IV. TRENDS IN USE IN CERTAIN PESTICIDE CATEGORIES

Reported pesticide use in California in 2004 totaled 180 million pounds, an increase of 5.1 million pounds from 2003. Production agriculture, the major category of use subject to reporting requirements, accounted for most of the overall increase in use. Applications for production agriculture increased by 6.0 million pounds.

The active ingredients (AI) with the largest uses by pounds were sulfur, petroleum oils, metam-sodium, mineral oil, and 1,3-dichloropropene (1,3-D). Sulfur use increased by 783,000 pounds (1.5 percent) and was the most highly used non-adjuvant pesticide in 2004, both in pounds applied and acres treated. By pounds, sulfur accounted for 30 percent of all reported pesticide use. Sulfur is a natural fungicide favored by both conventional and organic farmers. Petroleum oil use decreased by 1.5 million pounds (-8.7 percent), metam sodium use decreased by 132,000 pounds (-0.9 percent), mineral oil use increased by 2.8 million pounds (44 percent), and 1,3-D use increased by 1.9 million pounds (28 percent).

Major crops or sites that showed an overall increase in pesticide pounds applied from 2003 to 2004 included almonds (2.8 million pounds increase), oranges (2.4 million pounds), processing tomatoes (0.6 million pounds), fresh tomatoes (0.5 million pounds), and outdoor nurseries in containers (0.4 million pounds). Major crops or sites with decreased pounds applied included carrots (0.5 million pounds decrease), walnuts (0.3 million pounds), public health (0.3 million pounds), lemons (0.3 million pounds), and pears (0.3 million pounds).

DPR data analyses have shown that pesticide use varies from year to year depending upon pest problems, weather, acreage and types of crops planted, economics, and other factors. Spring of 2004 was warm and dry so diseases of many crops were low; therefore fungicide use was less in 2004 than in 2003. Herbicide use increased partly because a wet winter promoted the growth of weeds. The hot dry summer was conducive to mite buildups, so miticide use increased. A dramatic increase occurred in the use of some newer, reduced-risk pesticides such as spinosad, acetamiprid, pyraclostrobin, methoxyfenozide, carfentrazone-ethyl, and boscalid. Field prices improved in 2004 for most of the 12 crops discussed in Section V of this report, entitled “Trends in Pesticide Use in Certain Commodities”. This increase may have also been a contributor to use more pesticides to protect valuable crops.

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

In the past several years, the PUR Annual Reports have included tables of pesticide use in various pesticide categories, including reproductive toxins, carcinogens, organophosphates and carbamates, ground water contaminants, toxic air contaminants, oils, reduced-risk pesticides, and biopesticides. Use in about half of these pesticide categories increased and about half decreased from 2003 to 2004. However, most of the increase in pounds applied was due to increases in the fumigant 1,3-D and the herbicides diuron and simazine. Fumigants are applied at high rates, in part, because they treat a volume of space rather than a surface area such as the leaves and stems of plants. Thus, the pounds applied are large even though the number of applications or number of acres treated may be relatively small. Herbicide use in general increased as mentioned above because of increased weed problems in 2004. If these three AIs were not included, then use would have decreased in all of the categories, excluding the low risk oils and reduced-risk AIs. Some of the major statistical changes from 2003 to 2004 include:

- Chemicals classified as reproductive toxins decreased in pounds applied from 2003 to 2004 (down 600,000 pounds or 2.5 percent) and decreased in cumulative acres treated (down 180,000 acres or 7.7 percent). The largest decrease in pounds was from the fumigant methyl bromide.

- The pounds of chemicals classified as carcinogens increased (up 1.1 million pounds or 3.8 percent), but acres treated decreased (down 160,000 acres or 4.1 percent). The increase in pounds was mainly due to increase in use of the fumigant 1,3-D, one of several alternatives to methyl bromide. However, diuron had the largest increase in acres treated. Use of most other AIs classified as carcinogens decreased.

- Use of insecticide organophosphate and carbamate chemicals, which includes compounds of high regulatory concern, continued to decline as they have for nearly every year since 1995. Use decreased by 130,000 pounds (1.6 percent) and by 360,000 acres treated (5.7 percent). Although most organophosphate and carbamate AIs decreased, pounds of phosmet and chlorpyrifos increased, and acres treated with phosmet increased. Interestingly, acres treated with chlorpyrifos decreased more than nearly all other organophosphates and carbamates. The reason for this difference with chlorpyrifos is that use increased dramatically on oranges, where chlorpyrifos rate of use was about 3 pounds/acre and decreased on alfalfa, where rate of use was about 0.5 pounds/acres

- Use of chemicals categorized as ground water contaminants increased from 2003 to 2004. Use by pounds increased 81,000 pounds applied (3.6 percent), and cumulative acres treated increased by about 170,000 acres (11 percent). Nearly all of the increase was due to diuron and simazine.

- Chemicals categorized as toxic air contaminants, another regulatory concern, increased by 1.0 million pounds applied (2.7 percent) but decreased by 250,000 cumulative acres treated (7.1 percent). Most of the increase in pounds was due to increases in 1,3-D.

- Pounds of reduced-risk pesticides decreased by 32,000 pounds applied (2.9 percent) but increased by 130,000 acres treated (2.2 percent). The biggest increases (with both pounds and acres treated) were in use of methoxyfenozide, pyraclostrobin, and boscalid. The biggest decreases were in use of tebufenozide and indoxacarb.

- Biopesticide use decreased, especially by pounds applied. Use decreased by 340,000 pounds (33 percent) and by 150,000 acres treated (6.6 percent). By far, most of the decrease in pounds was due to liquefied nitrogen used in structural applications and potassium bicarbonate; most of the decrease in acres treated was due to *Bacillus thuringiensis*.

Since 1992, 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 normal variations. Short periods of time (three to five years) may suggest trends, such as the increased pesticide use from 2001 to 2004 or the decreased use from 1998 to 2001. However, statistical analyses from 1992 to 2004 do not indicate a significant trend of either increase or decrease in pesticide use.

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

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

To provide an overview, pesticide use is summarized for eight different categories from 1994 to 2004 (Tables 3–10 and Figures 1–8). These categories classify pesticides according to certain characteristics such as reproductive toxins, carcinogens, or reduced-risk characteristics.

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

1. Pesticides listed on the State's Proposition 65 list of chemicals "known to cause reproductive toxicity”.
2. Pesticides listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals "known to cause cancer”.
3. Pesticides that are cholinesterase inhibitors, that is, organophosphate and carbamate chemicals.
4. Pesticides on the “a” part of DPR's groundwater protection list (section 6800 (a) of the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1).
5. Pesticides from DPR's toxic air contaminants list (California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, section 6860).
6. Oil pesticides, which may include some chemicals on the State’s Proposition 65 list of chemicals “known to cause cancer” but which also serve as alternatives to high-toxicity pesticides.
7. AIs contained in pesticide products that have been given reduced-risk status by U.S. EPA.
8. Biopesticides, which 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 TRENDS OF PESTICIDES ON THE STATE'S PROPOSITION 65 LIST OF CHEMICALS THAT ARE "KNOWN TO CAUSE REPRODUCTIVE TOXICITY"

Table 3A. *The reported pounds of pesticides used which 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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1080	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
2,4-DB ACID	0	0	0	1,697	6,932	12,397	11,453	16,954	9,393	6,408	4,789
AMITRAZ	70,363	75,018	55,459	66,439	13,563	7,558	8,087	263	154	115	0
ARSENIC PENTOXIDE	86,445	83,814	205,089	64,372	50,899	245,238	91,267	259,386	194,650	165,709	12,705
ARSENIC TRIOXIDE	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1
BENOMYL	141,586	189,943	148,433	114,406	227,690	133,109	118,601	76,739	28,978	7,094	2,209
BROMACIL, LITHIUM SALT	11,085	6,517	17,381	9,141	4,686	4,162	4,478	3,217	4,016	3,025	1,801
BROMOXYNIL OCTANOATE	127,154	119,407	148,480	115,368	120,877	120,338	116,125	78,484	72,759	76,927	50,223
CHLORSULFURON	1,228	1,485	1,623	2,218	3,046	1,445	2,590	1,203	2,190	8,690	9,978
CYANAZINE	532,688	641,057	566,632	470,838	277,313	180,487	50,468	17,250	7,178	37	8
CYCLOATE	51,035	49,138	44,628	55,459	62,753	49,096	37,408	31,785	34,347	30,080	42,563
DICLOFOP-METHYL	38,276	16,540	79,874	41,130	24,783	18,710	21,696	11,765	5,058	9,309	5,988
EPTC	765,576	660,185	703,996	579,245	393,031	448,883	323,254	276,782	253,887	141,756	182,245
ETHYLENE OXIDE	3	0	0	0	31	2	6	3	0	0	0
FENOXAPROP-ETHYL	5,023	3,731	3,974	3,895	1,504	2,048	979	366	106	53	64
FLUAZIFOP-BUTYL	2,375	2,148	823	2,028	1,211	516	205	149	166	31	34
HYDRAMETHYLNON	227	807	1,741	5,456	3,183	2,267	2,495	2,381	2,741	2,024	1,896
LINURON	79,950	84,937	84,335	84,621	82,170	78,046	65,511	58,173	61,994	60,128	69,289
METAM-SODIUM	11,122,361	14,975,528	15,253,924	14,969,732	13,729,306	16,774,246	13,218,764	12,545,403	15,137,719	14,815,687	14,683,308
METHYL BROMIDE	16,607,324	17,165,964	16,022,069	15,663,832	13,569,875	15,300,388	10,869,241	6,618,631	6,550,818	7,384,398	7,089,862
METIRAM	0	0	0	0	<1	0	0	2	0	1	5
MYCLOBUTANIL	69,941	85,525	89,087	94,375	129,773	94,626	96,175	83,995	76,655	83,465	70,896
NABAM	8	1	0	0	50	2	1	8	0	0	10,693
NICOTINE	457	228	298	258	83	93	21	17	2	2	4
NITRAPYRIN	150	639	114	49	407	150	192	16	89	117	12
OXADIAZON	20,488	21,458	25,260	23,196	21,959	19,399	18,256	15,905	16,692	12,550	12,980

***Table 3A** (cont.). The reported pounds of pesticides used which are on the State's Proposition 65 list of chemicals that are "known to cause reproductive toxicity."*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
OXYDEMETON-METHYL	111,347	120,101	106,612	115,781	89,789	122,912	110,797	99,756	96,357	93,789	102,554
OXYTHIOQUINOX	4,474	7,172	6,204	2,709	1,576	2,705	411	149	117	34	27
POTASSIUM DIMETHYL DITHIO CARBAMATE	47	0	0	15	24,795	0	0	0	23	28	293
PROPARGITE	1,742,736	1,770,065	1,743,278	1,816,028	1,385,327	1,504,268	1,331,979	1,159,792	972,371	1,054,607	1,010,872
RESMETHRIN	1,069	856	661	594	796	632	712	542	661	1,561	245
SODIUM DIMETHYL DITHIO CARBAMATE	337	1	0	0	8,279	355	1,315	173	0	0	10,693
STREPTOMYCIN SULFATE	6,165	9,619	9,494	9,605	14,950	9,406	10,820	7,554	5,990	8,588	4,702
TAU-FLUVALINATE	4,723	3,787	4,137	3,040	2,827	3,315	2,251	2,228	2,184	1,630	1,581
THIOPHANATE-METHYL	100,890	116,746	122,862	88,640	65,169	76,040	67,779	66,953	71,468	125,925	119,008
TRIADIMEFON	24,147	20,692	17,370	12,204	12,919	4,846	3,114	2,840	1,736	1,770	2,110
TRIBUTYLTIN METHACRYLATE	1,734	278	185	60	113	270	107	106	39	0	0
TRIFORINE	32,574	39,729	24,877	6,562	2,752	519	365	99	78	88	294
VINCLOZOLIN	33,661	48,270	60,286	46,908	54,719	52,731	35,658	32,208	22,164	18,568	14,863
WARFARIN	<1	<1	1	1	1	1	1	1	1	3	3
TOTAL	31,797,646	36,321,386	35,549,186	34,469,905	30,389,140	35,271,206	26,622,586	21,471,277	23,632,778	24,114,197	23,518,798

