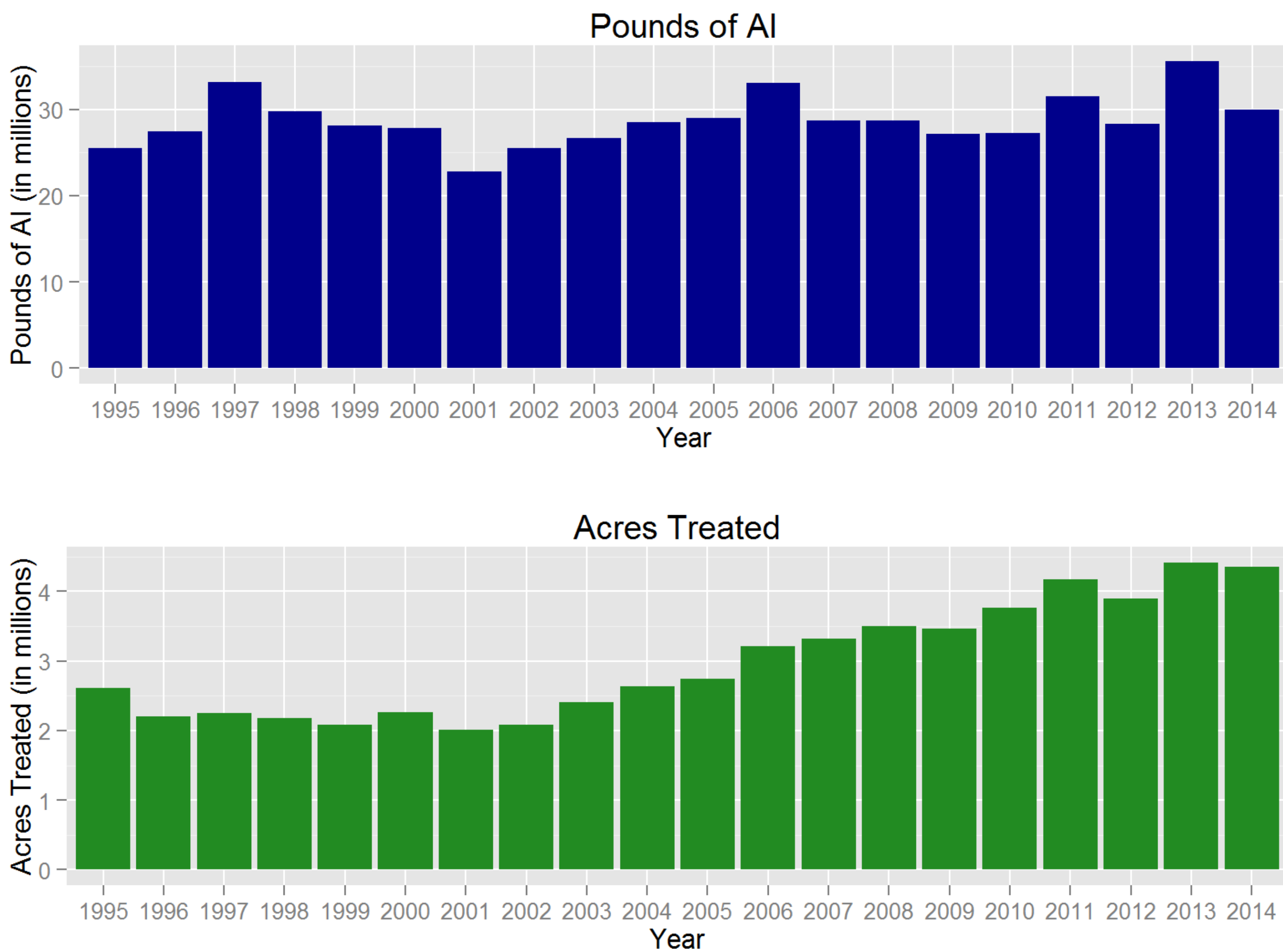

Figure 11: *Use trends of pesticides that are oils. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of A or B carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides 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 17: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
(3S, 6R)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	<1	0	0	<1	0	0	<1	0	<1
(3S, 6S)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	<1	0	0	<1	0	0	<1	0	<1
(E)-4-TRIDECEN-1-YL-ACETATE	103	113	176	80	96	0	0	0	23
(E)-5-DECEN-1-OL	0	0	0	0	0	0	<1	<1	<1
(E)-5-DECENOL	4	2	2	1	1	<1	2	3	1
(E)-5-DECENYL ACETATE	17	7	8	4	5	2	10	7	4
(E,E)-9, 11-TETRADECADIEN-1-YL ACETATE	0	39	28	11	2	6	3	4	3
(E,Z)-7,9-DODECADIEN-1-YL ACETATE	0	0	0	0	50	249	270	24	24
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	0	0	0	0	0	0	0
(S)-KINOPRENE	201	238	252	276	277	191	301	284	309
(S)-VERBENONE	0	0	0	0	0	0	55	0	0
(Z)-11-HEXADECEN-1-YL ACETATE	6	2	0	681	0	1	0	0	0
(Z)-11-HEXADECENAL	6	2	0	0	0	0	0	0	0
(Z)-4-TRIDECEN-1-YL-ACETATE	3	4	6	3	3	0	0	0	1
(Z)-9-DODECENYL ACETATE	<1	1	<1	<1	<1	<1	<1	<1	<1
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	0	0	<1	3	2	0	0	0	0
(Z,Z)-11,13-HEXADECADIENAL	0	<1	<1	0	<1	571	271	321	619
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	0	0	0	3	3	0	0	0	0
1,4-DIMETHYLNAPHTHALENE	599	18	837	1,544	1,152	544	893	2,194	1,085
1,7-DIOXASPIRO-(5,5)-UNDECANE	<1	<1	<1	<1	<1	<1	<1	1	<1
1-DECANOL	0	0	0	0	0	0	0	0	0
1-METHYLCYCLOPROPENE	<1	<1	<1	<1	<1	<1	1	1	<1
1-NAPHTHALENEACETAMIDE	30	49	55	32	25	20	20	19	22
1-OCTEN-3-OL	0	0	0	0	0	0	0	0	<1
2-METHYL-1-BUTANOL	0	0	0	0	0	0	0	<1	<1
3,13 OCTADECADIEN-1-YL ACETATE	0	0	44	0	1	12	0	<1	0
3,7-DIMETHYL-6-OCTEN-1-OL	0	0	1	5	23	12	28	54	42
ACETIC ACID	0	1	21	79	1,732	73	601	43	62

Table 17: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
AGROBACTERIUM RADIOBACTER	291	577	32	142	124	95	28	237	147
AGROBACTERIUM RADIOBACTER, STRAIN K1026	6	<1	<1	1	<1	<1	<1	34	<1
ALLYL ISOTHIOCYANATE	<1	0	0	0	0	0	<1	0	0
ALMOND, BITTER	<1	<1	<1	<1	<1	<1	<1	<1	<1
AMINO ETHOXY VINYL GLYCINE HYDROCHLORIDE	703	963	1,073	543	1,024	1,194	1,368	1,444	1,755
AMMONIUM BICARBONATE	2	7	2	<1	9	14	7	46	32
AMMONIUM NITRATE	13,991	27,443	36,662	39,540	40,065	48,226	66,503	85,367	87,540
AMPELOMYCES QUISQUALIS	<1	<1	0	<1	<1	0	0	0	0
ANIMAL GLAND EXTRACTS	0	0	0	0	0	0	0	0	0
ASPERGILLUS FLAVUS STRAIN AF36	0	0	0	0	0	<1	4	4	8
AZADIRACHTIN	2,408	2,235	2,246	2,500	1,885	2,014	2,639	3,151	3,999
BACILLUS FIRMUS (STRAIN I-1582)	0	0	0	0	0	0	0	0	42
BACILLUS POPILLIAE	0	0	0	0	0	0	0	<1	<1
BACILLUS PUMILUS, STRAIN QST 2808	5,646	7,062	8,138	6,987	6,783	7,560	6,750	6,244	7,937
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	45,430	20,192	21,441	18,178	13,013	10,602	9,123	10,512	10,509
BACILLUS SUBTILIS GB03	14	6	1	<1	<1	<1	1	1	2
BACILLUS SUBTILIS MBI600	0	0	0	0	0	0	<1	<1	0
BACILLUS SUBTILIS VAR. AMYLOLIQUEFACIENS STRAIN FZB24	0	0	0	0	0	0	3	90	154
BACILLUS THURINGIENSIS (BERLINER)	35	27	16	4	6	26	18	11	4
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	9,377	20,474	20,484	27,539	20,397	11,666	17,042	13,265	18,768
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	1,752	2,877	2,373	894	824	819	730	359	333
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	14,310	8,267	9,433	17,202	11,401	22,640	12,616	9,290	11,795
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	16,042	22,702	12,325	12,128	7,424	4,689	10,291	8,246	7,971
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	2,272	987	460	402	150	244	234	53	43

Table 17: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	281	147	369	118	66	478	44	500	514
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	1	0	0	0	<1	<1	0	0	0
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	54,236	63,866	66,612	80,565	75,074	58,242	52,425	77,913	80,311
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	2	2	0	<1	<1	0	0	0	0
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	3	0	764	118	14	0	0	0	0
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	3,872	632	277	42	1	75	298	5	35
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	0	<1	0	<1	0	0	0	0	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	1,384	154	442	95	0	0	528	0	0
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN ABTS-1857	28,905	32,529	39,464	31,043	26,250	24,282	30,573	29,866	48,784
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	432	563	256	243	130	88	1	18	6
BACILLUS THURINGIENSIS, SUBSP. ISRAELENSIS, STRAIN AM 65-52	59,019	40,376	52,969	53,778	71,050	52,876	173,147	49,670	42,746
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN ABTS-351, FERMENTATION SOLIDS AND SOLUBLES	53,351	71,755	78,527	69,545	96,988	83,027	95,283	83,647	111,273
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	6,139	2,262	2,068	3,747	3,589	2,611	3,187	2,323	1,928

Table 17: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	<1	1	26	28	<1	<1	4	0	<1
BACTERIOPHAGE ACTIVE AGAINST XANTHOMONAS CAMPESTRIS PV. VESICATORIA AND PSEUDOMONAS SYRINGAE PV. TOMATO	0	0	0	0	0	<1	<1	<1	<1
BALSAM FIR OIL	0	0	0	0	<1	0	<1	<1	<1
BEAUVERIA BASSIANA STRAIN GHA	571	711	569	378	357	608	1,053	1,775	2,746
BUFFALO GOURD ROOT POWDER	0	137	279	1	11	0	1	25	5
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	0	0	0	0	0
CANOLA OIL	4	29	25	17	131	26	15	28	34
CAPSICUM OLEORESIN	2	10	5	2	4	4	12	10	27
CARBON DIOXIDE	53,732	32,010	44,315	7,727	17,550	21,239	30,826	15,739	12,453
CASTOR OIL	37	4	4	21	7	<1	2	<1	8
CHENOPODIUM AMBROSIODES NEAR AMBROSIODES	0	0	0	20,330	10,336	7,897	10,231	20,261	17,504
CHITOSAN	0	0	0	0	0	0	0	0	0
CINNAMALDEHYDE	12	3	354	0	0	1	0	0	0
CITRIC ACID	45,264	41,249	57,279	56,086	74,789	89,558	94,162	127,587	116,221
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	96,537	110,881	104,822	106,271	115,931	70,601	77,257	119,281	196,906
CODLING MOTH GRANULOSIS VIRUS	<1	<1	<1	<1	<1	<1	<1	<1	<1
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08	11	6	0	127	80	176	245	611	626
CORN GLUTEN MEAL	1	0	<1	0	0	0	0	0	0
CORN SYRUP	0	81	1,893	2,891	3,026	4,377	4,766	3,216	3,344
COYOTE URINE	0	0	0	0	<1	1	2	3	9
CYTOKININ	0	0	0	0	0	<1	<1	<1	<1
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	0	0	0	0
DIHYDRO-5-PENTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	0	0	0	0
E,E-8,10-DODECADIEN-1-OL	2,278	2,273	2,037	4,978	1,942	1,376	1,995	2,216	1,393
E-11-TETRADECEN-1-YL ACETATE	99	2,399	744	312	100	172	133	142	61
E-8-DODECENYL ACETATE	228	236	265	606	898	192	270	273	224

Table 17: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	6	32	18	18	0	1	<1	0	0
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	0	0	0	0	0	0	0	0	0
ESSENTIAL OILS	4	<1	0	<1	<1	<1	1	<1	15
ETHYLENE	0	0	0	0	97	1,030	868	1,247	1,186
EUCALYPTUS OIL	<1	0	0	0	22	<1	0	0	0
EUGENOL	<1	0	0	0	0	0	1	<1	1
FARNESOL	4	2	2	3	10	5	11	21	17
FENUGREEK	5	31	6	17	1	5	8	2	1
FERRIC SODIUM EDTA	0	0	0	0	0	1,979	6,351	5,855	6,649
FISH OIL	0	0	0	0	0	1,657	5,466	4,114	0
FORMIC ACID	1	1,509	499	280	223	241	634	77	333
FOX URINE	0	0	0	0	<1	<1	2	1	4
GAMMA AMINOBUTYRIC ACID	4,213	1,936	944	177	118	40	133	28	15
GARLIC	89	142	212	36	423	29	1,905	2,831	1,392
GERANIOL	<1	0	1	5	23	12	28	54	42
GERMAN COCKROACH PHEROMONE	<1	<1	<1	<1	<1	<1	<1	<1	<1
GIBBERELLINS	24,688	25,083	23,516	22,916	21,381	21,288	22,678	28,630	27,299
GIBBERELLINS, POTASSIUM SALT	15	<1	<1	0	<1	<1	5	0	0
GLIOCLADIUM VIRENS GL-21 (SPORES)	1	152	945	356	945	649	1,957	3,538	2,932
GLUTAMIC ACID	4,213	1,936	944	177	118	40	133	28	15
HARPIN PROTEIN	60	32	16	14	13	11	1	1	<1
HEPTYL BUTYRATE	0	0	0	0	<1	<1	<1	14	6
HYDROGEN PEROXIDE	17,526	11,860	20,740	21,750	69,179	59,393	36,303	47,143	49,404
HYDROPRENE	11,970	2,282	2,383	1,664	6,382	11,261	3,948	7,318	5,728
IBA	31	20	11	6	7	9	12	15	13
INDOLE	0	0	0	0	0	0	0	<1	0
IRON PHOSPHATE	1,484	1,634	1,901	1,435	2,351	2,874	2,327	2,118	2,004
KAOLIN	1,638,397	1,681,292	1,460,552	2,371,254	3,040,482	1,686,898	2,002,517	2,473,380	2,849,022
LACTOSE	10,667	9,019	11,341	9,160	7,984	9,285	6,554	7,135	6,596
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	0	<1	<1	0	0	0	5	0	0
LAURYL ALCOHOL	472	503	830	432	736	497	755	415	289
LAVANDULYL SENECIOATE	0	0	140	462	437	6,120	586	361	386

Table 17: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
LIMONENE	32,845	68,949	45,536	56,495	56,406	62,925	74,369	61,243	346,040
LINALOOL	170	113	63	62	1,104	95	137	72	59
MARGOSA OIL	0	0	0	0	579	7,886	9,106	12,189	22,547
MENTHOL	<1	0	0	0	5	<1	0	20	0
METARHIZIUM ANISOPLIAE STRAIN F52	0	0	0	0	0	0	116	89	121
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	<1	<1	<1	0	<1	<1	0	0	0
METHOPRENE	6,941	3,357	2,620	1,568	1,492	1,809	1,304	1,350	1,321
METHYL ANTHRANILATE	449	152	118	312	343	448	300	1,237	634
METHYL EUGENOL	0	0	0	0	0	5	0	9	0
METHYL NONYL KETONE	0	<1	<1	<1	<1	0	0	<1	<1
METHYL SALICYLATE	<1	<1	0	<1	0	0	0	0	0
MONTOK PEPPER	0	0	0	0	0	0	0	0	0
MUSCALURE	15	22	19	20	15	15	16	12	17
MYRISTYL ALCOHOL	96	102	169	88	150	102	155	84	59
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	25,039	29,990	23,867	23,273	22,813	27,757	25,556	26,007	17,675
N6-BENZYL ADENINE	446	198	153	168	217	128	168	182	181
NAA	9	4	31	3	5	4	9	15	12
NAA, AMMONIUM SALT	1,100	1,253	1,193	1,203	976	839	1,400	1,056	945
NAA, ETHYL ESTER	1	2	8	3	6	23	4	3	5
NAA, POTASSIUM SALT	9	11	0	0	0	0	0	53	15
NAA, SODIUM SALT	3	3	1	2	0	0	0	2	1
NEROLIDOL	3	2	2	6	24	12	28	54	42
NITROGEN, LIQUIFIED	57,121	15,741	11,945	2,181	135	216	74	594	6
NONANOIC ACID	11,203	10,949	11,093	9,063	17,322	17,939	18,200	21,552	17,500
NONANOIC ACID, OTHER RELATED	590	576	584	477	912	944	958	1,134	921
NOSEMA LOCUSTAE SPORES	<1	<1	<1	<1	<1	<1	1	<1	<1
OIL OF ANISE	<1	<1	<1	0	0	<1	<1	<1	<1
OIL OF BERGAMOT	<1	0	0	0	0	0	0	0	0
OIL OF BLACK PEPPER	0	<1	<1	1	<1	<1	<1	1	1
OIL OF CEDARWOOD	0	0	0	0	<1	0	0	0	0
OIL OF CITRONELLA	<1	<1	3	0	5	46	0	0	1
OIL OF CITRUS	0	0	0	0	0	0	0	0	0
OIL OF GERANIUM	0	0	0	0	<1	0	0	0	0
OIL OF JOJOBA	9,572	7,240	12,070	3,418	4,176	1,232	507	134	376
OIL OF LEMON EUCALYPTUS	0	0	0	0	0	<1	3	0	0
OIL OF LEMONGRASS	<1	0	0	0	0	0	0	0	0

Table 17: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
OIL OF MUSTARD	0	0	0	0	0	0	0	0	0
OIL OF PEPPERMINT	0	<1	<1	0	<1	0	0	0	0
OXYPURINOL	0	<1	0	0	0	0	0	0	<1
PAECILOMYCES FUMOSOROSEUS APOPKA STRAIN 97	0	0	0	0	0	0	507	3,301	5,912
PAECILOMYCES LILACINUS STRAIN 251	0	0	0	0	252	515	840	4,073	5,019
PANTOEA AGGLOMERANS STRAIN E325, NRRL B-21856	0	0	0	33	4	1	1	1	0
PERFUME	0	0	0	0	0	0	0	0	0
PHENYLETHYL PROPIONATE	151	326	502	500	822	423	535	701	712
POLYHEDRAL OCCLUSION BODIES (OB'S) OF THE NUCLEAR POLYHEDROSIS VIRUS OF HELICOVERPA ZEA (CORN EARWORM)	0	0	<1	1	1	51	6	1	2
POLYOXIN D, ZINC SALT	237	234	331	397	1,296	3,513	4,736	6,731	7,397
POTASSIUM BICARBONATE	163,083	114,163	109,171	180,858	275,648	358,175	228,829	239,593	222,248
POTASSIUM PHOSPHITE	135,335	189,512	182,376	141,395	287,730	279,702	281,490	389,986	706,676
POTASSIUM SORBATE	1,262	743	0	<1	65	0	0	0	0
PROPYLENE GLYCOL	42,641	28,505	24,132	25,792	54,233	48,120	58,399	85,716	89,350
PSEUDOMONAS FLUORESCENS, STRAIN A506	1,004	614	390	328	217	274	59	92	270
PSEUDOMONAS SYRINGAE STRAIN ESC-11	<1	0	0	0	0	0	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	<1	0	0	0	<1	0	0	3	0
PUTRESCENT WHOLE EGG SOLIDS	69	20	1	143	3	1	1	1	1
PYTHIUM OLIGANDRUM DV74	0	0	0	0	0	<1	<1	<1	0
QST 713 STRAIN OF DRIED BACILLUS SUBTILIS	17,139	17,337	16,703	16,175	21,464	23,961	23,409	24,581	20,860
QUILLAJA	83	276	1,183	410	682	1,081	785	1,031	773
REYNOUTRIA SACHALINENSIS	0	0	0	179	8,996	14,843	14,787	15,309	15,898
S-ABSCISIC ACID	0	0	7	66	864	1,852	2,651	2,131	2,340
S-METHOPRENE	1,391	1,726	3,520	3,284	3,921	2,313	2,324	2,325	2,517
SALICYLIC ACID	<1	0	0	0	0	0	0	0	0
SAWDUST	2	<1	1	<1	1	0	4	4	0
SESAME OIL	35	883	529	851	1,309	1,327	15	<1	0
SILVER NITRATE	0	0	0	0	<1	<1	<1	<1	0
SODIUM BICARBONATE	0	0	67	27	3	515	146	44	458
SODIUM CHLORIDE	1,027	715	4	3	2	132	124	119	211

Table 17: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SODIUM LAURYL SULFATE	274	400	340	146	96	458	884	431	570
SOYBEAN OIL	70,398	14,747	12,005	28,359	24,110	24,098	22,022	45,973	59,297
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	1	<1	<1	<1	<1	<1	<1	10	11
STREPTOMYCES LYDICUS WYEC 108	<1	<1	<1	1	2	1	2	3	3
SUCROSE OCTANOATE	2	0	1,685	4,003	1,128	230	55	188	98
THYME	171	485	593	775	1,311	665	844	1,135	1,149
THYMOL	1,026	289	523	1,675	1,539	265	181	398	314
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	24	38	20	11	504	129	158	184	86
TRICHODERMA ICC 012 ASPERELLUM	0	0	0	0	0	13	19	43	2
TRICHODERMA ICC 080 GAMSII	0	0	0	0	0	13	19	43	2
ULOCLADIUM OUDEMANSII (U3 STRAIN)	0	0	0	0	0	0	0	29	792
VANILLIN	1	5	1	3	<1	1	1	<1	<1
VEGETABLE OIL	256,605	154,128	270,375	196,078	323,401	514,884	276,278	315,218	266,954
XANTHINE	0	<1	0	0	0	0	0	0	<1
XANTHOMONAS CAMPESTRIS PV. POANNUA	<1	0	0	0	0	0	0	0	0
YEAST	1,159	1,030	999	926	470	1,165	818	80	32
YUCCA SCHIDIGERA	0	0	7	169	634	1,649	7,147	11,681	5,651
Z,E-9,12-TETRADECADIEN-1-YL ACETATE	0	1	0	6,149	1	7	6	14	122
Z-11-TETRADECEN-1-YL ACETATE	14	228	9	9	9	4	8	8	<1
Z-8-DODECENOL	41	41	46	106	157	33	45	44	38
Z-8-DODECENYL ACETATE	3,455	3,647	4,051	9,262	13,964	2,949	3,805	3,467	3,242
Z-9-TETRADECEN-1-OL	0	0	0	0	0	0	0	0	0
TOTAL	3,075,738	2,922,836	2,834,532	3,714,471	4,887,258	3,738,489	3,863,814	4,542,529	5,571,227

Table 18: *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	2006	2007	2008	2009	2010	2011	2012	2013	2014
(3S, 6R)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	1,484	0	0	3	0	0	7	0	24
(3S, 6S)-3-METHYL-6-ISOPROPENYL-9-DECEN-1-YL ACETATE	1,484	0	0	3	0	0	7	0	24
(E)-4-TRIDECEN-1-YL-ACETATE	4,870	5,193	7,672	3,942	3,995	0	0	0	1,074
(E)-5-DECEN-1-OL	0	0	0	0	0	0	53	83	20
(E)-5-DECENOL	385	737	262	118	249	166	502	837	650
(E)-5-DECENYL ACETATE	385	737	262	118	249	166	555	920	670
(E,E)-9, 11-TETRADECADIEN-1-YL ACETATE	0	22	956	3	474	759	608	985	466
(E,Z)-7,9-DODECADIEN-1-YL ACETATE	0	0	0	0	5,168	18,104	22,856	2,479	1,623
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	0	0	0	0	0	0	0
(S)-KINOPRENE	440	453	575	510	490	346	506	674	748
(S)-VERBENONE	0	0	0	0	0	0	100	0	0
(Z)-11-HEXADECEN-1-YL ACETATE	183	116	0	1,622	0	49	0	0	0
(Z)-11-HEXADECENAL	423	72	0	0	0	0	0	0	0
(Z)-4-TRIDECEN-1-YL-ACETATE	4,870	5,193	7,672	3,942	3,995	0	0	0	1,074
(Z)-9-DODECENYL ACETATE	96	5,342	1,304	123	74	1,814	392	555	1,966
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	0	0	1	93	1	0	0	0	0
(Z,Z)-11,13-HEXADECADIENAL	0	200	109	0	763	11,336	17,283	20,591	38,681
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	0	0	0	93	1	0	0	0	0
1,4-DIMETHYLNAPHTHALENE	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,7-DIOXASPIRO-(5,5)-UNDECANE	4	55	<1	6	<1	<1	30	43	25
1-DECANOL	0	0	0	0	0	0	0	0	0
1-METHYLCYCLOPROPENE	2	6	13	61	3	1	17	21	14
1-NAPHTHALENEACETAMIDE	666	927	870	607	408	315	393	343	394
1-OCTEN-3-OL	0	0	0	0	0	0	0	0	<1
2-METHYL-1-BUTANOL	0	0	0	0	0	0	0	<1	<1
3,13 OCTADECADIEN-1-YL ACETATE	0	0	85	0	50	131	0	<1	0
3,7-DIMETHYL-6-OCTEN-1-OL	0	0	67	349	1,531	788	2,220	3,939	3,545
ACETIC ACID	0	10	2	226	110	162	3,165	3,114	10,311
AGROBACTERIUM RADIOBACTER	698	555	217	215	362	325	852	624	505

Table 18: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
AGROBACTERIUM RADIOBACTER, STRAIN K1026	335	366	1,935	5,086	81	19	4,947	9,016	754
ALLYL ISOTHIOCYANATE	<1	0	0	0	0	0	<1	0	0
ALMOND, BITTER	328	2,068	87	471	74	412	271	88	65
AMINO ETHOXY VINYL GLYCINE HYDROCHLORIDE	6,453	9,238	10,253	5,611	10,179	11,108	14,991	16,371	17,646
AMMONIUM BICARBONATE	4	55	<1	6	<1	<1	30	43	25
AMMONIUM NITRATE	433,770	503,230	643,869	679,675	726,842	817,497	867,166	1,084,950	952,048
AMPELOMYCES QUISQUALIS	10	14	0	22	2	0	0	0	0
ANIMAL GLAND EXTRACTS	0	0	0	0	0	0	0	0	0
ASPERGILLUS FLAVUS STRAIN AF36	0	0	0	0	0	260	48,833	89,337	146,566
AZADIRACHTIN	68,244	91,385	86,813	82,652	71,707	70,227	98,809	113,777	158,339
BACILLUS FIRMUS (STRAIN I-1582)	0	0	0	0	0	0	0	0	12
BACILLUS POPILLIAE	0	0	0	0	0	0	0	<1	<1
BACILLUS PUMILUS, STRAIN QST 2808	64,333	79,795	91,795	75,509	72,582	84,282	76,209	68,093	83,153
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	<1	<1	<1	<1	9	<1	231	60	135
BACILLUS SUBTILIS GB03	3	2	5	2	<1	6	<1	20	302
BACILLUS SUBTILIS MBI600	0	0	0	0	0	0	2	<1	0
BACILLUS SUBTILIS VAR. AMYLOLIQUEFACIENS STRAIN FZB24	0	0	0	0	0	0	406	1,702	3,516
BACILLUS THURINGIENSIS (BERLINER)	2,939	1,129	41	82	127	877	292	258	91
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	39,077	53,040	40,440	48,842	40,395	18,657	25,262	22,511	28,609
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	15,784	24,379	20,510	7,888	6,943	7,800	6,221	3,296	2,941
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	543	833	4,719	501	1,873	337	773	1,133	1,279
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	29,505	35,513	21,008	19,700	10,721	8,222	15,297	9,855	10,751
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	42,279	16,522	8,671	7,807	2,269	3,063	1,973	818	613

Table 18: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	2,913	1,271	2,147	1,302	688	3,428	644	3,580	4,038
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	7	0	0	0	<1	<1	0	0	0
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	125,390	119,055	100,581	101,522	111,746	84,069	81,637	95,895	111,216
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	<1	<1	0	<1	<1	0	0	0	0
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	93	0	1,898	310	73	0	0	0	0
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	6,684	1,225	451	62	3	200	373	5	99
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	0	<1	0	<1	0	0	0	0	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	3,021	479	1,298	250	0	0	1,320	0	0
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN ABTS-1857	41,546	43,209	49,890	41,724	37,209	35,254	41,581	36,840	68,323
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	4,235	4,766	2,343	2,136	1,057	640	4	112	47
BACILLUS THURINGIENSIS, SUBSP. ISRAELENSIS, STRAIN AM 65-52	4,809	25	2,497	270	758	1,052	1,305	794	2,543
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN ABTS-351, FERMENTATION SOLIDS AND SOLUBLES	100,697	133,297	134,290	120,661	162,444	152,463	164,914	149,540	193,440
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	23,346	20,045	15,173	20,295	18,465	16,390	15,228	10,138	7,887

Table 18: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	<1	<1	25	52	2	<1	10	0	<1
BACTERIOPHAGE ACTIVE AGAINST XANTHOMONAS CAMPESTRIS PV. VESICATORIA AND PSEUDOMONAS SYRINGAE PV. TOMATO	0	0	0	0	0	11	25	21	12
BALSAM FIR OIL	0	0	0	0	<1	0	<1	<1	<1
BEAUVERIA BASSIANA STRAIN GHA	2,743	2,481	2,091	2,188	1,686	2,706	4,012	6,857	10,865
BUFFALO GOURD ROOT POWDER	0	1,694	3,227	8	138	0	25	161	200
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	0	0	0	0	0
CANOLA OIL	5	33	1,388	1,541	4,786	3,872	2,329	5,791	4,230
CAPSICUM OLEORESIN	247	277	528	325	388	238	576	546	1,574
CARBON DIOXIDE	<1	<1	<1	<1	<1	26	917	5	20
CASTOR OIL	2	<1	4	12	<1	<1	<1	<1	<1
CHENOPODIUM AMBROSIODES NEAR AMBROSIODES	0	0	0	6,355	9,265	6,868	13,401	22,552	25,820
CHITOSAN	0	0	0	0	0	0	0	0	0
CINNAMALDEHYDE	10	2	556	0	0	<1	0	0	0
CITRIC ACID	852,995	815,766	919,736	903,198	1,204,981	1,332,018	1,389,580	1,542,228	1,683,547
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	73,386	71,278	64,156	47,422	42,281	40,770	42,615	60,182	85,171
CODLING MOTH GRANULOSIS VIRUS	1,479	2,141	1,487	1,139	984	3,468	3,431	4,339	4,510
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08	62	120	0	1,204	395	1,107	1,697	4,286	4,746
CORN GLUTEN MEAL	<1	0	3	0	0	0	0	0	0
CORN SYRUP	0	1,132	7,991	14,316	12,877	27,721	27,760	15,992	14,240
COYOTE URINE	0	0	0	0	<1	12	<1	<1	<1
CYTOKININ	0	0	0	0	0	199	2,409	352	3,290
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	0	0	0	0
DIHYDRO-5-PENTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	0	0	0	0
E,E-8,10-DODECADIEN-1-OL	20,728	27,784	21,585	15,300	15,283	17,872	15,879	18,241	16,454
E-11-TETRADECEN-1-YL ACETATE	6,637	6,189	5,996	5,592	5,405	1,701	4,485	4,396	489
E-8-DODECENYL ACETATE	37,412	49,086	54,242	46,757	49,591	45,667	49,300	47,640	41,349

Table 18: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	9	35	91	37	0	<1	<1	0	0
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	0	0	0	0	0	0	0	0	0
ESSENTIAL OILS	<1	1	0	<1	4	<1	<1	<1	<1
ETHYLENE	0	0	0	0	4	70	49	36	21
EUCALYPTUS OIL	<1	0	0	0	2	<1	0	0	0
EUGENOL	<1	0	0	0	0	0	<1	<1	<1
FARNESOL	1,246	652	422	503	1,597	826	2,227	3,940	3,547
FENUGREEK	328	2,068	87	471	74	412	271	88	65
FERRIC SODIUM EDTA	0	0	0	0	0	3,049	8,428	8,038	10,326
FISH OIL	0	0	0	0	0	<1	382	252	0
FORMIC ACID	<1	1	51	10	60	1	368	5	178
FOX URINE	0	0	0	0	<1	12	<1	<1	<1
GAMMA AMINOBUTYRIC ACID	58,586	24,697	12,905	1,786	835	542	1,811	384	314
GARLIC	363	346	288	374	1,123	1,369	12,410	14,485	8,509
GERANIOL	<1	0	67	349	1,531	788	2,220	3,939	3,545
GERMAN COCKROACH PHEROMONE	<1	<1	<1	<1	<1	<1	<1	<1	<1
GIBBERELLINS	458,764	455,130	490,530	513,398	493,034	509,875	529,800	548,176	529,110
GIBBERELLINS, POTASSIUM SALT	348	32	8	0	34	150	795	0	0
GLIOCLADIUM VIRENS GL-21 (SPORES)	<1	5	1,090	716	1,401	1,076	3,172	5,444	5,030
GLUTAMIC ACID	58,586	24,697	12,905	1,786	835	542	1,811	384	314
HARPIN PROTEIN	6,089	3,721	1,998	1,562	1,631	1,582	115	95	0
HEPTYL BUTYRATE	0	0	0	0	<1	<1	<1	<1	<1
HYDROGEN PEROXIDE	9,952	7,744	9,361	14,521	23,208	39,193	21,863	22,939	28,089
HYDROPRENE	7	2	200	82	<1	<1	2	4	<1
IBA	27,670	44,093	3,862	150	227	1,156	1,283	962	940
INDOLE	0	0	0	0	0	0	0	<1	0
IRON PHOSPHATE	4,197	7,145	6,569	4,561	6,345	5,477	6,519	6,276	8,109
KAOLIN	63,343	56,911	47,438	66,781	82,636	51,100	57,742	80,018	87,685
LACTOSE	95,549	80,366	99,526	77,363	81,164	91,936	68,442	80,147	61,663
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	0	<1	<1	0	0	0	2	0	0
LAURYL ALCOHOL	5,488	9,358	7,782	4,705	5,495	6,443	6,652	7,807	5,587
LAVANDULYL SENECIOATE	0	0	4,316	2,375	7,025	11,754	6,666	5,869	6,294

Table 18: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
LIMONENE	75,333	79,012	64,151	55,465	29,621	15,514	73,605	29,457	32,918
LINALOOL	<1	<1	7	1	<1	<1	<1	<1	2
MARGOSA OIL	0	0	0	0	40	4,260	7,977	9,546	18,991
MENTHOL	<1	0	0	0	2	<1	0	20	0
METARHIZIUM ANISOPLIAE STRAIN F52	0	0	0	0	0	0	202	133	634
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	<1	<1	<1	0	<1	<1	0	0	0
METHOPRENE	157	51	42	211	4	896	<1	<1	<1
METHYL ANTHRANILATE	1,557	298	219	550	380	2,043	215	1,092	808
METHYL EUGENOL	0	0	0	0	0	<1	0	<1	0
METHYL NONYL KETONE	0	<1	<1	1	<1	0	0	<1	<1
METHYL SALICYLATE	<1	1	0	<1	0	0	0	0	0
MONTOK PEPPER	0	0	0	0	0	0	0	0	0
MUSCALURE	476	1,179	<1	739	300	68	40	50	134
MYRISTYL ALCOHOL	5,488	9,358	7,782	4,705	5,495	6,443	6,652	7,807	5,587
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	4,478	5,097	5,257	5,331	4,840	5,136	4,274	4,456	3,637
N6-BENZYL ADENINE	7,711	2,628	1,775	2,072	3,352	1,691	1,666	2,954	2,630
NAA	26,799	43,507	3,331	47	38	220	655	293	109
NAA, AMMONIUM SALT	11,174	11,709	10,445	9,024	9,140	9,075	11,922	10,611	9,703
NAA, ETHYL ESTER	<1	<1	73	1	23	396	384	113	189
NAA, POTASSIUM SALT	41	41	0	0	0	0	0	6	110
NAA, SODIUM SALT	452	340	37	257	0	0	0	153	85
NEROLIDOL	1,246	652	422	503	1,597	826	2,227	3,940	3,547
NITROGEN, LIQUIFIED	<1	<1	<1	<1	<1	<1	<1	<1	5
NONANOIC ACID	883	1,275	498	703	412	828	480	2,166	2,074
NONANOIC ACID, OTHER RELATED	877	1,275	498	701	412	828	460	2,166	2,074
NOSEMA LOCUSTAE SPORES	<1	254	30	132	12	12	1,612	1,206	910
OIL OF ANISE	<1	<1	<1	0	0	<1	<1	<1	<1
OIL OF BERGAMOT	<1	0	0	0	0	0	0	0	0
OIL OF BLACK PEPPER	0	<1	<1	<1	<1	<1	<1	<1	<1
OIL OF CEDARWOOD	0	0	0	0	15	0	0	0	0
OIL OF CITRONELLA	<1	<1	2	0	34	48	0	0	<1
OIL OF CITRUS	0	0	0	0	0	0	0	0	0
OIL OF GERANIUM	0	0	0	0	15	0	0	0	0
OIL OF JOJOBA	9,029	7,846	11,566	7,203	8,255	1,762	1,075	311	323
OIL OF LEMON EUCALYPTUS	0	0	0	0	0	<1	<1	0	0
OIL OF LEMONGRASS	<1	0	0	0	0	0	0	0	0

Table 18: (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	2006	2007	2008	2009	2010	2011	2012	2013	2014
OIL OF MUSTARD	0	0	0	0	0	0	0	0	0
OIL OF PEPPERMINT	0	<1	<1	0	15	0	0	0	0
OXYPURINOL	0	1	0	0	0	0	0	0	6
PAECILOMYCES FUMOSOROSEUS APOPKA STRAIN 97	0	0	0	0	0	0	2,109	12,818	18,346
PAECILOMYCES LILACINUS STRAIN 251	0	0	0	0	1,115	2,330	3,531	20,039	25,756
PANTOEA AGGLOMERANS STRAIN E325, NRRL B-21856	0	0	0	698	55	25	50	50	0
PERFUME	0	0	0	0	0	0	0	0	0
PHENYLETHYL PROPIONATE	<1	<1	<1	94	<1	<1	<1	<1	<1
POLYHEDRAL OCCLUSION BODIES (OB'S) OF THE NUCLEAR POLYHEDROSIS VIRUS OF HELICOVERPA ZEA (CORN EARWORM)	0	0	98	254	302	14,752	1,297	337	518
POLYOXIN D, ZINC SALT	<1	3	1,067	1,299	19,082	69,669	95,595	143,476	165,203
POTASSIUM BICARBONATE	61,465	47,299	41,899	69,155	101,283	118,618	75,332	85,847	85,258
POTASSIUM PHOSPHITE	42,856	52,370	49,951	36,665	92,671	82,323	115,741	131,545	214,507
POTASSIUM SORBATE	571	230	0	2	105	0	0	0	0
PROPYLENE GLYCOL	738,448	520,537	420,161	381,957	591,332	662,506	675,969	973,864	1,065,383
PSEUDOMONAS FLUORESCENS, STRAIN A506	11,929	4,801	1,943	2,463	1,472	1,281	372	431	1,178
PSEUDOMONAS SYRINGAE STRAIN ESC-11	<1	0	0	0	0	0	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	<1	0	0	0	3	0	0	<1	0
PUTRESCENT WHOLE EGG SOLIDS	<1	<1	<1	33	2	<1	<1	<1	<1
PYTHIUM OLIGANDRUM DV74	0	0	0	0	0	2	2	63	0
QST 713 STRAIN OF DRIED BACILLUS SUBTILIS	64,606	67,563	75,619	81,252	100,689	118,049	124,438	141,276	137,274
QUILLAJA	3,591	18,584	27,814	22,595	22,949	30,225	22,801	28,528	30,203
REYNOUTRIA SACHALINENSIS	0	0	0	1,297	70,363	90,737	94,077	96,126	94,287
S-ABSCISIC ACID	0	0	34	502	5,197	9,528	14,974	11,645	12,622
S-METHOPRENE	9,552	30,635	47,284	47,190	65,114	62,628	87,637	49,491	53,441
SALICYLIC ACID	<1	0	0	0	0	0	0	0	0
SAWDUST	<1	10	19	<1	<1	0	74	108	0
SESAME OIL	<1	888	846	1,448	1,912	1,938	39	1	0
SILVER NITRATE	0	0	0	0	<1	<1	10	22	0
SODIUM BICARBONATE	0	0	17	57	1	967	1,026	291	544
SODIUM CHLORIDE	<1	<1	<1	<1	<1	2	175	207	135

Table 18: (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	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**
SODIUM LAURYL SULFATE	<1	<1	14	<1	<1	<1	<1	<1	<1
SOYBEAN OIL	3,675	3,277	2,460	3,792	6,845	3,636	3,302	4,524	6,275
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	29	12	<1	<1	<1	1	<1	5	10
STREPTOMYCES LYDICUS WYEC 108	50	96	1,910	4,009	6,998	6,404	10,367	16,074	13,351
SUCROSE OCTANOATE	4	0	448	930	1,172	148	1	5	10
THYME	<1	<1	<1	68	<1	<1	<1	<1	<1
THYMOL	3	52	60	50	422	12	18	1	1
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	286	311	201	320	7,253	873	1,088	994	2,516
TRICHODERMA ICC 012 ASPERELLUM	0	0	0	0	0	86	704	604	35
TRICHODERMA ICC 080 GAMSII	0	0	0	0	0	86	704	604	35
ULOCLADIUM OUDEMANSII (U3 STRAIN)	0	0	0	0	0	0	0	19	707
VANILLIN	328	2,068	87	471	74	412	271	88	65
VEGETABLE OIL	275,541	144,591	231,954	211,586	292,501	458,756	266,226	350,771	241,352
XANTHINE	0	1	0	0	0	0	0	0	6
XANTHOMONAS CAMPESTRIS PV. POANNUA	14	0	0	0	0	0	0	0	0
YEAST	5,262	4,694	4,560	3,957	1,306	5,261	3,729	325	142
YUCCA SCHIDIGERA	0	0	18	598	2,316	4,907	16,093	19,524	11,283
Z,E-9,12-TETRADECADIEN-1-YL ACETATE	0	44	0	1,622	<1	49	<1	<1	<1
Z-11-TETRADECEN-1-YL ACETATE	6,637	6,166	5,040	5,589	4,931	942	3,877	3,411	23
Z-8-DODECENOL	37,412	49,086	54,242	46,757	49,591	45,667	49,300	47,640	41,349
Z-8-DODECENYL ACETATE	37,412	49,086	54,242	46,757	49,591	45,667	49,300	47,640	41,349
Z-9-TETRADECEN-1-OL	0	0	0	0	0	0	0	0	0
TOTAL	4,075,445	3,814,782	4,013,525	3,908,033	4,776,837	5,321,996	5,473,070	6,364,511	6,689,522

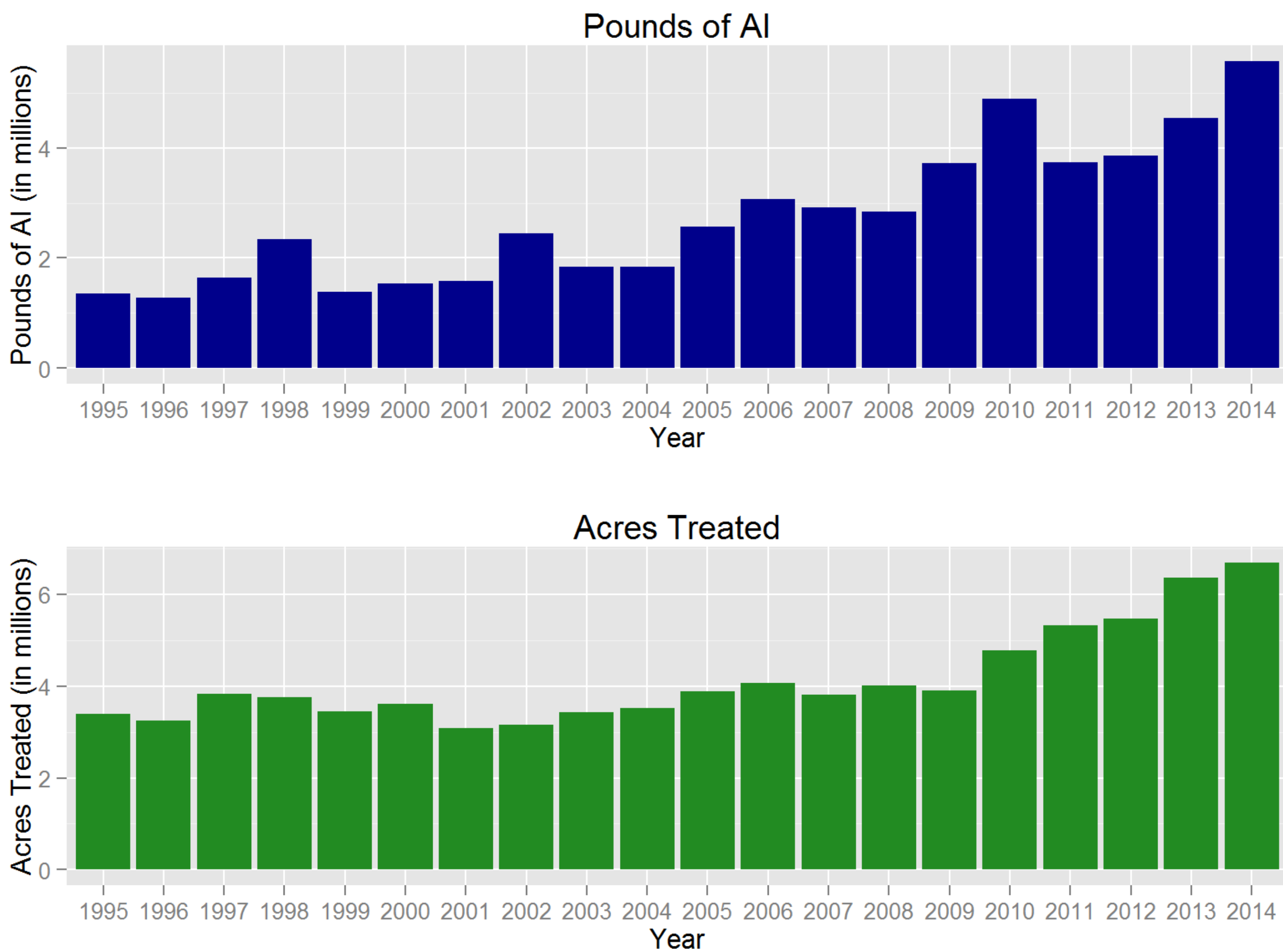

Figure 12: *Use trends of pesticides that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones). Reported pounds of active ingredient (AI) 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 chapter describes possible reasons for changes in pesticide use from 2013 to 2014 in the following commodities: alfalfa, almond, carrot, cotton, orange, pistachio, processing tomato, rice, strawberry, table and raisin grape, walnut, and wine grape. These 12 commodities were chosen because each was treated with more than 4.0 million pounds of active ingredients (AIs) or treated on more than 3 million acres, cumulatively. Collectively, this represents 71 percent of the amount reported in the PUR (77 percent of total used on agricultural fields) and 74 percent of the area treated in 2014.

Information used to develop this chapter 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. However, it is important to note these explanations for changes in pesticide use are based on anecdotal information, not rigorous statistical analyses.

This report discusses two different measures of pesticide use: amount of AI applied in pounds and cumulative area treated in acres (for an explanation of cumulative area treated see page 10). Although area treated increased from 2013 to 2014, total pounds of AIs decreased. The decrease in amount was due primarily to a decrease in use of oils and fumigants. The increase in area treated was due mostly to increased use of fungicides and insecticides (Figures 1 and 2). Sulfur had the most area treated and the largest increase among all non-adjuvant AIs. Other commonly used AIs with large increases in area treated were the insecticides methoxyfenozide, chlorantraniliprole, and spirotetramat (Figure A-1). Commonly used AIs with large increases in amount applied were sulfur, chloropicrin, and kaolin. AIs with large decreases in either amount or area treated were oil, potassium n-methyldithiocarbamate, methyl bromide, oxyfluorfen, and chlorpyrifos.

Sulfur is a natural fungicide favored by both conventional and organic farmers and is used mostly to control powdery mildew on grape and processing tomato (Figure A-2). However, it is used in some crops to suppress mites. Petroleum and mineral oils were used mostly as insecticides on almond, orange, wine grape, and walnut. Oils are also often used as fungicides and adjuvants. In production agriculture, fumigants, such as potassium n-methyldithiocarbamate, methyl bromide, and chloropicrin are usually applied to the soil before planting a crop.

Methoxyfenozide is an insect growth regulator that disrupts natural molting of caterpillars by mimicking the action of the insect hormone ecdysone. Methoxyfenozide will cause the insect to molt prematurely and to stop feeding, leading to its death. Most use is on almond for navel orangeworm control followed by use on wine grape, alfalfa, pistachio, and table and raisin grape. Chlorantraniliprole is a relatively new insecticide that interrupts muscle contraction in caterpillars and in some beetles and flies. Most chlorantraniliprole is used in almond, pistachio, and processing tomato. Spirotetramat is another new insecticide, which works by inhibiting lipid biosynthesis, affecting reproduction. Most use was on grapes, lettuce, broccoli, and orange. Kaolin is a natural white clay used both as a fungicide and an insecticide mostly on walnut, tangerine, processing tomato, and orange. Oxyfluorfen is an herbicide used primarily in almond, wine grape, walnut, and pistachio. Chlorpyrifos is an organophosphate insecticide that DPR has recently made a California restricted material. Most of the use amount was in almond, but most of the use by area treated was in alfalfa, almond, walnut, and cotton.

Crops treated with the greatest amount of pesticides in 2014 were wine grape, almond, table and raisin grape, processing tomato, and strawberry. Major crops or sites where the amount applied from 2013 to 2014 increased include processing tomato, soil fumigation, walnut, lemon, and table and raisin grape (Table 19). Crops or sites where the amount applied decreased include almond, carrot, water area, dry onion, and cotton.

Table 19: *The change in pounds of AI applied and acres planted or harvested and the percent change from 2013 to 2014 for the crops or sites with the greatest increase and decrease in pounds applied.*

	Change in Use 2013–2014		Percent Change 2013–2014	
Crop Treated	Pounds of AI	Acres Planted or Harvested	Pounds of AI	Acres Planted or Harvested
TOMATO, PROCESSING	986,278	29,000	7	11
SOIL FUMIGATION/PREPLANT	691,984		10	
WALNUT	642,432	10,000	13	4
LEMON	456,728	1,000	22	2
GRAPE	336,300	-10,000	2	-3
COTTON	-578,157	-68,000	-19	-24
ONION, DRY	-636,055	0	-36	0
WATER AREA	-694,864		-68	
CARROT	-1,107,136	3,000	-17	5
ALMOND	-4,075,303	50,000	-14	5

DPR data analyses have shown that pesticide use varies from year to year. A grower's or applicator's decision to spray or not depends on many things, such as current pest levels and the likelihood that pest populations will increase; cost of pesticides and their application relative to the economic loss from pest damage, which depends on the expected amount of damage and the value of the crop; the availability of other methods to manage the pest; pesticide resistance; and the desire to minimize possible harm to the environment and farm workers. Pest populations are determined by many complex ecological interactions; sometimes the causes of pest outbreaks are unknown. Weather is a critically important factor and affects different pest species in different ways. For example, the winter and spring of 2014 was relatively dry and mild, conditions that reduced levels of many weeds and diseases, but helped overwintering survival of some insect pests. Insect pest populations were high in some crops in 2014, such as almond, walnut, alfalfa, but low in other crops, such as cotton and pistachio. Even though weed populations were generally low, in some cases growers applied more herbicides to reduce weed competition for water, which has become more important because of the drought. Fumigant use was down, probably because of increased cost and tighter regulations.

In the following tables, use is expressed as pounds of AI applied and as cumulative number of acres treated. However, in some tables, such as the first table in each crop section, "acres treated" values are summed across different AIs and include data from applications of products that contain more than one AI. For those applications, the acres treated during that application are only tallied once, rather than adding acres treated for each AI in the product.

Alfalfa

Alfalfa is grown primarily as a forage crop, providing protein and high energy for dairy cows and other livestock. California is the leading alfalfa hay-producing state in the United States. There are six alfalfa growing regions in California, encompassing a range of climatic conditions: Intermountain, Sacramento Valley, San Joaquin Valley, Coastal, High Desert, and Low Desert (Figure A-3). The price received per ton of hay, the acres treated, and the acres harvested all increased in 2014 (Table 20). Insecticides and herbicides continued to be the most commonly used pesticide classes in California alfalfa production (Figure 13), but greater insecticide use contributed most significantly to increases in overall acres treated with pesticides in 2014. Recent warm winters may have contributed to increasing pest densities, and the high price of hay may have provided growers with an incentive to treat for insect pests more.

Table 20: *Total reported pounds of all active ingredients (AI), acres treated, acres harvested, and prices for alfalfa each year from 2010 to 2014. Harvested acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	2,728,075	3,526,152	3,540,947	3,739,793	3,735,824
Acres Treated	4,559,213	5,545,189	5,207,665	6,205,595	6,647,010
Acres Harvested	930,000	880,000	900,000	830,000	875,000
Price/ton	$ 133	$ 239	$ 210	$ 206	$ 244

In 2014 increases in insecticide use amounts were primarily due to increased use of pyrethroids (lambda-cyhalothrin, s-cypermethrin, and especially beta-cyfluthrin and permethrin), organophosphates (chlorpyrifos and especially dimethoate), and a carbamate (methomyl) (Figures 14 and A-4). The most widely applied insecticides were lambda-cyhalothrin, dimethoate, chlorpyrifos, indoxacarb, and s-cypermethrin, though beta-cyfluthrin and methoxyfenozide were close behind. Growers generally deal with three major insect pest groups

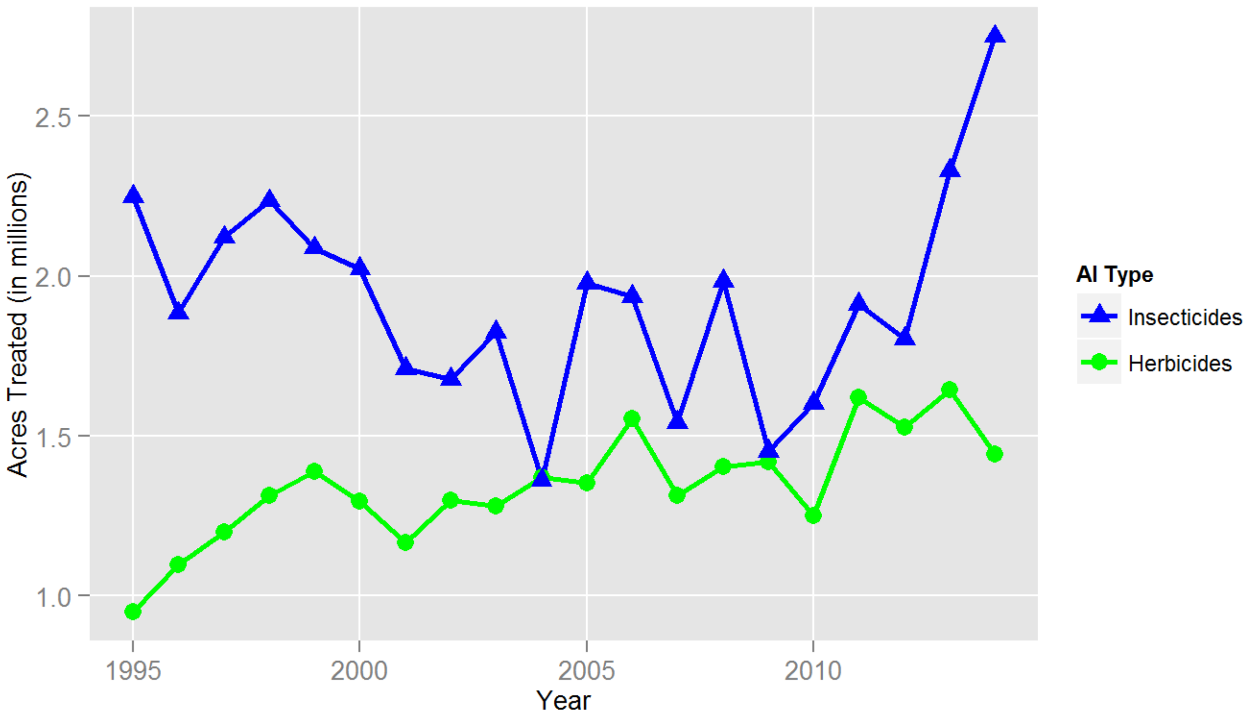

Figure 13: *Acres of alfalfa treated by all AIs in the major types of pesticides from 1995 to 2014.*

in alfalfa production: the weevil complex in late winter to spring, an aphid complex starting in late summer through spring and continuing into summer, and a lepidopteran larval complex in the summer. Of these, the blue alfalfa aphid and alfalfa weevil were identified as "critical" pests in a recent DPR-funded project on critical uses of chlorpyrifos. Aphid infestations, particularly of the blue alfalfa aphid, were very high in 2014. Host plant resistance and biological control had been the mainstays for controlling these pests, but for reasons that are still unclear, blue alfalfa aphid populations have overcome these previously successful strategies. Among the reasons offered for the upsurge in blue alfalfa aphid problems are the evolution within the aphid population that has reduced the effectiveness of current resistant varieties, resistance of the aphid to conventional insecticides, increased exposure of natural enemies to broad spectrum insecticides, and regional changes in climate that increases survival of overwintering populations. The increase in the use of chlorpyrifos, dimethoate, and pyrethroids can be linked to the blue alfalfa aphid problems that started in Imperial County in March 2013 and spread northward throughout California. In 2014, weevil problems were severe, possibly due to the dry and warm winter and spring. Such conditions promote short larval developmental times and prolonged egg-laying periods, which led to high pest pressures and increased reliance on pyrethroids and organophosphates. Repeated applications of these insecticides were needed to prevent a build-up of pest populations resulting from a prolonged egg-laying period and the emergence of a second adult generation. Additionally, the pests are developing resistance to the insecticides, further promoting more pesticide applications. The use of broad spectrum insecticides against weevils knocked down

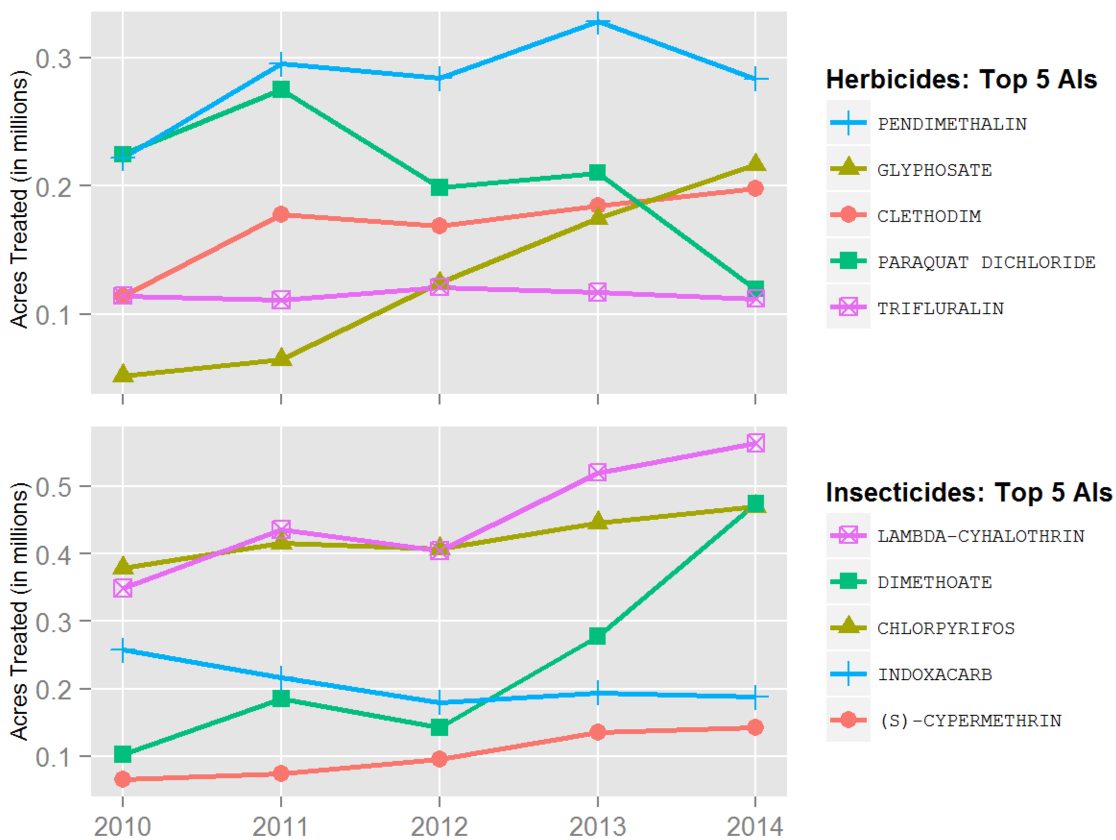

Figure 14: *Acres of alfalfa treated by the top 5 AIs of each AI type from 2010 to 2014.*

populations of natural enemies, which amplified the problems with blue alfalfa aphid. Populations of the summer lepidopteran complex were not severe in 2014, and these moth and butterfly larvae are controlled by applications of indoxacarb, methoxyfenozide, and chlorantraniliprole. Of these, only chlorantraniliprole use, as determined by area treated, increased substantially in 2014.

Herbicide use decreased in 2014 (Figure 13). Pendimethalin, glyphosate, clethodim, paraquat dichloride, and trifluralin were the herbicides used on the most acres; only use of glyphosate and, to a lesser extent, clethodim increased. An overall decrease in herbicide use accompanied by an increase in glyphosate use likely reflects greater adoption of Round-Up Ready alfalfa varieties. Most of these herbicides were used in the winter and spring, but glyphosate was used early in the season and in mid-summer, and clethodim was used late in the season (Figure A-5).

Use of fungicides in alfalfa is minimal compared to the use of insecticides and herbicides.

Almond

California produces 80 percent of world's supply of almonds. Almonds are grown mainly in Kern, Merced, Fresno, Madera, Stanislaus, and San Joaquin counties in the San Joaquin Valley and in Butte and Colusa counties in the Sacramento Valley (Figure A-6). Almond acreage increased in 2014 as it has for the last several years, primarily because of the increased price of almonds (Table 21). The total amount of pesticide used on the almond crop decreased in 2014, but the cumulative area treated increased (Table 21).

Table 21: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for almond each year from 2010 to 2014. Planted acres from 2010 to 2014 are from CDFA, April 2015b; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	20,458,139	25,881,574	23,103,499	29,868,996	25,793,693
Acres Treated	12,434,602	13,737,094	14,796,909	16,973,176	17,975,304
Acres Planted	855,000	875,000	930,000	970,000	1,020,000
Price/lb	$ 1.79	$ 1.99	$ 2.58	$ 3.21	$ 3.19

The amount and area treated with insecticides decreased in 2014, mostly due to less use of petroleum-based oils (Figures 15, 16, and A-7). The major almond arthropod pests include navel orangeworm (NOW), ants, mites, peach twig borer, and San Jose scale. The warm, dry winter resulted in a large over-wintering population of NOW, which created both direct losses to the growers and nut quality problems for the handlers. Since pesticide resistance has become an important problem, growers and pesticide control advisers tried to diversify their use of pesticide products and apply products with different modes of action. The increased use of

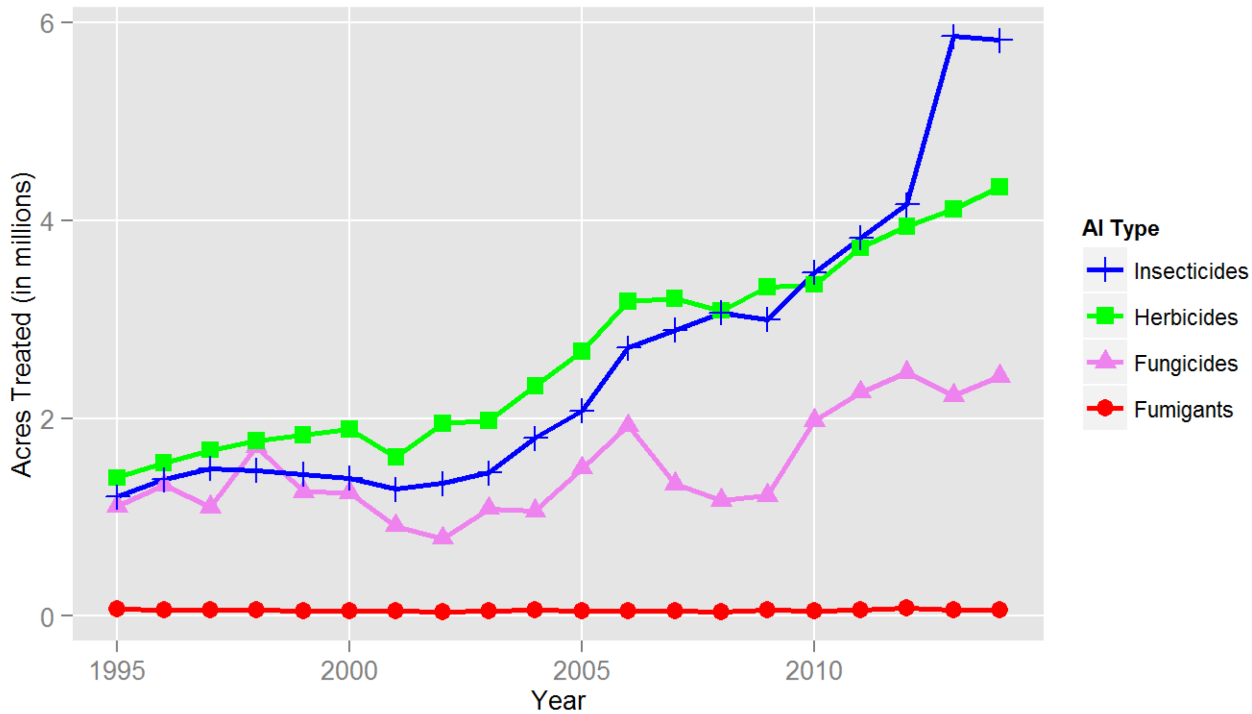

Figure 15: *Acres of almond treated by all AIs in the major types of pesticides from 1995 to 2014.*

methoxyfenozide and chlorantraniliprole (Figure16) was due to resistance to pyrethroid insecticides, such as bifenthrin. Abamectin use for spider mites has decreased (Figure16) because resistance to this miticide has become fairly widespread. As a consequence, use of other miticides, such as etoxazole, increased.

Herbicide use has increased steadily from 1995 to 2014, due mostly to increased almond acreage and the development of resistance to herbicides, especially glyphosate. Based on expert opinions, controlling weeds could result in a 10 to 20 percent reduction in water use, which might also explain the increase in herbicide use.

Fungicide use also increased in 2014, probably because of the increased planted acreage and the increased occurrence of brown rot blossom blight and alternaria leaf spot brought on by rain when almonds were in bloom (Figure A-8). The major almond diseases were alternaria leaf spot, brown rot, band canker, scab, and powdery mildew. The increase in fungicide use was mostly from increased use of fluopyram, metconazole, propiconazole, and pyraclostrobin. The increased use of fluopyram and metconazole was probably because of their effectiveness against a number of key diseases.

The amount of fumigants increased in 2014 but the area treated remained about the same as in 2013. Fumigants are used before *Prunus* species like almonds are replaced with *Prunus* species to

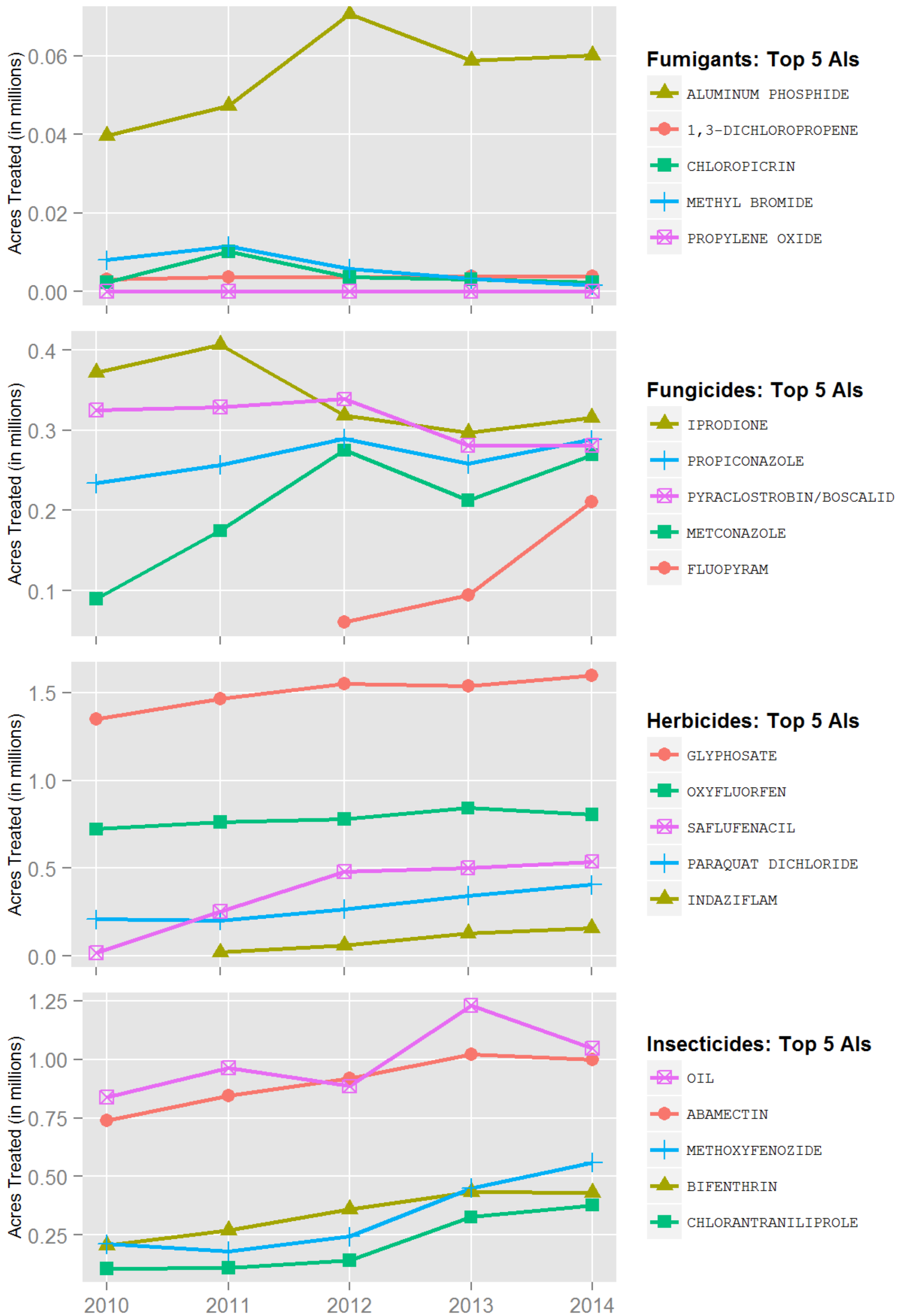

Figure 16: *Acres of almond treated by the top 5 AIs of each AI type from 2010 to 2014.*

control replanting disease and for postharvest treatments of nuts. The almond industry has been encouraging growers to adopt alternatives to fumigants.

Carrot

California is the largest producer of fresh market carrots in the United States, accounting for 83 percent of the U.S. production of 2.5 billion pounds in 2014. California has four main production regions for carrots: 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)(Figure A-9). The San Joaquin Valley accounts for more than half the state's acreage.

In 2014, 66,000 acres of carrots were planted in California, an increase of about 5 percent from 2013 (Table 22). Though the area treated increased 14 percent from 2013, the amount of AI applied to carrots decreased 17 percent, largely due to the decrease in fumigant use as fungicides, herbicides, and insecticides all increased (Figure 17). Nematodes, cavity spot, and leaf blights remained the major pest concerns, while warmer weather was conducive to the occurrence of powdery mildew.

Table 22: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for carrot each year from 2010 to 2014. Planted acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	8,291,040	6,620,272	7,229,722	6,428,043	5,320,907
Acres Treated	453,186	457,754	507,486	526,657	602,937
Acres Planted	57,000	65,000	62,000	63,000	66,000
Price/cwt	$ 27.6	$ 34.9	$ 26.9	$ 29.6	$ 27.4

The most-applied fungicides in 2014 by area treated were sulfur, mefenoxam, QST 713 strain of dried *Bacillus subtilis*, pyraclostrobin, and azoxystrobin. The increased occurrence of powdery mildew was largely responsible for the increase in use of sulfur (Figures 18, A-10, and A-11). The biopesticide *B. subtillis* continues to be popular with growers given its efficacy against soil borne disease and fungal pathogens.

As was the case in 2013, the most prominent herbicides used in carrot production by area treated in 2014 were linuron, pendimethalin, fluazifop-p-butyl, trifluralin, and EPTC (Figure 18). Linuron is a post-emergence herbicide that provides good control of broadleaf weeds and small grasses.

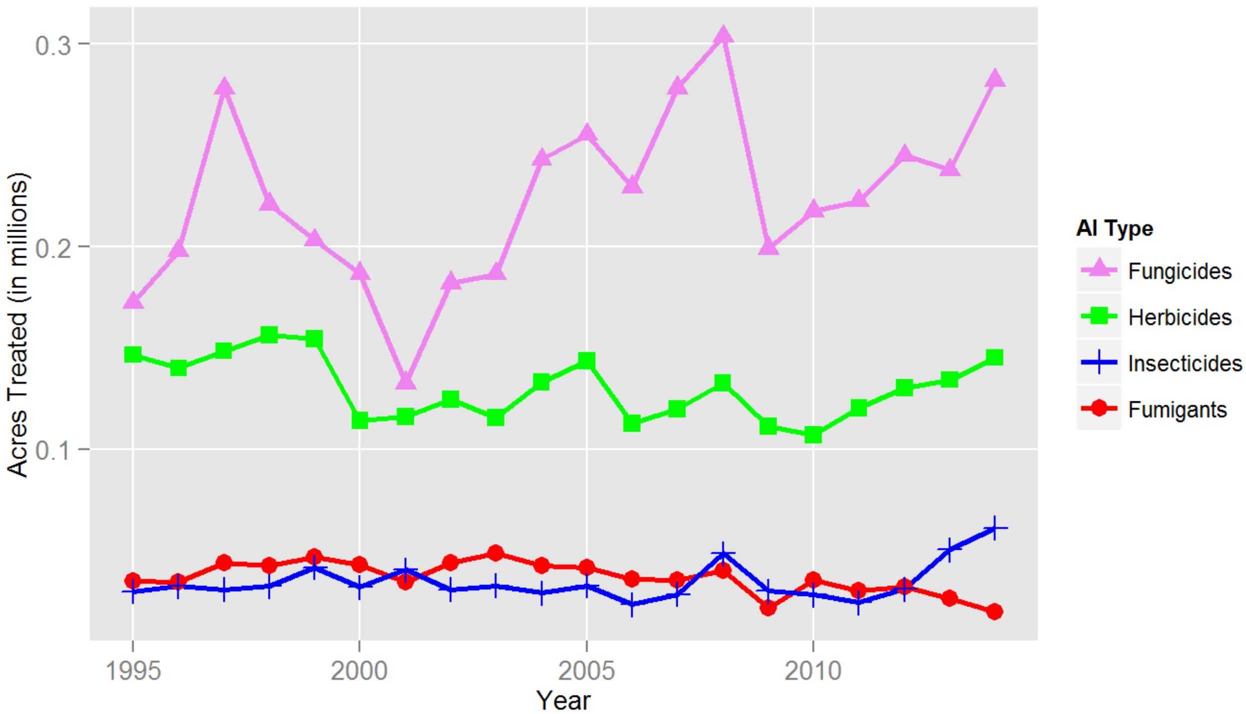

Figure 17: *Acres of carrot treated by all AIs in the major types of pesticides from 1995 to 2014.*

The most prominent insecticides used in 2014 by area treated included *Paecilomyces lilacinus* Strain 251, esfenvalerate, imidacloprid, methoxyfenozide, and s-cypermethrin (Figure 18). The biopesticide *Paecilomyces lilacinus* Strain 251 (a naturally occurring fungus with nematicidal properties) was the most widely used insecticide, followed closely by esfenvalerate, which is used against a range of insect pests such as whitefly, leafhoppers, and cutworms.

Fumigants in carrot production are primarily used to manage nematodes and also provide control of weeds and soil-borne diseases. Fumigant use continued to decline due in part to the cost and reduced efficacy associated with the shanking requirement when applying metam-sodium and metam-potassium. Fumigants accounted for 78 percent of all pesticide AIs applied to carrot acreage by amount applied and approximately 3 percent of AIs by area treated. As with the previous two years, no chloropicrin use in carrot was reported for 2014.

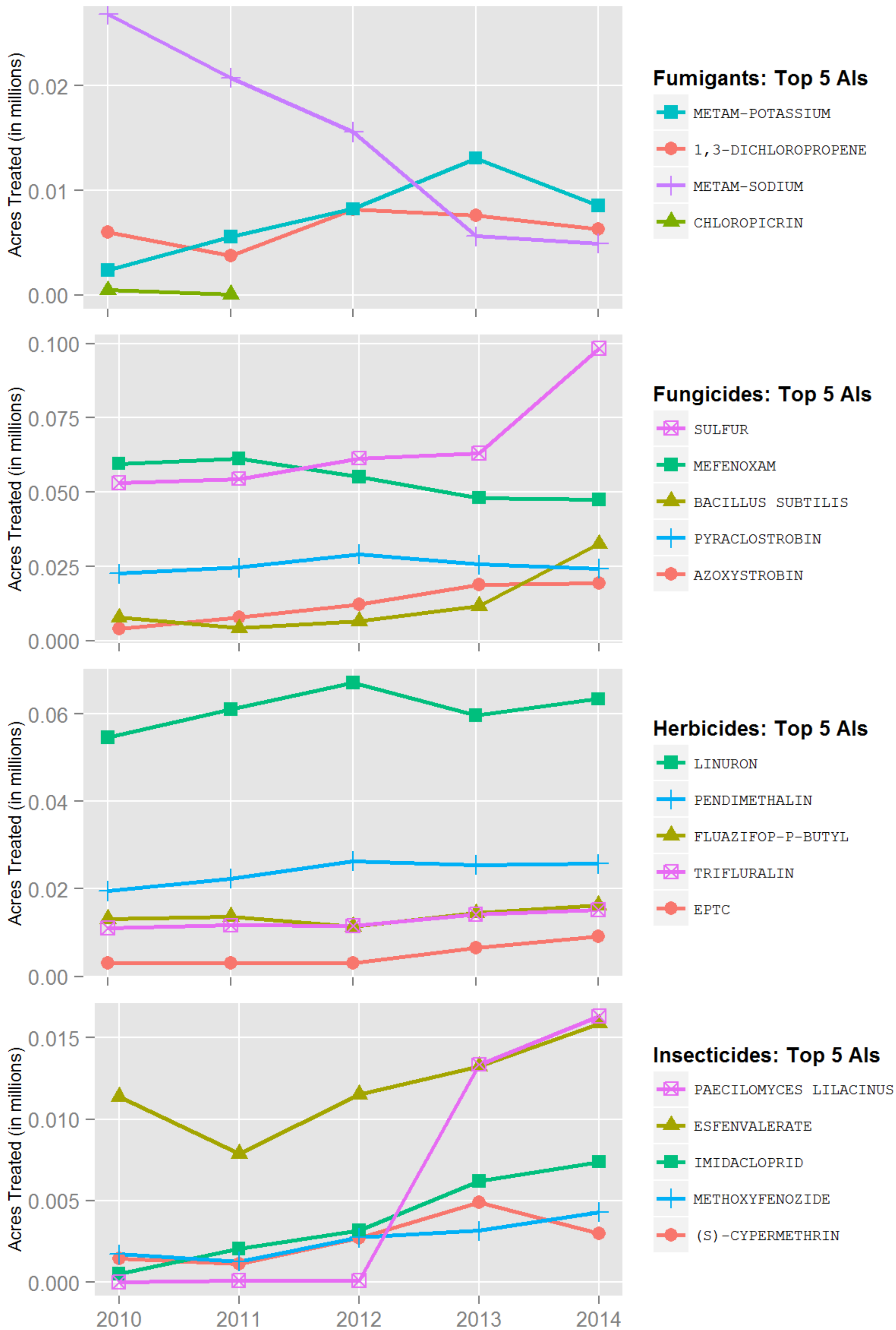

Figure 18: *Acres of carrot treated by the top 5 AIs of each AI type from 2010 to 2014.*

Cotton

Cotton is grown for its fiber, but cottonseed can be used to produce cottonseed oil and cottonseed meal for dairy feed. Total planted acreage decreased in 2014 partly because of the drought and competition from other higher value perennial crops, such as nuts, stone fruits, and grapes (Table 23). Most cotton is grown in the southern San Joaquin Valley, with smaller acreages grown in Imperial and Riverside counties and a few counties in the Sacramento Valley (Figure A-12). Nearly all pesticide use decreased from 2013 to 2014.