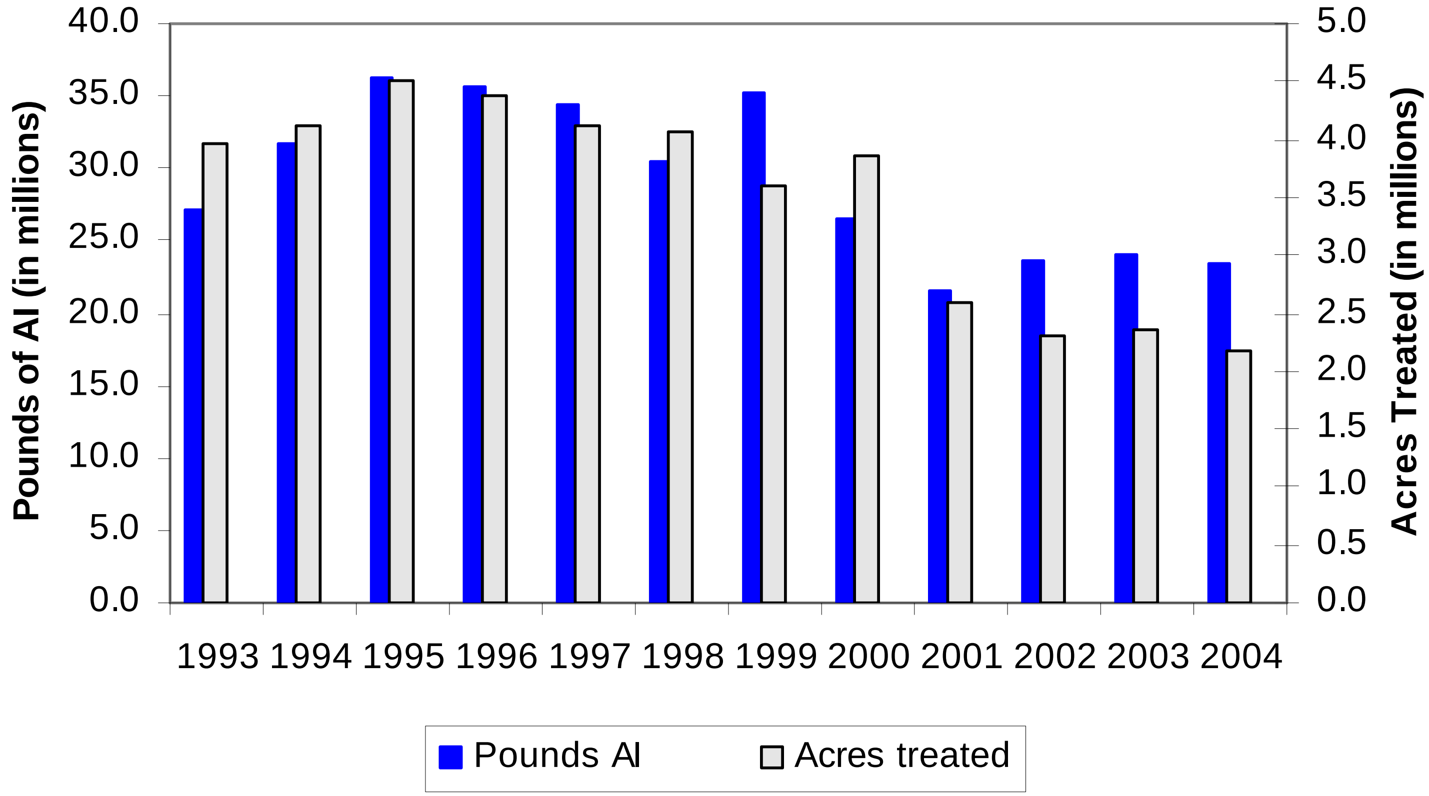
Table 3B. *The reported cumulative acres treated with pesticides that are on the State's Proposition 65 list of chemicals "known to cause reproductive toxicity." Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1080	53	32	25	0	0	0	42	30	301	50	0
2,4-DB ACID	0	0	0	2,599	12,167	20,063	19,496	25,843	15,584	10,384	8,873
AMITRAZ	137,434	174,867	129,857	161,651	28,945	14,684	16,011	1,269	605	379	0
ARSENIC PENTOXIDE	660	0	0	0	0	0	709,893	56	0	0	48
ARSENIC TRIOXIDE	0	0	0	0	0	0	0	0	1	<1	0
BENOMYL	271,289	360,931	310,563	245,687	434,725	242,796	217,611	135,929	47,771	13,360	3,983
BROMACIL, LITHIUM SALT	0	0	0	0	40	40	30	0	0	0	0
BROMOXYNIL OCTANOATE	245,715	224,276	277,062	224,250	240,997	257,417	313,362	251,527	238,713	218,285	162,572
CHLORSULFURON	39,962	39,584	54,360	27,628	39,873	30,691	34,528	29,079	18,836	25,830	25,929
CYANAZINE	284,812	365,520	325,627	288,087	185,082	129,547	56,059	19,708	8,763	25	5
CYCLOATE	22,571	20,685	19,597	25,986	29,761	24,555	18,487	15,918	17,213	16,721	20,695
DICLOFOP-METHYL	47,273	19,314	89,276	47,217	28,296	21,442	24,470	14,198	6,259	11,257	7,391
EPTC	273,441	241,587	232,820	208,093	141,511	148,685	107,613	99,953	94,240	56,639	64,049
ETHYLENE OXIDE	0	0	0	0	194	31	41	0	0	0	0
FENOXAPROP-ETHYL	33,712	24,153	25,540	24,439	10,480	13,824	8,847	3,820	1,327	839	1,681
FLUAZIFOP-BUTYL	3,824	2,225	1,513	1,537	3,908	806	137	144	98	0	<1
HYDRAMETHYLNON	0	3	36	35	289	1,615	3,648	2,762	2,148	1,978	1,314
LINURON	97,887	105,284	104,772	110,067	112,122	111,009	86,317	81,801	86,914	85,427	95,565
METAM-SODIUM	183,625	199,457	215,899	198,395	154,309	186,300	146,847	125,263	141,357	142,396	128,427
METHYL BROMIDE	106,694	107,933	96,507	103,068	90,107	102,125	75,741	60,892	53,100	55,251	57,175
METIRAM	0	0	0	0	<1	0	0	7	0	<1	2
MYCLOBUTANIL	692,036	841,178	814,268	866,360	1,225,372	887,981	842,639	737,643	704,231	741,930	655,947
NABAM	0	0	0	0	55	20	0	60	0	0	0
NICOTINE	382	237	167	128	57	36	14	31	1	0	2
NITRAPYRIN	261	1,493	147	105	851	329	276	0	169	258	42
OXADIAZON	1,812	2,400	2,213	1,832	1,933	3,407	2,656	2,637	1,838	1,904	3,121
OXYDEMETON-METHYL	226,433	253,868	220,824	244,056	186,964	253,281	225,984	200,171	193,441	189,047	206,746
OXYTHIOQUINOX	6,410	10,000	8,768	5,896	5,306	2,152	817	250	182	71	137

***Table 3B** (cont.)**.** The reported cumulative acres treated with pesticides that are on the State's Proposition 65 list of chemicals "known to cause reproductive toxicity."*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
POTASSIUM DIMETHYL DITHIO CARBAMATE	6	0	0	0	0	0	0	0	2	6	0
PROPARGITE	1,030,485	1,052,358	980,963	989,265	756,098	795,410	704,529	606,737	524,421	558,006	543,728
RESMETHRIN	419	222	144	182	160	84,044	33	35	32	66	209
SODIUM DIMETHYL DITHIO CARBAMATE	0	0	0	0	253	20	0	60	0	0	0
STREPTOMYCIN SULFATE	58,703	84,111	84,999	89,336	131,936	76,414	97,019	62,184	52,180	63,444	37,461
TAU-FLUVALINATE	26,578	19,771	22,156	18,387	14,075	17,343	10,101	10,893	9,024	7,937	7,312
THIOPHANATE-METHYL	86,803	101,694	128,267	89,556	63,842	81,428	68,422	53,990	64,324	121,294	112,500
TRIADIMEFON	132,295	118,746	100,142	59,229	79,968	25,719	11,855	9,501	6,747	7,625	6,751
TRIBUTYLTIN METHACRYLATE	13	<1	1	<1	1	1	1	<1	0	0	0
TRIFORINE	64,069	76,411	53,589	17,455	6,352	1,279	751	244	203	196	61
VINCLOZOLIN	49,519	66,672	82,968	67,373	69,067	63,931	43,629	38,570	27,786	21,682	18,207
WARFARIN	192	151	541	382	310	99	556	101	449	632	1,504
TOTAL	4,125,368	4,515,163	4,383,613	4,118,283	4,055,351	3,598,505	3,848,461	2,591,245	2,318,261	2,352,919	2,171,437

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



USE TRENDS OF PESTICIDES LISTED BY U.S. EPA AS CARCINOGENS OR BY THE STATE AS "KNOWN TO CAUSE CANCER"

Table 4A. *The reported pounds of pesticides used that are listed by U.S. EPA as B2 carcinogens or that are on the State's Proposition 65 list of chemicals "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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1,3-DICHLOROPROPENE	2,122	409,821	1,956,846	2,400,930	2,911,385	3,122,723	4,442,193	4,135,462	5,359,193	7,009,034	8,945,145
ACIFLUORFEN, SODIUM SALT	1	6	11	29	<1	10	<1	1	3	<1	18
ALACHLOR	42,854	41,119	45,733	51,259	46,264	29,789	36,468	29,431	28,666	24,913	27,229
ARSENIC ACID	27,571	37,206	53,777	59,835	52,558	48,029	11,906	12,023	4,976	318	223
ARSENIC PENTOXIDE	86,445	83,814	205,089	64,372	50,899	245,238	91,267	259,386	194,650	165,709	12,705
ARSENIC TRIOXIDE	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1
CACODYLIC ACID	43,685	43,275	31,417	26,060	17,379	15,930	16,093	3,983	1,795	207	115
CAPTAN	608,658	734,314	918,588	799,878	1,559,136	965,922	642,757	399,263	392,205	499,973	370,418
CHLOROTHALONIL	832,288	1,125,790	1,053,319	779,328	1,181,163	753,840	680,735	522,212	605,016	712,761	571,428
CHROMIC ACID	120,822	117,092	286,521	89,931	71,109	343,543	128,642	363,205	272,300	232,064	17,753
CREOSOTE	871,469	444,461	491,044	259,086	1,752	4,873	9,879	4,700	9,018	3,384	1,092
DAMINOZIDE	6,775	6,763	7,944	11,028	10,306	9,411	9,138	11,323	10,048	10,156	9,582
DDVP	4,798	6,063	13,097	13,636	13,998	12,325	12,718	12,837	8,524	3,437	3,807
DIOCTYL PHTHALATE	83	<1	1	1	318	1,076	595	640	604	521	397
DIPROPYL ISOCINCHOMERONATE	2	1	3	<1	<1	0	<1	1	0	1	<1
DIURON	1,234,507	1,054,409	1,265,426	1,228,114	1,504,268	1,188,640	1,343,727	1,107,421	1,303,108	1,343,596	1,397,638
ETHOPROP	51,270	51,104	27,955	23,842	27,949	26,196	16,119	19,046	16,531	28,419	23,130
ETHYLENE OXIDE	3	0	0	0	31	2	6	3	0	0	0
FENOXYCARB	1,492	1,673	712	65	552	71	88	86	53	32	34
FOLPET	3	2	<1	<1	<1	<1	<1	0	2	<1	0
FORMALDEHYDE	11,864	153,519	334,548	403,824	305,297	111,714	55,300	28,612	14,035	18,690	111,151
IPRODIONE	431,318	564,127	520,763	424,338	572,287	411,548	422,179	305,629	247,365	287,631	261,039
LINDANE	5,281	4,507	4,576	5,388	6,293	4,842	4,738	2,388	1,633	908	775
MANCOZEB	464,924	659,240	567,866	526,364	987,270	630,968	611,498	430,604	396,672	538,033	379,299
MANEB	912,903	1,257,122	1,328,318	1,081,124	1,596,876	1,045,567	1,203,483	817,059	851,643	1,026,685	953,782
METAM-SODIUM	11,122,361	14,975,528	15,253,924	14,969,732	13,729,306	16,774,246	13,218,764	12,545,403	15,137,719	14,815,687	14,683,308
METIRAM	0	0	0	0	<1	0	0	2	0	1	5
ORTHO-PHENYLPHENOL	11,027	14,892	10,349	15,962	11,248	8,600	8,516	4,016	15,205	5,141	21,740

***Table 4A** (cont.)**.** The reported pounds of pesticides used that are listed by U.S. EPA as B2 carcinogens or that are on the State's Proposition 65 list of chemicals "known to cause cancer."*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ORTHO-PHENYLPHENOL, SODIUM SALT	46,825	30,830	33,539	25,389	32,315	29,019	31,681	27,071	25,249	20,857	5,898
OXADIAZON	20,488	21,458	25,260	23,196	21,959	19,399	18,256	15,905	16,692	12,550	12,980
OXYTHIOQUINOX	4,474	7,172	6,204	2,709	1,576	2,705	411	149	117	34	27
PARA-DICHLOROBENZENE	3	2	4	3	219	86	4	11	1	25	10
PENTACHLOROPHENOL	40	3	3	8	33	92	466	14	17	3	2
POTASSIUM DICHROMATE	596	380	41	50	103	319	554	1	<1	11	74
PROPARGITE	1,742,736	1,770,065	1,743,278	1,816,028	1,385,327	1,504,268	1,331,979	1,159,792	972,371	1,054,607	1,010,872
PROPOXUR	2,667	3,296	1,341	1,760	1,604	1,735	2,141	611	449	304	223
PROPYLENE OXIDE	41,815	131,593	224,495	198,559	198,595	172,556	118,381	99,727	99,674	99,396	151,484
PROPYZAMIDE	111,797	113,761	106,811	99,292	104,292	104,484	103,705	108,987	107,531	104,375	119,035
SODIUM DICHROMATE	0	0	180,478	182,185	122,647	32,699	122	329	633	217	0
THIODICARB	0	13,679	122,927	156,002	114,785	60,453	36,844	9,360	5,194	8,392	2,236
VINCLOZOLIN	33,661	48,270	60,286	46,908	54,719	52,731	35,658	32,208	22,164	18,568	14,863
TOTAL	18,899,632	23,926,358	26,882,493	25,786,216	26,695,819	27,735,648	24,647,014	22,468,903	26,121,055	28,046,644	29,109,519

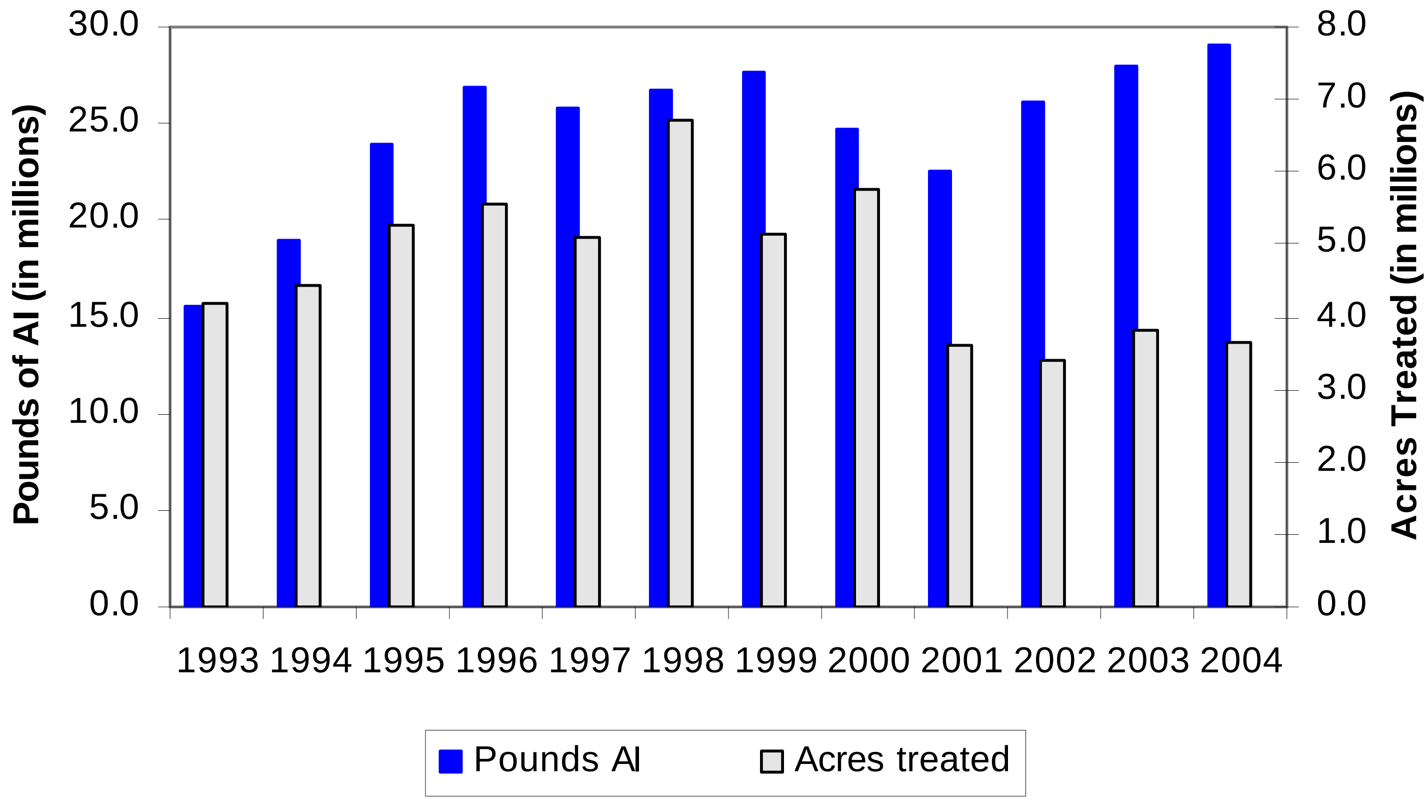
Table 4B. *The reported cumulative acres treated with pesticides listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals "known to cause cancer." Use includes primarily agricultural applications. The grand total for acres treated is less than the sum of acres treated for all active ingredients because some products contain more than one active ingredient. Data are from the Department of Pesticide Regulation's Pesticide Use.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1,3-DICHLOROPROPENE	33	4,174	17,223	22,193	27,059	29,430	33,101	30,817	42,064	48,944	56,618
ACIFLUORFEN, SODIUM SALT	2	8	<1	0	0	0	0	0	11	0	3
ALACHLOR	16,135	15,359	18,181	19,059	16,430	11,008	13,302	11,453	14,467	10,004	9,888
ARSENIC ACID	0	0	0	0	0	0	0	0	0	0	0
ARSENIC PENTOXIDE	660	0	0	0	0	0	709,893	56	0	0	48
ARSENIC TRIOXIDE	0	0	0	0	0	0	0	0	1	<1	0
CACODYLIC ACID	304,060	315,336	251,414	192,816	126,912	111,607	117,656	31,283	12,648	757	100
CAPTAN	244,164	295,860	381,989	347,631	602,684	404,731	309,768	215,969	213,438	271,140	211,028
CHLOROTHALONIL	517,357	674,126	674,086	492,219	796,672	456,007	428,109	312,726	347,725	361,250	331,650
CHROMIC ACID	660	0	0	0	0	0	709,893	56	0	0	0
CREOSOTE	0	0	0	0	126	11	45	1	0	0	56
DAMINOZIDE	2,692	2,659	2,653	3,512	4,510	3,107	3,416	6,146	5,319	3,103	2,664
DDVP	1,888	1,887	1,499	2,596	3,692	2,180	2,336	3,954	4,327	2,576	1,637
DIOCTYL PHTHALATE	1,060	0	55	14	6,250	24,270	11,195	10,776	6,649	3,880	6,249
DIPROPYL ISOCINCHOMERONATE	50	10	0	0	0	0	5	0	0	0	0
DIURON	454,829	507,279	685,352	819,993	865,246	849,482	864,334	788,559	796,903	843,154	971,384
ETHOPROP	5,767	5,470	3,139	3,213	3,784	3,610	3,477	3,542	4,152	6,078	4,917
ETHYLENE OXIDE	0	0	0	0	194	31	41	0	0	0	0
FENOXYCARB	5	11	5	<1	210	3,707	3,388	3,241	1,242	811	1,011
FOLPET	<1	0	1	2	0	0	0	0	0	0	0
FORMALDEHYDE	15	137	234	12	126	123	47	53	33	18	23
IPRODIONE	656,402	886,077	804,311	666,336	1,348,367	933,982	1,194,377	501,033	364,770	445,383	409,092
LINDANE	22,984	19,380	25,352	36,573	32,650	20,930	14,628	13,832	8,010	8,828	9,437
MANCOZEB	273,836	405,494	351,801	284,134	682,979	387,300	363,260	228,275	197,055	276,096	194,219
MANEB	512,009	652,122	731,079	624,123	942,083	629,897	611,717	535,105	554,787	659,893	601,360
METAM-SODIUM	183,625	199,457	215,899	198,395	154,309	186,300	146,847	125,263	141,357	142,396	128,427
METIRAM	0	0	0	0	<1	0	0	7	0	<1	2

***Table 4B** (cont.)**.** The reported cumulative acres treated with pesticides listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals "known to cause cancer."*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ORTHO-PHENYLPHENOL	4	8	67	75	645	583	321	59	82	726	272
ORTHO-PHENYLPHENOL, SODIUM SALT	88	47	652	0	20	6,234	18,599	60	40	9	0
OXADIAZON	1,812	2,400	2,213	1,832	1,933	3,407	2,656	2,637	1,838	1,904	3,121
OXYTHIOQUINOX	6,410	10,000	8,768	5,896	5,306	2,152	817	250	182	71	137
PARA-DICHLOROBENZENE	0	0	0	0	10	0	0	0	0	0	0
PENTACHLOROPHENOL	2	<1	15	4	190	0	59	38	0	0	20
POTASSIUM DICHROMATE	0	0	0	0	40	71	40	0	20	0	56
PROPARGITE	1,030,485	1,052,358	980,963	989,265	756,098	795,410	704,529	606,737	524,421	558,006	543,728
PROPOXUR	14	5	9	73	45	39	26	4	23	1	7
PROPYLENE OXIDE	0	0	0	<1	0	573	0	0	<1	0	22
PROPYZAMIDE	157,829	155,773	150,791	140,791	144,864	142,194	137,337	145,325	140,680	132,819	147,600
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	0	0	0
THIODICARB	0	22,785	176,788	223,154	155,440	83,796	50,604	13,382	8,256	12,113	3,684
VINCLOZOLIN	49,519	66,672	82,968	67,373	69,067	63,931	43,629	38,570	27,786	21,682	18,207
TOTAL	4,424,181	5,278,330	5,545,337	5,108,872	6,725,624	5,142,621	5,776,617	3,616,556	3,410,894	3,802,876	3,647,211