Table 23: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for cotton each year from 2010 to 2014. Planted acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	3,092,617	5,062,321	3,521,628	3,000,941	2,422,785
Acres Treated	6,152,081	9,887,302	6,549,647	6,252,042	4,575,462
Acres Planted	306,000	456,000	367,000	280,000	212,000
Price/lb	$ 1.50	$ 1.29	$ 1.11	$ 1.45	$ 1.38

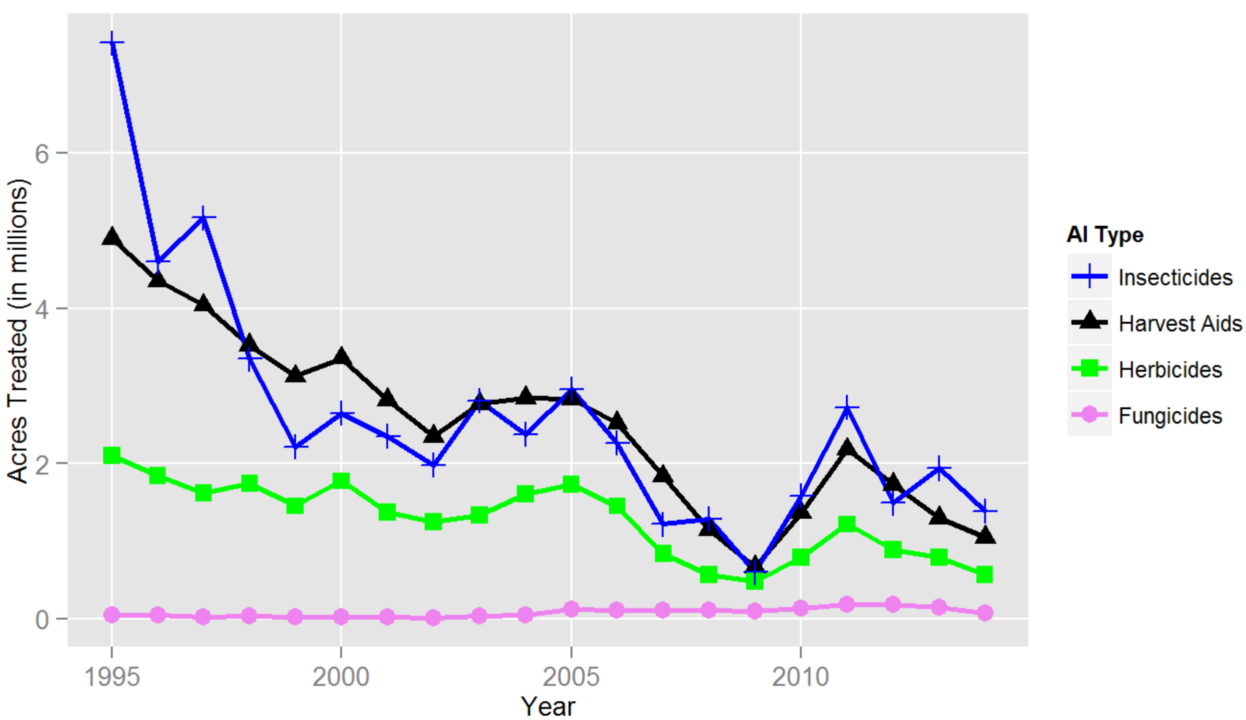

Figure 19: *Acres of cotton treated by all AIs in the major types of pesticides from 1995 to 2014.*

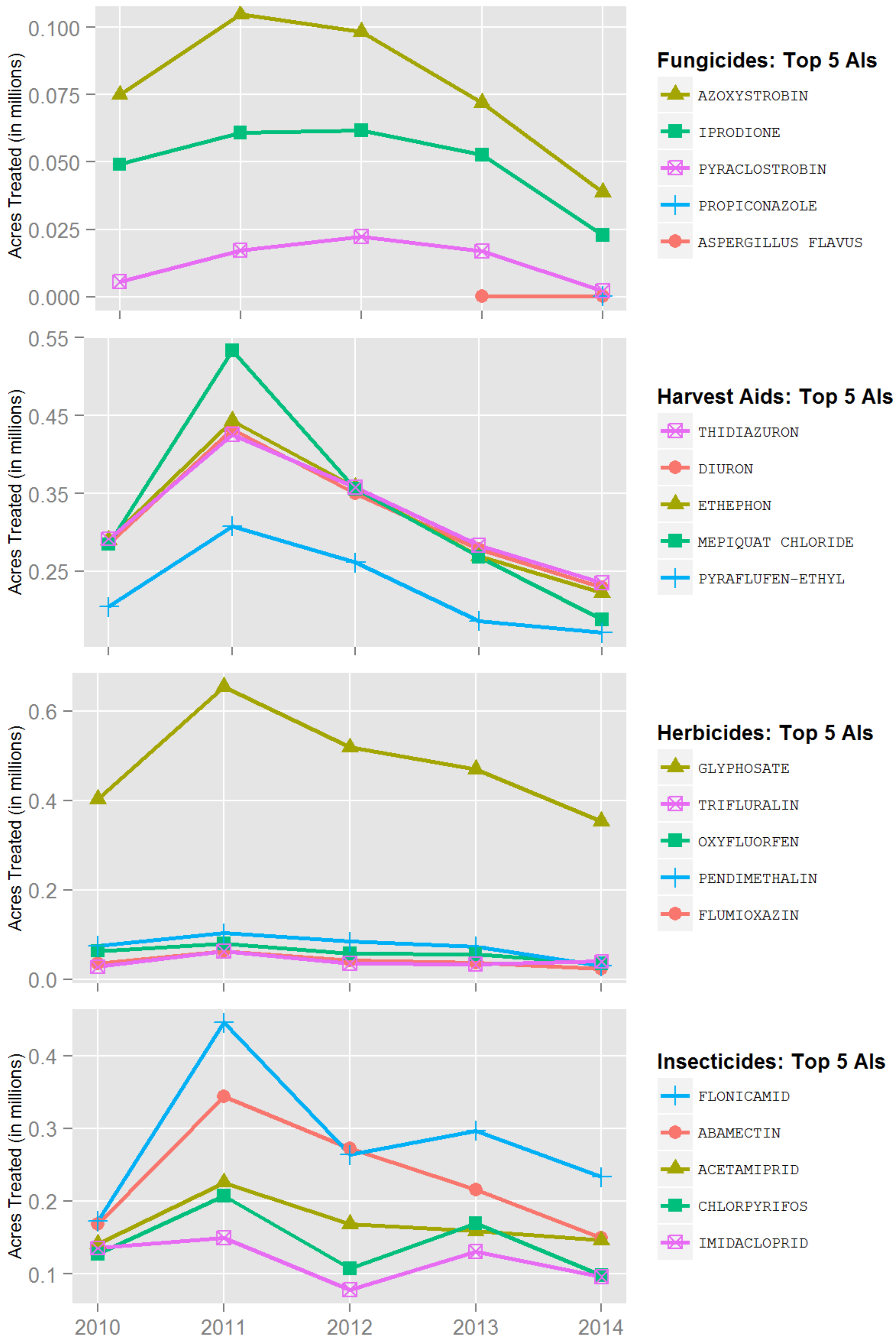

Figure 20: *Acres of cotton treated by the top 5 AIs of each AI type from 2010 to 2014.*

Use of all major insecticides decreased in 2014, except for buprofezin and flubendiamide (Figures 19, 20, A-13, and A-14). The major arthropod pests in cotton in 2014 were lygus bugs, spider mites, cotton aphids, whiteflies, and thrips. However, there were sporadic damaging populations of other pests, such as palestriped flea beetles and brown stink bugs. Arthropod populations were generally low during most of the year, except for late season whiteflies and aphids, which were both at about the same populations as in 2013. The foothills surrounding the San Joaquin Valley were not a source for lygus bugs migrating into cotton as they had been in the past because winter and early spring rainfall patterns resulted in less-than-ideal vegetative habitat for lygus. Late season aphids and whiteflies are a serious concern because they produce sugary excretions, which drop onto the cotton lint creating a condition called "sticky cotton." This condition causes problems when the cotton is ginned and lowers the quality of the cotton lint and thus the price growers receive. One factor partly responsible for larger whitefly populations in recent years is the California drought.

Use of nearly all major herbicides decreased (Figures 19, 20, and A-13). As has been the case for the last several years, glyphosate was by far the most-used herbicide due to the large acreage of Roundup-Ready cotton, which is genetically engineered to be resistant to glyphosate. Some AIs, such as paraquat dichloride, are used both as herbicides and harvest aids, chemicals used to defoliate or desiccate cotton plants before harvest. It is assumed that if an herbicide was applied in August through November, it was used as a harvest aid, otherwise as an herbicide (Figure A-14).

Fungicides are not widely used in cotton, but until 2013 use had been increasing because of increased incidence of seedling diseases, especially the disease caused by *Rhizoctonia solani*.

Fumigants are also little used in cotton fields and their use decreased from 2013 to 2014, but that was mostly because use in 2013 was unusually high. Fumigants are used to treat the soil before planting for a range of soil pathogens, nematodes, and weeds and are also used to treat stored products. The increased use in cotton in the last few years may be the result of concern about the soil-inhabiting fungus *Fusarium oxysporum* f. sp. *vasinfectum* race 4, more commonly known as FOV race 4, which is spreading throughout the San Joaquin Valley. Some experts consider this pathogen to be one of the biggest challenges California cotton growers have faced in many years. Once a field is infected, it is impossible to achieve economic yields with many cotton varieties. The pathogen cannot be completely controlled by pesticides, but some research has shown that metam-sodium treatments can knock down inoculum populations, and this may explain the increased use of fumigants. However, they will not eradicate the disease.

Orange

California has the highest valued citrus industry in the United States. Citrus is grown in four major areas in California. The San Joaquin Valley Region comprises nearly 65 percent of the state's acreage and is characterized by hot, dry summers and cold, wet winters. The Interior Region includes Riverside and San Bernardino counties and inland portions of San Diego, Orange, and Los Angeles counties and is marginally affected by the coastal climate. The Coastal-Intermediate Region is from Santa Barbara County south to the San Diego County/Mexico border and has a mild climate that is influenced by marine air. The Desert Region includes the Coachella and Imperial valleys where temperatures fluctuate widely (Figure A-15).

Table 24: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for orange each year from 2010 to 2014. Bearing acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	8,880,683	10,128,061	8,930,938	8,973,341	8,400,211
Acres Treated	2,418,561	2,445,282	2,344,874	2,370,991	2,370,325
Acres Bearing	183,000	180,000	177,000	171,000	166,000
Price/box	$ 12.54	$ 10.50	$ 13.19	$ 13.05	$ 19.03

Total bearing acres decreased in 2014 by 24 percent (Table 24), continuing a three-year decline due in part to a reduction in available irrigation water. The price per box, however, increased 46 percent in 2014. Record low freezing temperatures in December 2013 in the Central Valley caused a lot of damage to citrus.

Insecticide use was approximately the same in 2014 as in 2013, but from 2008 to 2013 its use increased (Figure 21). Oils are the most widely used insecticides on oranges (Figure 22). It is a class of broad spectrum pesticides 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 Asian citrus psyllid (ACP), which vectors huanglongbing (citrus greening disease), was first detected in Los Angeles in 2008. Since that time it has spread throughout southern California, up the Central Coast as far north as the Santa Barbara/San Luis Obispo county line, and to two locations in Tulare County in the San Joaquin Valley. However, despite eradication efforts, treatments have not prevented the spread of ACP, and it remains a major concern.

Aside from its use for the ACP eradication program, the broad-spectrum insecticide chlorpyrifos is used primarily for citricola scale control. However, chlorpyrifos resistance in citricola scale populations has been documented and imidacloprid is increasingly being used to help suppress these resistant populations. Although its use decreased in 2014, its use has otherwise steadily increased since 2005 (Figures A-16 and A-17). Imidacloprid is also used in the glassy-winged sharpshooter treatment program, and orange growers are required to treat for the pest.

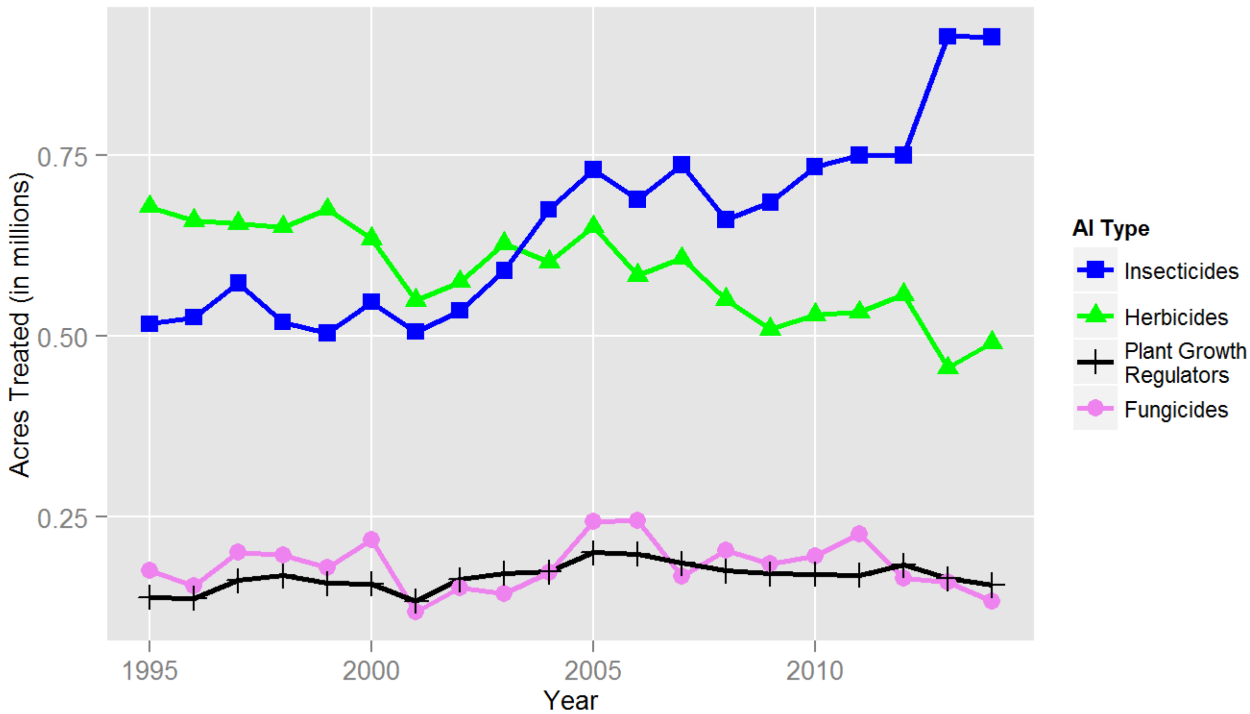

Figure 21: *Acres of orange treated by all AIs in the major types of pesticides from 1995 to 2014.*

Spinosad and spinetoram are relatively new insecticides and are primarily used on citrus to manage citrus thrips (Figure 22). Both are very selective, allowing natural enemies to survive. They may eventually erode the market share of older insecticides. Of the two, spinetoram is more effective against citrus thrips populations that have developed resistance to carbamate insecticides, and its persistence and effectiveness has resulted in the reduced use of spinosad.

Fenpropathrin is used to control red mites, citrus thrips, Asian citrus psyllid, katydids, and other miscellaneous pests. The insecticidal activity of fenpropathrin is largely interchangeable with that of beta-cyfluthrin, another synthetic pyrethroid. Abamectin is used to control thrips, mites, and citrus leafminer, and it is preferred because it is inexpensive and has broad-spectrum and long residual activity, low worker risk, and a short pre-harvest interval. Dimethoate controls a variety of pests such as scales and thrips, but its declining use is likely due to the growing popularity of replacement insecticides such as spinetoram and the neonicotinoids imidacloprid and acetamiprid. Pyriproxyfen is used almost exclusively for California red scale control. In the San Joaquin Valley, populations of armored scale have been found to be resistant to chlorpyrifos, methidathion, and carbaryl, and growers are encouraged to release parasitic wasps and use buprofezin, oil, pyriproxyfen, and spirotetramat.

Fungicides 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

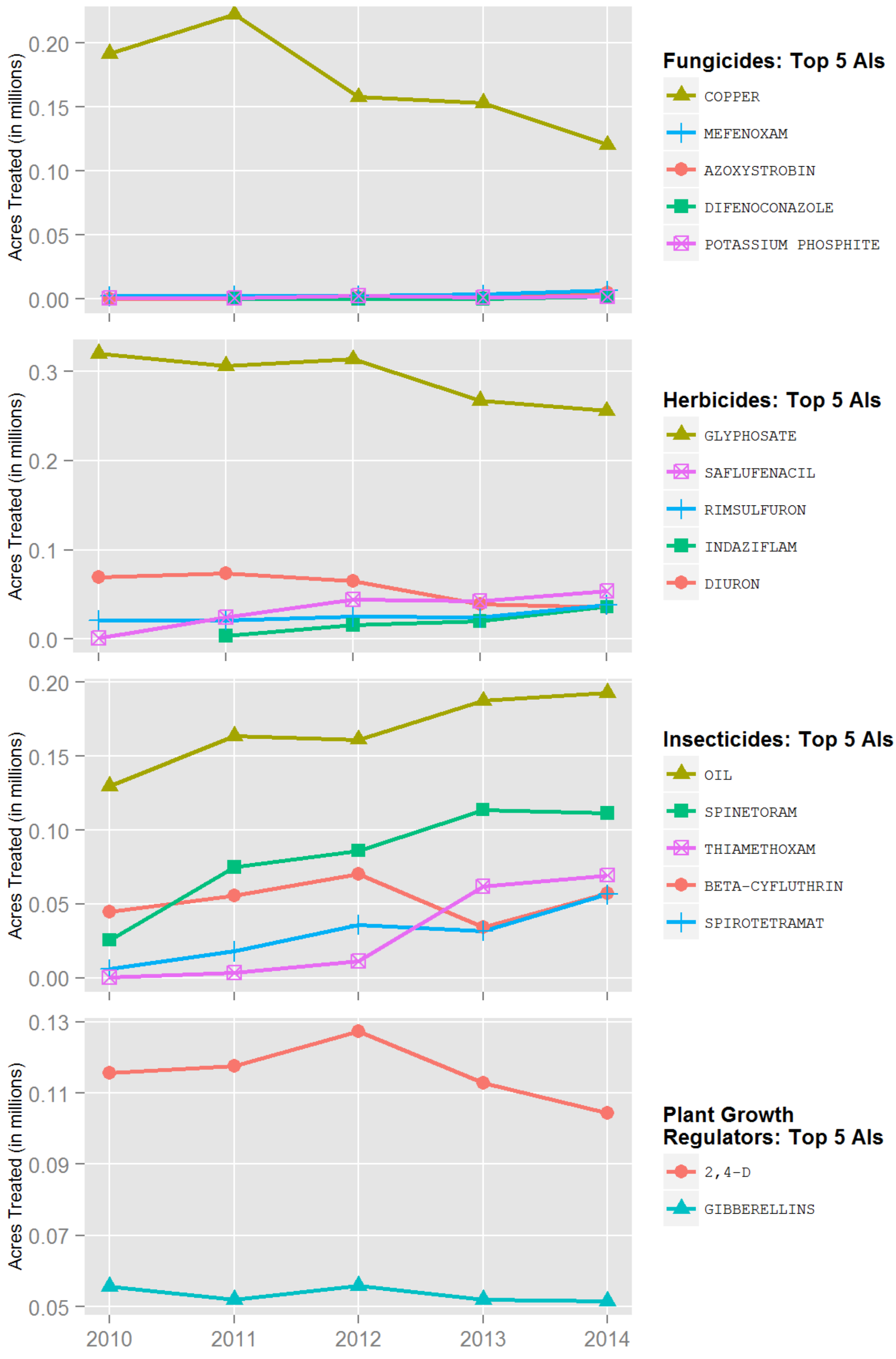

Figure 22: *Acres of orange treated by the top 5 AIs of each AI type from 2010 to 2014.*

harvest, but the spring of 2014 was dominated by warm, dry weather. Fungicide use decreased both in area treated and amount applied in 2014 (Figure 21). These decreases are attributable to a substantial decrease in the use of copper-based fungicides, which are the most widely used fungicides in oranges.

Weed control is important in citrus groves to prevent weeds from affecting tree growth and yields and impeding production and harvesting operations. A combination of pre- and post-emergence herbicides is used, as well as mechanical removal. Glyphosate, a post-emergence herbicide, was the most-used herbicide (Figure 22). Saflufenacil is a post-emergence, burn-down herbicide that was first used in 2010, and its use has steadily increased. There is a growing problem with resistance of horseweed and fleabane to glyphosate, and saflufenacil is a contact herbicide that is a good replacement. Indaziflam is a pre-emergence herbicide, and its use has increased every year since 2011, when it was first registered for use in California.

Pistachio

In 2014, California accounted for more than 221,000 bearing acres of pistachio, or almost 99 percent of the U.S. crop (Table 25). Worldwide, the U.S. has become the top pistachio producer, followed by Iran. The increase in pistachio acreage is projected to continue during the next few years due to a surge in planting around 2005. Pistachio is grown in 22 counties, from San Bernardino County in the south to Tehama County in the north, with most grown in the San Joaquin Valley counties of Kern, Madera, Fresno, and Tulare (Figure A-18). Pistachio trees usually alternate between high and low production each year. Most of California's tree crops produced well in 2014, and the pistachio crop had a total yield of nearly 513 million pounds, up 9 percent from the yield in 2013.

Table 25: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for pistachio each year from 2010 to 2014. Bearing acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	2,829,812	4,047,467	3,964,873	4,720,761	4,829,388
Acres Treated	2,169,050	2,364,014	2,778,875	3,372,022	3,760,004
Acres Bearing	137,000	153,000	182,000	203,000	221,000
Price/lb	$ 2.22	$ 1.98	$ 2.61	$ 3.48	$ 3.10

In 2014, important arthropod pests of pistachio included mites, leaffooted plant bug, false chinch bug, stink bugs, and navel orangeworm (NOW), although pest populations were low in many areas. Insecticide use, as measured by area treated, increased 17 percent from 2013 to 2014,

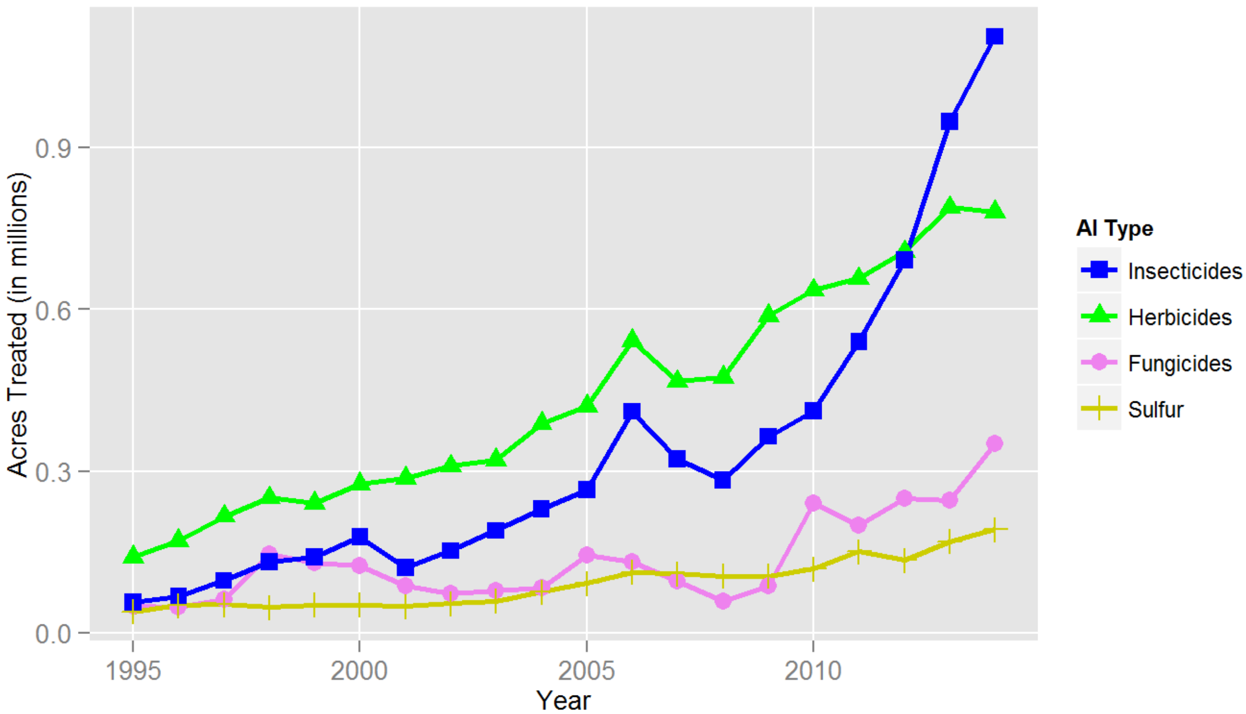

Figure 23: *Acres of pistachio treated by all AIs in the major types of pesticides from 1995 to 2014.*

primarily due to additional bearing acres, a relatively late harvest, and perceived late-season threats by leaffooted plant bug, stink bugs, and NOW (Figures 23, A-19, and A-20). Leaffooted plant bugs usually appear just before harvest in August and September, but early-season feeding can cause epicarp lesion to the nuts shortly after bloom and lead to kernel necrosis after shell hardening in June, darkening the nutmeat and ruining the flavor. Stink bugs can also be late-season pests, causing kernel necrosis during July and August. Often growers preemptively apply insecticides, primarily lambda-cyhalothrin and permethrin, before any of the bugs can do much damage.

NOW feeds directly on the nutmeat. As the larvae feed, they leave behind frass (or excrement), a substrate for the fungi *Aspergillus flavus* and *A. parasiticus*. NOW attacks nuts beginning in July, but insecticide sprays target the third generation that coincides with the beginning of the nut harvest. NOW pressure was lower in 2014 than in 2013, but growers sprayed lambda-cyhalothrin, bifenthrin, chlorantraniliprole, and methoxyfenozide preemptively. The NOW larvae overwinter in mummy nuts on the ground, and during dry winters they avoid the fungal diseases that would normally kill them under wet conditions. The use of mating-disruption pheromone puffers have increased steadily since 2011. Puffers contain the active ingredient (Z,Z)-11, 13-hexadecadienal and in April 2014 were used in a voluntary area-wide program targeting Kern County's West Side, where the risk of NOW damage is unusually high.

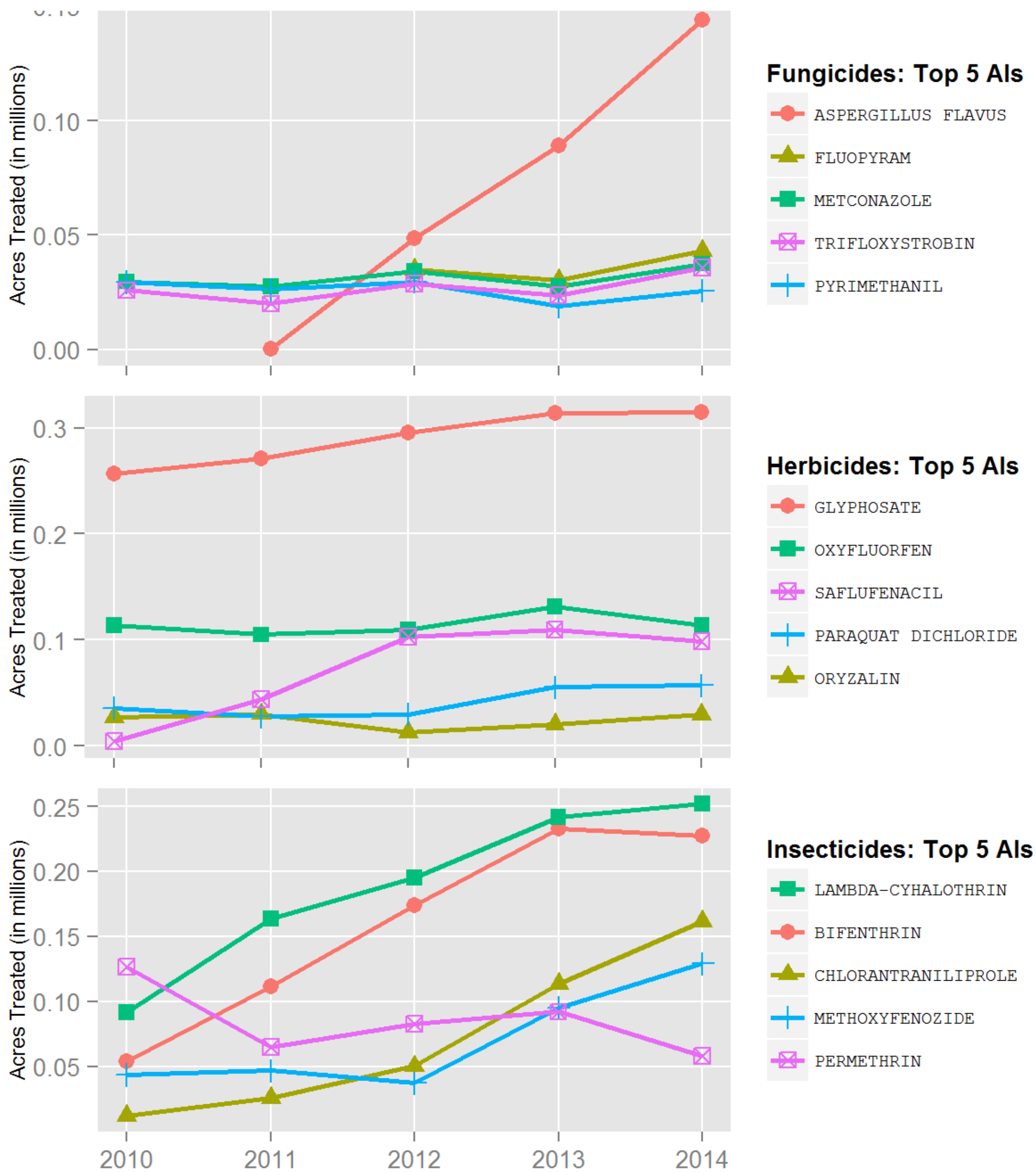

Figure 24: *Acres of pistachio treated by the top 5 AIs of each AI type from 2010 to 2014.*

Use of the most prominent fungicides increased (Figure 24). *Aspergillus flavus* strain AF36 is lumped with the fungicides, but is actually a fungal inoculant that acts as a biological control agent and prevents contamination of nuts by aflatoxins. The aflatoxin-producing fungi, a complex of *Aspergillus flavus* and *A. parasiticus*, grow on pest-damaged nuts. Aflatoxins are both toxic and carcinogenic. About half of the strains of *A. flavus* found in orchards are atoxigenic—that is, they do not produce aflatoxin. However, almost all *A. parasiticus* strains produce aflatoxins. When applied to orchards, the harmless, atoxigenic strain of *Aspergillus flavus*, AF36, crowds out aflatoxin-producing strains and drastically reduces aflatoxin levels in the nuts. In 2014, AF36 was used on more than 65 percent of all bearing trees; it also qualifies for use on certified organic pistachio.

Sulfur, used as a low-risk miticide, is applied at several pounds per acre. Sulfur is commonly used to manage citrus flat mite, which feeds on the stems of nut clusters, the nut hulls, and nuts themselves, leading to shell stain. As the weather warms up in June, mite populations thrive and peak in late July and August. In 2014, growers began applying sulfur for mites in April and continued applying higher-than-usual amounts through the warm spring and summer (Figure A-20).

Use of all major herbicides decreased (Figure 24) due to drought conditions during the growing season. The post-emergence herbicide glyphosate is applied year-round, but mostly during the summer months (Figure A-20) to manage weeds such as field bindweed and cheeseweed. Under drought conditions, herbicides, both pre-emergence and post-emergence, are still needed to limit weed growth. Reducing competition from weeds extends limited supplies of irrigation water and protects young trees from the false chinch bug, which builds up on weeds next to the orchards.

Processing tomato

In 2014, processing tomato growers planted 292,000 acres, yielding 14 million tons, a 16 percent yield increase from 2013. About 95 percent of U.S. processing tomatoes are grown in California. At 34 percent, the U.S. is the world's top producer of processing tomatoes followed by the European Union and China. California processing tomatoes, valued at $1.25 billion in 2014, are primarily grown in the Sacramento and San Joaquin Valleys (Figure A-21). Fresno County leads the state in acreage with 31 percent (90,000 acres) of the statewide total, followed by Yolo County (37,000 acres), San Joaquin County (35,000 acres), and Kings County (31,000 acres). Significant production also occurs in Merced, Colusa, Kern, Solano, and Stanislaus counties.

Overall, use of pesticide active ingredients (AIs) increased 7 percent, from 13.9 million pounds in 2013 to 14.9 million pounds in 2014 (Table 26). Total cumulative area treated of processing tomatoes also increased 7 percent. Sulfur, metam-sodium, and potassium N-methyldithiocarbamate (metam-potassium) accounted for 86 percent of the total pounds of

Table 26: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for processing tomato each year from 2010 to 2014. Planted acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	13,853,431	14,029,657	13,458,221	13,882,826	14,869,104
Acres Treated	3,234,624	3,119,500	2,991,008	3,436,210	3,682,773
Acres Planted	271,000	255,000	260,000	263,000	292,000
Price/ton	$ 71.40	$ 74.30	$ 75.00	$ 88.80	$ 89.50

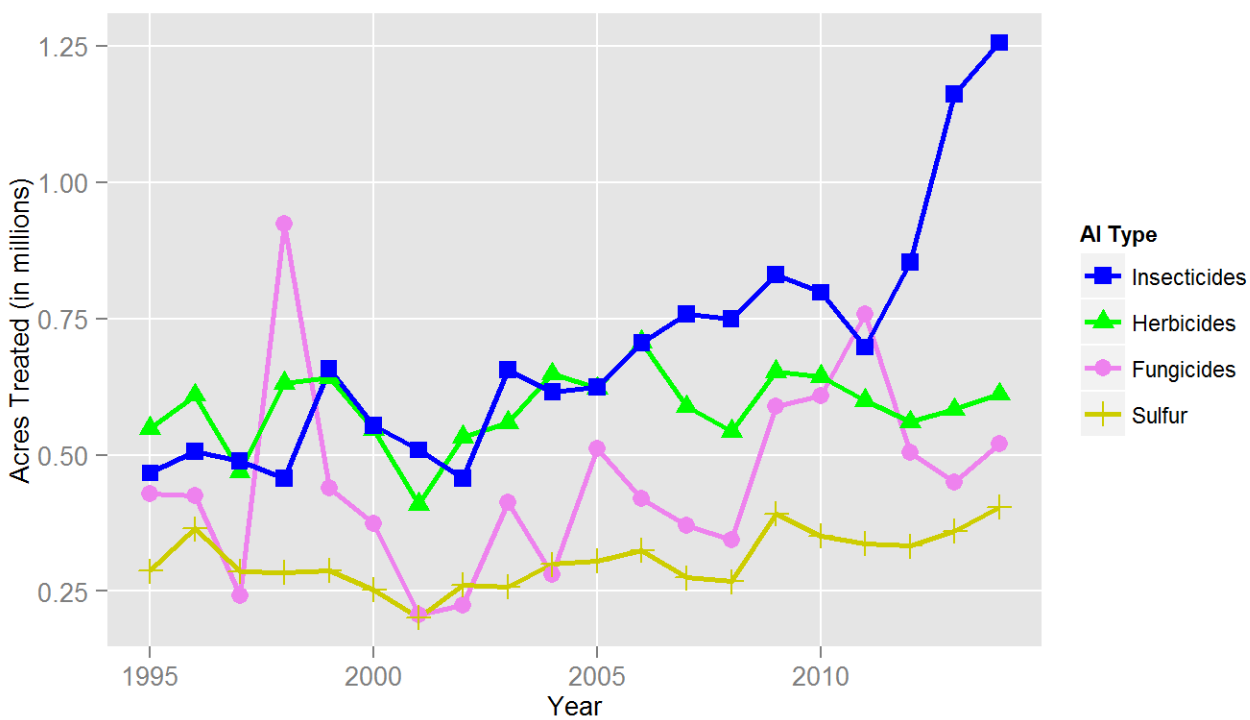

Figure 25: *Acres of processing tomato treated by all AIs in the major types of pesticides from 1995 to 2014.*

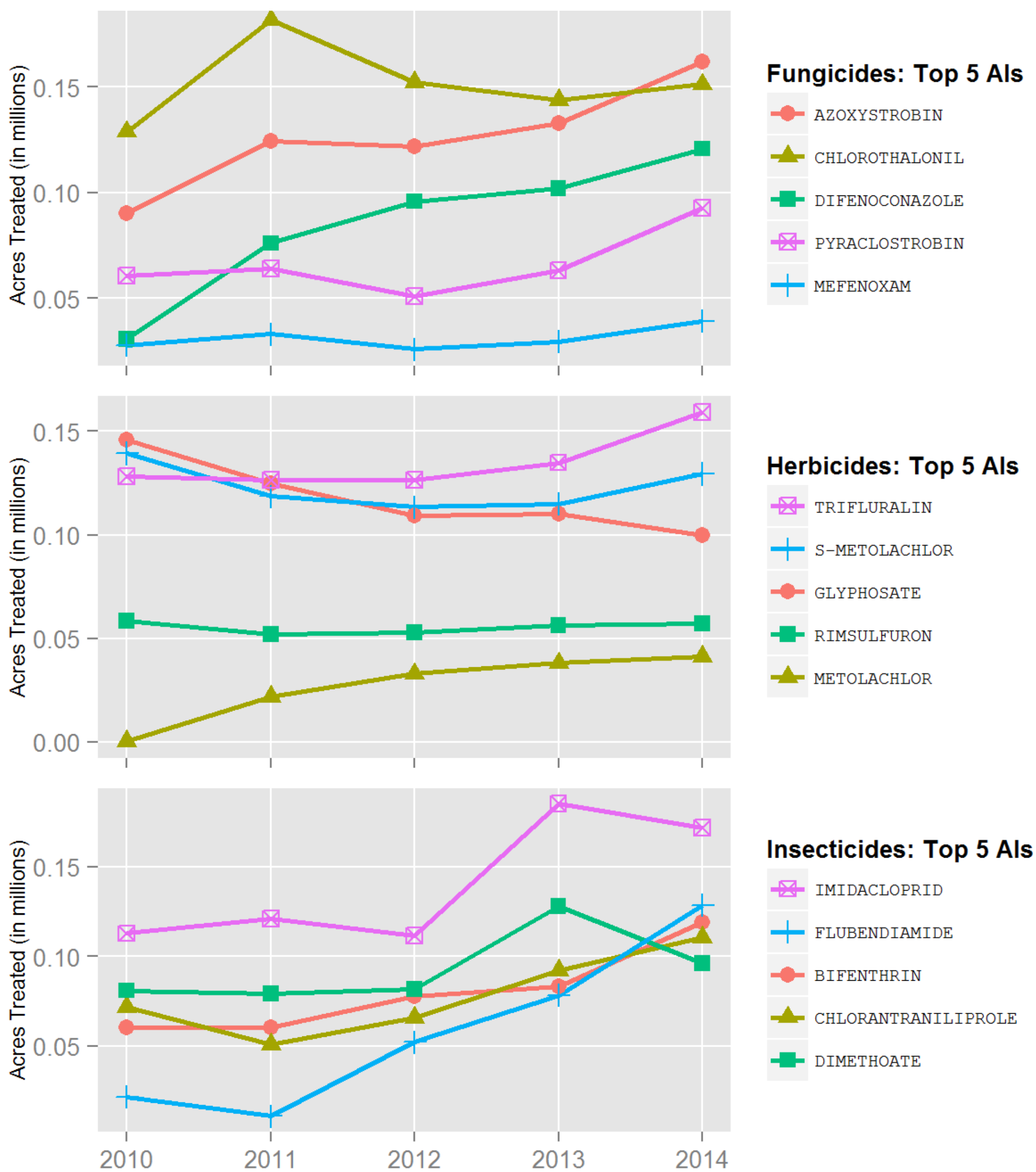

Figure 26: *Acres of processing tomato treated by the top 5 AIs of each AI type from 2010 to 2014.*

pesticide AIs applied, while sulfur, imidacloprid, azoxystrobin, trifluralin, chlorothalonil, and s-metolachlor were applied to the most acreage (Figure A-22). The most-used category as measured by acres treated was insecticides, which increased 8 percent from 2013 to 2014 (Figure 25). The most-used category as measured by amount AI applied was fungicide/insecticide (mostly sulfur and kaolin); use in this category increased 11 percent.

Overall fungicide use, expressed as cumulative area treated, increased 21 percent; pounds of AI increased 11 percent. Since 2009, use of difenoconazole and azoxystrobin has continuously increased, likely because of increasingly severe powdery mildew outbreaks in the last few years (Figure 26). As a result of these outbreaks, growers must now apply preventive treatments instead of treating powdery mildew as it appears. Pyraclostrobin and fluxapyroxad use in 2014 increased by 47 percent and 137 percent, respectively. These two active ingredients are combined in a product used to control powdery mildew.