Figure 2. *Use trends of pesticides that are listed by U.S. EPA as B2 carcinogens or that are on the State's Proposition 65 list of chemicals "known to cause cancer." Reported pounds of active ingredient (AI) applied include both agricultural and reportable 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 5A. *The reported pounds of cholinesterase-inhibiting pesticides used. These pesticides are the currently registered 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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
3-IODO-2-PROPYNYL BUTYLCARBAMATE	0	0	<1	0	1	<1	<1	<1	0	0	0
ACEPHATE	371,862	458,012	355,350	343,840	384,091	307,272	283,355	240,191	217,383	223,749	204,816
ALDICARB	225,973	354,500	545,117	530,066	534,665	280,755	329,431	297,882	244,786	262,103	231,012
AZINPHOS-METHYL	418,935	406,230	406,099	336,353	193,069	216,624	185,055	159,786	153,200	213,863	50,562
BENDIOCARB	4,431	1,526	1,674	259	125	108	593	62	32	23	9
BENSULIDE	64,796	69,271	94,587	129,784	192,136	242,460	217,150	189,216	194,687	229,016	236,814
BUTYLATE	108,686	67,179	87,612	84,268	69,805	71,071	31,732	27,640	19,412	26,826	20,323
CARBARYL	820,787	835,811	809,794	753,801	426,893	387,145	365,174	287,802	256,057	205,080	240,071
CARBOFURAN	278,108	242,999	220,622	183,321	161,588	138,665	132,427	95,863	81,486	49,275	30,354
CHLORPROPHAM	3,000	3,230	3,015	2,057	2,321	3,102	3,544	3,504	1,380	6,191	2,861
CHLORPYRIFOS	2,887,838	3,385,416	2,687,809	3,152,564	2,355,626	2,257,936	2,093,400	1,674,120	1,419,332	1,546,481	1,775,828
COUMAPHOS	0	0	0	0	0	15	152	97	62	64	63
CYCLOATE	51,035	49,138	44,628	55,459	62,753	49,096	37,408	31,785	34,347	30,080	42,563
DDVP	4,798	6,063	13,097	13,636	13,998	12,325	12,718	12,837	8,524	3,437	3,807
DEMETON	1,238	775	411	0	3	5	2	3	42	<1	0
DESMEDIPHAM	8,588	8,465	6,092	6,188	4,737	6,014	6,703	3,750	3,398	3,636	3,747
DIAZINON	1,358,358	1,216,935	1,093,121	955,108	900,596	979,458	1,057,845	1,001,294	690,590	523,786	492,050
DICROTOPHOS	1	113	3	0	11	122	0	2	27	41	0
DIMETHOATE	671,948	583,498	419,807	515,798	397,847	485,274	397,223	284,751	310,422	294,928	332,043
DISULFOTON	134,600	95,972	142,372	128,335	105,327	95,919	76,164	51,545	54,567	46,996	41,211
EPTC	765,576	660,185	703,996	579,245	393,031	448,883	323,254	276,782	253,887	141,756	182,245
ETHEPHON	848,134	982,776	951,415	882,802	762,217	734,263	734,810	620,075	538,449	574,371	637,205
ETHION	4,054	79	2	3	906	64	0	5	13	13	<1
ETHOPROP	51,270	51,104	27,955	23,842	27,949	26,196	16,119	19,046	16,531	28,419	23,130
FENAMIPHOS	178,781	187,242	189,379	156,280	125,459	107,745	104,505	74,858	70,939	59,421	58,691
FENTHION	186	413	141	176	29	22	33	61	79	3	36
FONOFOS	73,167	74,936	67,969	50,555	25,349	24,216	4,370	580	465	182	30

***Table 5A** (cont.). The reported pounds of cholinesterase-inhibiting pesticides used. These pesticides are the currently registered organophosphate and carbamate active ingredients.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
FORMETANATE HYDROCHLORIDE	152,622	104,012	106,168	97,907	77,723	65,030	43,941	45,625	35,844	28,420	30,651
MALATHION	749,317	801,496	673,379	773,782	645,889	678,105	505,970	556,371	636,384	654,151	492,308
METHAMIDOPHOS	240,959	500,055	260,255	312,067	244,269	116,256	76,865	46,615	30,645	36,987	31,332
METHIDATHION	367,447	321,605	328,328	309,154	178,451	177,105	98,129	93,521	68,389	54,398	61,204
METHIOCARB	4,126	2,672	2,120	4,769	5,384	3,314	2,411	2,262	1,852	2,274	2,789
METHOMYL	707,814	807,977	679,383	833,758	666,442	551,181	550,862	378,305	294,491	364,779	262,195
METHYL PARATHION	129,155	140,469	130,614	153,187	158,228	157,594	75,169	59,620	53,644	73,337	71,525
MOLINATE	1,496,227	1,377,257	1,356,258	1,170,699	1,006,025	911,376	1,025,786	733,534	877,572	539,871	367,155
NALED	457,723	700,676	351,267	615,314	260,048	297,895	255,419	261,882	196,777	186,260	152,479
OXAMYL	73,440	66,179	82,327	119,441	161,042	128,956	137,989	77,121	80,315	93,754	112,603
OXYDEMETON-METHYL	111,347	120,101	106,612	115,781	89,789	122,912	110,797	99,756	96,357	93,789	102,554
PARATHION	6,104	13,642	14,050	5,187	5,766	4,041	3,581	2,589	3,205	621	240
PEBULATE	235,690	244,181	202,634	184,015	185,696	225,077	160,018	45,619	71,721	35,755	10,118
PHENMEDIPHAM	8,863	8,771	6,612	6,621	5,836	6,735	7,478	4,249	4,351	5,021	4,481
PHORATE	159,146	135,887	160,854	139,725	149,707	93,488	87,974	70,645	76,482	64,947	60,162
PHOSALONE	99	52	27	33	11	0	4	0	0	0	0
PHOSMET	189,415	266,349	395,160	566,484	644,898	638,822	583,116	484,059	404,934	341,642	658,087
POTASSIUM DIMETHYL DITHIO CARBAMATE	47	0	0	15	24,795	0	0	0	23	28	293
PROFENOFOS	263,884	245,420	184,264	150,575	40,433	49,575	43,879	22,011	24,452	12,871	15,620
PROPAMOCARB HYDROCHLORIDE	0	0	16,341	10,215	57,121	6,285	4,959	2,288	828	83	5
PROPETAMPHOS	38,307	77,985	23,249	17,338	9,970	6,074	4,500	3,991	2,463	721	315
PROPOXUR	2,667	3,296	1,341	1,760	1,604	1,735	2,141	611	449	304	223
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	892,441	866,726	760,809	626,684	440,382	345,842	396,827	257,062	190,149	233,640	179,690
SODIUM DIMETHYL DITHIO CARBAMATE	337	1	0	0	8,279	355	1,315	173	0	0	10,693
SULFOTEP	1,000	509	316	355	213	246	215	267	77	8	29
SULPROFOS	876	171	0	119	84	0	0	<1	0	0	0
TETRACHLORVINPHOS	10,051	7,118	7,056	6,044	5,831	3,975	4,850	4,746	3,285	1,262	722
THIOBENCARB	406,085	559,610	618,412	894,287	724,926	732,505	1,007,249	644,625	839,962	587,211	521,586
THIODICARB	0	13,679	122,927	156,002	114,785	60,453	36,844	9,360	5,194	8,392	2,236
TRICHLORFON	4,275	4,552	3,327	3,843	2,476	2,779	3,992	3,004	1,545	1,068	1,035
TOTAL	16,045,617	17,132,318	15,466,155	16,158,902	13,056,633	12,262,468	11,645,448	9,263,448	8,571,483	7,891,332	7,761,802

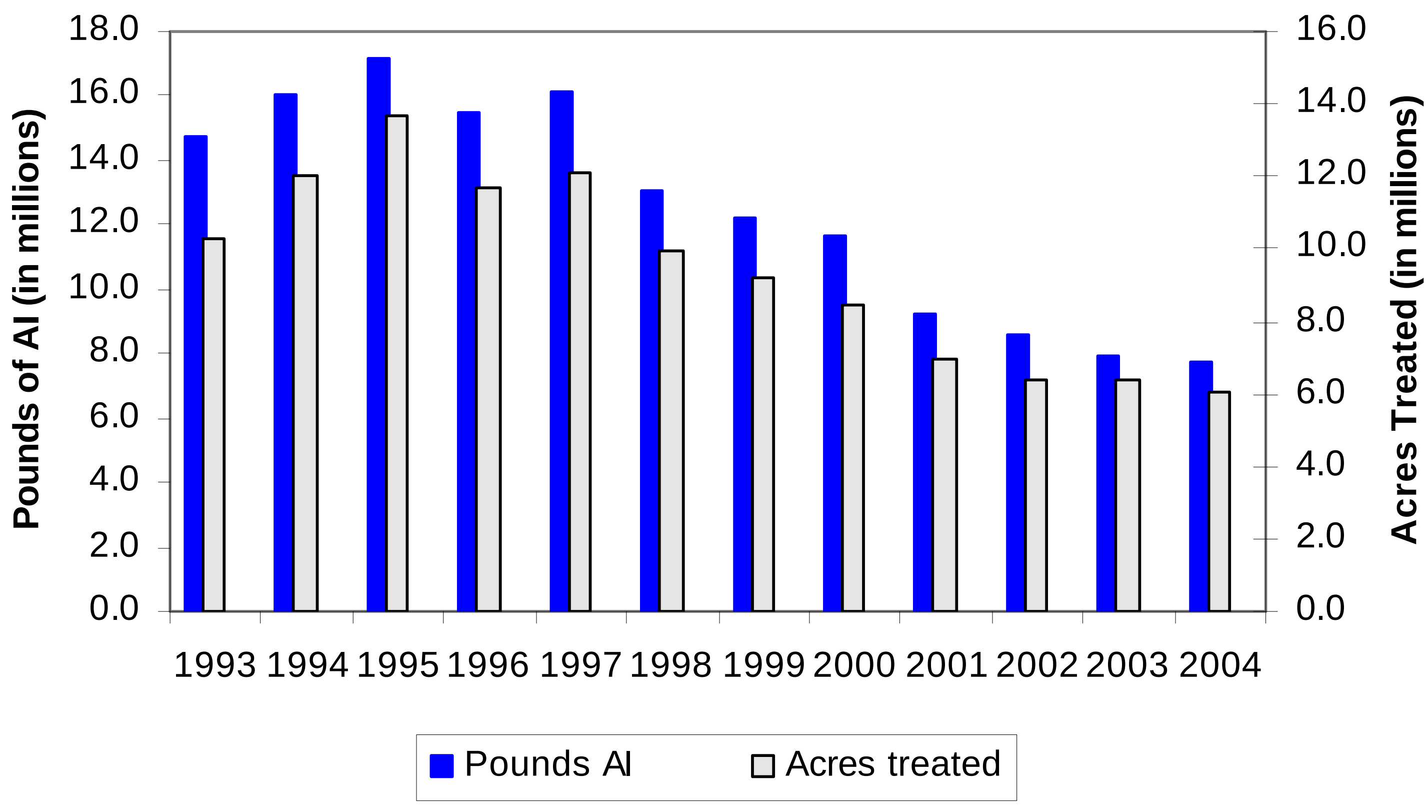
Table 5B. *The reported cumulative acres treated with cholinesterase-inhibiting pesticides. These pesticides are the currently registered organophosphate and carbamate active ingredients. Use includes primarily agricultural applications. The grand total for acres treated is less than the sum of acres 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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
3-IODO-2-PROPYNYL BUTYLCARBAMATE	0	0	0	0	150	0	0	40	0	0	0
ACEPHATE	402,643	489,259	406,607	372,566	403,537	370,111	295,298	266,278	232,908	223,396	211,892
ALDICARB	256,428	355,717	490,499	442,029	397,890	266,773	314,440	282,453	225,820	231,090	217,540
AZINPHOS-METHYL	293,466	274,347	277,745	233,406	134,334	140,226	118,805	117,544	94,035	117,001	38,622
BENDIOCARB	1,574	499	188	19	28	11	<1	2	0	9	<1
BENSULIDE	17,446	22,489	31,916	45,795	61,984	80,873	72,866	62,859	60,883	66,375	70,239
BUTYLATE	23,105	14,864	17,689	17,572	14,259	14,959	6,957	6,270	4,598	5,450	3,940
CARBARYL	291,147	305,452	312,058	292,721	197,664	216,991	196,264	147,612	106,590	97,811	103,261
CARBOFURAN	460,647	449,507	364,150	322,064	303,957	272,441	258,441	246,149	182,567	91,791	50,138
CHLORPROPHAM	20	0	4	26	106	151	127	112	80	124	166
CHLORPYRIFOS	1,910,520	2,824,142	1,869,874	2,223,551	1,669,859	1,420,414	1,441,819	1,355,172	1,235,180	1,478,761	1,322,839
COUMAPHOS	0	0	0	0	0	0	1,339	809	733	17	49
CYCLOATE	22,571	20,685	19,597	25,986	29,761	24,555	18,487	15,918	17,213	16,721	20,695
DDVP	1,888	1,887	1,499	2,596	3,692	2,180	2,336	3,954	4,327	2,576	1,637
DEMETON	2,490	1,583	1,002	0	18	66	0	56	0	2	0
DESMEDIPHAM	62,171	71,577	51,183	61,368	56,272	71,977	60,248	34,738	32,344	35,435	35,938
DIAZINON	878,221	752,898	680,947	530,355	477,804	546,577	478,994	437,934	489,149	483,283	509,158
DICROTOPHOS	0	76	9	0	16	11	0	0	0	64	0
DIMETHOATE	1,205,884	1,193,214	955,445	1,097,751	871,305	1,078,024	874,730	639,271	681,318	621,038	701,470
DISULFOTON	114,949	87,291	147,078	124,319	100,935	86,332	69,018	45,258	48,723	39,182	34,481
EPTC	273,441	241,587	232,820	208,093	141,511	148,685	107,613	99,953	94,240	56,639	64,049
ETHEPHON	704,394	806,425	776,247	700,941	653,817	720,773	697,300	631,330	550,255	601,519	660,356
ETHION	2,093	91	5	2	621	53	0	5	0	1	0
ETHOPROP	5,767	5,470	3,139	3,213	3,784	3,610	3,477	3,542	4,152	6,078	4,917
FENAMIPHOS	114,333	112,249	111,729	97,013	72,102	66,100	60,340	36,999	38,397	36,293	34,142
FENTHION	0	0	0	0	0	0	0	0	0	0	18
FONOFOS	58,852	59,041	55,207	36,123	16,926	14,146	2,325	497	234	116	20
FORMETANATE HYDROCHLORIDE	141,203	100,837	103,521	95,544	77,965	63,047	42,880	45,234	36,131	29,411	33,167

***Table 5B** (cont.). The reported cumulative acres treated with cholinesterase-inhibiting pesticides. These pesticides are the currently registered organophosphate and carbamate active ingredients.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
MALATHION	401,037	425,062	363,635	410,658	383,121	403,646	323,737	290,933	314,361	287,445	249,314
METHAMIDOPHOS	199,314	418,703	313,618	263,816	290,061	158,079	101,494	63,046	37,012	41,506	38,874
METHIDATHION	255,006	231,930	245,914	200,528	129,358	115,249	71,992	64,785	48,554	38,516	45,281
METHIOCARB	3,394	2,129	1,511	2,906	3,523	2,369	2,700	1,866	1,997	1,757	3,064
METHOMYL	1,215,586	1,425,295	1,145,115	1,376,868	1,118,188	880,910	893,424	627,264	509,104	615,609	437,673
METHYL PARATHION	137,691	129,976	125,729	125,638	128,675	119,315	43,773	39,449	37,448	51,192	48,640
MOLINATE	384,031	348,465	357,239	317,680	267,090	246,084	276,315	190,488	222,044	134,120	89,593
NALED	473,011	702,155	338,861	604,615	251,044	279,898	244,617	234,184	154,963	148,781	110,218
OXAMYL	115,085	106,205	122,353	176,793	225,380	177,183	179,048	100,294	98,313	115,250	135,832
OXYDEMETON-METHYL	226,433	253,868	220,824	244,056	186,964	253,281	225,984	200,171	193,441	189,047	206,746
PARATHION	3,404	6,688	5,099	2,071	2,592	1,976	4,025	2,977	7,026	1,016	392
PEBULATE	76,688	86,494	74,647	69,381	64,501	74,697	51,205	15,122	21,491	10,680	4,319
PHENMEDIPHAM	62,694	72,060	52,125	62,449	58,649	73,905	61,975	35,477	34,452	38,265	37,750
PHORATE	133,392	111,217	123,789	106,427	109,759	81,724	71,407	63,160	58,391	50,290	47,488
PHOSALONE	47	56	18	64	5	0	10	0	0	0	0
PHOSMET	136,500	172,539	214,416	236,611	312,707	253,234	219,707	189,517	158,970	128,029	209,843
POTASSIUM DIMETHYL DITHIO CARBAMATE	6	0	0	0	0	0	0	0	2	6	0
PROFENOFOS	336,830	296,860	211,769	162,204	44,641	46,250	46,617	23,700	25,997	13,599	11,657
PROPAMOCARB HYDROCHLORIDE	0	0	23,793	14,677	81,050	6,851	17,696	2,625	1,041	22	10
PROPETAMPHOS	0	0	0	0	0	0	0	0	0	0	0
PROPOXUR	14	5	9	73	45	39	26	4	23	1	7
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	615,978	604,586	531,052	437,505	305,306	245,470	282,844	187,153	129,570	158,604	133,535
SODIUM DIMETHYL DITHIO CARBAMATE	0	0	0	0	253	20	0	60	0	0	0
SULFOTEP	884	537	408	251	241	224	168	314	57	3	8
SULPROFOS	896	299	0	83	80	0	0	0	0	0	0
TETRACHLORVINPHOS	780	519	674	356	3,109	1,543	575	232	125	6	291
THIOBENCARB	91,906	126,745	159,121	227,658	187,295	186,341	252,506	169,056	222,606	154,952	136,132
THIODICARB	0	22,785	176,788	223,154	155,440	83,796	50,604	13,382	8,256	12,113	3,684
TRICHLORFON	818	1,037	204	149	1,071	97	70	51	19	8	0
TOTAL	12,051,166	13,664,563	11,666,708	12,137,558	9,940,972	9,227,717	8,484,527	6,960,130	6,392,624	6,395,557	6,032,734

Figure 3. *Use trends of cholinesterase-inhibiting pesticides, which includes pesticides with organophosphate and carbamate active ingredients. Reported pounds of active ingredient (AI) applied include both agricultural and reportable 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 GROUND WATER PROTECTION LIST

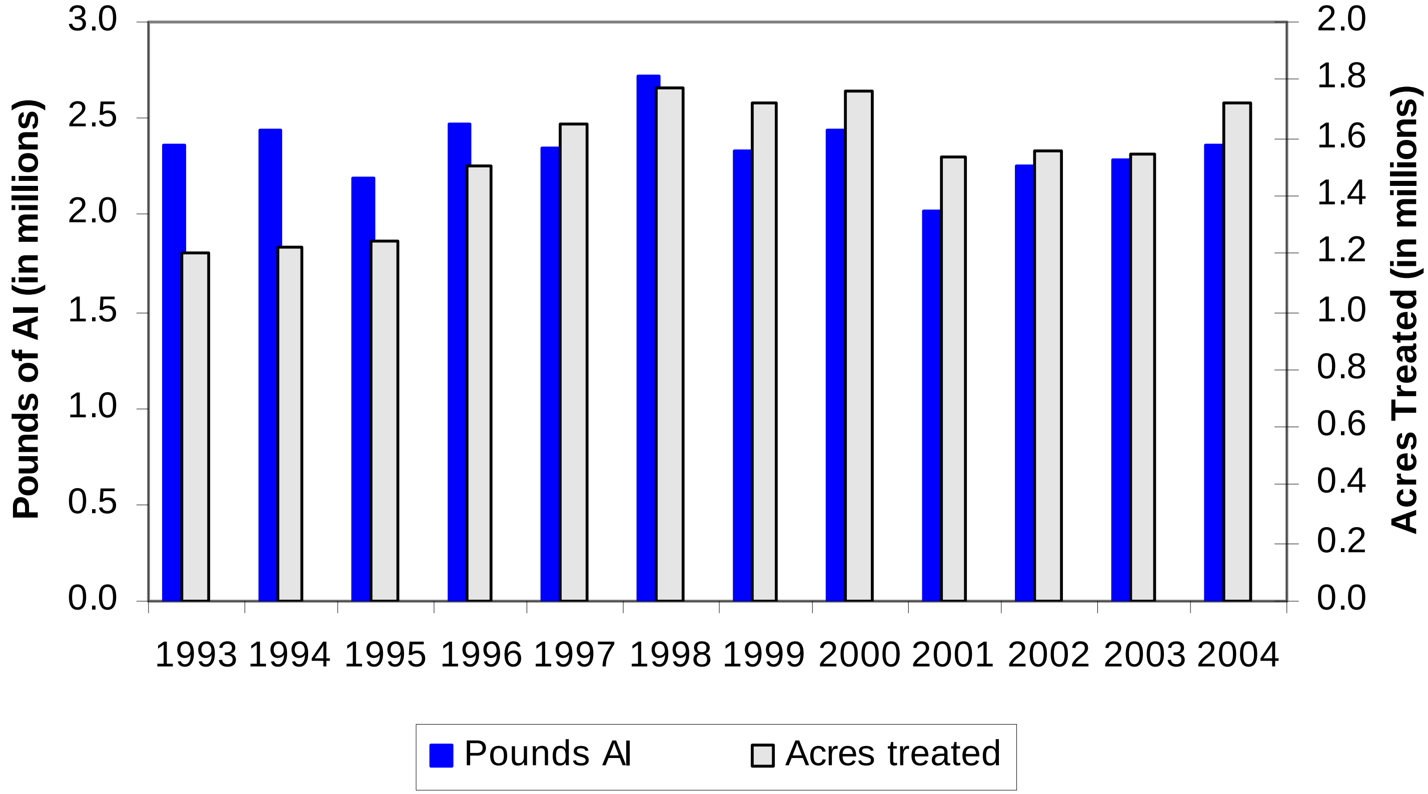
Table 6A. *The reported pounds of pesticides on the "a" part of DPR's groundwater protection list. These pesticides are the currently registered active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800(a). Use includes both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

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ATRAZINE	46,497	36,078	57,018	46,568	54,840	69,549	57,403	62,872	59,292	58,245	38,701
ATRAZINE, OTHER RELATED	2,480	1,932	3,062	2,502	2,943	3,706	1,224	1,321	1,237	1,216	810
BENTAZON, SODIUM SALT	1,175	655	1,518	1,907	1,757	1,837	1,210	393	1,045	1,216	1,370
BROMACIL	104,052	95,444	98,293	82,424	84,645	75,613	67,753	56,128	55,821	56,417	56,476
BROMACIL, LITHIUM SALT	11,085	6,517	17,381	9,141	4,686	4,162	4,478	3,217	4,016	3,025	1,801
DIURON	1,234,507	1,054,409	1,265,426	1,228,114	1,504,268	1,188,640	1,343,727	1,107,421	1,303,108	1,343,596	1,397,638
NORFLURAZON	154,383	153,138	196,142	212,621	265,886	286,214	257,651	209,981	188,032	146,815	139,960
PROMETON	84	117	68	20	22	4	28	2	21	2	20
SIMAZINE	890,353	837,366	839,209	764,586	794,758	696,574	700,648	587,000	634,176	674,141	729,349
TOTAL	2,444,616	2,185,656	2,478,115	2,347,882	2,713,804	2,326,298	2,434,122	2,028,334	2,246,747	2,284,673	2,366,124