The acreage treated with herbicides increased 5 percent from 2013 to 2014 (Figure 25); the amount used increased 2 percent. Primary weeds of concern for processing tomatoes are nightshades and bindweed. Trifluralin and pendimethalin are used to control bindweed and are often used in combination with metolachlor. The use of pendimethalin decreased 21 percent, trifluralin use increased 18 percent, and metolachlor use increased 9 percent (Figure 26). Recent phytotoxicity issues with trifluralin and pendimethalin may contribute in part to an increase in the use of metolachlor. Glyphosate is commonly used for preplant treatments in late winter and early spring (Figure A-23); its use decreased 9 percent.

Processing tomato growers primarily use three fumigants—metam-potassium, metam-sodium, and 1,3-dichloropropene—to manage root-knot nematodes and weeds, particularly those of the nightshade family. In 2014, fumigant use decreased 6 percent and accounted for about 16 percent of the total amount of pesticide AIs applied. In terms of area treated, fumigant use increased 6 percent. The increase in fumigated acres is due to a 24 percent increase in acres treated with metam sodium.

In 2014, 1.3 million acres were treated with insecticides, an 8 percent increase from 2013 (Figure 25). This increase was likely to control a population explosion of thrips, which vectors tomato spotted wilt virus. For the last several years, growers have been treating for thrips more frequently and earlier in the season (Figure A-23), which effectively reduces tomato spotted wilt virus. Dimethoate, the use of which decreased 25 percent, is a broad spectrum insecticide used for thrips control. However, its use early in the season can disrupt natural predation and cause population explosions of other insect pests, such as leafminers, later in the season. A secondary pest increase due to the use of broad spectrum insecticides may account for the 72 percent increase in use of methoxyfenozide. Methomyl use increased 13 percent, even though growers have begun switching to pyrethroids such as bifenthrin because of worker safety considerations. Bifenthrin, the use of which increased 43 percent, is a broad spectrum pyrethroid often used in rotation with spinosad for thrips control. Bifenthrin is also used to manage mites and stinkbugs.

The use imidacloprid, the most-used insecticide by area treated, decreased 7 percent from the previous year. This may account for the increased use of other pesticides to treat thrips. Use of insecticides targeting lepidopterous larvae increased in 2014 due to increased pest pressure: flubendiamide use increased 64 percent, while chlorantraniliprole use increased 20 percent.

Rice

California is the largest producer of short and medium grain (Calrose) Japonica rice in the United States and the second largest rice growing state in the nation. Ninety-five percent of the rice in California is grown in six counties in the Sacramento Valley (Colusa, Sutter, Glenn, Butte, Yuba, and Yolo, Figure A-24). The drought has had marked effects on rice growers and water cutbacks have caused significant reduction in rice plantings. In 2014 the acres planted with rice decreased 23 percent from 2013 (Table 27).

Table 27: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for rice each year from 2010 to 2014. Planted acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	4,677,241	4,880,965	5,364,625	5,326,046	4,916,446
Acres Treated	2,640,766	2,969,077	2,992,120	3,091,557	2,658,703
Acres Planted	558,000	585,000	562,000	567,000	434,000
Price/cwt	$ 21.0	$ 18.6	$ 18.6	$ 20.9	$ 19.3

Herbicides were the most-used class of pesticides on rice in 2014 (Figure 27). They accounted for 72 percent of the cumulative area treated with non-adjuvant pesticides and 59 percent of the total amount of AIs applied. Much of California's rice is grown repeatedly in the same fields and growers are heavily dependent on herbicides for effective weed control. Many of the weed species are difficult to control and severely compete with the rice crop for resources if no control method is adopted.

Many species of broadleaf, grass, and sedge weeds that grow along with rice have been developing resistance to herbicides. In addition to the well-established resistances to acetolactate synthase (ALS)-inhibiting herbicides, such as bensulfuron methyl, and resistance of certain watergrass types to propanil, new resistances have been observed in bearded sprangletop to clomazone and cyhalofop-butyl, and sedge to propanil. The increased use of thiobencarb in 2014 was probably due to the evolving resistance of spangletop to clomazone and cyhalofop-butyl. Bensulfuron methyl use may have decreased due to the 2013 introduction of the formulated

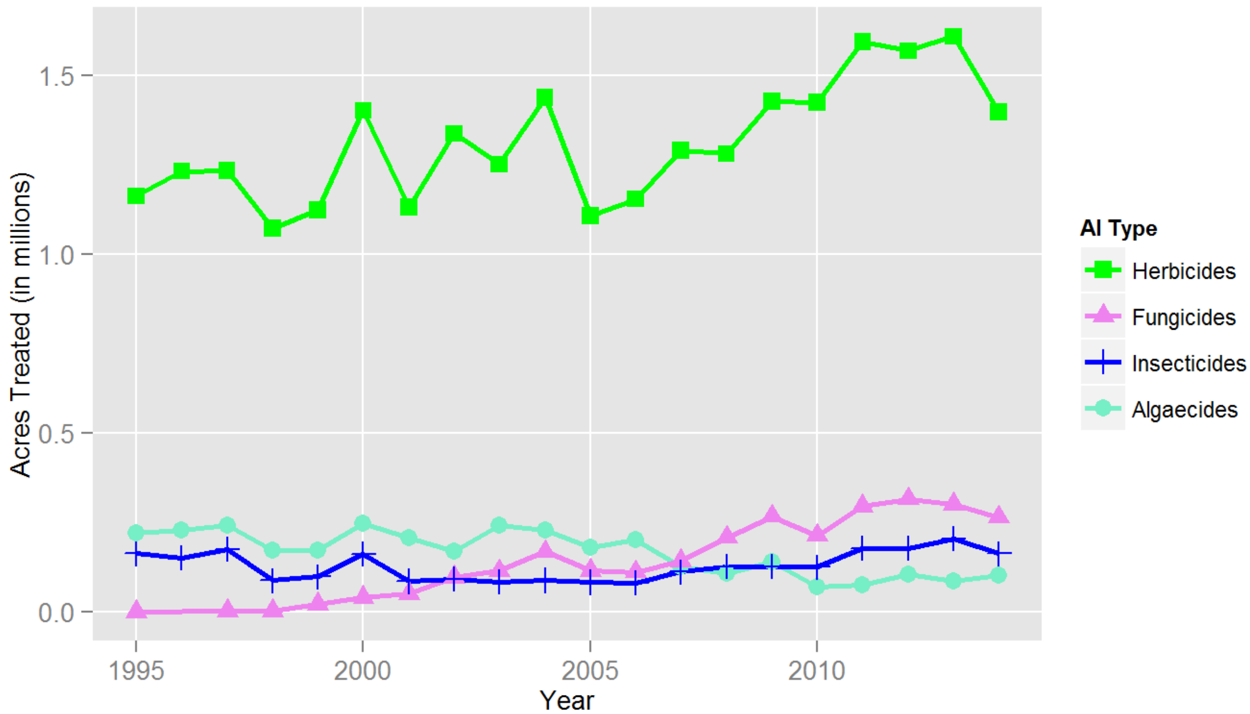

Figure 27: *Acres of rice treated by all AIs in the major types of pesticides from 1995 to 2014.*

mixture of thiobencarb and imazosulfuron which controls bensulfuron methyl-resistant sedges (Figures 28 and A-25).

The area treated with fungicides decreased 12 percent (Figure 27), but the amount applied increased 46 percent. The increase was almost entirely due to the increased use of sodium carbonate peroxyhydrate, which is approved as an organic fungicide for rice. Azoxystrobin was the major fungicide used on rice, accounting for 82 percent of all the cumulative area treated with fungicides (Figures 28 and A-25). Azoxystrobin, propiconazole, and trifloxystrobin are reduced-risk fungicides often used as preventive treatments. The two strobilurin fungicides (azoxystrobin and trifloxystrobin) are used due to their effectiveness as well as their ability to increase yields when used in preventive treatments.

Copper sulfate is the key algaecide registered for rice in California. It is used primarily for algae control in rice fields, but also doubles as a control for tadpole shrimp in both conventional and organic production. Copper sulfate is known to bind to organic matter such as straw residue, potentially reducing its efficacy. Its use has been decreasing in the past few years probably due to increases in price, inconsistency of supply, and variability in efficacy (Figure A-25).

Insect pressures are usually low on California rice, and insecticides are used on few acres (Figure 27). Use of insecticides decreased in area and amount applied in 2014. Rice water weevil

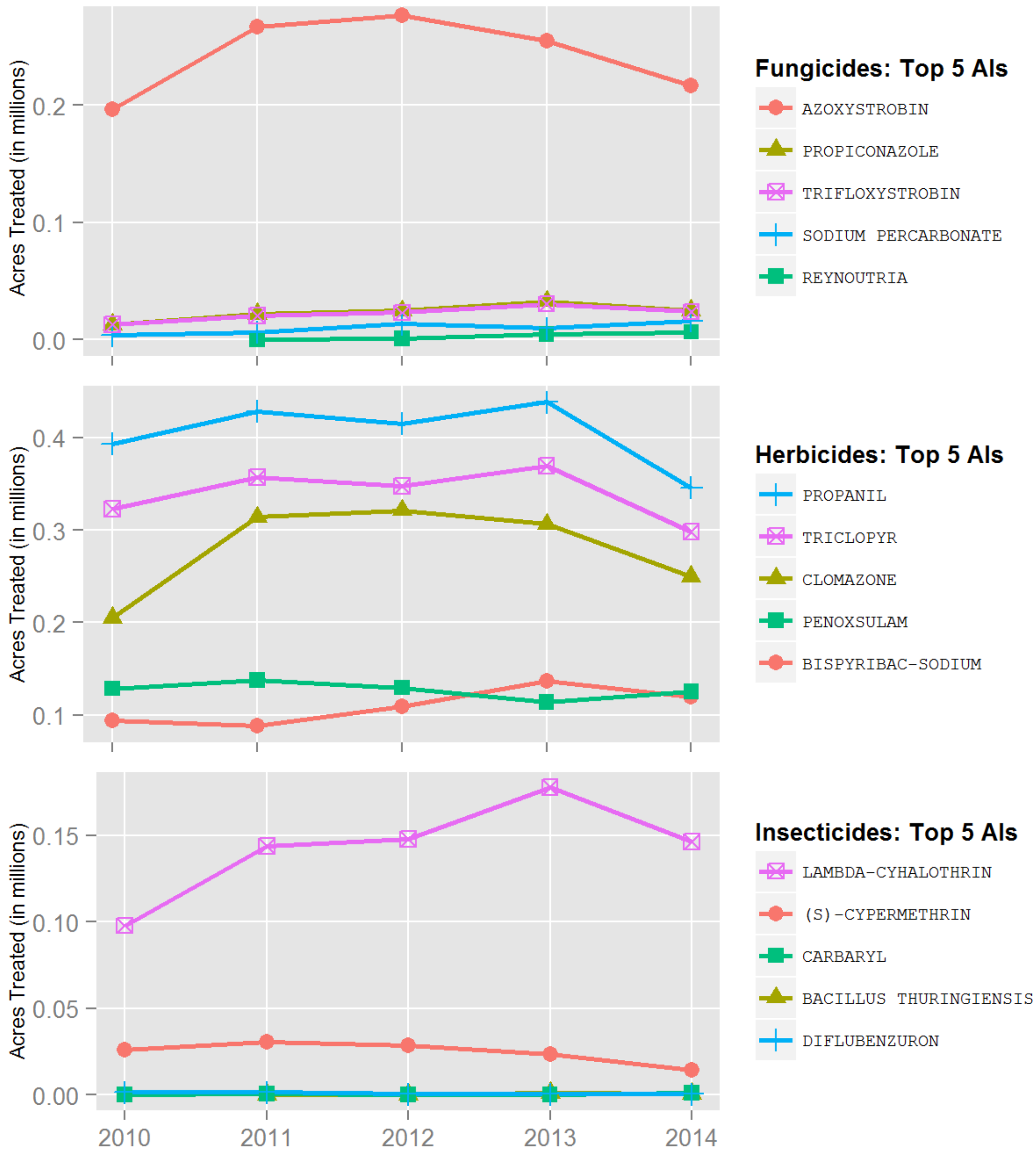

Figure 28: *Acres of rice treated by the top 5 AIs of each AI type from 2010 to 2014.*

is the major insect pest on California rice, but tadpole shrimp are becoming more problematic, and in some areas they are the main pest attacking rice during the seedling stage. Growers rely on lambda-cyhalothrin and copper sulfate pentahydrate applied soon after flooding (Figure 28).

Strawberry

In 2014 California produced 2.3 billion pounds of strawberries—over 88 percent of the total U.S. production—valued at more than $2.6 billion. Market prices determine how much of the crop goes to fresh market and how much is processed, and in 2014, about 75 percent of the crop went to fresh market. About 41,500 acres of strawberries were planted and harvested in 2014 (Table 28), primarily along the central and southern coast, with smaller but significant production occurring in the Central Valley (Figure A-27).

Table 28: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for strawberry each year from 2010 to 2014. Planted acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	11,074,231	12,099,389	13,845,644	12,035,887	12,269,050
Acres Treated	2,000,634	1,975,652	2,210,253	2,564,486	2,802,030
Acres Planted	38,600	38,000	39,000	41,500	41,500
Price/cwt	$ 70.10	$ 75.20	$ 77.10	$ 79.80	$ 90.00

The major insect pests of strawberries 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 due to warmer, drier winters and increased diversity in the regional crop complex that supports this pest. Flonicamid, an insecticide used to control lygus, was applied to 24 percent more acres in 2014 (Figures A-28 and A-29).

Herbicide use in 2014 did not differ significantly from the previous year. Several herbicides, such as flumioxazin and napropamide, showed a slight decrease in area treated. Other herbicides, primarily carfentrazone-ethyl and pendimethalin, were applied to more acres in 2014 than 2013.

Fungicides continue to be the most-used pesticides in 2014, as measured by area treated. The area treated with nearly every major fungicide in strawberries increased in 2014 (Figure 29). It is possible that these increases are partially due to the continuing effects of the statewide drought: Lack of rainfall can cause salt buildup in the soil, leading to plant stress and increased disease susceptibility.

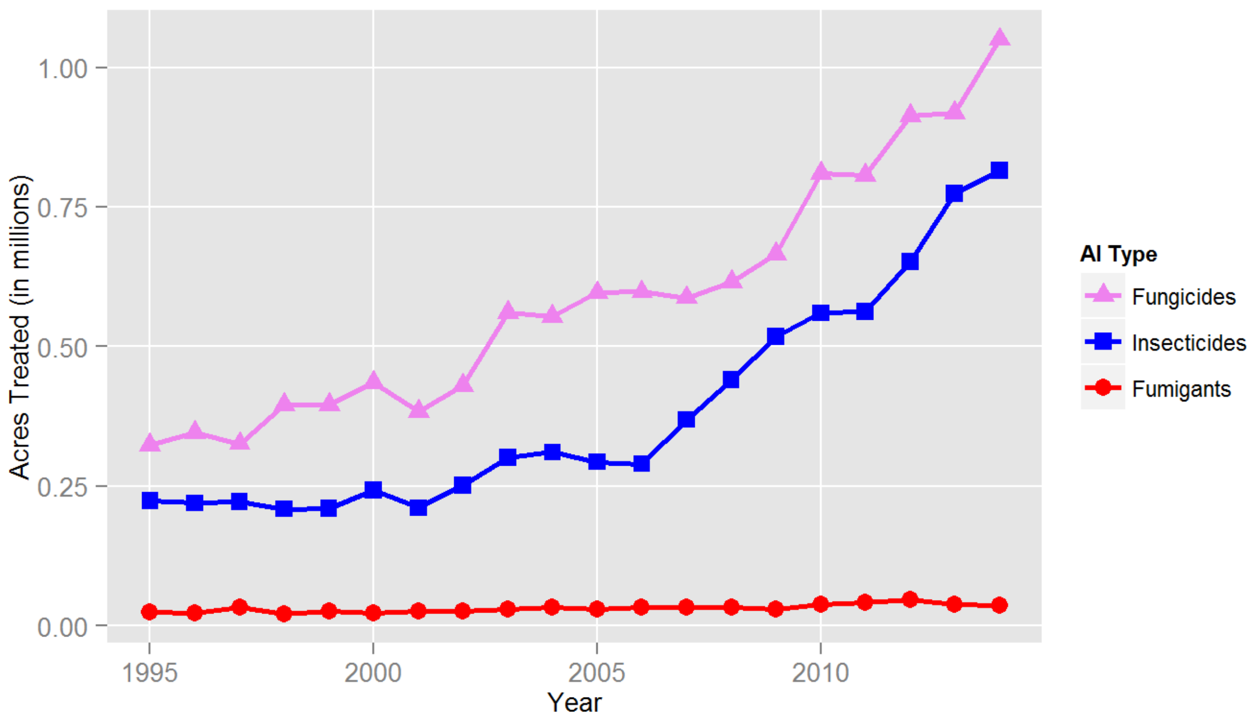

Figure 29: *Acres of strawberry treated by all AIs in the major types of pesticides from 1995 to 2014.*

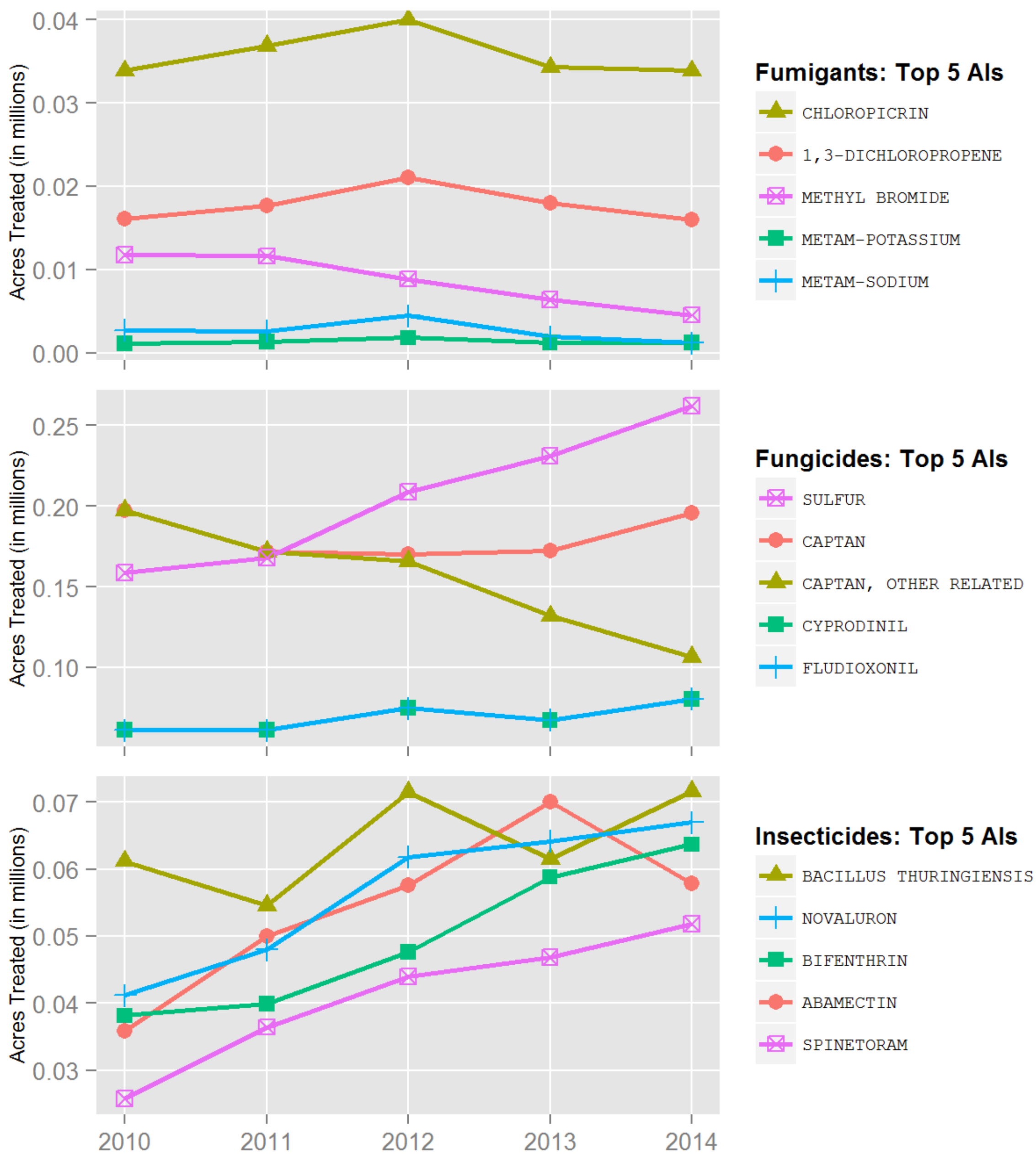

Figure 30: *Acres of strawberry treated by the top 5 AIs of each AI type from 2010 to 2014.*

Strawberry production relies on several fumigants. Fumigants accounted for about 81 percent of the amount of all pesticide AIs applied to strawberries in 2014, but less than two percent of the total cumulative area treated. However, most strawberry fields are fumigated. The area treated with fumigants in 2014 decreased 3 percent (Figures 30 and A-28). Methyl bromide use decreased by 29 percent, metam-sodium use decreased by 38 percent, and 1,3-dichloropropene use decreased by 11 percent. Chloropicrin use decreased by roughly 1 percent. Methyl bromide is used primarily to control pathogens and nutsedge. Metam-sodium is generally more effective in controlling weeds, but less effective than 1,3-dichloropropene or 1,3-dichloropropene plus chloropicrin against soilborne diseases and nematodes. Fumigants usually are applied at higher rates than other pesticide types, such as fungicides and insecticides, in part because they treat a volume of space rather than a surface such as leaves and stems of plants. Thus, the amounts applied are large relative to other pesticide types even though the number of applications or number of acres treated may be relatively small.

Table and raisin grape

The southern San Joaquin Valley region accounts for more than 90 percent of California's raisin and table grape production (Figure A-30). Total acreage planted to table and raisin grape decreased by 10,000 acres in 2014, even as average prices increased (Table 29). Raisin grapes accounted for the decrease; table grape acreage increased slightly. Raisin prices declined due to labor shortages and the lure of higher value crops. Thompson Seedless was again the leading raisin grape variety, while Flame Seedless was again the leading table grape variety.

Changes in pesticide use on table and raisin grape, like those on wine grape, are influenced by a number of factors, including weather, topography, pest pressure, evolution of resistance, competition from newer pesticide products, commodity prices, application restrictions, and efforts by growers to reduce costs.

Table 29: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for table and raisin grape each year from 2010 to 2014. Planted acres from 2011 to 2014 are from CDFA, April 2015a; planted acres in 2010 are from USDA, October 2012; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	14,078,795	16,512,651	14,919,865	14,616,473	14,881,486
Acres Treated	5,880,674	6,791,060	6,833,164	7,143,809	7,094,837
Acres Planted	307,000	305,000	321,000	323,000	313,000
Price/ton	$ 489.13	$ 522.00	$ 719.67	$ 681.94	$ 749.60

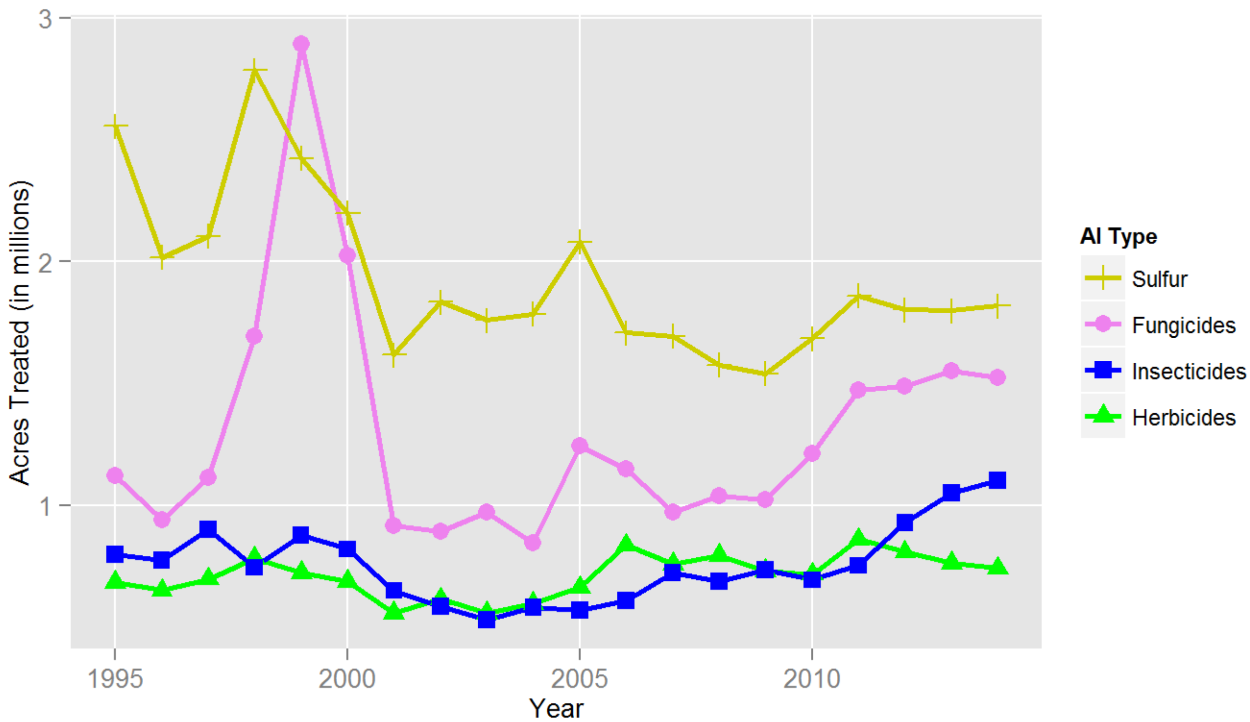

Figure 31: *Acres of table and raisin grape treated by all AIs in the major types of pesticides from 1995 to 2014.*

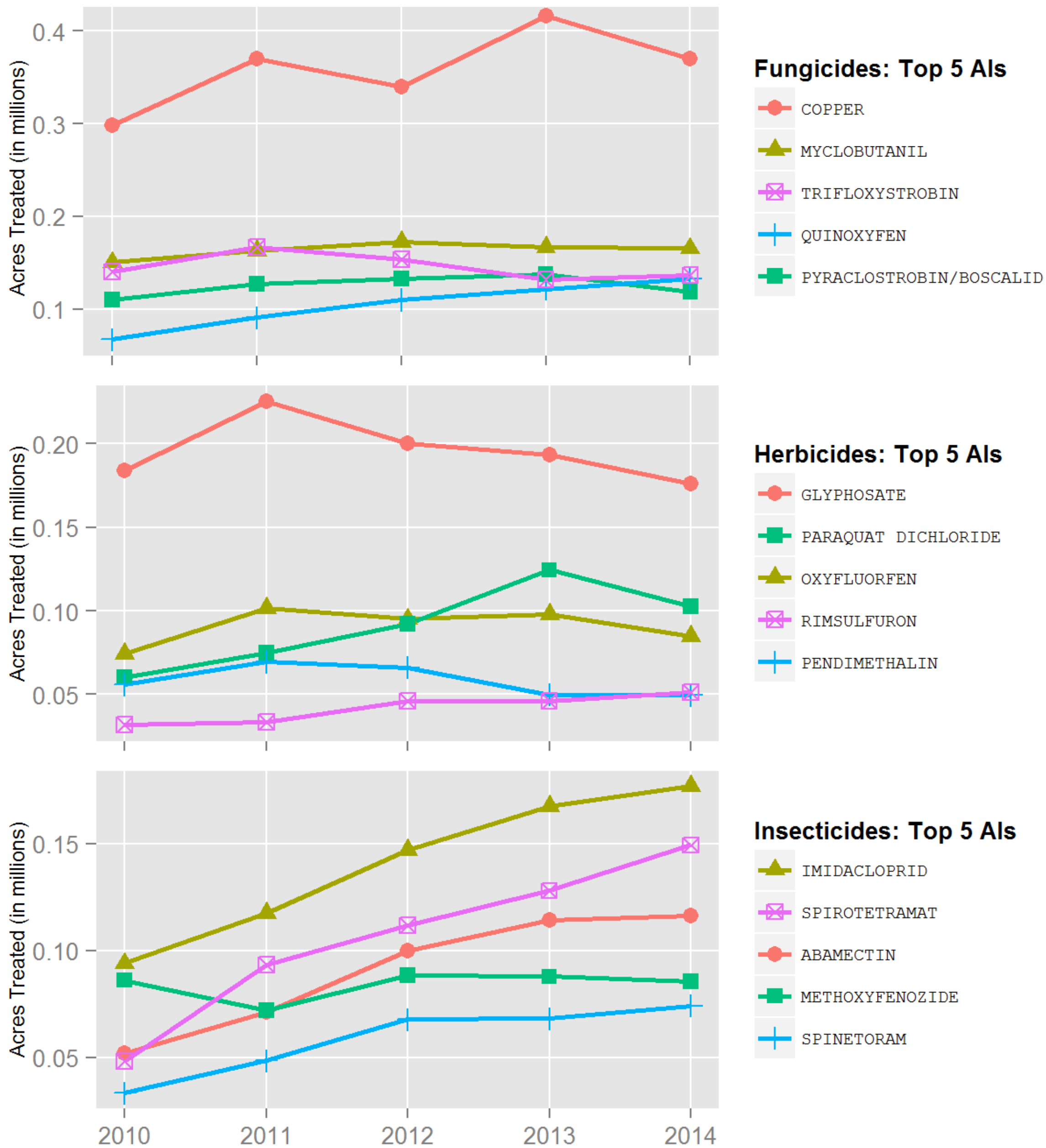

Figure 32: *Acres of table and raisin grape treated by the top 5 AIs of each AI type from 2010 to 2014.*

Pest pressure was relatively “normal” in 2014. As a consequence, the cumulative area treated with insecticides changed little from 2013 (Figure 31); the amount of insecticide applied did not change much either. The insecticides applied to the greatest area in 2014 were the same as in 2013: imidacloprid, spirotetramat, abamectin, methoxyfenozide, spinetoram, and *Bacillus thuringiensis* (Figures 32 and A-31). Except for methoxyfenozide, modest increases in treated acreage was observed for all of these insecticides. As in 2013, warm spring temperatures allowed early build-up of vine mealybug (VMB) populations. Imidacloprid (Figure A-32) and buprofezin are used during warm weather between bud break and harvest to control mealybug infestations. Spirotetramat also provides control of mealybugs; its use has steadily increased since its registration in 2008. Chlorpyrifos has been used as a delayed dormant or post-harvest spray to prevent spring build-ups of VMB populations, but its use was down in 2014, possibly in anticipation of new regulation then proposed by DPR. Abamectin and etoxazole are used to treat for mites, which were again a concern for growers due to above average temperatures early in the growing season. The use of cryolite, a pesticide approved for use on organically grown produce, decreased again in 2014, a trend that has continued since at least 2004. Cryolite is a stomach poison applied early in the season to control lepidopteran pests such as omnivorous leafroller. Methoxyfenozide controls similar pests, but can be used later in the growing season than cryolite. Use of spinosad increased in 2014. Changes in the price of products, growers looking to purchase the cheapest product that will provide control, and rotation of AIs to avoid resistance can explain much of the patterns of change in insecticide use.

The area treated with sulfur did not change, and the area treated with all other fungicides taken as a group decreased marginally (Figure 31). Fungicides with the greatest area treated included sulfur, copper-based pesticides, myclobutanil, boscalid, pyraclostrobin (boscalid and pyraclostrobin are used as a mixture), trifloxystrobin, and quinoxyfen (Figure 32). Other commonly used fungicides were cyprodinil and tebuconazole. Acres treated with three recently registered fungicides (tetraconazole, metrafenone, and fludioxonil) increased in 2014, while use of difenoconazole, another recently registered fungicide, decreased slightly. This is the reverse of their use pattern in 2013, except for tetraconazole, which had increased use in both 2013 and 2014. This pattern can be explained by growers rotating AIs to delay the evolution of resistance.

The area treated with herbicides decreased marginally in 2014 (Figure 31). With drought continuing into a third year, weed growth may have been inhibited to some extent. The herbicides applied to the greatest area were glyphosate, paraquat dichloride, oxyfluorfen, pendimethalin, and rimsulfuron (Figure 32). Glyphosate use decreased by a small amount, likely in response to continuing concerns over weed resistance to this AI. Glufosinate-ammonium is an attractive alternative to glyphosate, but stocks have been low in the last few years due to high demand in the Midwest and the South, where corn and soybean varieties genetically engineered for resistance to glufosinate-ammonium have been extensively planted in these regions. Glufosinate-ammonium was more widely available in 2014 due to some new product registrations; its use increased from approximately 10,000 acres to approximately 45,000 acres. The only other herbicide that saw much more use in 2014 was trifluralin, which was applied on about 25,000 acres. A new AI, indaziflam, registered in 2012, was applied to almost 23,000 acres in 2014. It is a pre-emergence herbicide that is effective on glyphosate-resistant weeds. However, it is only labeled for vines older than five years and will likely be used only a couple seasons in a row in the same vineyard, due to its long residual activity.

Use of all the major fumigants increased in 2014; about 4,500 acres were treated. Half of these applications were of aluminum phosphide; 1,3-dichloropropene accounted for 1,400 acres treated.

The area treated with plant growth regulators (PGRs) changed little in 2014. The most commonly used PGRs were gibberellins, which are applied in early spring to lengthen and loosen grape clusters and increase berry size (Figure A-32). Less compact clusters may be less vulnerable to berry splitting and bunch rot. Ethephon was the next most commonly applied PGR. Ethephon is applied at onset of ripening to improve berry color. Its use in conjunction with S-abscisic acid for this purpose was recently extolled, and an increase in S-abscisic acid use in 2014 suggests that this advice was being heeded. Use of this mix is likely to increase in the future, especially on Crimsons, as its berries tend not to redden in high heat. PGRs that were used more widely in 2014 were hydrogen cyanamide and forchlorfenuron. Hydrogen cyanamide is applied after pruning to promote bud break, and forchlorfenuron is applied at fruit set to increase the size of berries.

Walnut

California produces 99 percent of the walnuts grown in the United States. The California walnut industry is comprised of over 4,000 growers who farmed approximately 290,000 bearing acres in 2014 (Table 30 and Figure A-33). According to the 2014 Walnut Objective Measurement Report, mild temperatures led to faster crop development and an earlier harvest. Walnut production was estimated at 545,000 tons in 2014, an increase of about 10 percent from the previous year. The price per ton decreased by about 13 percent, while bearing acreage increased by almost 4 percent. The amount of applied pesticide AIs increased by 13 percent, and the area treated increased by 15 percent. In general, pesticide use followed similar trends seen in recent years, with increases in fungicide, insecticide, and herbicide use, though fumigant use declined (Figure 33).

The area treated with insecticides, which includes miticides, increased 13 percent (Figure 33). Reasons include increased acreage and relatively warm temperatures throughout the growing season, especially in the spring, which allowed insects to mature faster and shorten the time between generations. Pressure from walnut husk fly and navel orangeworm continued to increase, and a rise in post-harvest worm damage was noted. Abamectin, a miticide, remained the most-used insecticide because of its low cost and continued efficacy, while another miticide, hexythiazox, saw a large increase in treated acreage (Figures 34 and A-34). Drought and hot weather conditions may have contributed to the increased mite pressure.

Table 30: *Total reported pounds of all active ingredients (AI), acres treated, acres bearing, and prices for walnut each year from 2010 to 2014. Bearing acres from 2010 to 2014 are from USDA, September 2015; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	3,992,400	3,949,980	4,278,369	5,042,734	5,685,166
Acres Treated	2,317,105	2,352,354	2,981,037	3,496,841	4,015,589
Acres Bearing	255,000	265,000	270,000	280,000	290,000
Price/ton	$ 2,040	$ 2,900	$ 3,030	$ 3,710	$ 3,230

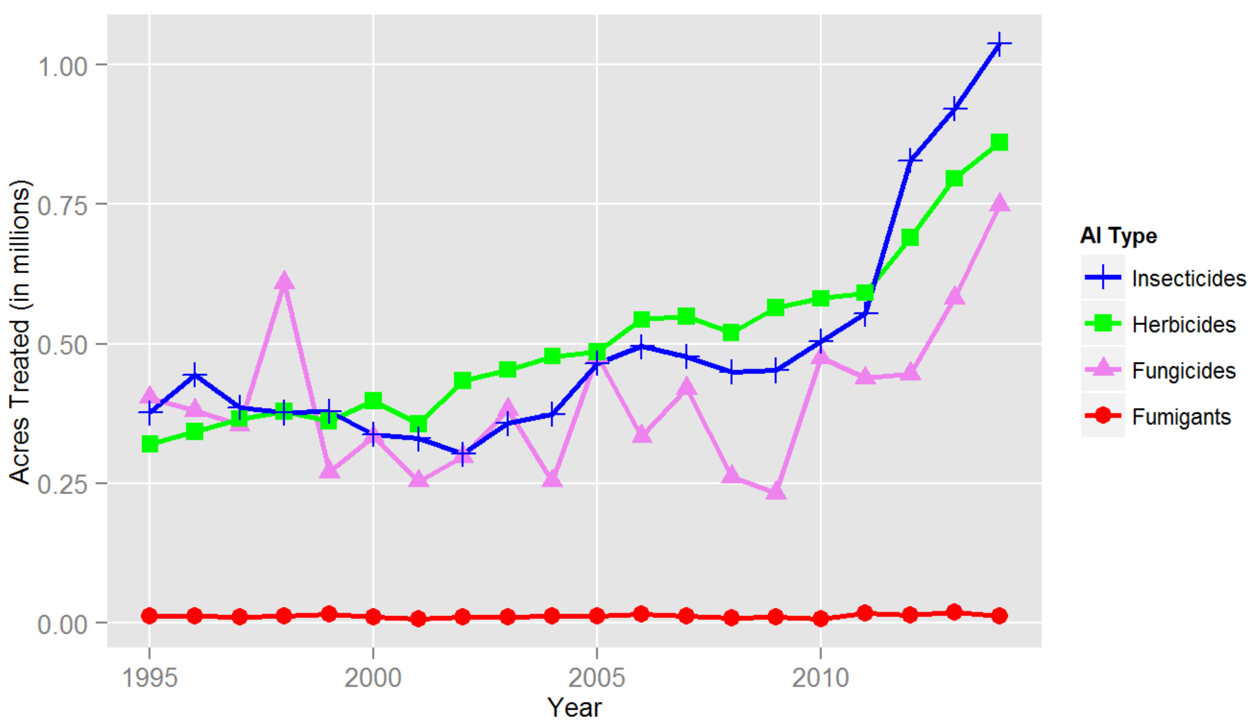

Figure 33: *Acres of walnut treated by all AIs in the major types of pesticides from 1995 to 2014.*

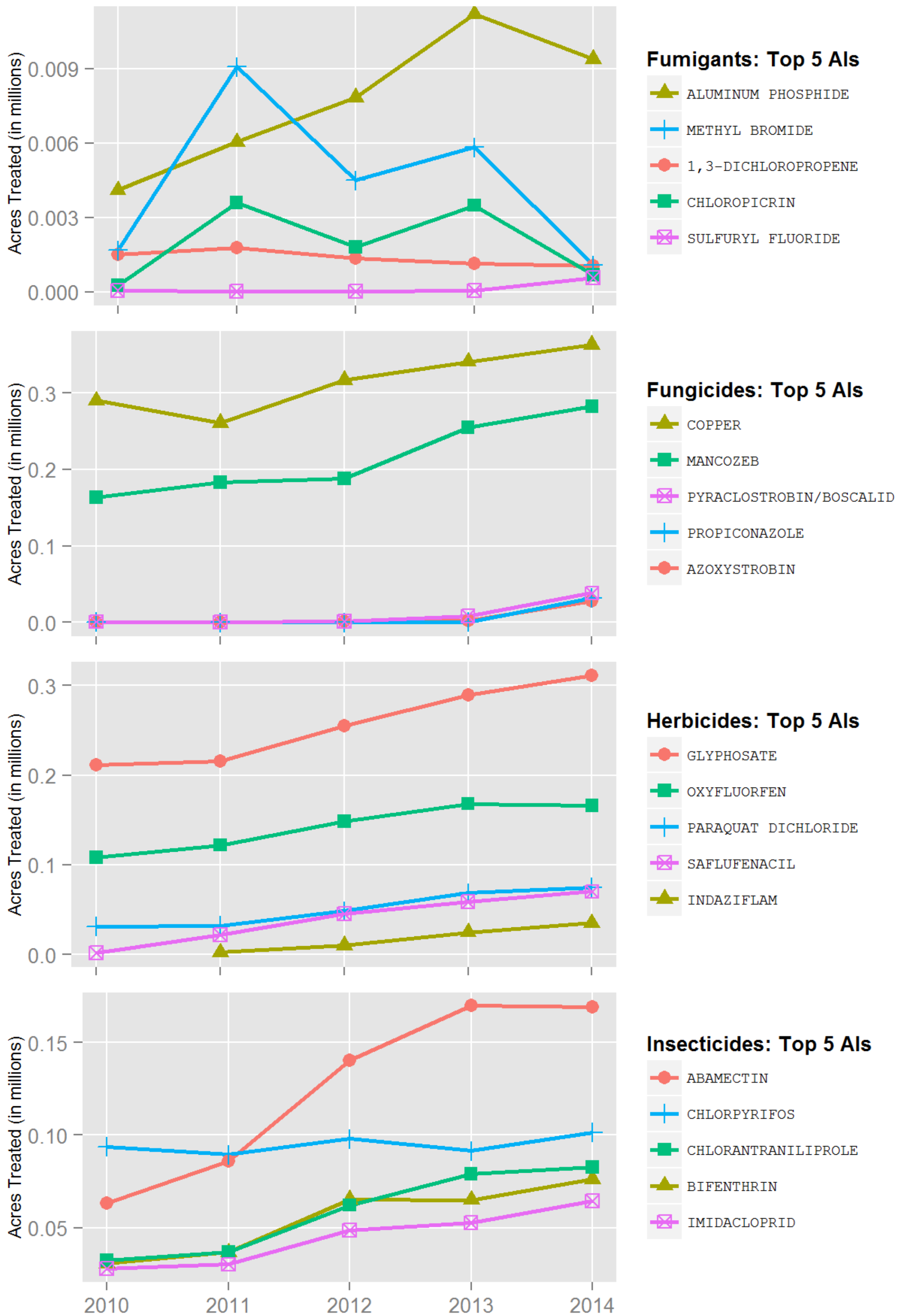

Figure 34: *Acres of walnut treated by the top 5 AIs of each AI type from 2010 to 2014.*

The 8 percent increase in the area treated with herbicides (Figure 33) reflects the increase in walnut acreage, especially young plantings, where weeds thrive until tree canopies are capable of shading orchard floors. In addition, a relatively dry winter adversely impacted or even prevented the use of pre-emergence herbicide programs and may have contributed to increased use of post-emergence herbicides like glyphosate and saflufenacil (Figures A-34 and A-35). Saflufenacil's favorable pricing and very good efficacy against most broadleaf weeds, including glyphosate-resistant hairy fleabane in the San Joaquin Valley, likely contributed to its increased use (Figures 34 and A-34). Use of the relatively new herbicide indaziflam continues to increase because of its long-lasting, broad spectrum control of weeds.