Table 6B. *The reported cumulative acres treated with pesticides on the "a" part of DPR's groundwater protection list. These pesticides are the currently registered 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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
ATRAZINE	32,065	22,234	32,043	27,257	37,556	39,881	34,524	33,376	28,589	29,966	26,911
ATRAZINE, OTHER RELATED	32,065	22,234	32,042	27,257	37,529	39,876	34,524	33,376	28,589	29,966	26,911
BENTAZON, SODIUM SALT	1,688	805	1,460	2,010	1,904	1,968	1,502	432	1,094	987	1,279
BROMACIL	65,421	66,289	62,206	58,722	57,136	53,861	42,458	30,149	29,585	27,974	26,204
BROMACIL, LITHIUM SALT	0	0	0	0	40	40	30	0	0	0	0
DIURON	454,829	507,279	685,352	819,993	865,246	849,482	864,334	788,559	796,903	843,154	971,384
NORFLURAZON	139,498	133,585	179,015	186,991	214,144	217,178	230,836	192,305	161,702	125,619	125,802
PROMETON	8	23	27	8	85	18	51	0	174	49	171
SIMAZINE	589,560	573,735	607,228	613,237	647,072	611,626	619,639	515,419	561,195	546,015	587,663
TOTAL	1,218,778	1,238,484	1,505,936	1,651,236	1,769,479	1,721,896	1,757,983	1,532,564	1,551,972	1,547,283	1,716,031

Figure 4. *Use trends of pesticides on DPR's groundwater protection list. These pesticides are the currently registered 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 reportable 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 CONTAMINATS LIST

Table 7A. *The reported pounds of pesticides on DPR's toxic air contaminants list applied in California. These pesticides are the currently registered 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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1,3-DICHLOROPROPENE	2,122	409,821	1,956,846	2,400,930	2,911,385	3,122,723	4,442,193	4,135,462	5,359,193	7,009,034	8,945,145
2,4-D	27,544	23,995	22,089	10,227	3,868	3,060	2,065	1,787	1,691	1,732	1,828
2,4-D, 2-ETHYLHEXYL ESTER	71	278	10	1,313	13,750	72,225	12,557	13,706	15,477	19,715	20,816
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	28,863	30,642	27,954	25,684	29,061	15,992	6,737	674	452	1,357	624
2,4-D, BUTOXYETHANOL ESTER	67,414	31,743	38,567	13,263	12,140	5,628	6,107	5,336	3,482	3,812	4,837
2,4-D, BUTOXYPROPYL ESTER	1,166	224	61	13	569	5	4	3	0	0	0
2,4-D, BUTYL ESTER	1	39	0	0	2,169	8	21	<1	593	2	0
2,4-D, DIETHANOLAMINE SALT	714	1,938	3,003	24,809	14,965	5,843	13,002	6,667	8,080	8,831	5,022
2,4-D, DIMETHYLAMINE SALT	399,046	454,658	468,771	428,874	422,673	355,318	426,211	399,644	425,542	512,828	470,635
2,4-D, DODECYLAMINE SALT	5	16	8	58	75	730	0	257	322	0	0
2,4-D, HEPTYLAMINE SALT	0	86	<1	0	0	46	0	0	<1	0	0
2,4-D, ISOOCTYL ESTER	1,212	13,466	7,822	60,356	46,603	17,387	6,914	15,828	12,343	12,366	10,039
2,4-D, ISOPROPYL ESTER	4,508	5,077	5,090	6,543	7,510	6,879	8,260	6,618	7,843	8,322	9,066
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	672	37	35	0	3	7	11	0	0	0	0
2,4-D, OCTYL ESTER	0	15	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	2,326	2,032	1,774	1,575	999	1,822	783	391	634	326	472
2,4-D, TETRADECYLAMINE SALT	1	4	2	13	17	170	0	60	75	0	0
2,4-D, TRIETHYLAMINE SALT	121,241	105,656	93,876	34,610	5,688	2,344	1,038	634	426	435	386
2,4-D, TRIISOPROPYLAMINE SALT	24	6	2	3	5	6	0	5	9	6	0
ACROLEIN	336,993	362,773	322,578	341,245	264,207	328,238	290,180	233,928	283,541	272,733	211,014
ALUMINUM PHOSPHIDE	86,525	80,577	103,858	89,198	67,804	123,419	119,545	100,020	169,224	119,500	131,230
ARSENIC ACID	27,571	37,206	53,777	59,835	52,558	48,029	11,906	12,023	4,976	318	223
ARSENIC PENTOXIDE	86,445	83,814	205,089	64,372	50,899	245,238	91,267	259,386	194,650	165,709	12,705
ARSENIC TRIOXIDE	<1	<1	<1	<1	1	1	<1	<1	<1	<1	<1
CAPTAN	608,658	734,314	918,588	799,878	1,559,136	965,922	642,757	399,263	392,205	499,973	370,418

Table 7A *(cont.)**.** The reported pounds of pesticides on DPR's toxic air contaminants list applied in California.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CAPTAN, OTHER RELATED	14,890	17,831	21,729	19,448	54,940	22,216	14,617	9,017	8,945	11,344	8,271
CARBARYL	820,787	835,811	809,794	753,801	426,893	387,145	365,174	287,802	256,057	205,080	240,071
CHLORINE	750,653	2,815,119	330,017	423,469	422,252	628,546	678,417	297,086	502,944	619,735	516,546
CHROMIC ACID	120,822	117,092	286,521	89,931	71,109	343,543	128,642	363,205	272,300	232,064	17,753
DAZOMET	3,026	5,875	12,851	13,305	12,217	12,409	10,486	44,299	45,020	44,798	58,492
DDVP	4,798	6,063	13,097	13,636	13,998	12,325	12,718	12,837	8,524	3,437	3,807
ETHYLENE OXIDE	3	0	0	0	31	2	6	3	0	0	0
FORMALDEHYDE	11,864	153,519	334,548	403,824	305,297	111,714	55,300	28,612	14,035	18,690	111,151
HYDROGEN CHLORIDE	206	224	1,938	129	762	11,067	3,316	4,276	4,256	3,222	2,510
LINDANE	5,281	4,507	4,576	5,388	6,293	4,842	4,738	2,388	1,633	908	775
MAGNESIUM PHOSPHIDE	1,892	2,703	2,163	2,362	4,132	3,540	3,541	2,492	4,811	2,844	2,621
MANCOZEB	464,924	659,240	567,866	526,364	987,270	630,968	611,498	430,604	396,672	538,033	379,299
MANEB	912,903	1,257,122	1,328,318	1,081,124	1,596,876	1,045,567	1,203,483	817,059	851,643	1,026,685	953,782
META-CRESOL	2	2	3	6	8	11	14	1	1	1	2
METAM-SODIUM	11,122,361	14,975,528	15,253,924	14,969,732	13,729,306	16,774,246	13,218,764	12,545,403	15,137,719	14,815,687	14,683,308
METHANOL	100	27	0	0	0	3	<1	0	0	0	0
METHOXYCHLOR	692	1,049	484	358	566	16	26	41	144	3	1
METHOXYCHLOR, OTHER RELATED	90	139	62	44	11	<1	0	<1	0	0	<1
METHYL BROMIDE	16,607,324	17,165,964	16,022,069	15,663,832	13,569,875	15,300,388	10,869,241	6,618,631	6,550,818	7,384,398	7,089,862
METHYL ISOTHIOCYANATE	2,219	123	0	353	220	616	3,323	2,871	3,512	547	1,357
METHYL PARATHION	129,155	140,469	130,614	153,187	158,228	157,594	75,169	59,620	53,644	73,337	71,525
NAPHTHALENE	1	<1	0	1	333	<1	0	0	<1	23	0
PARA-DICHLOROBENZENE	3	2	4	3	219	86	4	11	1	25	10
PARATHION	6,104	13,642	14,050	5,187	5,766	4,041	3,581	2,589	3,205	621	240
PCNB	91,601	109,755	83,087	89,548	88,036	67,424	62,224	50,341	43,387	38,821	34,176
PCP, OTHER RELATED	5	<1	<1	1	2	11	54	2	2	<1	<1
PCP, SODIUM SALT	0	0	0	0	2	0	0	<1	0	0	0
PCP, SODIUM SALT, OTHER RELATED	0	0	0	0	0	0	0	0	0	0	0
PENTACHLOROPHENOL	40	3	3	8	33	92	466	14	17	3	2
PHENOL	296	300	25	8	44	12	20	30	0	<1	9
PHOSPHINE	0	0	0	0	0	0	0	44	901	1,141	1,664

***Table 7A** (cont.)**.** The reported pounds of pesticides on DPR's toxic air contaminants list applied in California.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
PHOSPHORUS	29	34	58	14	12	9	22	3	1	1	1
POTASSIUM N-METHYLDITHIOCARBAMATE	0	0	0	0	9,143	0	105,364	137,098	449,804	581,840	851,181
POTASSIUM PERMANGANATE	0	0	0	0	243	0	0	0	0	0	0
PROPOXUR	2,667	3,296	1,341	1,760	1,604	1,735	2,141	611	449	304	223
PROPYLENE OXIDE	41,815	131,593	224,495	198,559	198,595	172,556	118,381	99,727	99,674	99,396	151,484
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	892,441	866,726	760,809	626,684	440,382	345,842	396,827	257,062	190,149	233,640	179,690
SODIUM CYANIDE	1,754	1,347	1,338	2,197	3,280	1,098	2,178	2,437	2,542	2,808	2,865
SODIUM DICHROMATE	0	0	180,478	182,185	122,647	32,699	122	329	633	217	0
SODIUM TETRATHIOCARBONATE	63,620	226,590	543,229	799,092	898,145	688,701	596,028	375,487	352,342	212,308	259,542
TRIFLURALIN	1,261,342	1,380,785	1,143,695	1,191,780	1,219,810	1,260,536	1,162,359	934,584	1,093,884	1,062,581	1,023,127
XYLENE	29,001	17,944	12,619	8,511	5,366	4,847	4,292	9,544	2,680	4,360	2,109
ZINC PHOSPHIDE	2,933	1,610	1,217	2,326	1,200	5,447	1,607	1,120	980	1,252	1,924
TOTAL	35,170,769	43,290,450	42,316,825	41,590,956	39,821,232	43,352,935	35,795,701	28,988,970	33,234,086	35,857,153	36,843,842