The area treated with fungicides increased 32 percent (Figure 33). Copper-based fungicides and mancozeb, which are both used for blight control, had the highest use, and use amounts were similar to those in 2013. Use of other fungicides, such as pyraclostrobin, boscalid, propiconazole, and azoxystrobin, saw large increases (Figures 34 and A-34). These increases were likely due to the increased occurrence of Botryosphaeria canker (Bot), a fungal disease that is able to kill wood within infested walnut orchards and cause severe crop loss. Currently there are no guidelines for treating Bot, and growers are spraying 3–4 times a year, in response to increased diagnosis and as a preventative measure given the seriousness of the disease.

The area treated with the fumigants methyl bromide, 1,3-dichloropropene, chloropicrin, and aluminum phosphide decreased (Figures 34 and A-34). Most fumigants are applied to the soil before planting while aluminum phosphide is used for rodent control. Given the cost and tighter regulations, some growers are using alternatives to pre-plant fumigation, such as fallowing or cover-cropping for a year prior to replanting orchards.

Wine grape

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) (Figure A-36). Pest and disease pressure may differ among these regions. The pooled figures in this report may not reflect differences in pesticide use patterns between production regions.

Changes in pesticide use on wine grape are influenced by a number of factors, including weather, topography, pest pressure, evolution of resistance, competition from newer pesticide products, commodity prices, application restrictions, efforts by growers to reduce costs, and increased emphasis on sustainable farming.

Table 31: *Total reported pounds of all active ingredients (AI), acres treated, acres planted, and prices for wine grape each year from 2010 to 2014. Planted acres from 2011 to 2014 are from CDFA, April 2015a; planted acres in 2010 are from USDA, October 2012; marketing year average prices from 2010 to 2014 are from USDA, September 2015. Acres treated means cumulative acres treated (see explanation p. 10).*

	2010	2011	2012	2013	2014
Pounds AI	26,287,852	29,542,701	26,845,177	26,677,001	26,718,893
Acres Treated	8,903,172	9,756,975	9,325,013	10,236,530	10,047,948
Acres Planted	535,000	543,000	588,000	610,000	615,000
Price/ton	$ 574	$ 637	$ 773	$ 753	$ 759

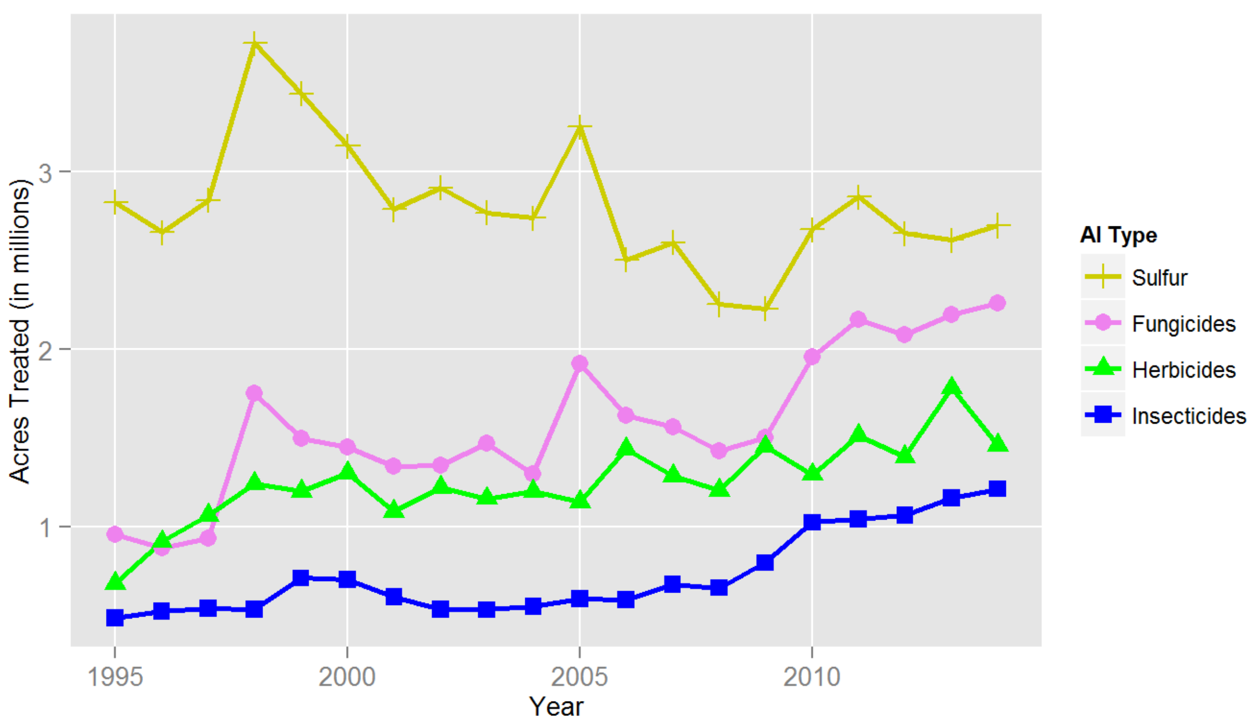

Figure 35: *Acres of wine grape treated by all AIs in the major types of pesticides from 1995 to 2014.*

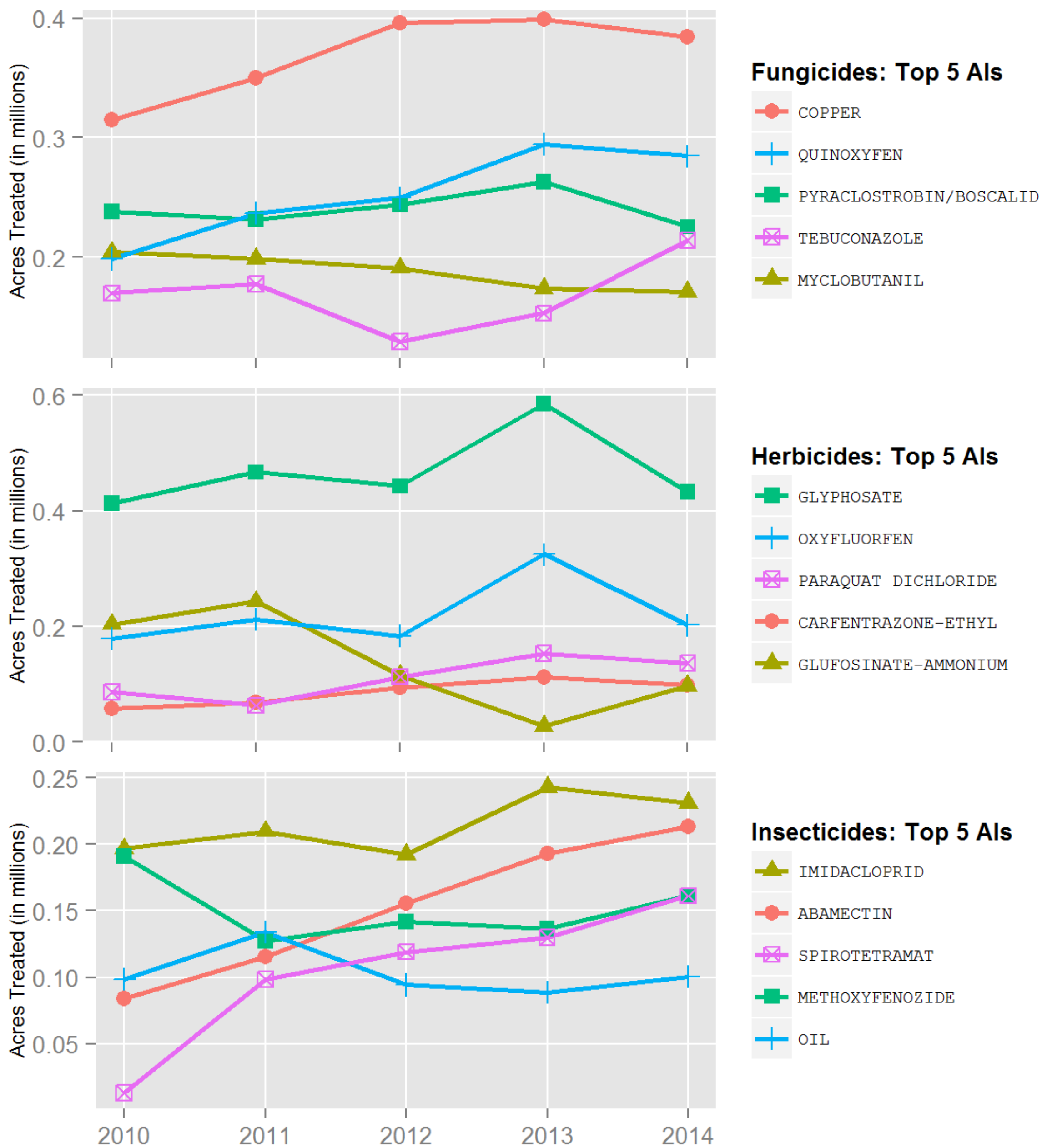

Figure 36: *Acres of wine grape treated by the top 5 AIs of each AI type from 2010 to 2014.*

By most accounts, 2014 was another good year for wine grape growers, with relatively low levels of pressure from pests and disease. The total amount of pesticide AIs applied in 2014 and the cumulative area treated were very close to 2013 values (Table 31).

Vine mealybug (VMB) continued to be a concern for growers. It has now been found throughout most of the grape-growing regions of California. The warm winters since 2012 have allowed VMB populations to build up early in the season. In the North Coast region, a new pest, the Virginia creeper leafhopper, caused substantial damage in some locations, as did the western grape leafhopper. While there is effective biological control for western grape leafhopper, Virginia creeper leafhopper infestations require insecticide applications. In contrast, pest pressure from the invasive European grapevine moth has lessened, and consequently the area under quarantine was further reduced in August 2014. Spider mites were a problem in some vineyards stressed by drought. Overall, the amount of insecticide applied to wine grape and the area treated increased slightly in 2014 (Figure 35). The insecticides applied to the greatest acreage in 2014 were imidacloprid, abamectin, spirotetramat, methoxyfenozide, and oils, as was the case in 2013 (Figures 36 and A-37). Other widely applied insecticides were etoxazole, chlorantraniliprole, thiamethoxam, buprofezin, and *Bacillus thuringiensis*. Imidacloprid and spirotetramat are used to suppress VMB populations mid-season (Figure A-38), and a decrease in imidacloprid use and an increase in spirotetramat use likely reflects growers cognizance of the need to rotate the use of insecticides with different modes of action. Oils have many attractive, broad spectrum properties and are relatively low risk to public health and the environment. Mixed with fungicides, oils can replace a surfactant and eradicate mildew growth, as well as suppress mites and insects such as grape leafhoppers. The area treated with chlorantraniliprole, first registered in 2008, decreased from 2012 to 2014. Chlorantraniliprole is relatively selective and methoxyfenozide is highly selective for lepidopteran pests. Both AIs are used in the control of the European grapevine moth. Use of the low-risk insecticide *Bacillus thuringiensis* again decreased. The total area treated with chlorpyrifos, which is also used to suppress VMB populations, declined again in 2014. Use of this insecticide has trended downward in wine grapes since 2008 (excepting 2012). Chlorpyrifos was used in delayed dormant and post-harvest applications for control of mealybugs and ants. Besides abamectin, the miticides etoxazole, bifenazate, fenproximate and hexathiazox were relatively widely used; use of bifenazate and fenproximate was substantially down in 2014, however, while use of etoxazole was only moderately higher than in 2013. These compounds were used to suppress populations of mites that were favored in some regions by a warm, early spring.

Due to another warm, dry year, fungal pathogens were not as big a problem as in previous years. Fungicide use amounts were quite similar to those in 2013, with marginal decreases in area treated with most AIs. The fungicides applied to the largest area included sulfur, copper-based pesticides, quinoxyfen, boscalid, pyraclostrobin (boscalid and pyraclostrobin are used as a mixture), tebuconazole, and myclobutanil (Figure 36). Other widely applied fungicides were trifloxystrobin, tetraconazole, and metrafenone. Tebuconazole, metrafenone, and fluopyram were the only fungicides that were used on substantially more acres in 2014. Metrafenone has a new mode of action, is easily absorbed by the plant, and helps prevent sporulation—all factors that are likely to lead to its greater use. Fluopyram, a fungicide effective in suppressing powdery mildew, was registered in 2012 and was applied to 119,000 acres in 2014. It was generally applied as a mix with tebuconazole. Patterns of fungicide use across years may partly reflect the fact that growers are cognizant of the need to rotate AIs to delay the evolution of resistance.

Continued drought kept weed levels low. Possibly as a result, the area treated with herbicides decreased by about 319,000 acres in 2014 (Figure 35). The herbicides applied to the greatest area in wine grape were glyphosate, oxyfluorfen, paraquat dichloride, carfentrazone-ethyl, and glufosinate-ammonium (Figure 36). Except for glufosinate-ammonium, use of all these herbicides decreased in 2014. Glyphosate resistance and a reduced supply of glufosinate-ammonium, due to a high demand in the Midwest and South, as well as globally, explain some of the observed trends in herbicide use over the past few years. Glufosinate-ammonium was more widely available in 2014 due to some new product registrations; its use increased from 28,000 acres to 97,000 acres. It is an attractive alternative to glyphosate. A new AI, indaziflam, registered in 2012, was applied to more than 54,000 acres in 2014. It has strong pre-emergence activity on glyphosate-resistant weeds, and an increase in its use over the next few years is expected. However, it is only approved for use on vines older than 5 years and will likely be used only a couple seasons in a row on the same vineyard due to its long residual activity.

Fumigants were used sparingly in wine grapes in 2014; the most commonly used fumigant was aluminum phosphide, used to control rodents. Its use was predominantly in the Central Coast region.

Gibberellins continue to be by far the most common plant growth regulator (PGR) used in wine grapes, accounting for 93 percent of PGR use in 2014. Gibberellins are applied in early spring in order to lengthen and loosen grape clusters, which reduces vulnerability to berry splitting and bunch rot. Other PGRs that were used on a much smaller scale (235 to 360 acres) were forchlorfenuron, s-abscisic acid, gamma aminobutyric acid, and glutamic acid.

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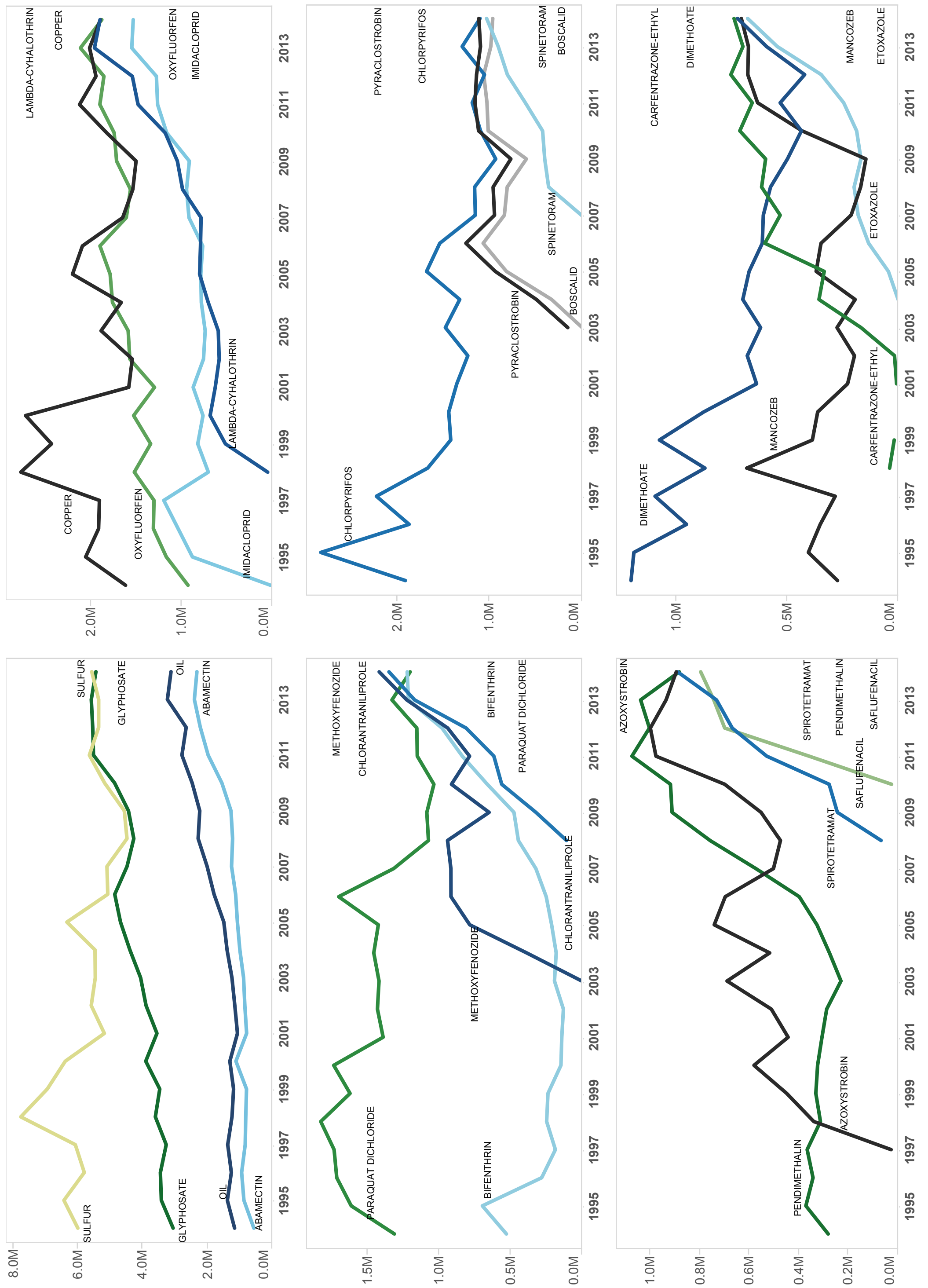
Appendix



Total acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, yellow insecticide/fungicides (mostly sulfur), orange defoliants, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-1: *Acres treated by the major AIs from 1994 to 2014.*

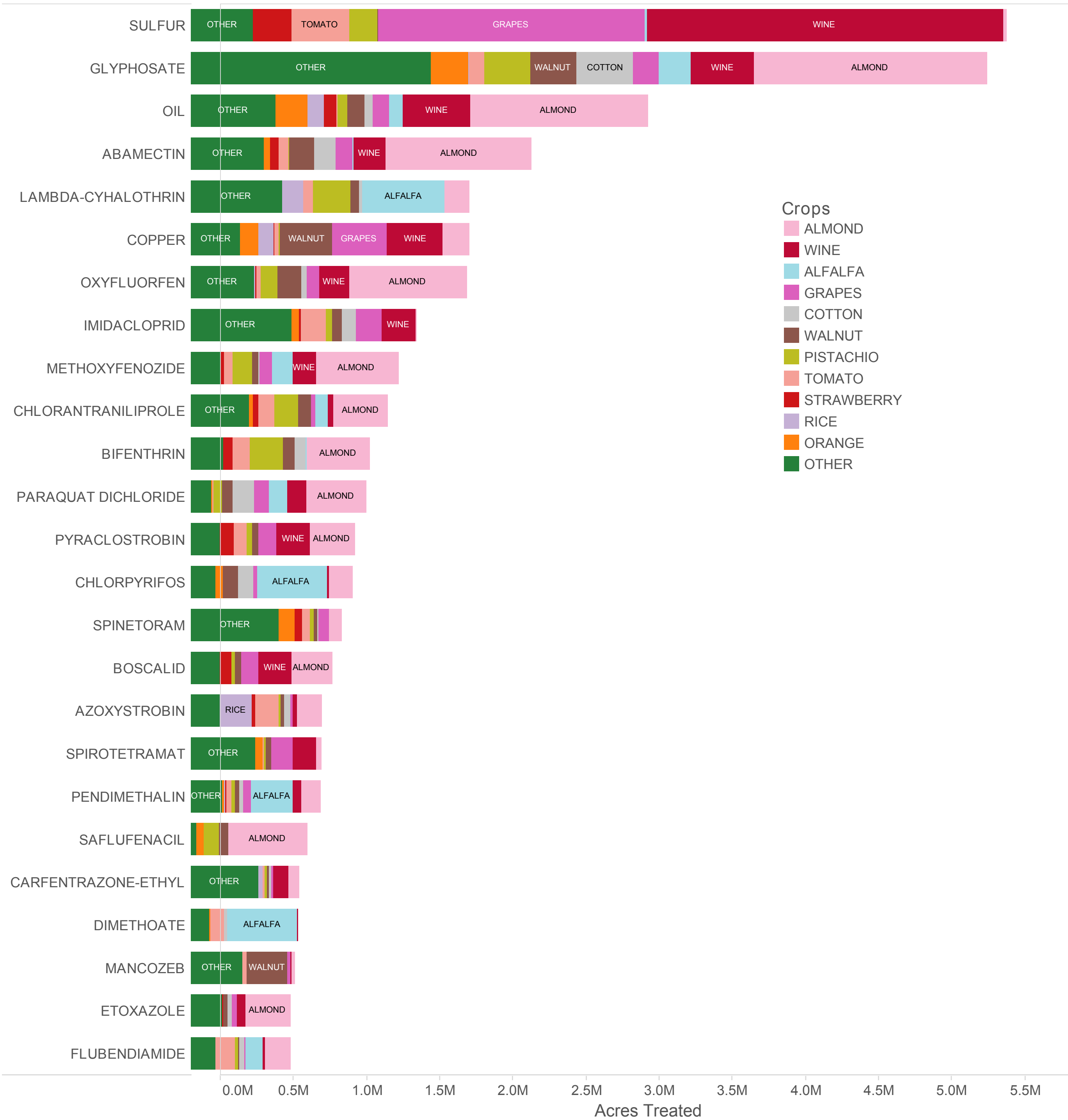


Figure A-2: *Acres treated by the major AIs and crops in 2014.*

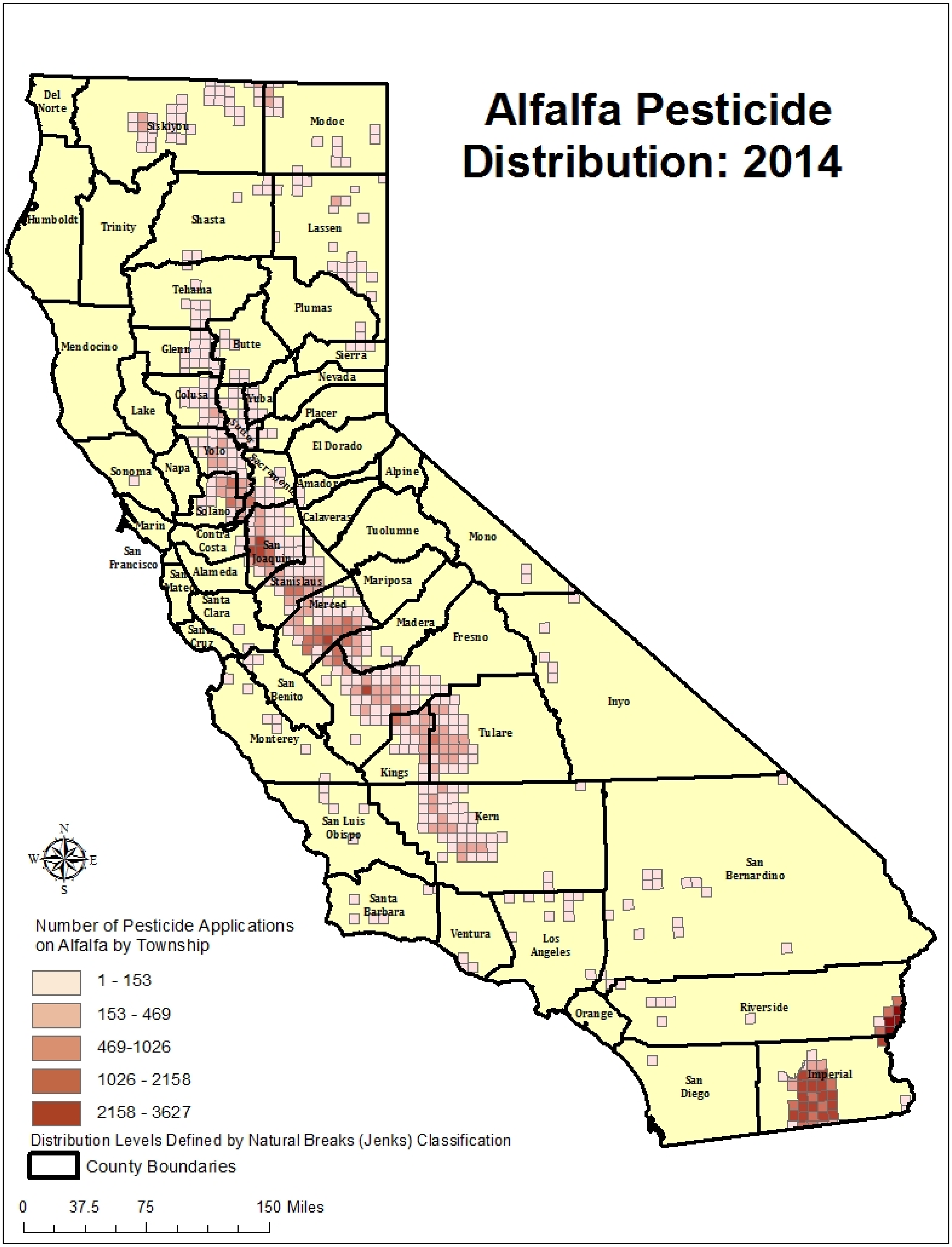
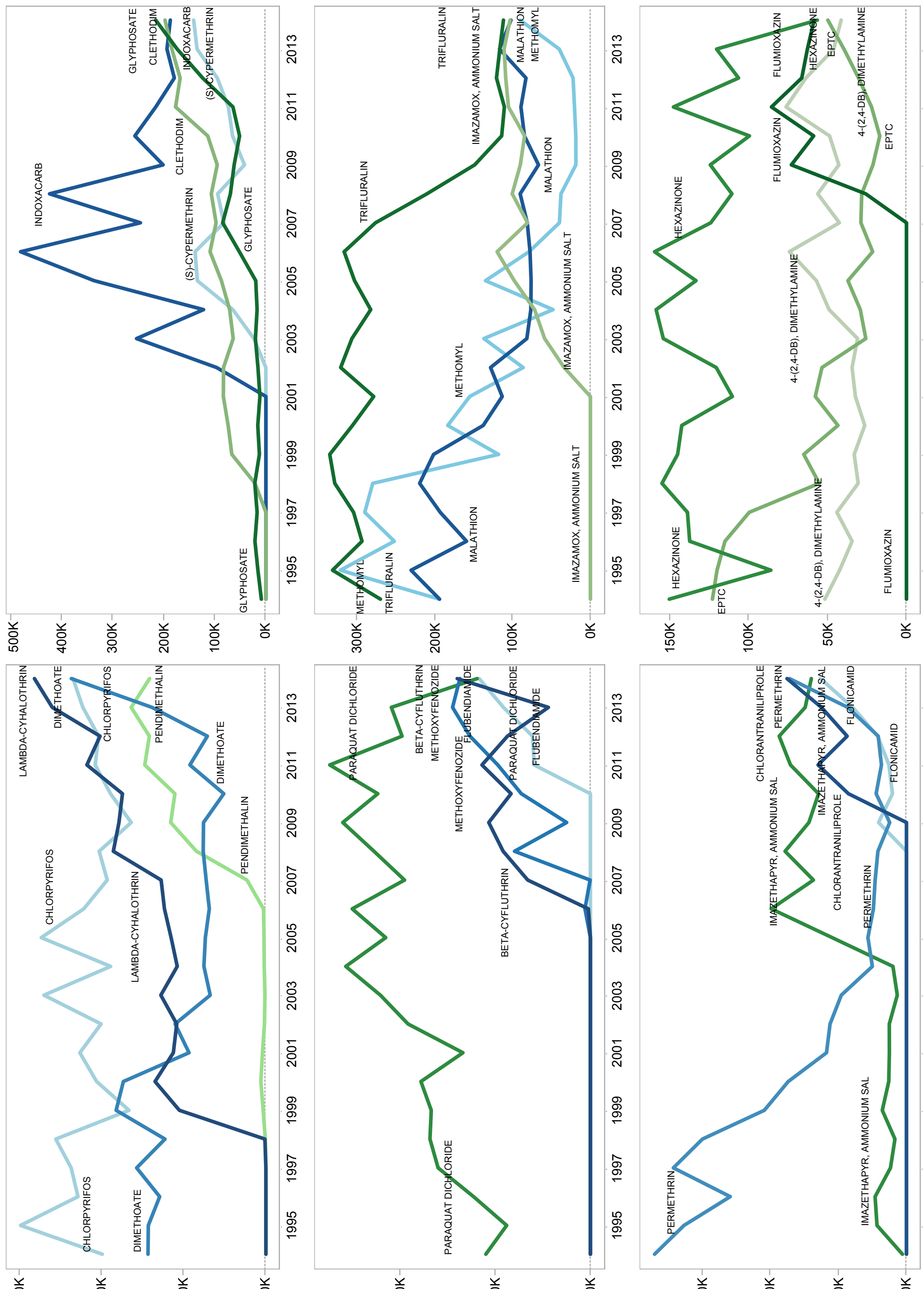


Figure A-3: *Number of pesticide application in alfalfa by township in 2014.*



Alfalfa acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-4: *Acres of alfalfa treated by the major AIs from 1994 to 2014.*

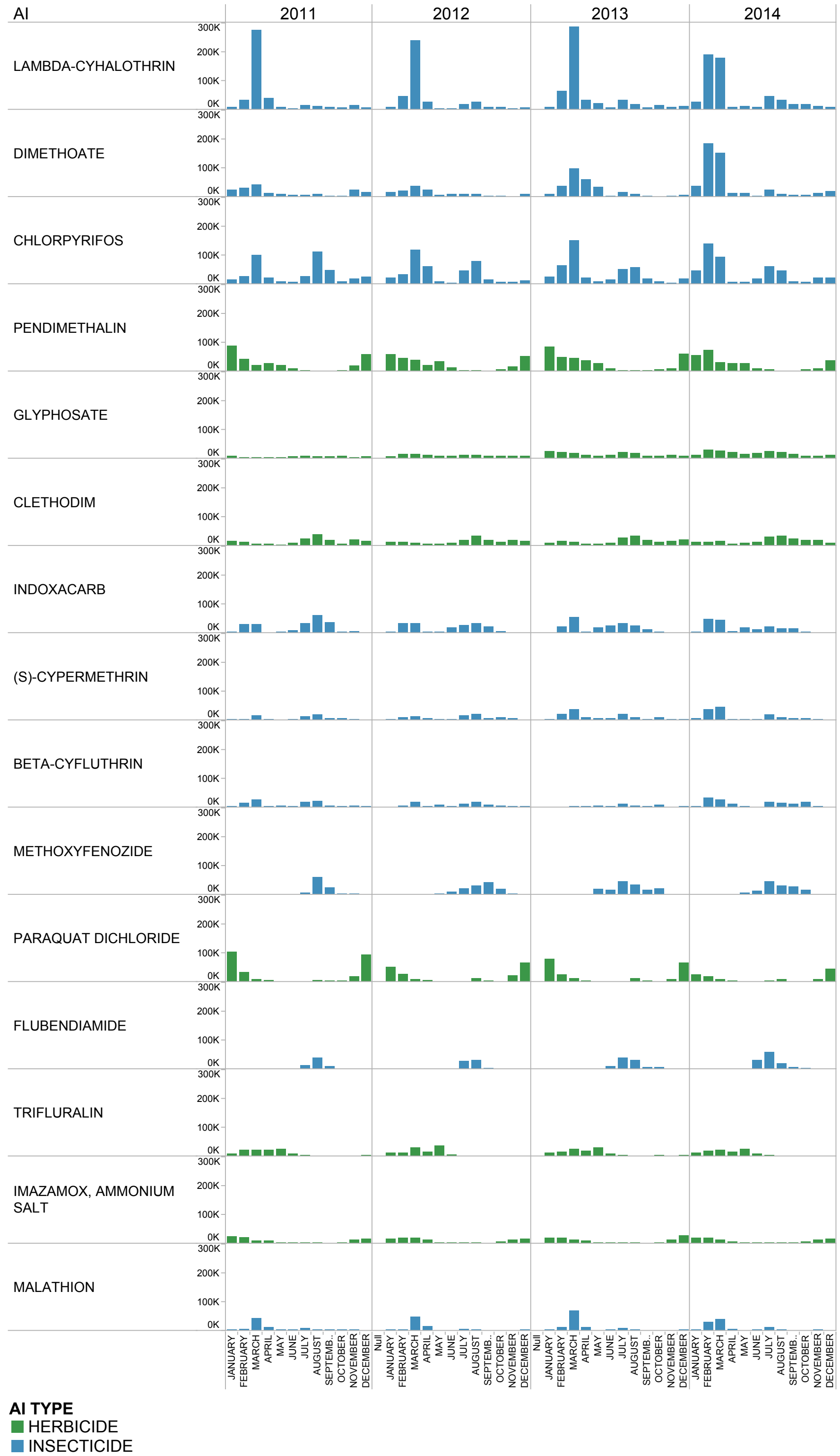


Figure A-5: *Acres of alfalfa treated by the major AIs by month and AI type from 2011 to 2014.*

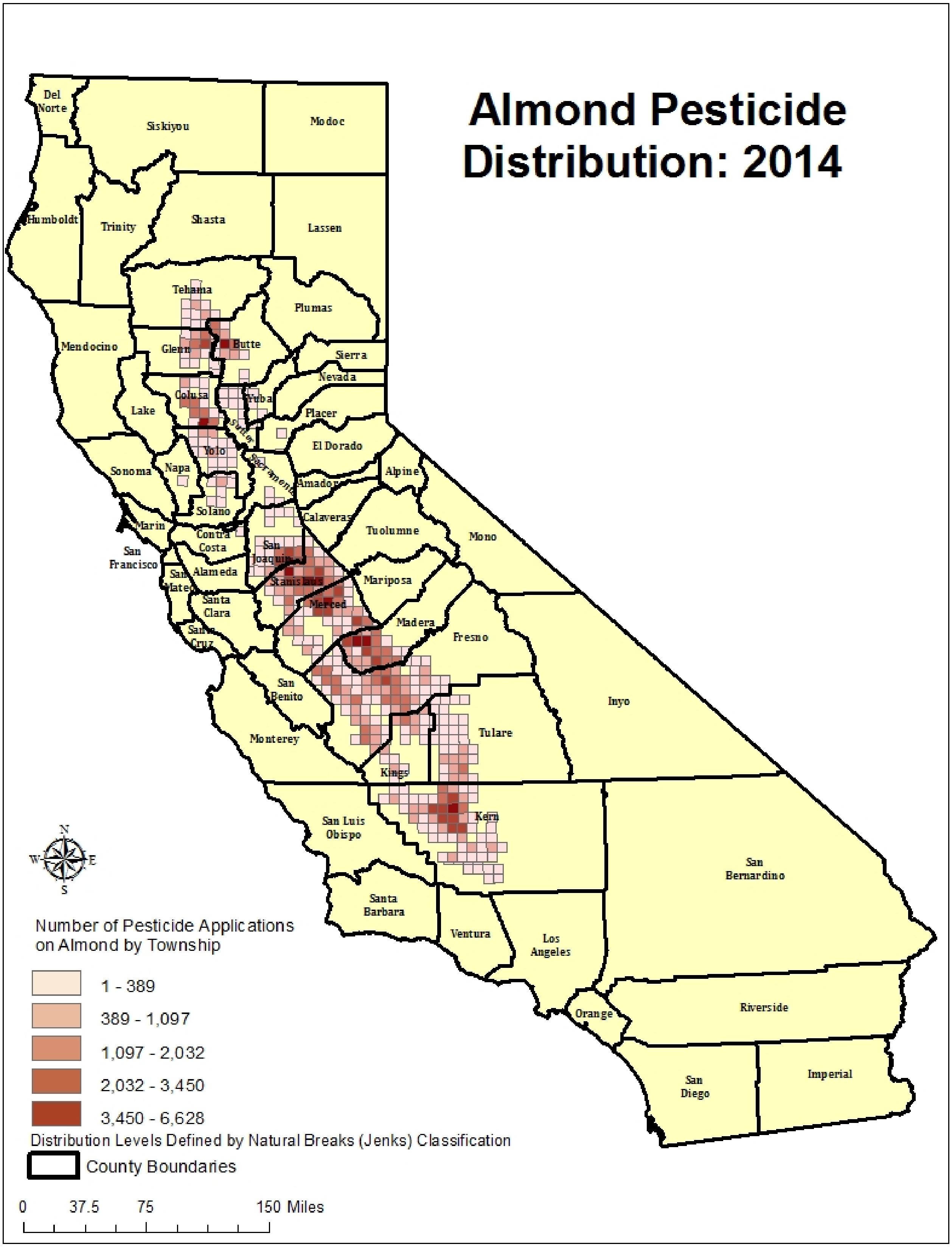
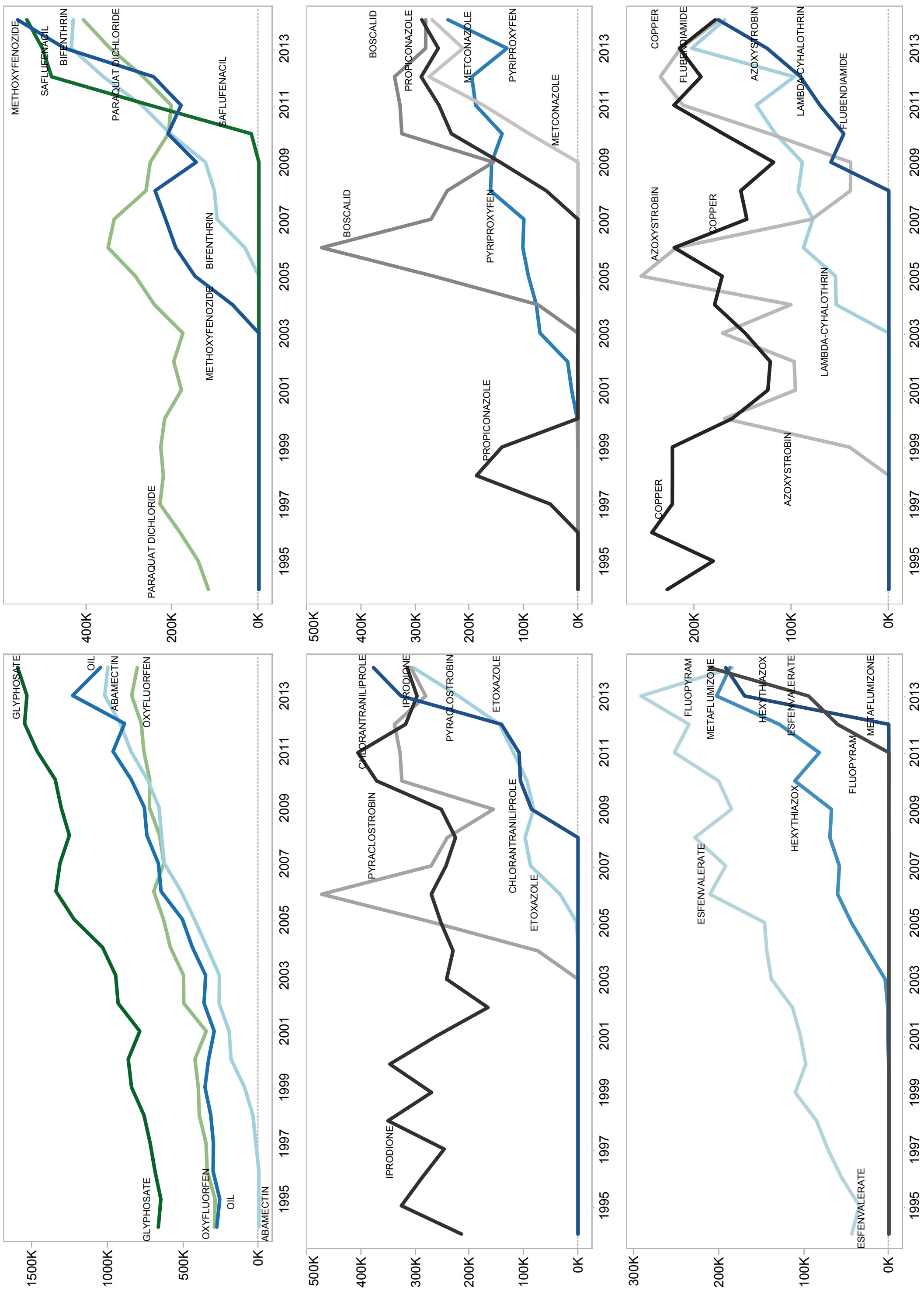