Table 7B. *The reported cumulative acres treated in California with pesticides on DPR's toxic air contaminants list. These pesticides are the currently registered 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 is 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	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1,3-DICHLOROPROPENE	33	4,174	17,223	22,193	27,059	29,430	33,101	30,817	42,064	48,944	56,618
2,4-D	156,563	151,453	137,230	50,709	11,649	7,791	5,054	3,952	2,295	2,562	3,577
2,4-D, 2-ETHYLHEXYL ESTER	65	385	160	729	6,867	7,624	7,833	6,919	9,906	22,426	20,362
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	26,138	22,298	21,872	20,055	22,117	11,843	5,711	359	264	630	1,475
2,4-D, BUTOXYETHANOL ESTER	46,343	29,933	35,599	13,504	13,798	7,198	7,013	5,633	2,565	2,539	4,035
2,4-D, BUTOXYPROPYL ESTER	100	5	2	51	105	37	5	9	0	0	0
2,4-D, BUTYL ESTER	0	0	0	0	307	37	24	1	101	0	0
2,4-D, DIETHANOLAMINE SALT	933	4,683	8,721	88,149	58,239	23,884	49,357	27,705	36,290	39,046	22,729
2,4-D, DIMETHYLAMINE SALT	474,599	524,146	540,728	527,870	477,967	411,858	495,513	475,796	491,048	595,257	553,037
2,4-D, DODECYLAMINE SALT	0	0	0	76	82	1,481	0	262	276	0	0
2,4-D, HEPTYLAMINE SALT	0	18	<1	0	0	29	0	0	0	0	0
2,4-D, ISOOCTYL ESTER	379	3,497	5,163	35,045	29,179	14,449	3,970	16,375	6,925	9,476	7,502
2,4-D, ISOPROPYL ESTER	63,244	72,878	69,081	87,492	101,141	100,837	103,938	88,849	108,908	116,859	117,870
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	449	36	26	0	2	3	0	0	0	0	0
2,4-D, OCTYL ESTER	0	0	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	28,812	22,655	23,846	21,479	14,356	15,542	11,278	5,200	7,468	5,509	8,680
2,4-D, TETRADECYLAMINE SALT	0	0	0	76	82	1,481	0	262	276	0	0
2,4-D, TRIETHYLAMINE SALT	152,474	146,454	131,679	46,600	7,381	2,638	1,311	1,257	688	1,035	677
2,4-D, TRIISOPROPYLAMINE SALT	0	0	0	0	0	0	0	0	0	0	0
ACROLEIN	888	3,190	2,462	1,514	292	3,981	873	1,409	2,206	642	575
ALUMINUM PHOSPHIDE	120,397	92,977	80,217	66,017	74,441	1,034,732	1,271,629	67,422	70,176	73,864	74,762
ARSENIC ACID	0	0	0	0	0	0	0	0	0	0	0
ARSENIC PENTOXIDE	660	0	0	0	0	0	709,893	56	0	0	48
ARSENIC TRIOXIDE	0	0	0	0	0	0	0	0	1	<1	0
CAPTAN	244,164	295,860	381,989	347,631	602,684	404,731	309,768	215,969	213,438	271,140	211,028
CAPTAN, OTHER RELATED	244,097	295,831	381,989	347,235	602,585	404,511	309,116	215,958	213,388	270,968	209,571

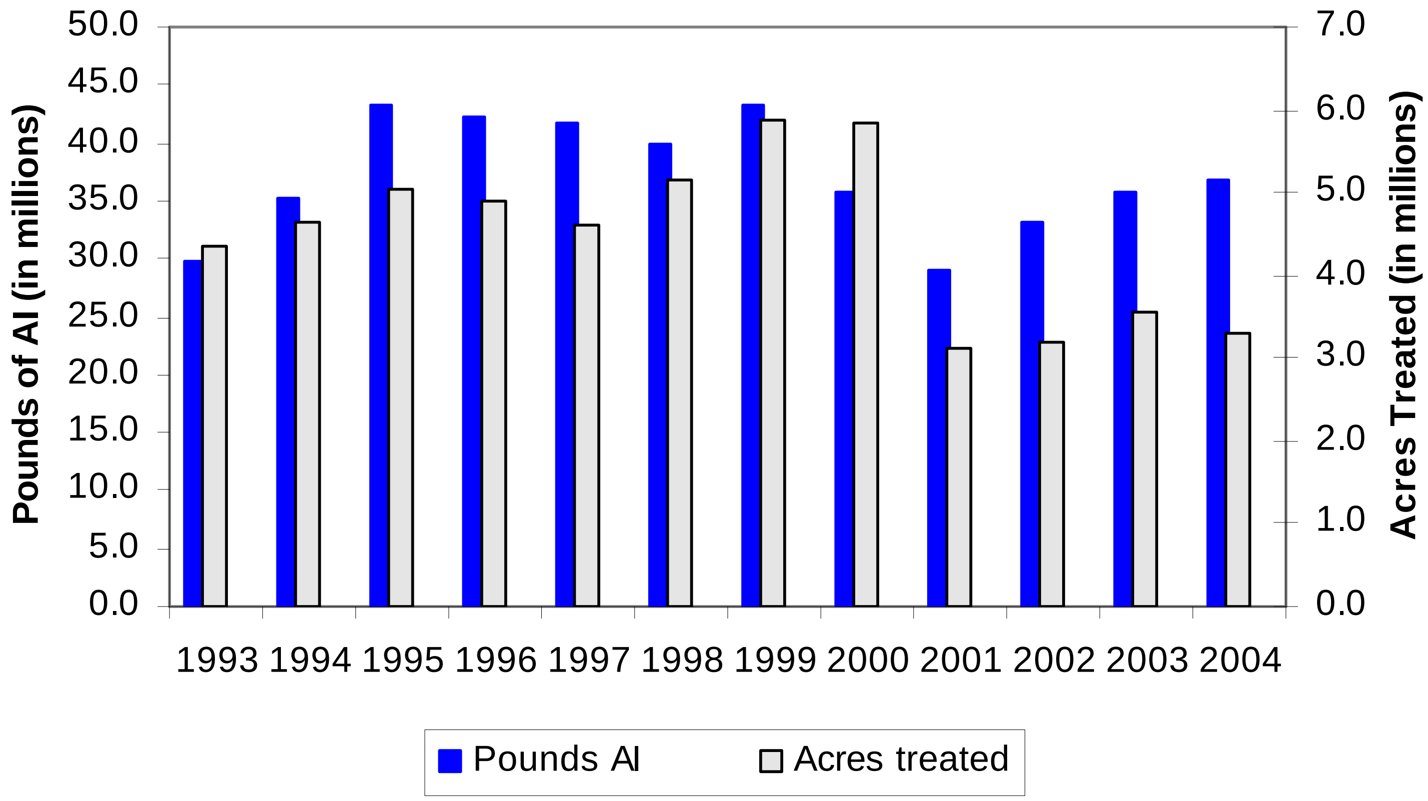
***Table 7B** (cont.). The reported cumulative acres treated in California with pesticides on DPR's toxic air contaminants list.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CARBARYL	291,147	305,452	312,058	292,721	197,664	216,991	196,264	147,612	106,590	97,811	103,261
CHLORINE	0	290	0	1,005	1,329	46,611	37,220	95	150	650	2,137
CHROMIC ACID	660	0	0	0	0	0	709,893	56	0	0	0
DAZOMET	59	384	863	1,099	3,589	243	222	224	136	326	298
DDVP	1,888	1,887	1,499	2,596	3,692	2,180	2,336	3,954	4,327	2,576	1,637
ETHYLENE OXIDE	0	0	0	0	194	31	41	0	0	0	0
FORMALDEHYDE	15	137	234	12	126	123	47	53	33	18	23
HYDROGEN CHLORIDE	1	0	1	0	16	0	0	27	590	273	1
LINDANE	22,984	19,380	25,352	36,573	32,650	20,930	14,628	13,832	8,010	8,828	9,437
MAGNESIUM PHOSPHIDE	0	23	19	26	184	616,017	46	373	7	167	1
MANCOZEB	273,836	405,494	351,801	284,134	682,979	387,300	363,260	228,275	197,055	276,096	194,219
MANEB	512,009	652,122	731,079	624,123	942,083	629,897	611,717	535,105	554,787	659,893	601,360
META-CRESOL	930	1,279	1,309	3,488	1,407	657	3,142	517	267	244	288
METAM-SODIUM	183,625	199,457	215,899	198,395	154,309	186,300	146,847	125,263	141,357	142,396	128,427
METHANOL	0	0	0	0	0	0	14	0	0	0	0
METHOXYCHLOR	220	30	19	131	194	140	197	88	24	0	44
METHOXYCHLOR, OTHER RELATED	70	5	9	52	5	0	0	0	0	0	<1
METHYL BROMIDE	106,694	107,933	96,507	103,068	90,107	102,125	75,741	60,892	53,100	55,251	57,175
METHYL ISOTHIOCYANATE	0	0	0	0	47	100	0	0	0	0	0
METHYL PARATHION	137,691	129,976	125,729	125,638	128,675	119,315	43,773	39,449	37,448	51,192	48,640
NAPHTHALENE	0	0	0	0	0	0	0	0	20	0	0
PARA-DICHLOROBENZENE	0	0	0	0	10	0	0	0	0	0	0
PARATHION	3,404	6,688	5,099	2,071	2,592	1,976	4,025	2,977	7,026	1,016	392
PCNB	55,371	53,079	44,187	29,169	39,090	28,324	28,628	25,832	9,533	7,759	3,817
PCP, OTHER RELATED	2	<1	15	4	15	0	59	38	0	0	20
PCP, SODIUM SALT	0	0	0	0	20	0	0	0	0	0	0
PCP, SODIUM SALT, OTHER RELATED	0	0	0	0	0	0	0	0	0	0	0
PENTACHLOROPHENOL	2	<1	15	4	190	0	59	38	0	0	20
PHENOL	6,126	7,947	718	37	275	459	5	501	0	25	310
PHOSPHINE	0	0	0	0	0	0	0	0	0	0	349
PHOSPHORUS	3,435	1,908	69	790	965	5,701	2,847	252	0	0	0
POTASSIUM N-METHYLDITHIOCARBAMATE	0	0	0	21	50	0	534	2,321	9,073	12,887	10,229

***Table 7B** (cont.). The reported cumulative acres treated in California with pesticides on DPR's toxic air contaminants list.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
POTASSIUM PERMANGANATE	0	0	0	0	20	0	0	0	0	0	0
PROPOXUR	14	5	9	73	45	39	26	4	23	1	7
PROPYLENE OXIDE	0	0	0	<1	0	573	0	0	<1	0	22
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	615,978	604,586	531,052	437,505	305,306	245,470	282,844	187,153	129,570	158,604	133,535
SODIUM CYANIDE	82,520	6,040	3,020	84,800	53,285	0	0	0	0	0	0
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	0	0	0
SODIUM TETRATHIOCARBONATE	3,706	12,997	27,736	35,473	34,488	24,947	21,002	13,574	11,559	6,832	8,497
TRIFLURALIN	1,160,072	1,282,997	1,086,892	1,131,033	1,083,219	1,159,648	1,038,856	800,893	944,334	903,654	920,528
XYLENE	28,673	28,870	24,221	13,568	11,327	3,325	6,208	9,665	4,533	7,512	3,375
ZINC PHOSPHIDE	27,654	16,101	22,801	26,756	18,833	38,101	16,349	11,069	7,049	8,387	14,150
TOTAL	4,656,488	5,042,019	4,892,104	4,591,003	5,142,630	5,870,168	5,842,438	3,111,086	3,173,973	3,540,993	3,290,356

Figure 5. *Use trends of pesticides on DPR's toxic air contaminants list. These pesticides are the currently registered 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 reportable 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