Figure A-6: *Number of pesticide application in almond by township in 2014.*



Almond acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-7: *Acres of almond treated by the major AIs from 1994 to 2014.*

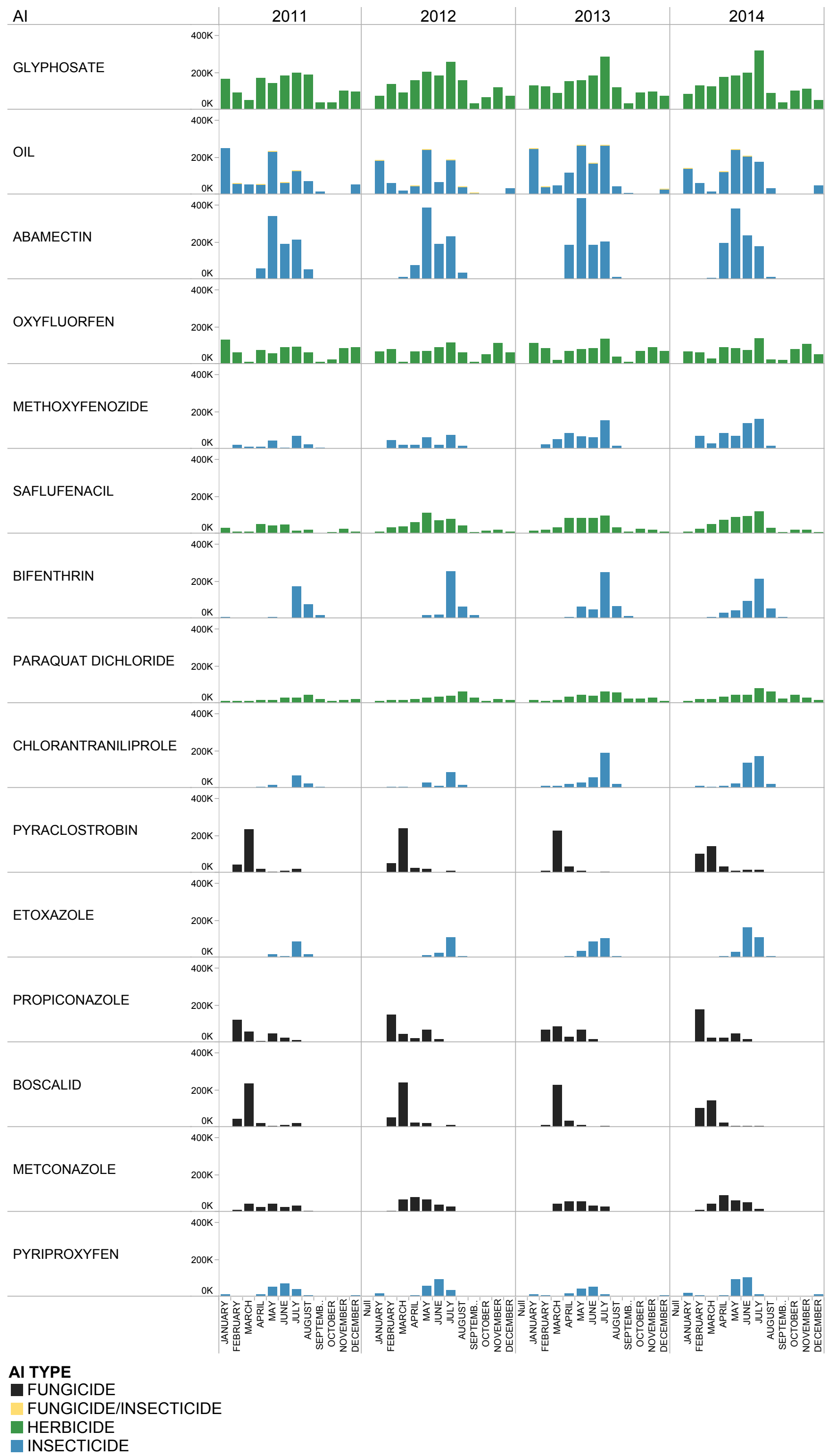


Figure A-8: *Acres of almond treated by the major AIs by month and AI type from 2011 to 2014.*

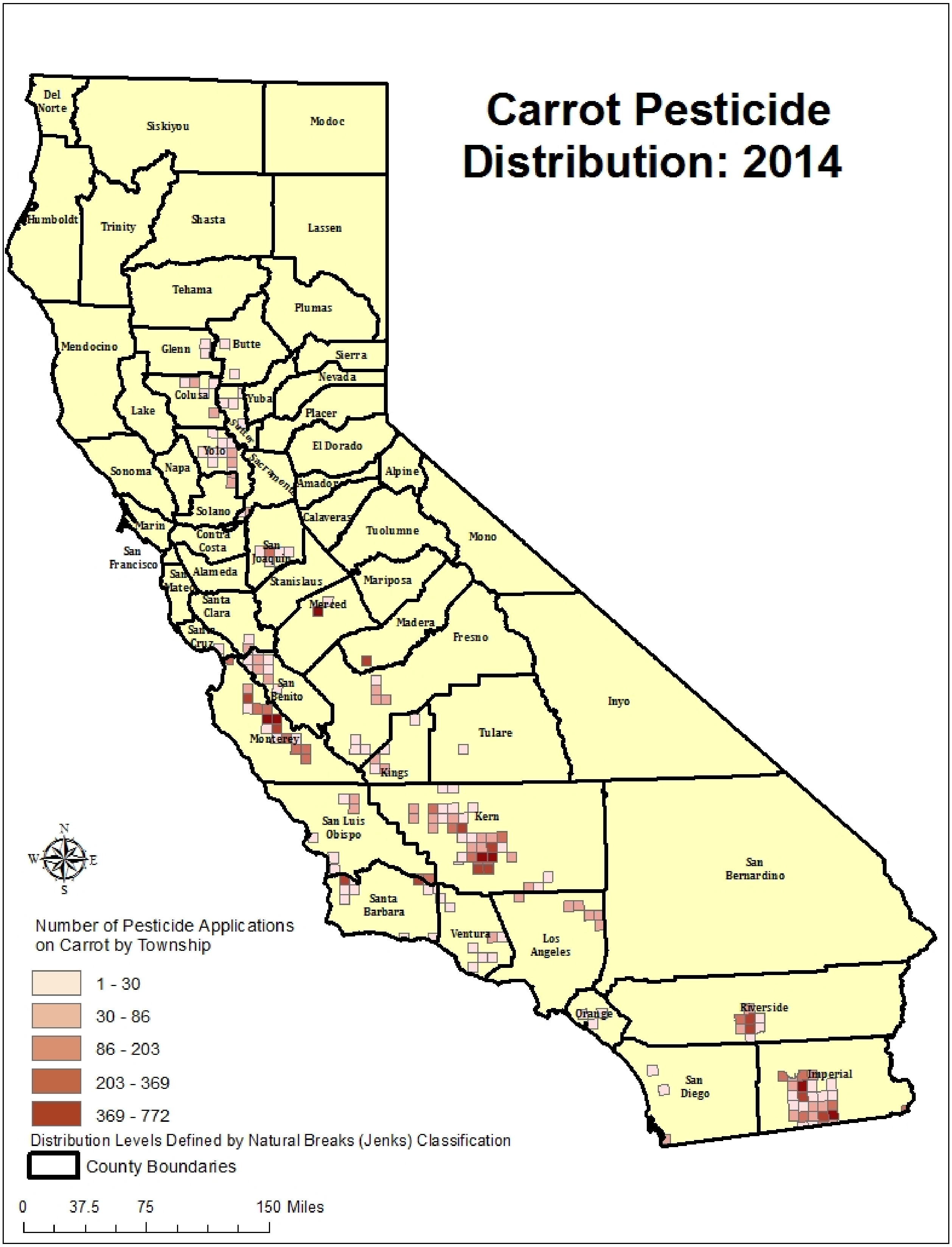
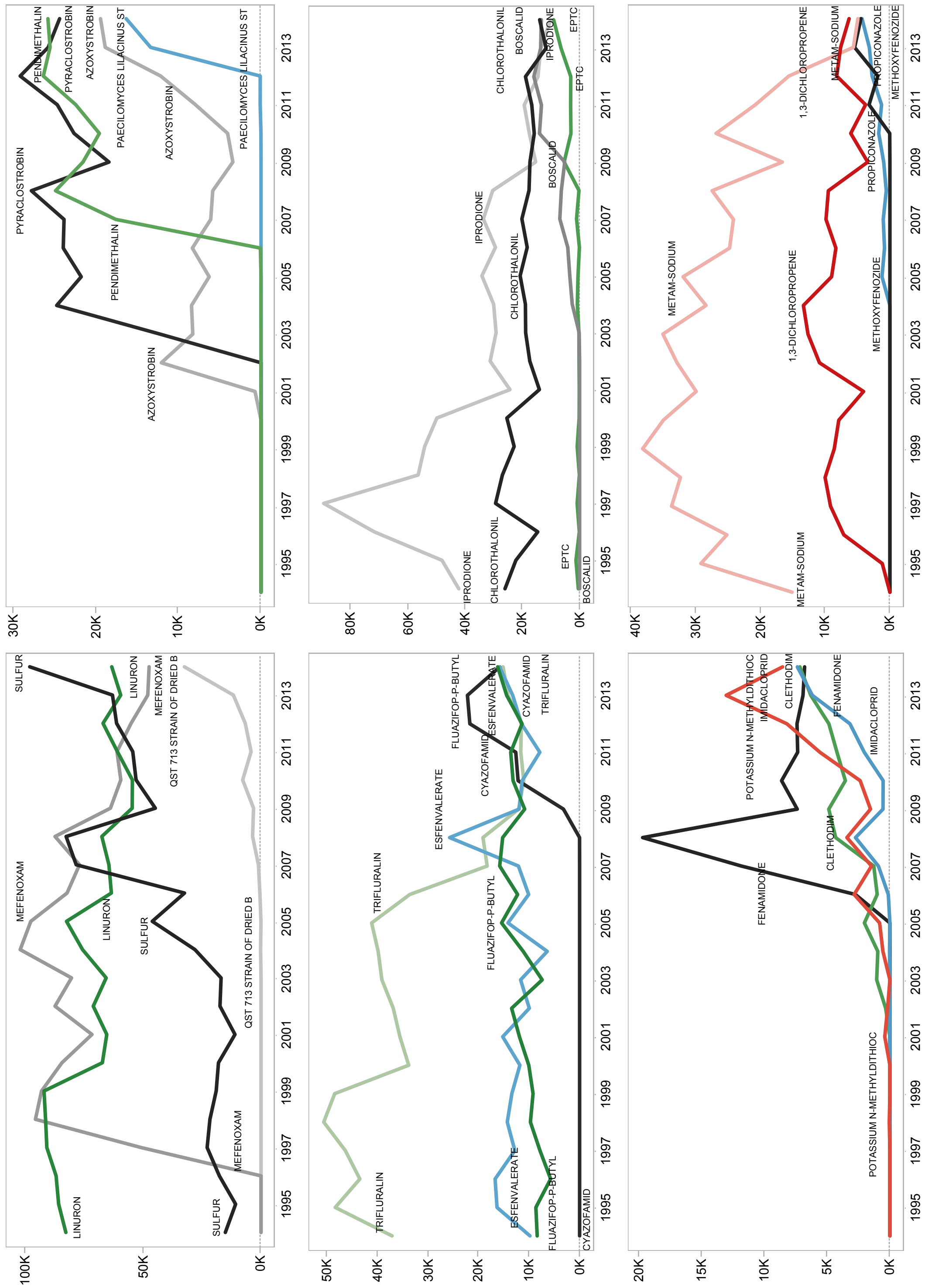


Figure A-9: *Number of pesticide application in carrot by township in 2014.*



Carrot acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-10: *Acres of carrot treated by the major AIs from 1994 to 2014.*

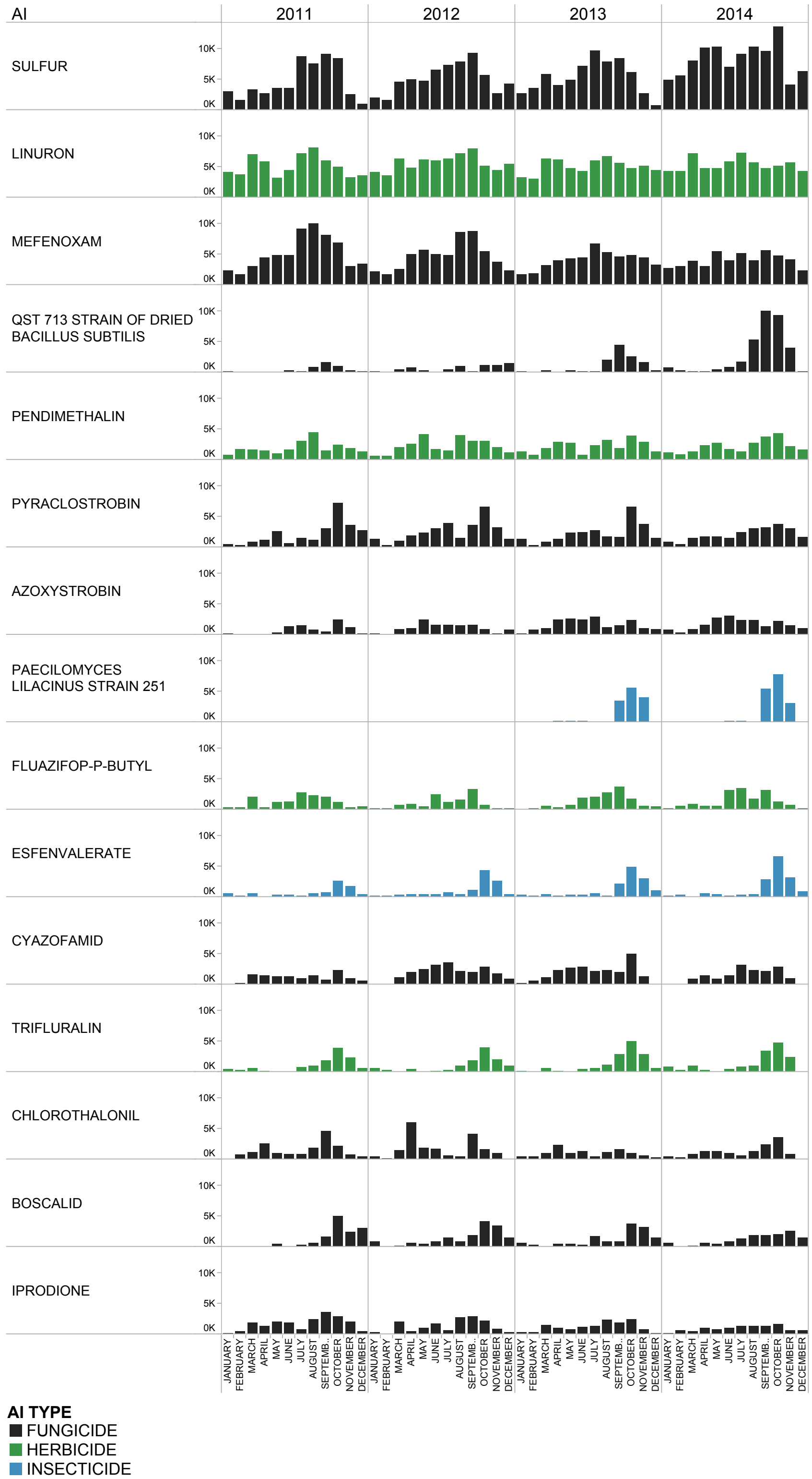


Figure A-11: *Acres of carrot treated by the major AIs by month and AI type from 2011 to 2014.*

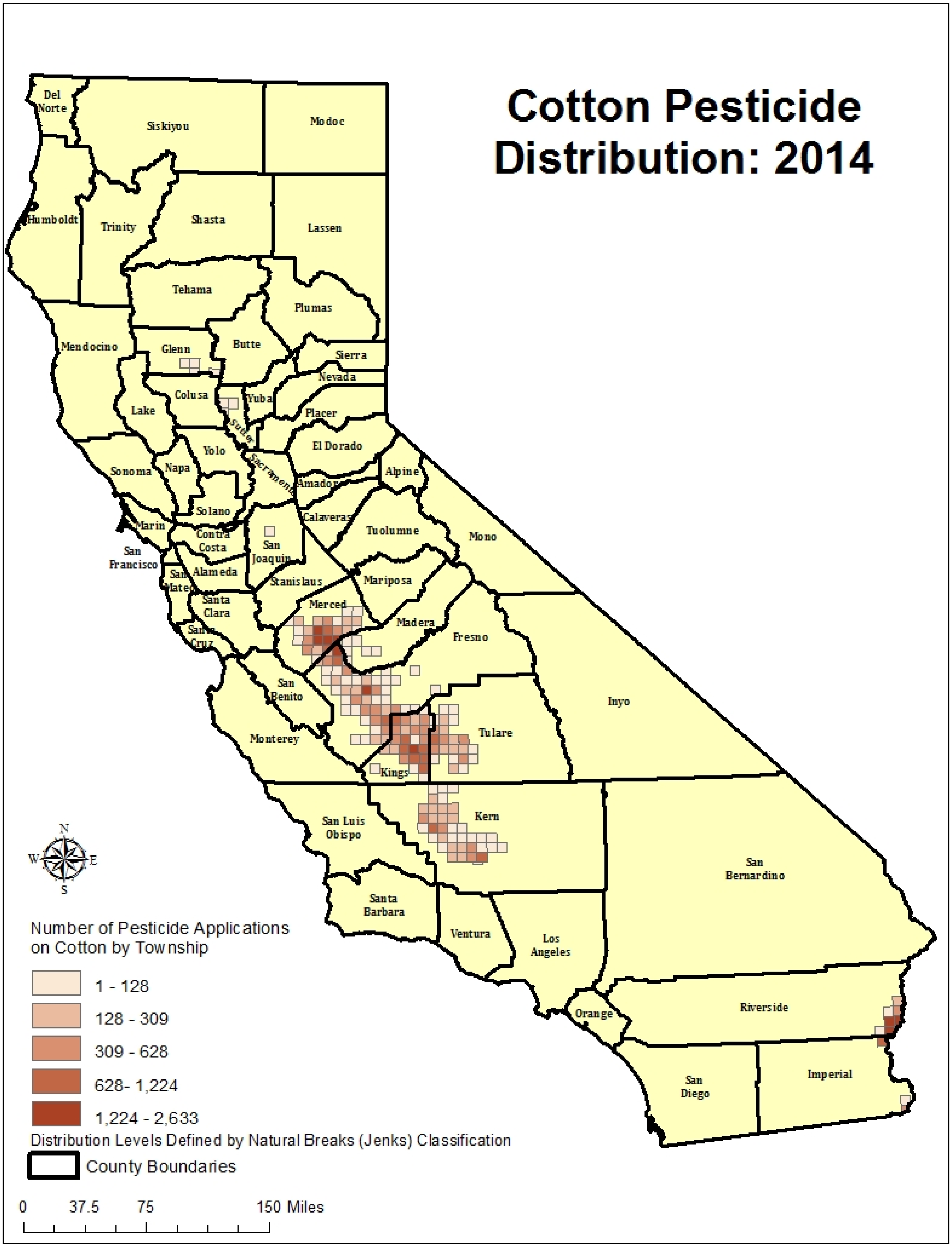
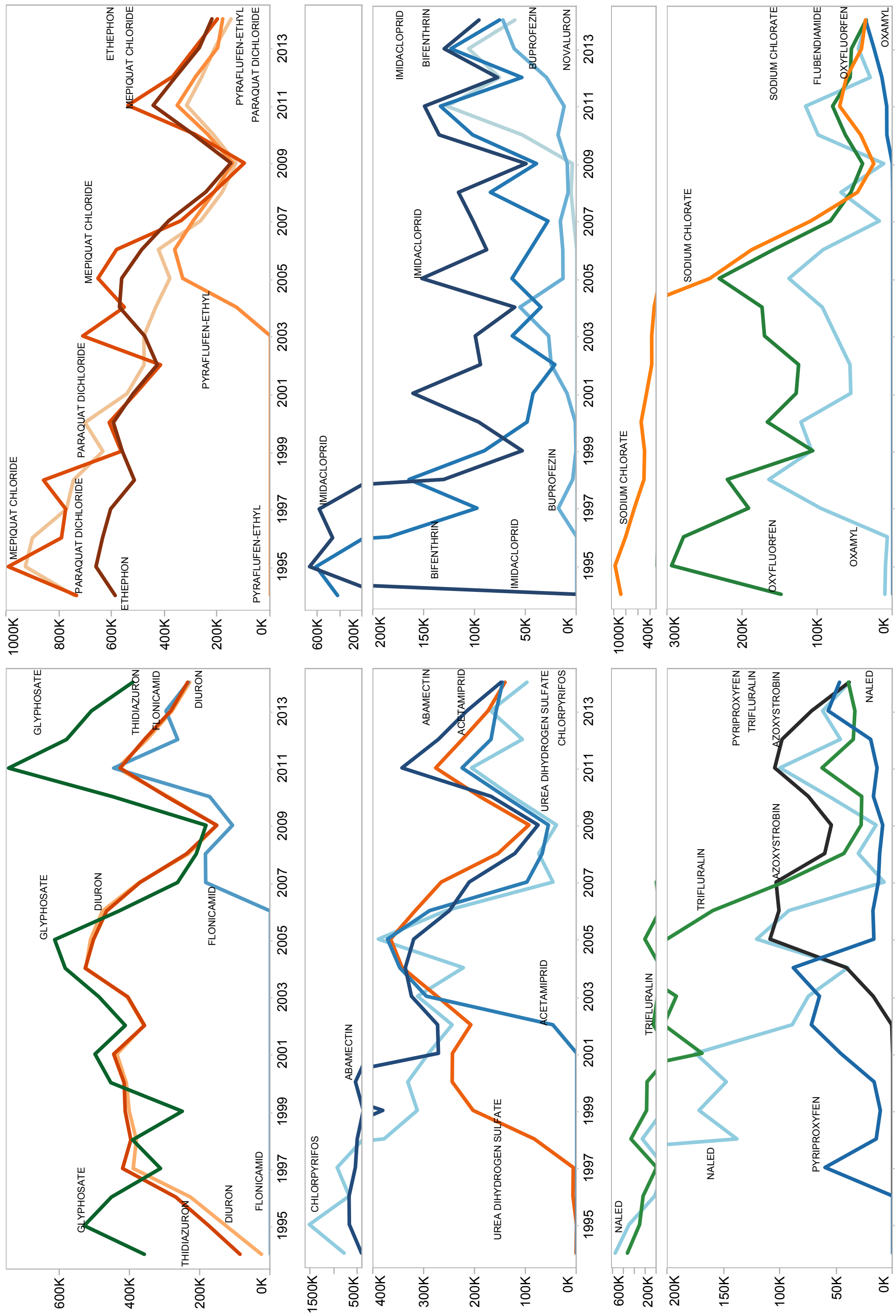


Figure A-12: *Number of pesticide application in cotton by township in 2014.*



Cotton acres treated by the major AIs from 1994 to 2014. The graphs are ordered by the acres treated in 2014 starting with the largest amount in the upper left, moving to the right, then down. Within each graph the AIs listed on the right side are listed in order of acres treated, with the AI with the largest amount on top. Because the amounts are often close in 2014, it may not be clear from these AI labels which line corresponds to which AI. However, the lines are labelled at other places, with the AI name touching its line. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides yellow, defoliants orange, and others purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-13: *Acres of cotton treated by the major AIs from 1994 to 2014.*

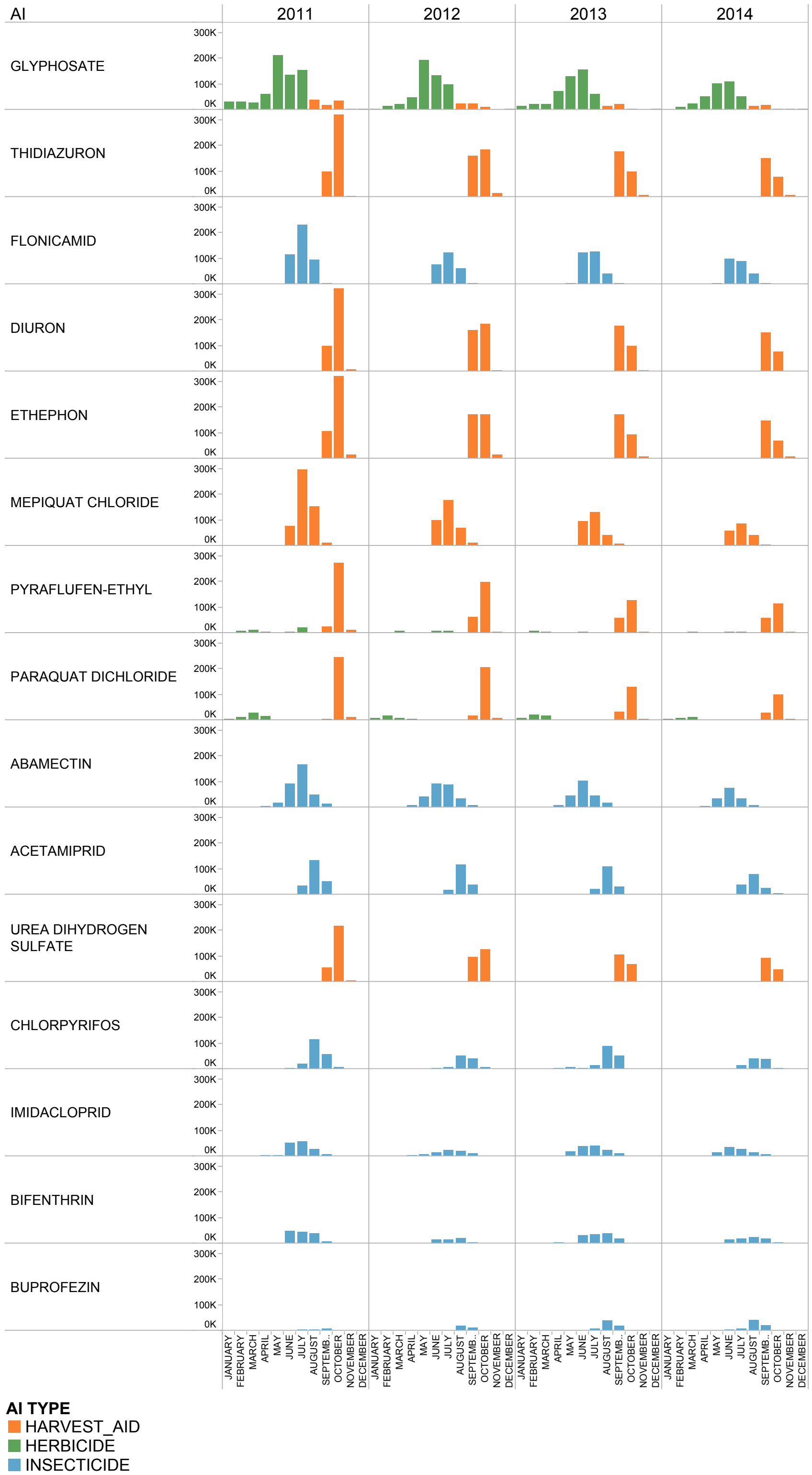


Figure A-14: *Acres of cotton treated by the major AIs by month and AI type from 2011 to 2014.*

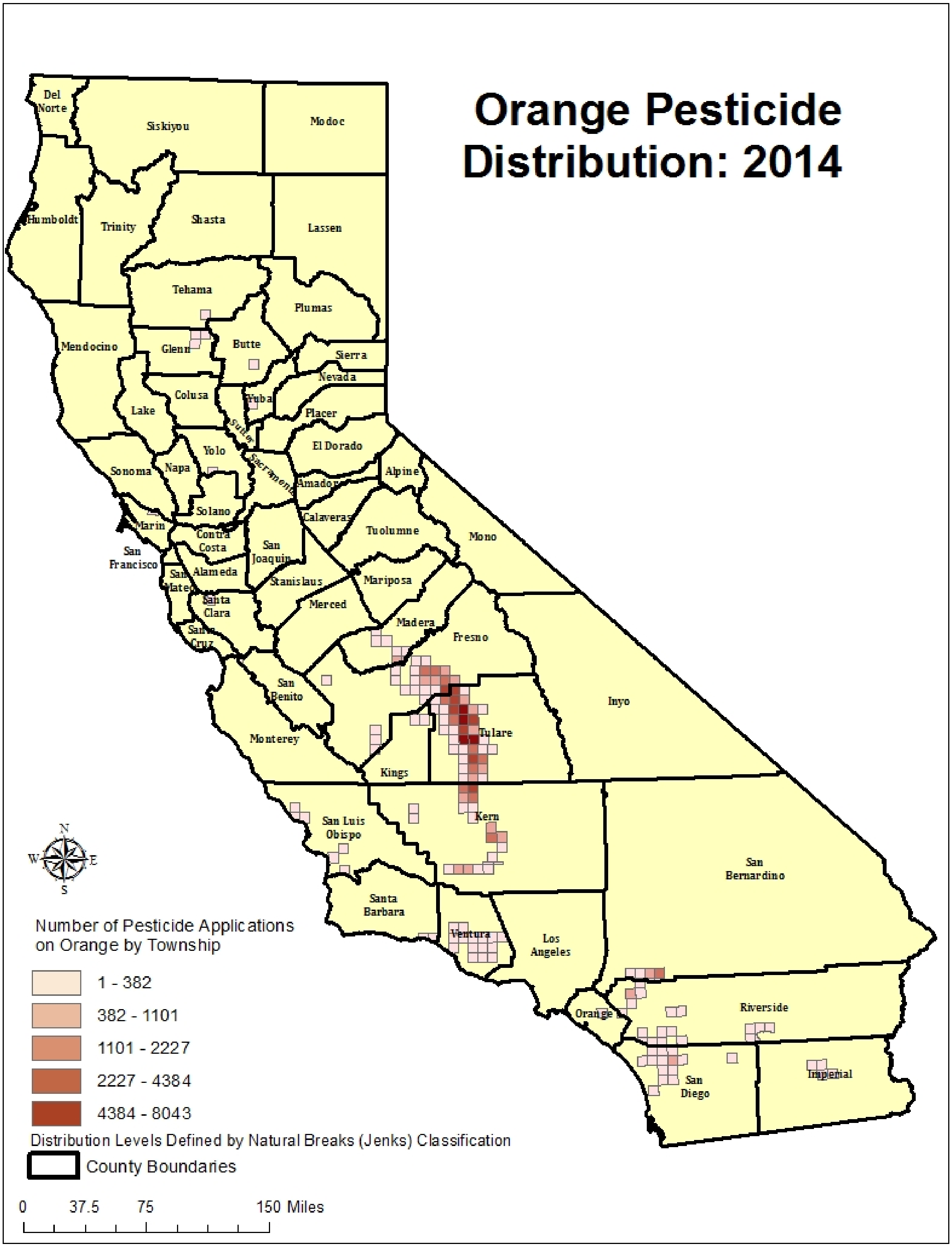
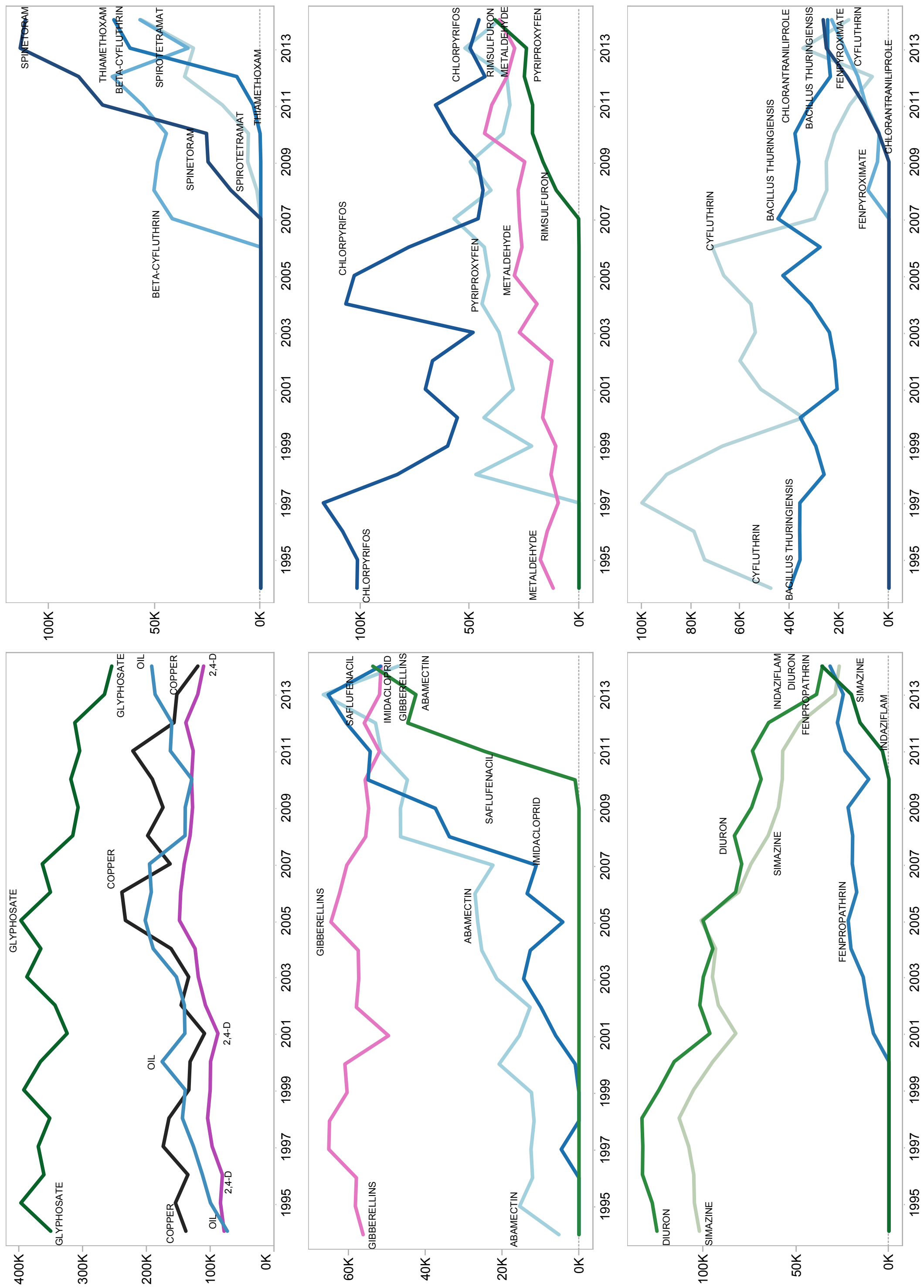


Figure A-15: *Number of pesticide application in orange by township in 2014.*



Orange acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-16: *Acres of orange treated by the major AIs from 1994 to 2014.*

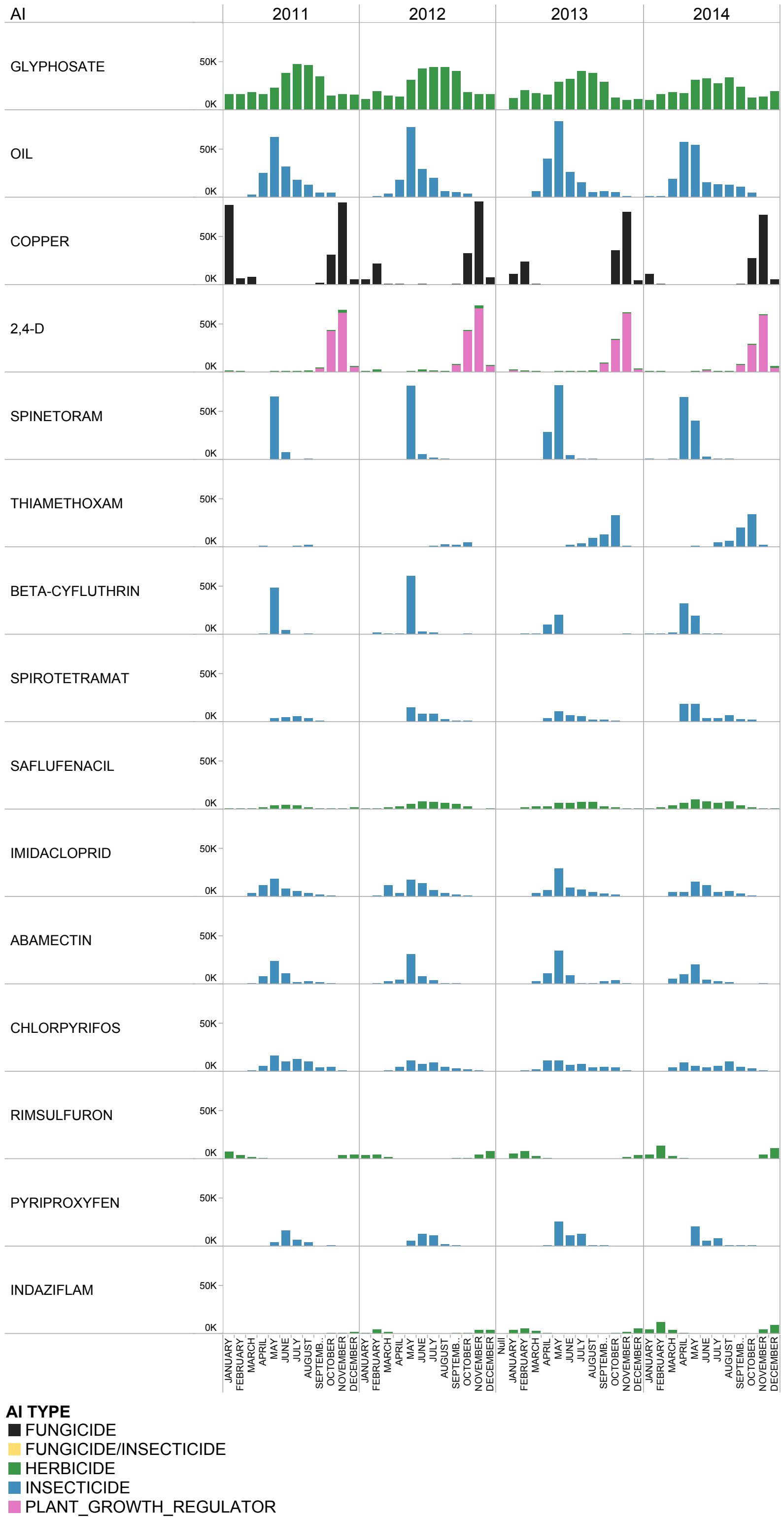


Figure A-17: *Acres of orange treated by the major AIs by month and AI type from 2011 to 2014.*

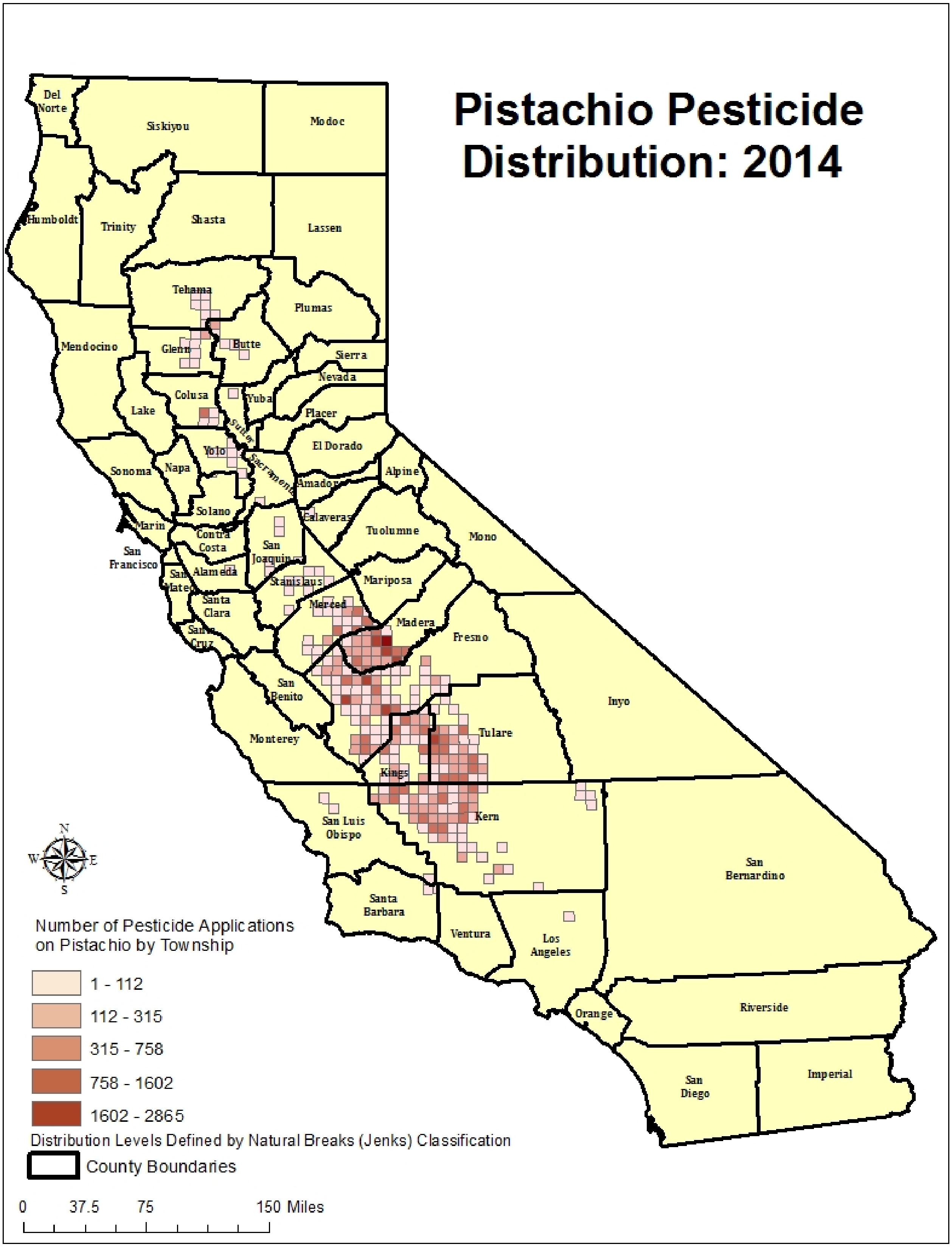
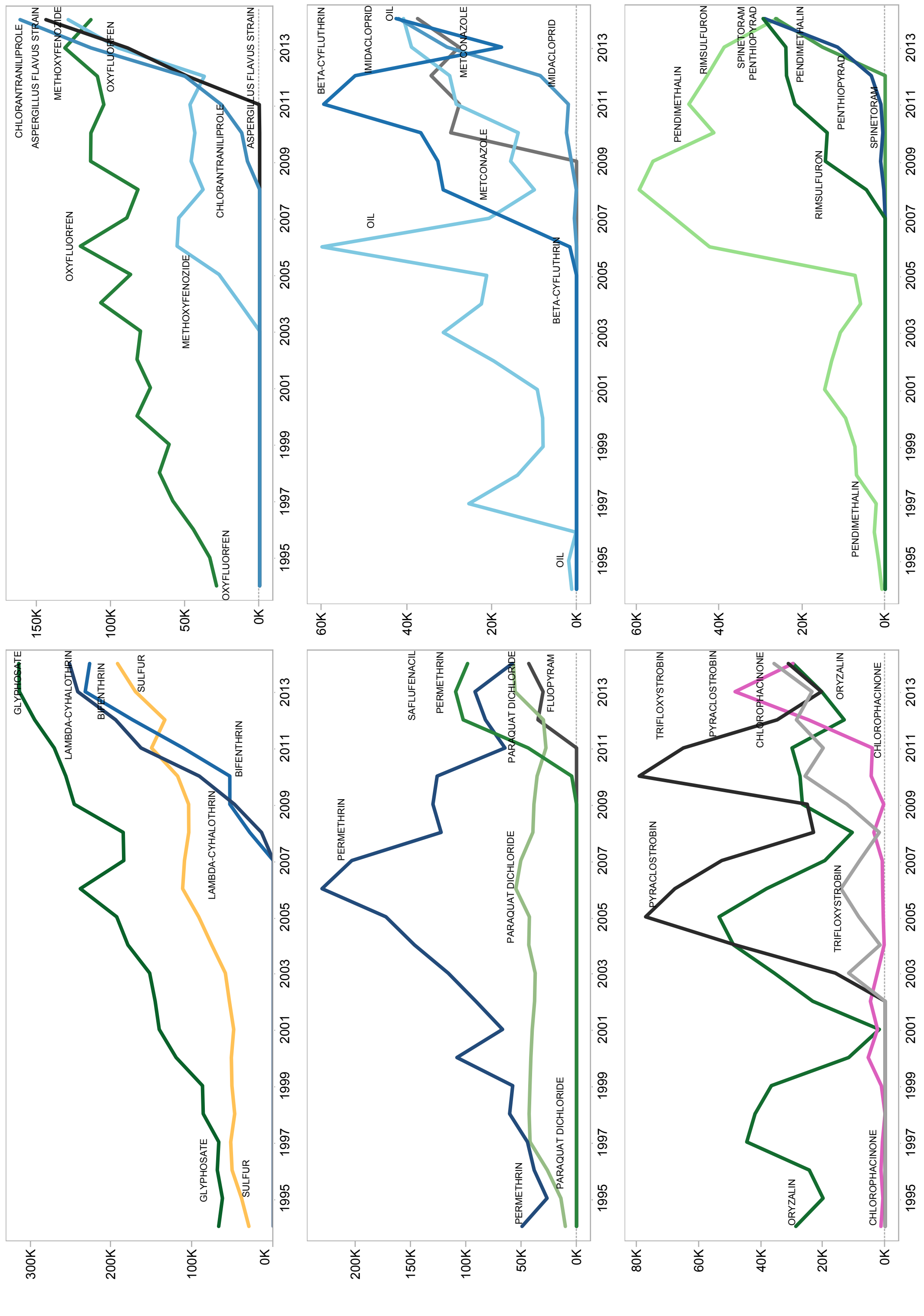


Figure A-18: *Number of pesticide application in pistachio by township in 2014.*



Pistachio acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-19: *Acres of pistachio treated by the major AIs from 1994 to 2014.*

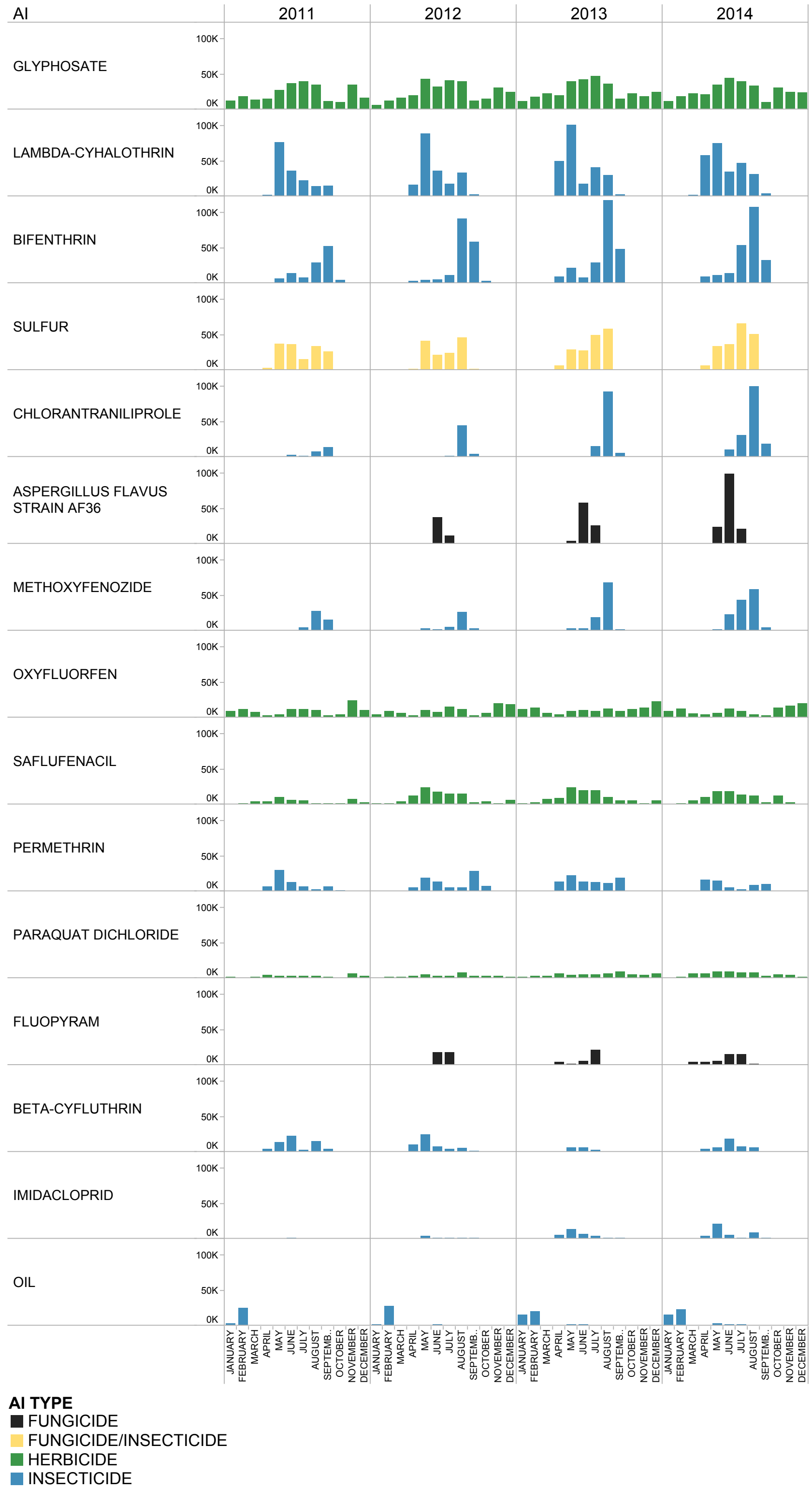


Figure A-20: *Acres of pistachio treated by the major AIs by month and AI type from 2011 to 2014.*

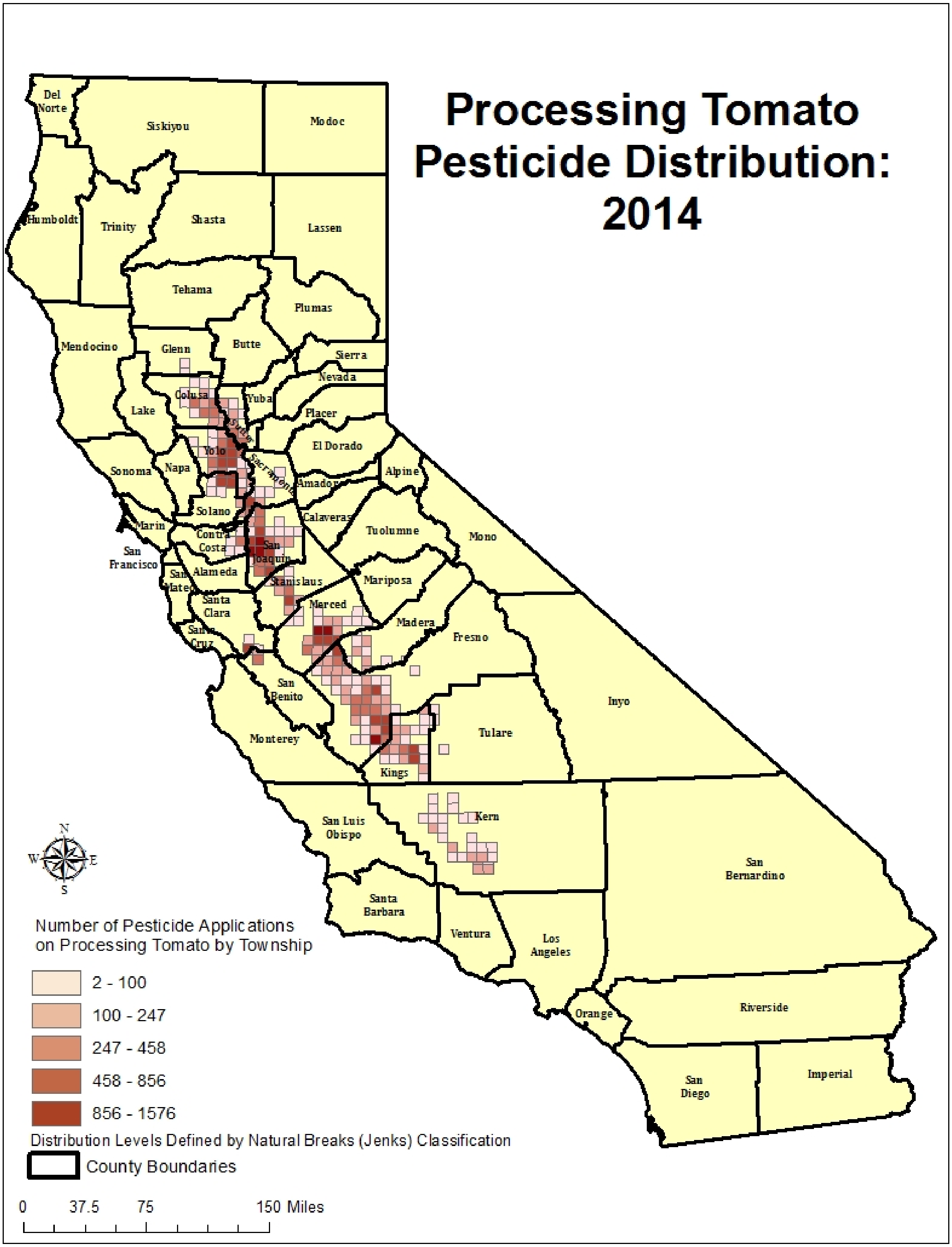
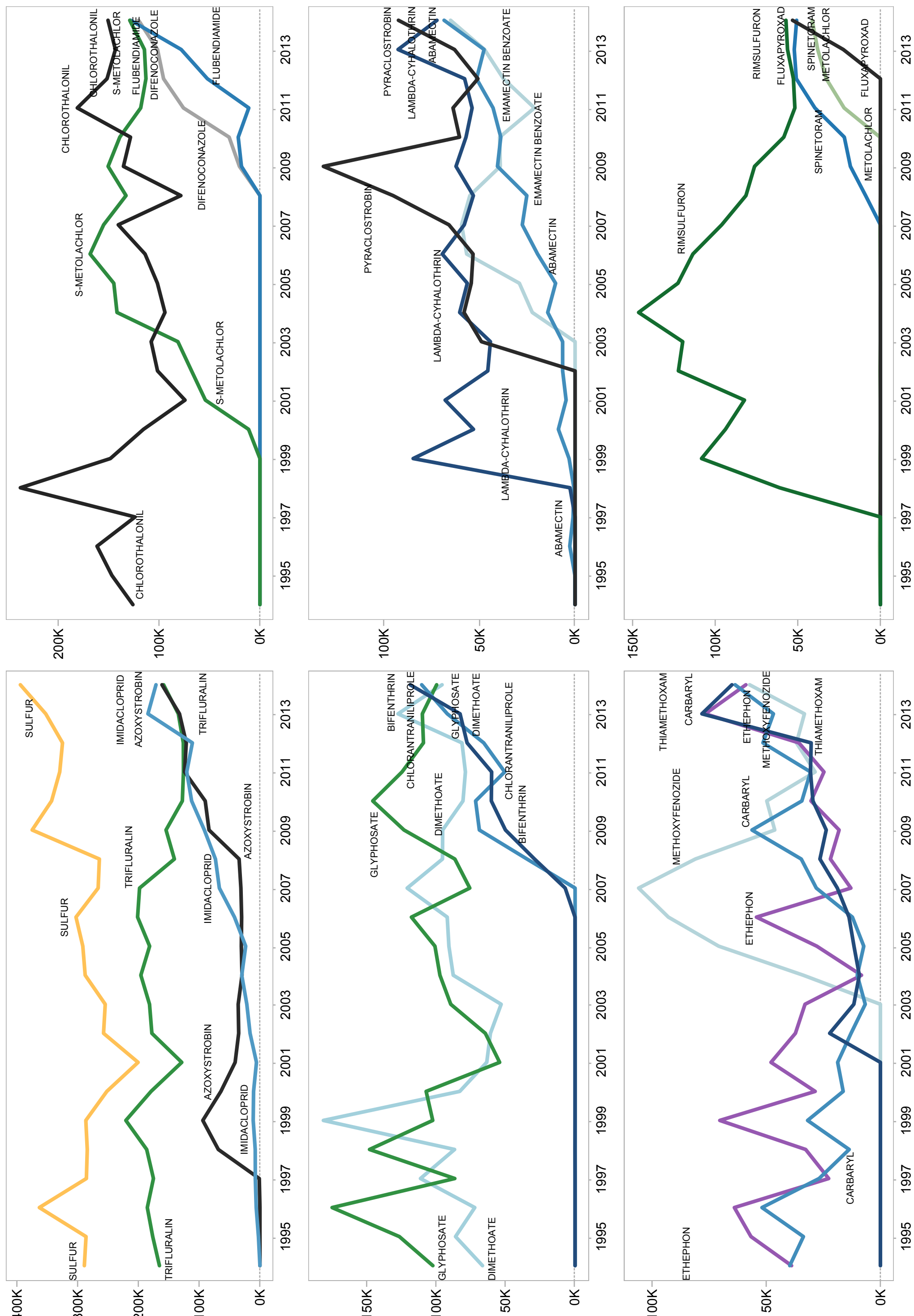


Figure A-21: *Number of pesticide application in processing tomato by township in 2014.*



Processing tomato acres treated by the major AIs from 1994 to 2014. The graphs are ordered by the acres treated in 2014 starting with the largest amount in the upper left, moving to the right, then down. Within each graph the AIs listed on the right side are listed in order of acres treated, with the AI with the largest amount on top. Because the amounts are often close in 2014, it may not be clear from these AI labels which line corresponds to which AI. However, the lines are labelled at other places, with the AI name touching its line. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides yellow, defoliants orange, and others purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-22: *Acres of processing tomato treated by the major AIs from 1994 to 2014.*

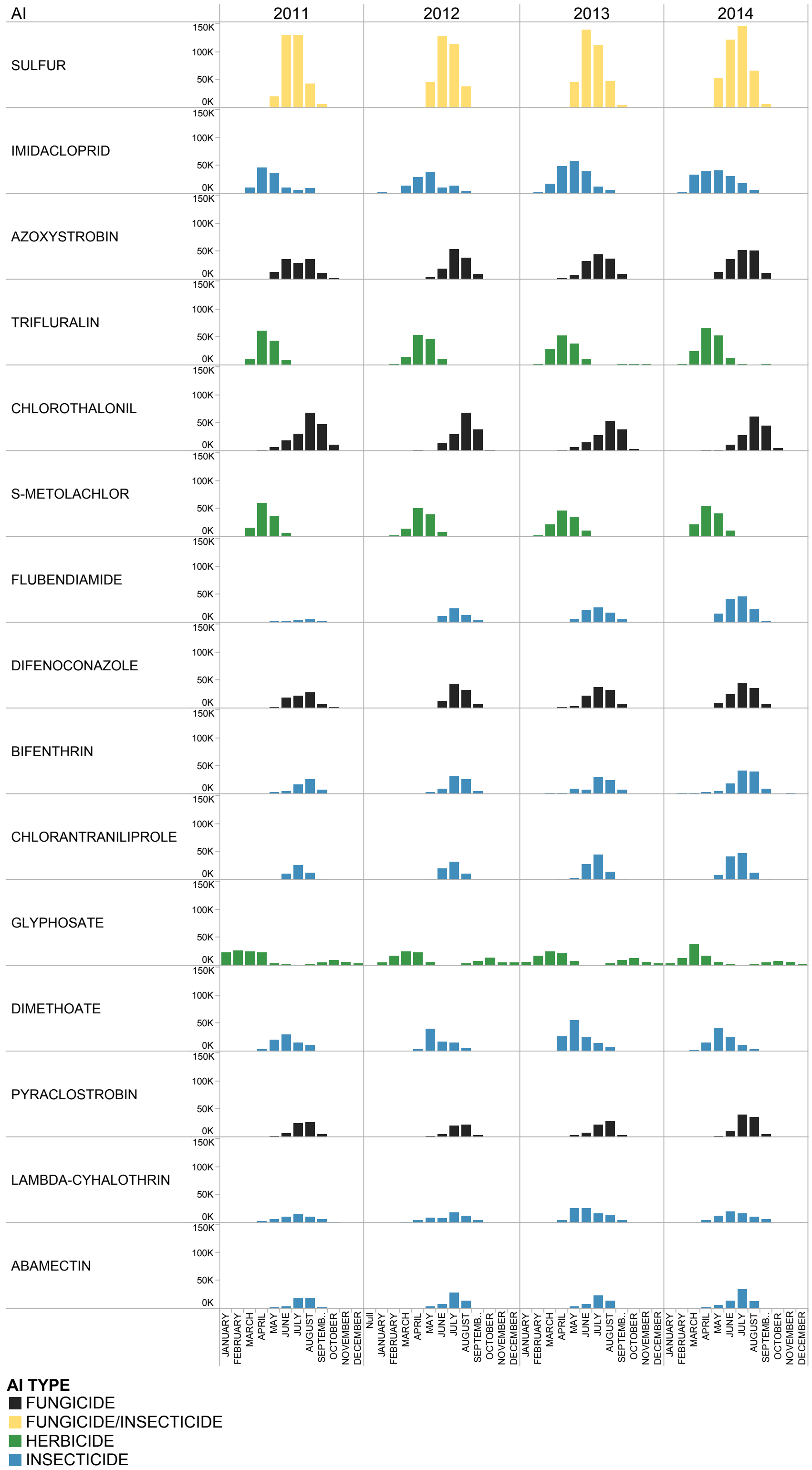


Figure A-23: *Acres of processing tomato treated by the major AIs by month and AI type from 2011 to 2014.*

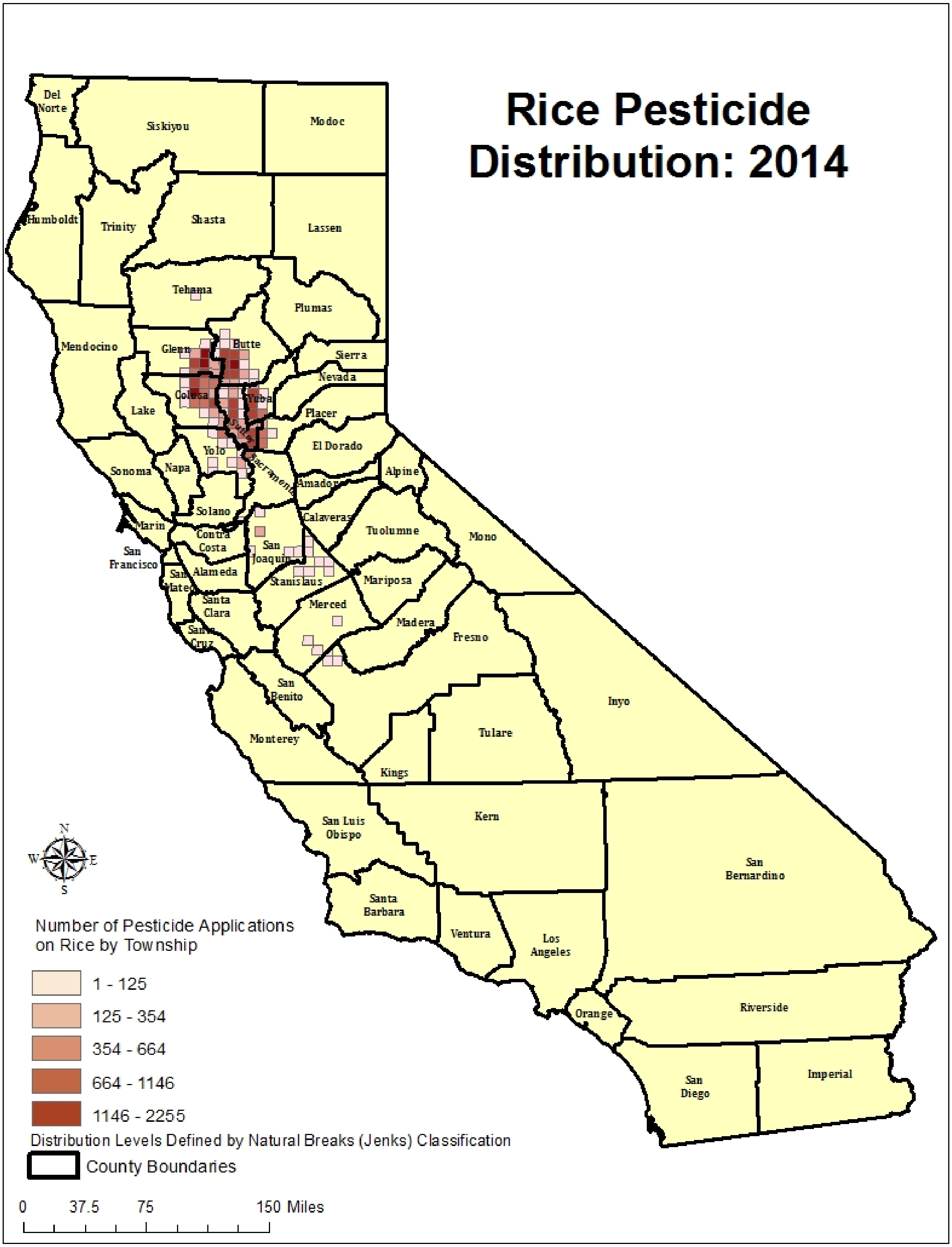


Figure A-24: *Number of pesticide application in rice by township in 2014.*

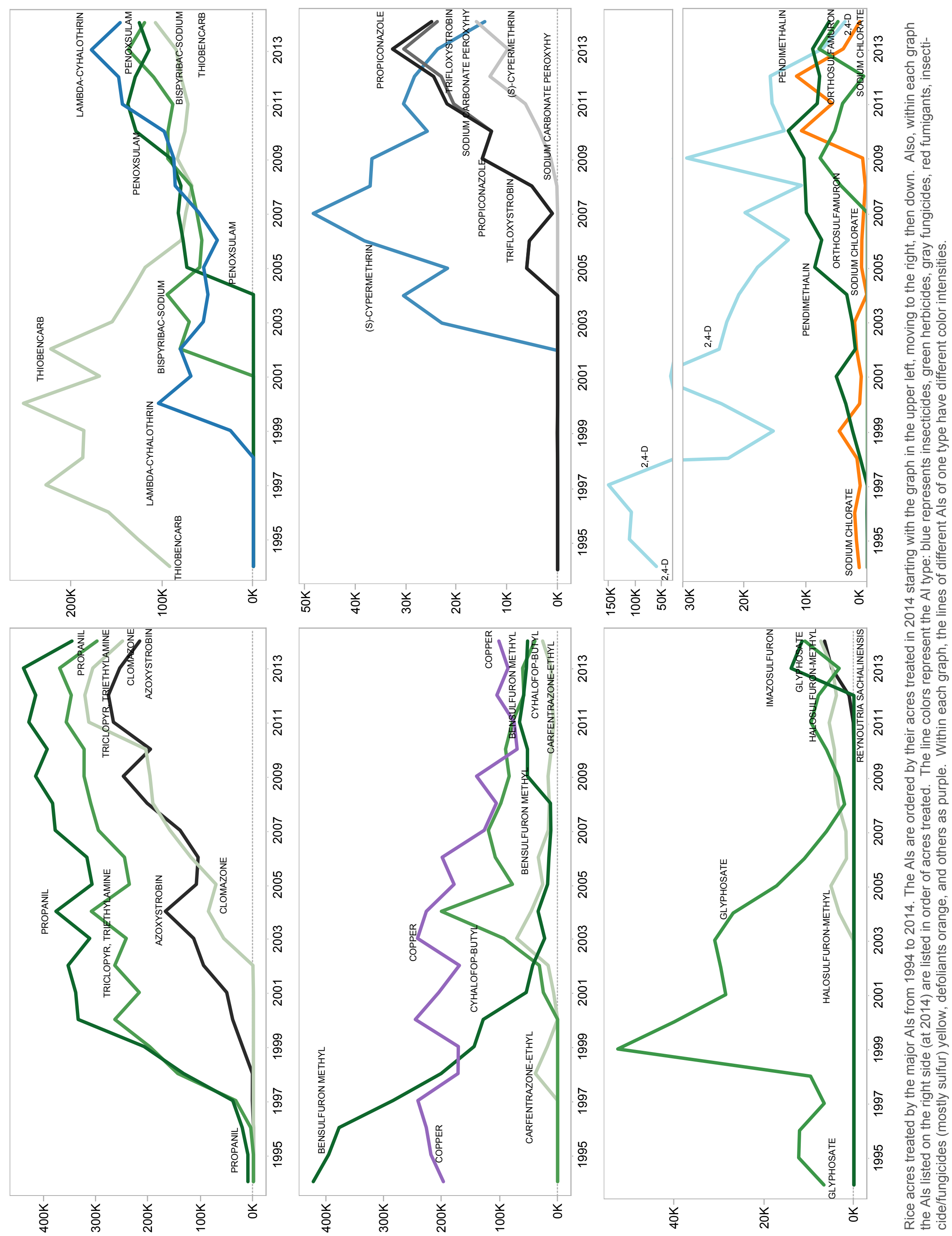


Figure A-25: *Acres of rice treated by the major AIs from 1994 to 2014.*

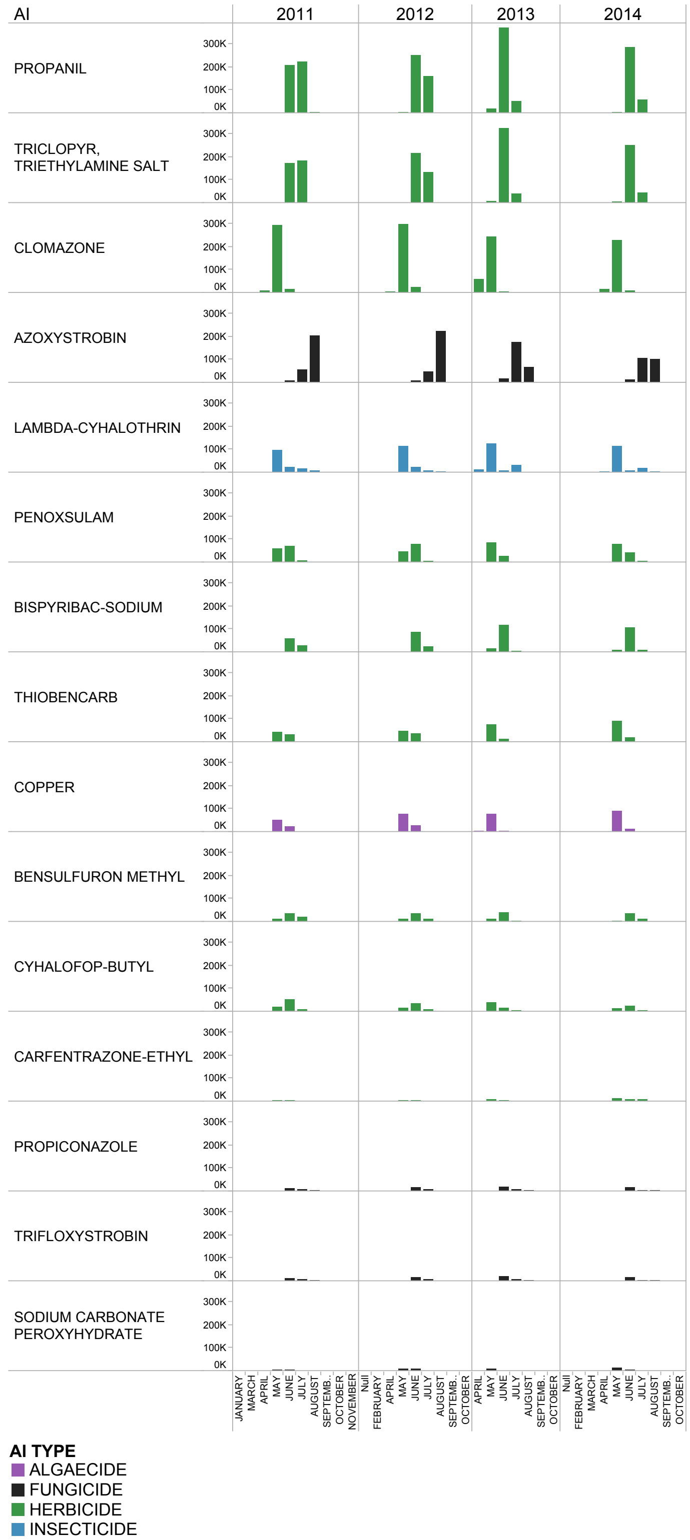


Figure A-26: *Acres of rice treated by the major AIs by month and AI type from 2011 to 2014.*

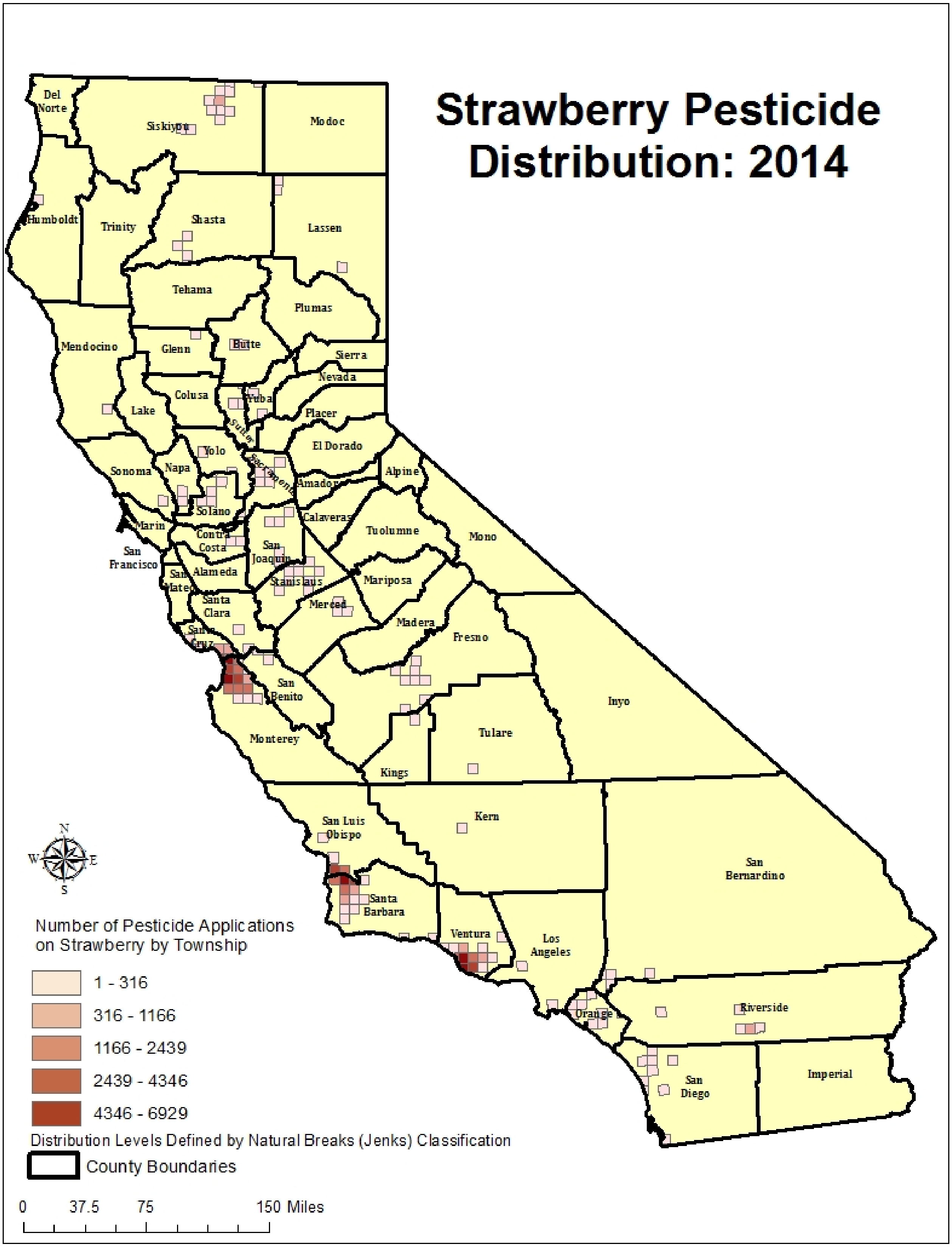
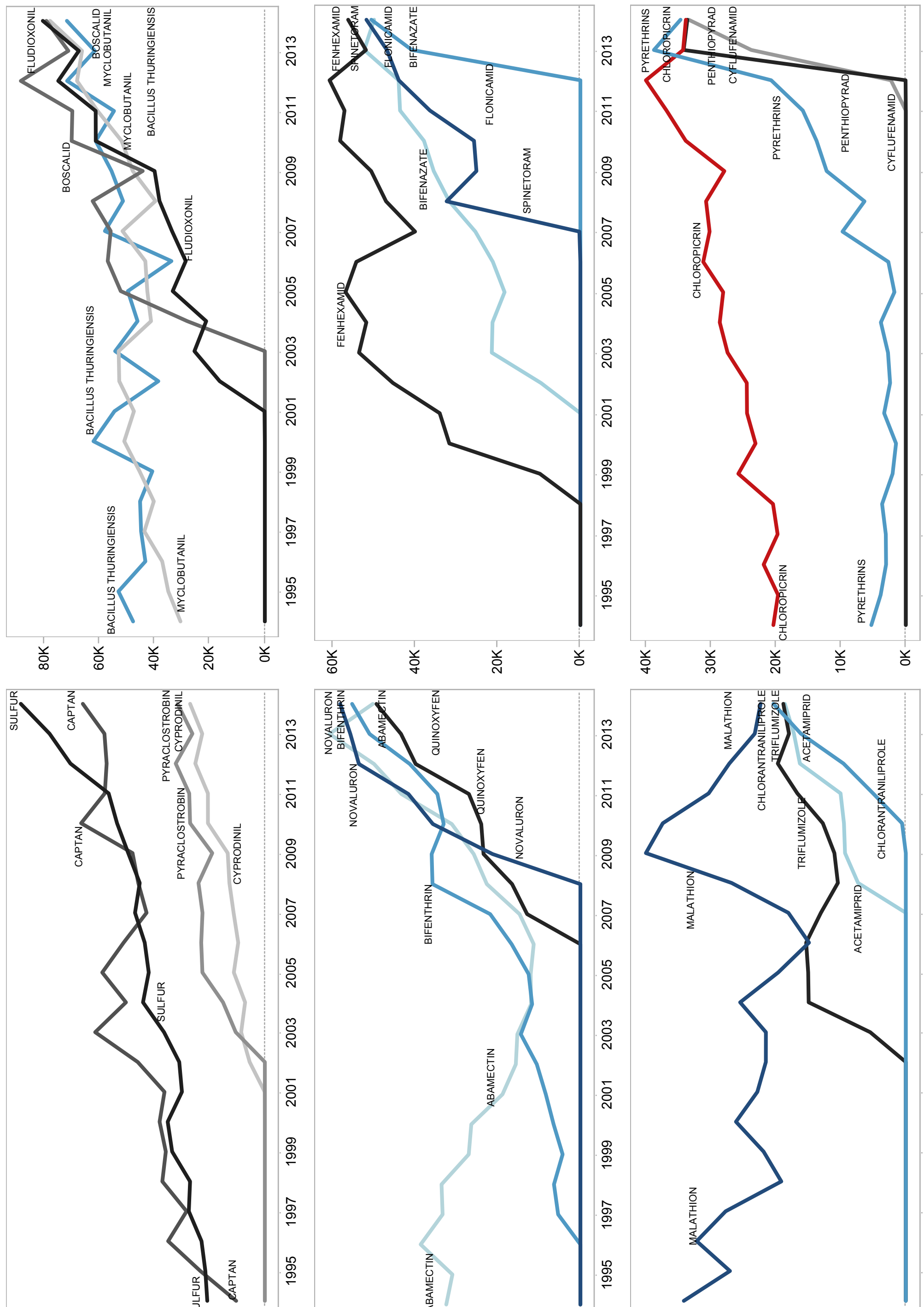


Figure A-27: *Number of pesticide application in strawberry by township in 2014.*



Strawberry acres treated by the major AIs from 1994 to 2014. The graphs are ordered by the acres treated in 2014 starting with the largest amount in the upper left, moving to the right, then down. Within each graph the AIs listed on the right side are listed in order of acres treated, with the AI with the largest amount on top. Because the amounts are often close in 2014, it may not be clear from these AI labels which line corresponds to which AI. However, the lines are labelled at other places, with the AI name touching its line. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides yellow, defoliants orange, and others purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-28: *Acres of strawberry treated by the major AIs from 1994 to 2014.*

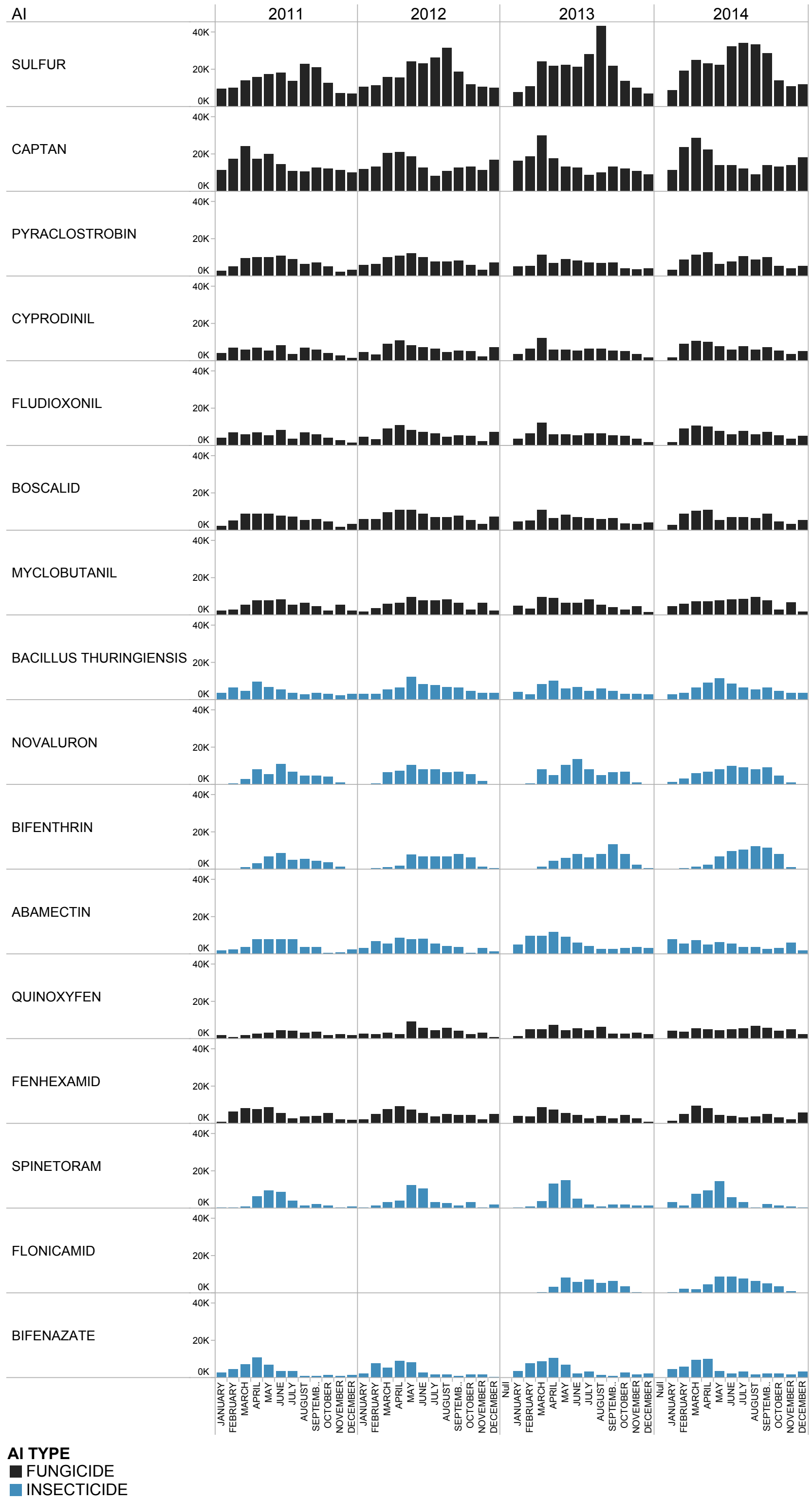


Figure A-29: *Acres of strawberry treated by the major AIs by month and AI type from 2011 to 2014.*

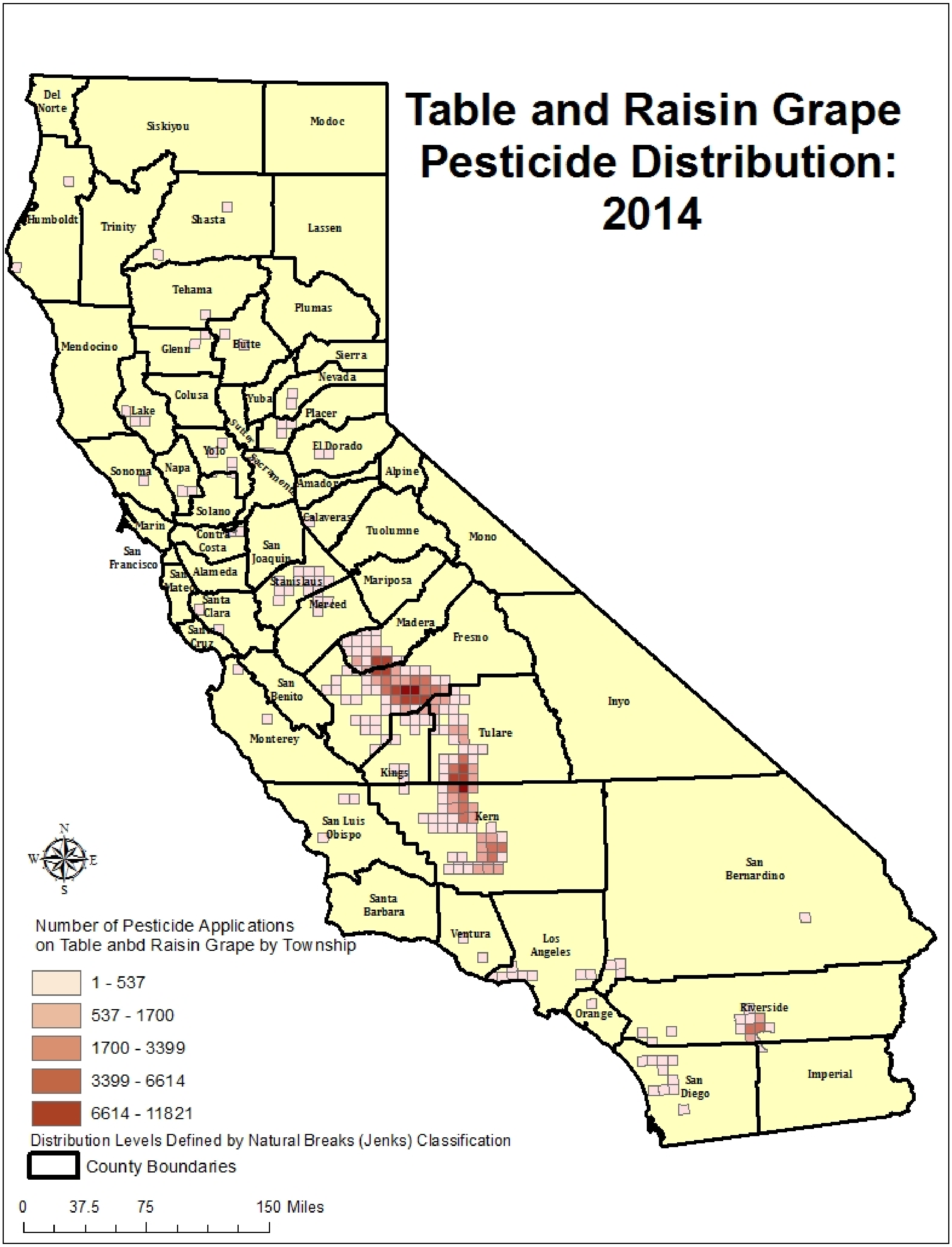


Figure A-30: *Number of pesticide application in table and raisin grape by township in 2014.*

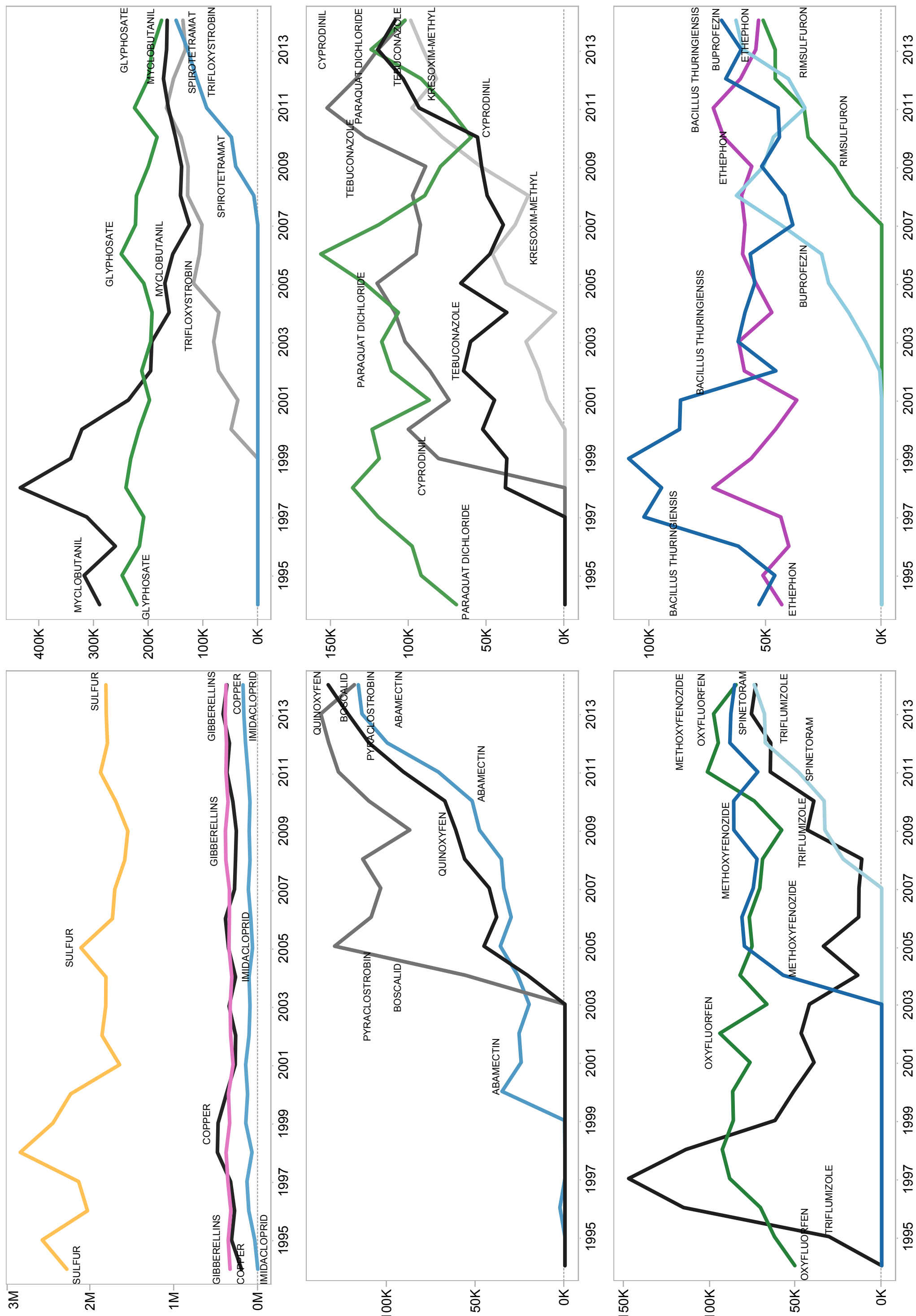


Table and raisin grape acres treated by the major AIs from 1994 to 2014. The graphs are ordered by the acres treated in 2014 starting with the largest amount in the upper left, moving to the right, then down. Within each graph the AIs listed on the right side are listed in order of acres treated, with the AI with the largest amount on top. Because the amounts are often close in 2014, it may not be clear from these AI labels which line corresponds to which AI. However, the lines are labelled at other places, with the AI name touching its line. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides yellow, defoliants orange, and others purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-31: *Acres of table and raisin grape treated by the major AIs from 1994 to 2014.*

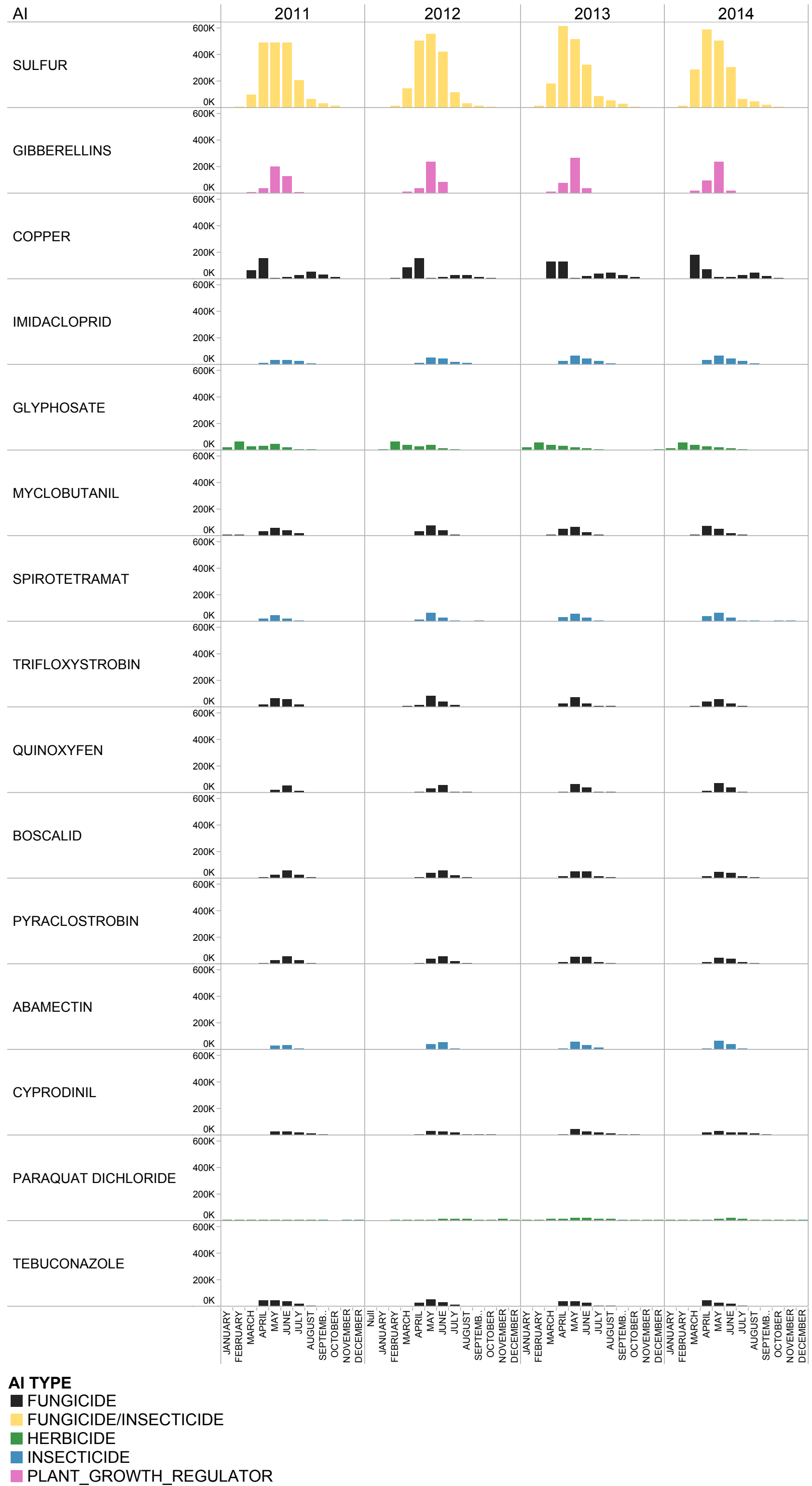


Figure A-32: *Acres of table and raisin grape treated by the major AIs by month and AI type from 2011 to 2014.*

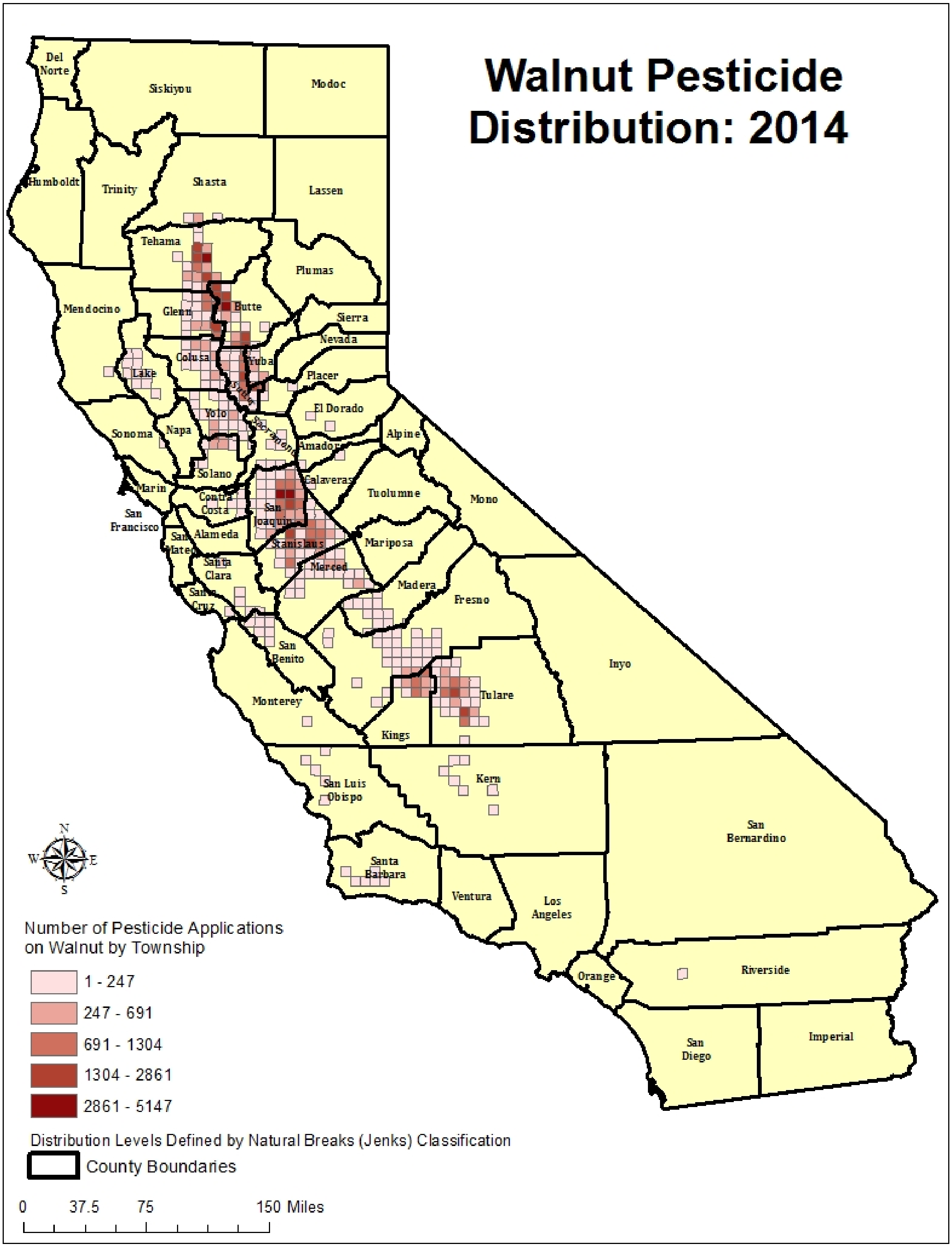
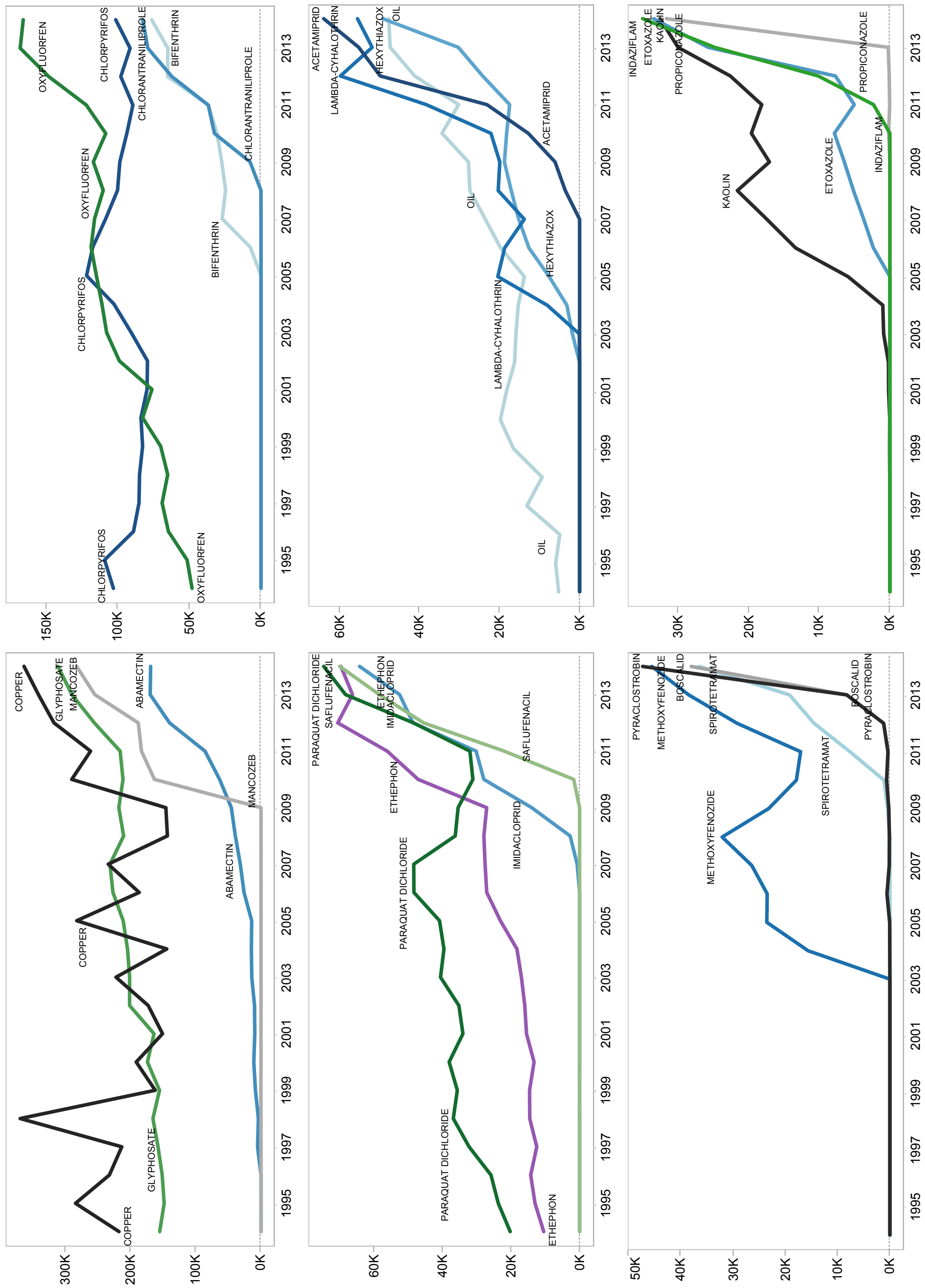


Figure A-33: *Number of pesticide application in walnut by township in 2014.*



Walnut acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-34: *Acres of walnut treated by the major AIs from 1994 to 2014.*

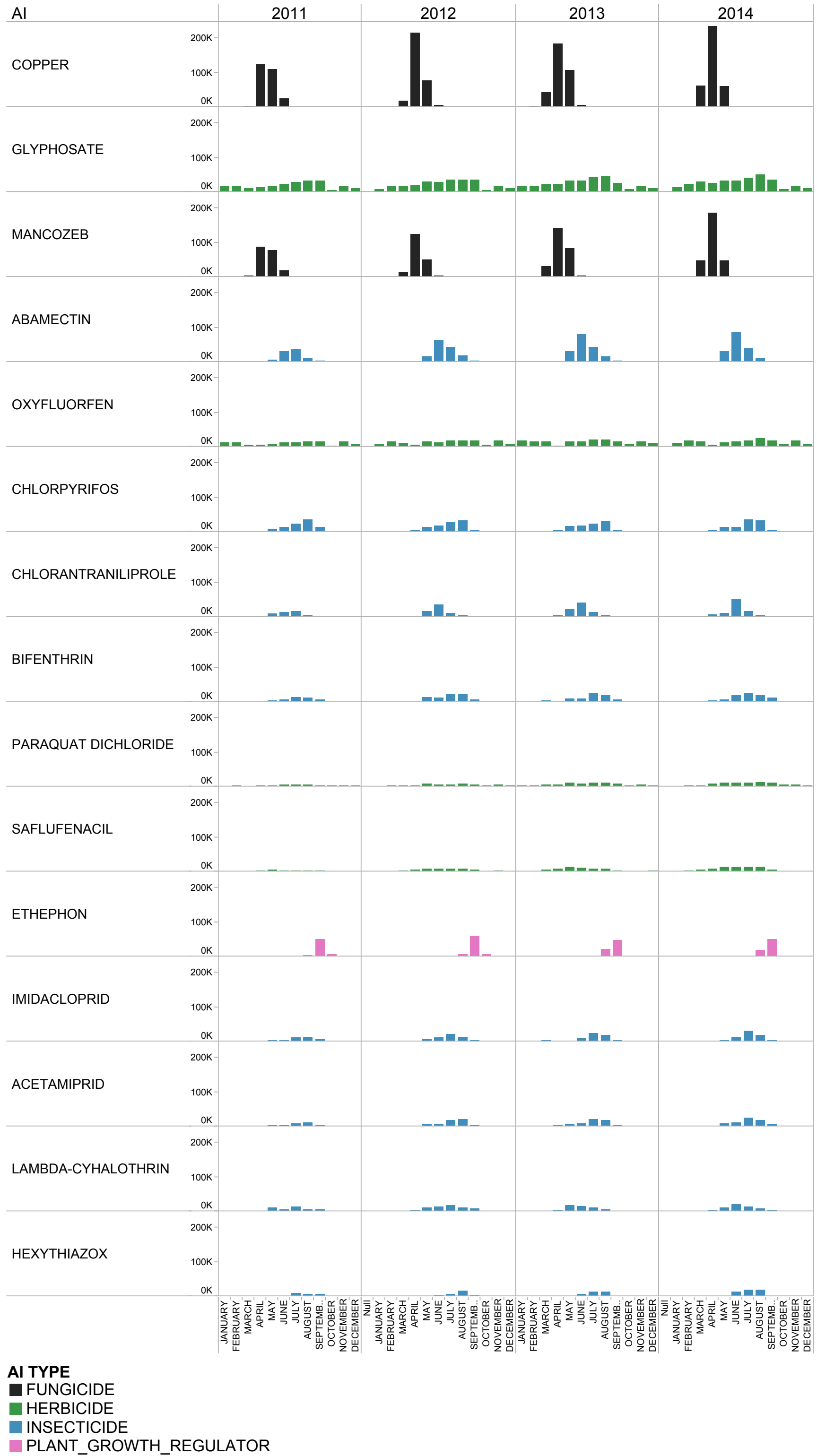


Figure A-35: *Acres of walnut treated by the major AIs by month and AI type from 2011 to 2014.*

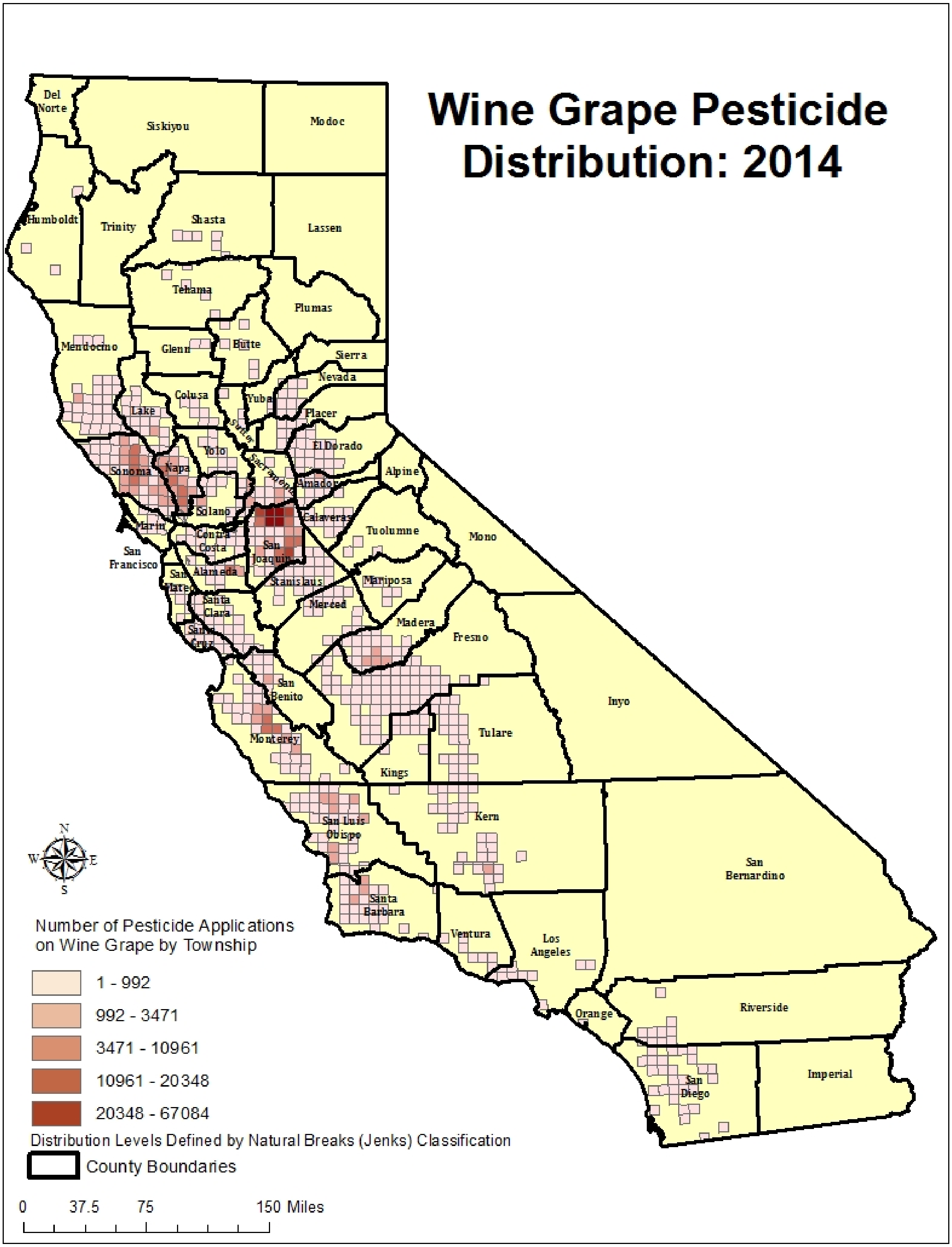
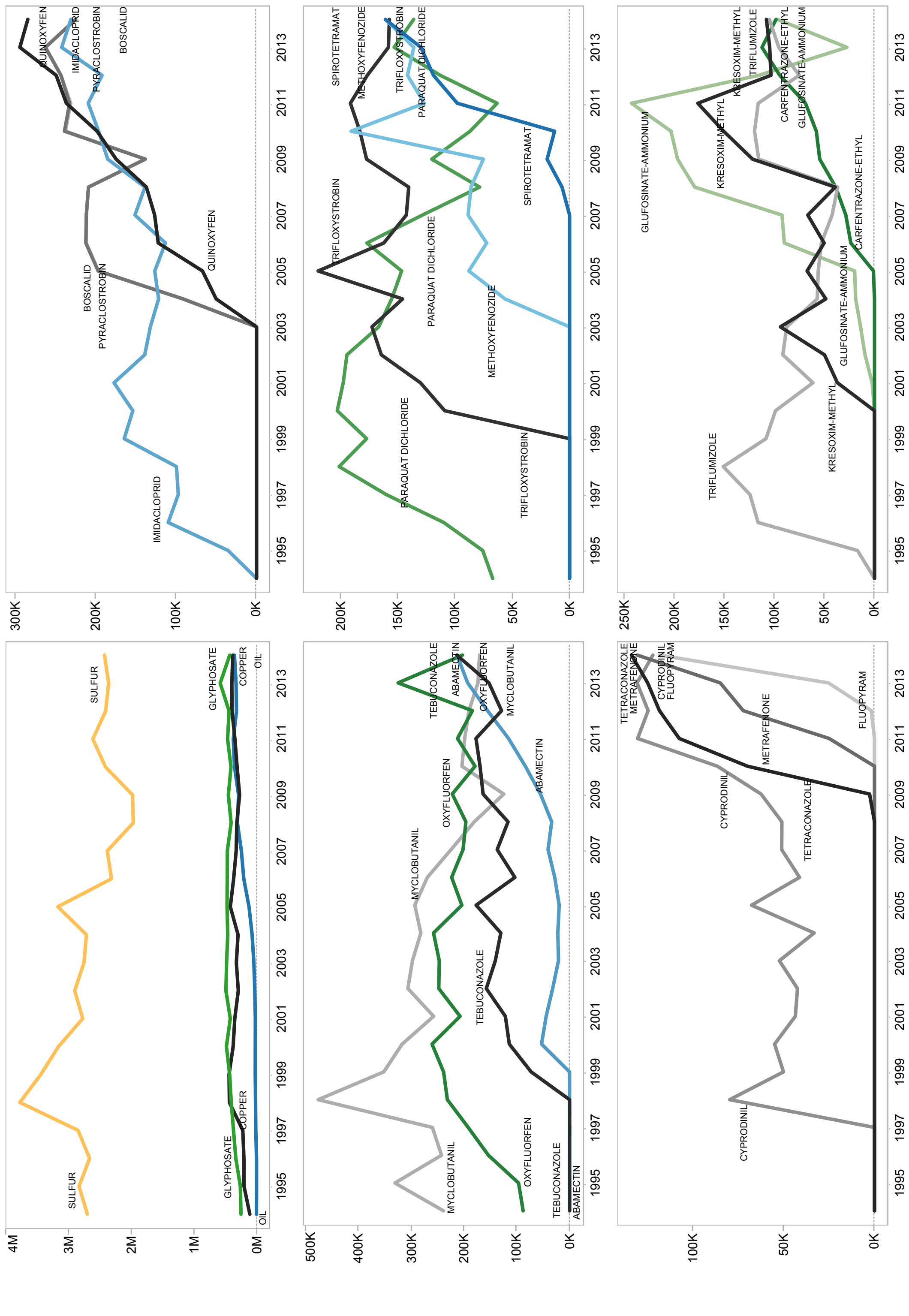


Figure A-36: *Number of pesticide application in wine grape by township in 2014.*



Wine grape acres treated by the major AIs from 1994 to 2014. The AIs are ordered by their acres treated in 2014 starting with the graph in the upper left, moving to the right, then down. Also, within each graph the AIs listed on the right side (at 2014) are listed in order of acres treated. The line colors represent the AI type: blue represents insecticides, green herbicides, gray fungicides, red fumigants, insecticide/fungicides (mostly sulfur) yellow, defoliants orange, and others as purple. Within each graph, the lines of different AIs of one type have different color intensities.

Figure A-37: *Acres of wine grape treated by the major AIs from 1994 to 2014.*

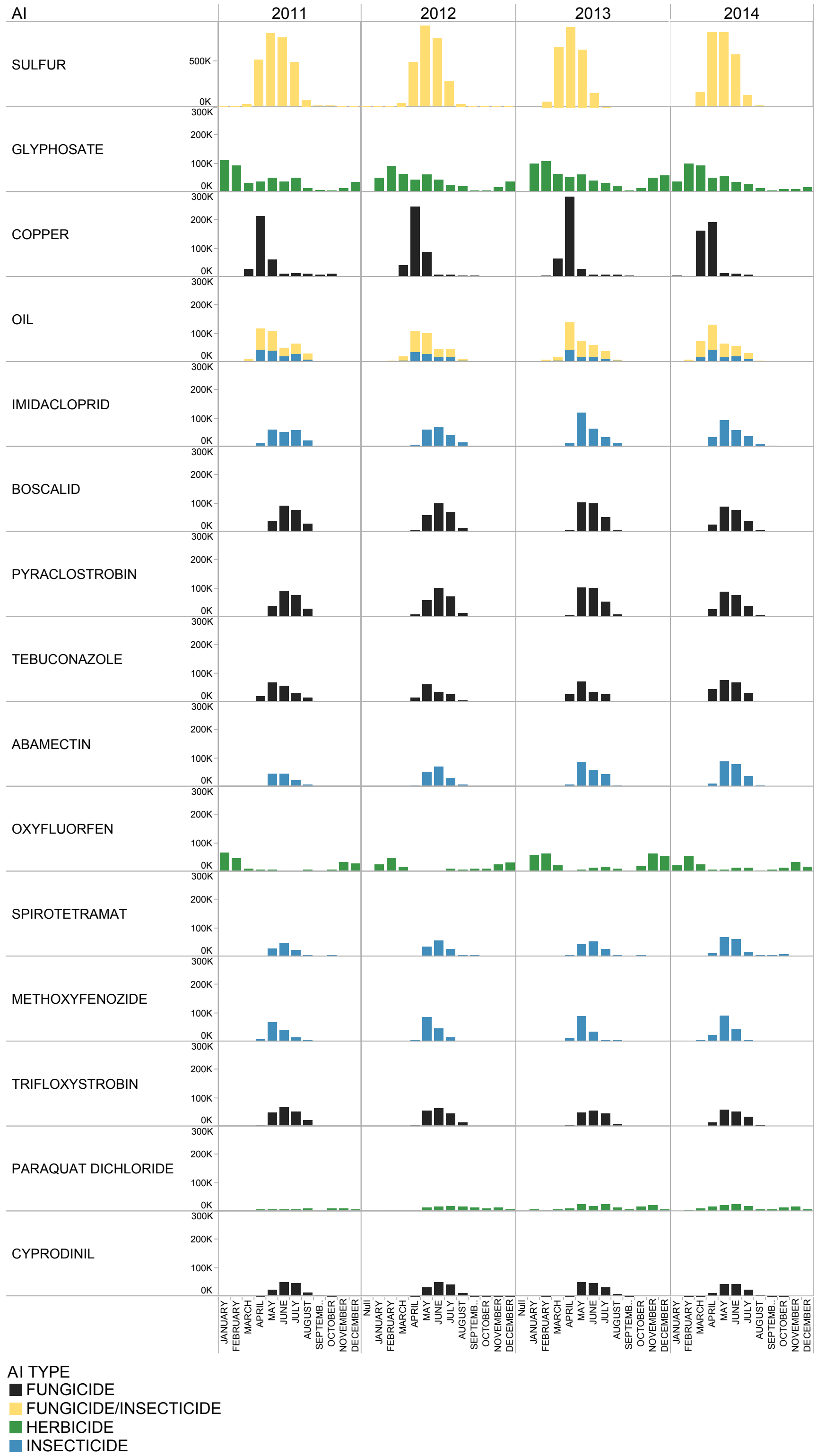


Figure A-38: *Acres of wine grape treated by the major AIs by month and AI type from 2011 to 2014.*