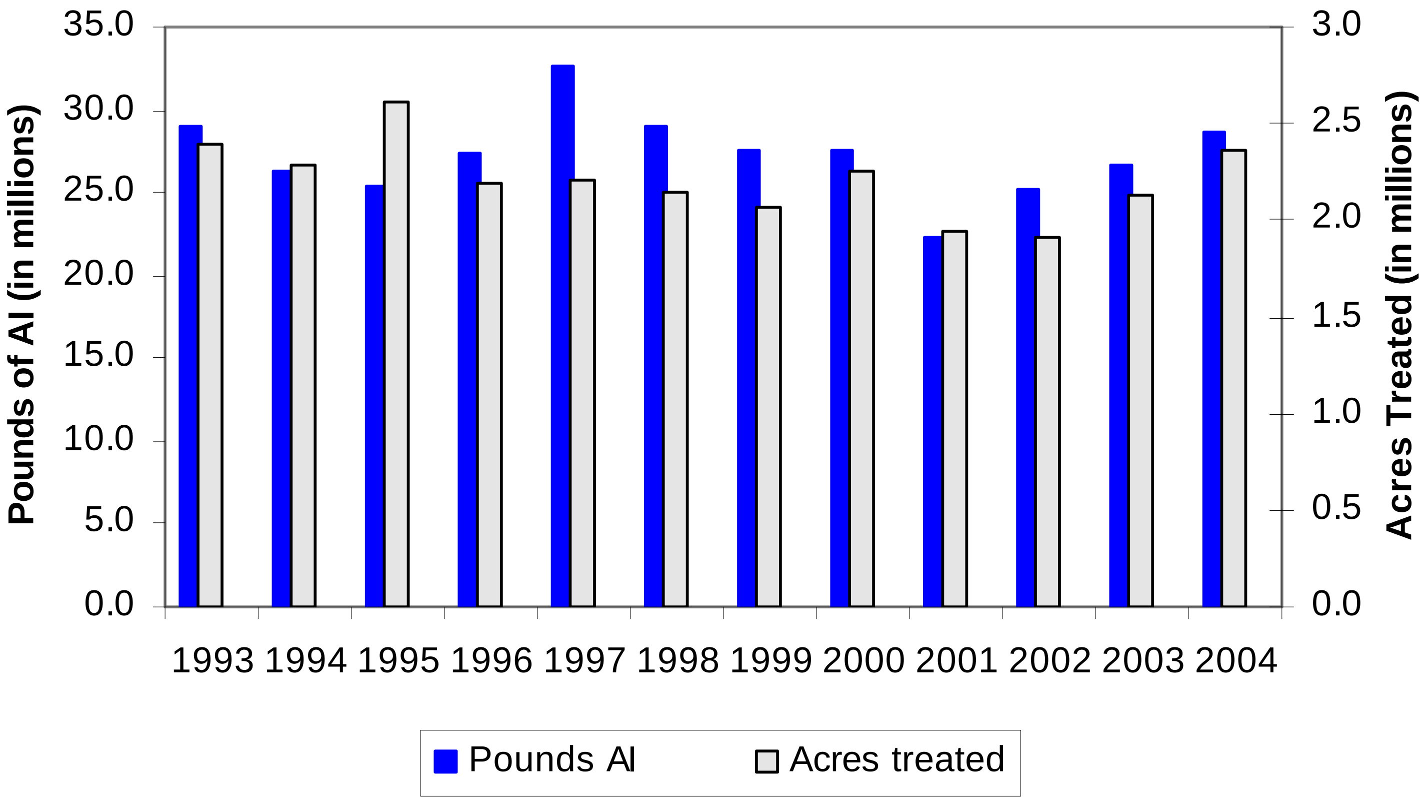
Table 8A. *The reported pounds of oil pesticides. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of B2 carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides that may not qualify as carcinogenic due to their degree of refinement. Many such oil pesticides also serve as alternatives to high-toxicity chemicals. For this reason, oil pesticide data was classified separately in this report. Use includes both agricultural and reportable non-agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
COAL TAR HYDROCARBONS	0	0	0	0	0	0	0	50	<1	0	0
HYDROTREATED PARAFFINIC SOLVENT	0	0	0	0	0	0	0	0	0	284,236	320,019
ISOPARAFFINIC HYDROCARBONS	8	10	5	2	35	8	13	1	1,928	23,782	30,095
KEROSENE	152,200	145,743	120,700	101,293	90,108	70,398	84,562	48,304	18,404	12,407	9,585
MINERAL OIL	3,444,484	3,350,535	4,797,876	5,542,530	5,286,094	4,418,280	3,911,471	3,654,856	5,054,070	6,280,443	9,053,668
NAPHTHA, HEAVY AROMATIC	27	26	143	83	0	0	0	29	0	2	53
PETROLEUM DERIVATIVE RESIN	551	4	94	15	6	1	3	1	<1	1	1
PETROLEUM DISTILLATES	2,279,717	2,459,518	1,705,072	1,791,012	1,604,775	2,416,054	2,299,176	1,739,436	1,565,116	1,879,545	1,600,483
PETROLEUM DISTILLATES, ALIPHATIC	0	0	0	0	0	0	<1	7	49,237	15,163	30,638
PETROLEUM DISTILLATES, AROMATIC	64,526	31,535	14,630	13,961	35,085	9,925	10,400	2,851	6,202	2,916	5,506
PETROLEUM DISTILLATES, REFINED	63,524	45,967	38,396	45,094	60,337	114,329	927,949	842,758	286,978	371,482	1,023,896
PETROLEUM HYDROCARBONS	183,214	234,001	266,895	210,042	236,590	121,783	143,090	219,545	216,917	985	642
PETROLEUM NAPHTHENIC OILS	320	0	12	1	9	2	3	91	325	208	24
PETROLEUM OIL, PARAFFIN BASED	440,464	434,878	312,359	267,704	0	310,988	344,350	342,367	283,487	367,051	433,848
PETROLEUM OIL, UNCLASSIFIED	19,674,078	18,687,636	20,063,955	24,633,153	21,723,758	20,084,263	19,797,620	15,447,561	17,656,554	17,447,935	15,927,177
PETROLEUM SULFONATES	1	<1	4	1	<1	<1	1	<1	<1	0	0
TOTAL	26,303,115	25,389,853	27,320,140	32,604,892	29,036,797	27,546,031	27,518,636	22,297,858	25,139,218	26,686,154	28,435,635

Table 8B. *The reported cumulative acres treated in California with oil pesticides. (See qualifying comments on U.S. EPA B2 carcinogen and Proposition 65 listing with Table 8A.) Uses include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
COAL TAR HYDROCARBONS	0	0	0	0	0	0	0	0	0	0	0
HYDROTREATED PARAFFINIC SOLVENT	0	0	0	0	0	0	0	0	0	306,243	327,022
ISOPARAFFINIC HYDROCARBONS	<1	0	0	0	0	0	0	0	4,490	56,120	67,795
KEROSENE	284,864	333,112	289,469	240,080	223,822	179,961	227,734	138,896	29,561	21,672	11,992
MINERAL OIL	130,688	144,413	190,550	191,954	615,564	163,976	157,520	169,885	199,089	286,423	407,021
NAPHTHA, HEAVY AROMATIC	0	0	0	0	0	0	0	11	0	0	0
PETROLEUM DERIVATIVE RESIN	1,321	3	191	50	13	1	0	0	0	0	0
PETROLEUM DISTILLATES	340,671	440,375	369,500	299,592	265,736	223,509	274,543	213,784	210,437	236,822	244,673
PETROLEUM DISTILLATES, ALIPHATIC	0	0	0	0	0	0	0	5,104	44,494	26,131	25,904
PETROLEUM DISTILLATES, AROMATIC	66,414	53,211	12,324	19,003	2,153	7,088	6,238	1,900	3,935	1,804	569
PETROLEUM DISTILLATES, REFINED	4,173	3,976	5,145	6,146	6,162	12,495	42,145	48,446	35,407	39,838	79,589
PETROLEUM HYDROCARBONS	191,965	248,347	193,257	200,989	276,950	237,043	258,740	289,094	273,322	2,869	108
PETROLEUM NAPHTHENIC OILS	540	0	73	0	50	37	0	5,119	13,241	11,314	2,484
PETROLEUM OIL, PARAFFIN BASED	664,715	680,590	464,508	443,059	0	470,204	461,939	445,342	416,483	488,928	555,670
PETROLEUM OIL, UNCLASSIFIED	603,690	703,859	663,575	811,902	753,904	775,828	817,752	631,471	703,820	667,064	653,593
PETROLEUM SULFONATES	0	<1	<1	<1	0	<1	10	0	0	0	0
TOTAL	2,288,491	2,607,726	2,188,420	2,212,690	2,144,304	2,070,045	2,246,598	1,937,975	1,914,147	2,124,920	2,369,478

Figure 6. Use trends of oil pesticides. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of B2 carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides that may not qualify as carcinogenic due to their degree of refinement. Many such oil pesticides also serve as alternatives to high-toxicity chemicals. For this reason, oil pesticide data was classified separately in this report. Reported pounds of active ingredient (AI) applied include both agricultural and reportable 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 REDUCED-RISK PESTICIDES

Table 9A. *The reported pounds of reduced-risk pesticides applied in California. These active ingredients are contained in pesticide products that have been given reduced-risk status by U.S. EPA. Use includes both agricultural and non-agricultural applications. Zero values in early years likely indicate the pesticide was not yet registered for use. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1-METHYLCYCLOPROPENE	0	0	0	0	0	0	0	<1	<1	<1	<1
ACETAMIPRID	0	0	0	0	0	0	0	0	6,434	26,628	34,717
ACIBENZOLAR-S-METHYL	0	0	0	0	0	0	0	230	1,157	1,159	714
AZOXYSTROBIN	0	0	0	23,851	69,232	95,723	114,968	85,600	95,827	97,516	87,275
BIFENAZATE	0	0	0	0	0	0	92	523	24,719	42,866	60,594
BISPYRIBAC-SODIUM	0	0	0	0	0	0	0	0	2,378	2,219	3,242
BOSCALID	0	0	0	0	0	0	0	0	0	59	62,149
BUPROFEZIN	0	0	0	6,987	8,459	22,244	678	3,439	22,302	33,510	43,055
CARBO METHOXY ETHER CELLULOSE, SODIUM SALT	92	184	22,994	1,032	723	638	436	543	6	0	0
CARFENTRAZONE-ETHYL	0	0	0	0	3,076	2,730	0	492	2,128	14,196	14,315
CINNAMALDEHYDE	0	0	0	<1	<1	6,764	10,332	4,704	806	238	326
CORN GLUTEN MEAL	0	0	0	0	0	2,490	4,590	2,744	1,294	8	18
CYPRODINIL	0	0	0	0	48,417	56,268	98,773	81,216	99,483	121,341	108,068
FENHEXAMID	0	0	0	0	0	12,386	36,240	39,583	50,073	64,535	53,890
FIPRONIL	0	0	0	<1	1	2	662	7,856	15,017	32,756	49,950
FLUDIOXONIL	0	0	0	0	551	349	568	974	5,021	7,369	6,504
FORCHLORFENURON	0	0	0	0	0	0	0	43	35	139	5
HEXAFLUMURON	0	<1	<1	<1	2	8	8	12	93	21	5
IMAZAMOX, AMMONIUM SALT	0	0	0	0	0	0	0	0	1,490	2,668	3,046
INDOXACARB	0	0	0	0	0	0	3,535	29,016	27,098	70,058	36,930
IRON PHOSPHATE	0	0	0	0	66	187	344	617	545	855	1,255
MEFENOXAM	0	0	43	29,078	59,960	55,942	60,426	49,967	54,562	60,964	65,450
METHOXYFENOZIDE	0	0	0	0	0	0	0	0	0	861	74,915
METHYL ANTHRANILATE	0	0	6	184	49	57	50	37	85	34	534
NOVALURON	0	0	0	0	0	0	0	0	2	24	40
OIL OF PEPPERMINT	0	0	0	0	0	0	0	<1	0	<1	<1
OXYPURINOL	0	0	0	0	0	0	<1	<1	0	0	0
POTASSIUM BICARBONATE	0	0	0	28	65,909	92,990	130,462	121,804	179,676	283,851	159,764
PROHEXADIONE CALCIUM	0	0	0	0	0	0	0	46	52	153	185

***Table 9A** (cont.)**.** The reported pounds of reduced-risk pesticides applied in California.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
PYMETROZINE	0	0	0	0	0	18	829	1,284	1,420	2,226	5,250
PYRACLOSTROBIN	0	0	0	0	0	0	0	0	0	23,855	55,892
PYRIPROXYFEN	0	0	0	3,220	6,072	3,096	14,040	7,663	9,782	10,796	13,363
SODIUM BICARBONATE	0	0	0	0	0	5	22	230	2,063	0	126
SPINOSAD	0	0	0	10,146	29,717	44,573	55,443	51,071	53,574	61,613	65,984
TEBUFENOZIDE	0	7,955	3,463	5,300	9,178	8,815	62,310	65,724	65,094	93,057	21,087
THIAMETHOXAM	0	0	0	0	0	0	0	0	10,897	10,187	10,070
TRIFLOXYSTROBIN	0	0	0	0	0	0	45,938	12,303	18,321	21,234	16,629
XANTHINE	0	0	0	0	0	0	<1	<1	0	0	0
TOTAL	92	8,138	26,506	79,825	301,413	405,284	640,744	567,721	751,434	1,086,997	1,055,345

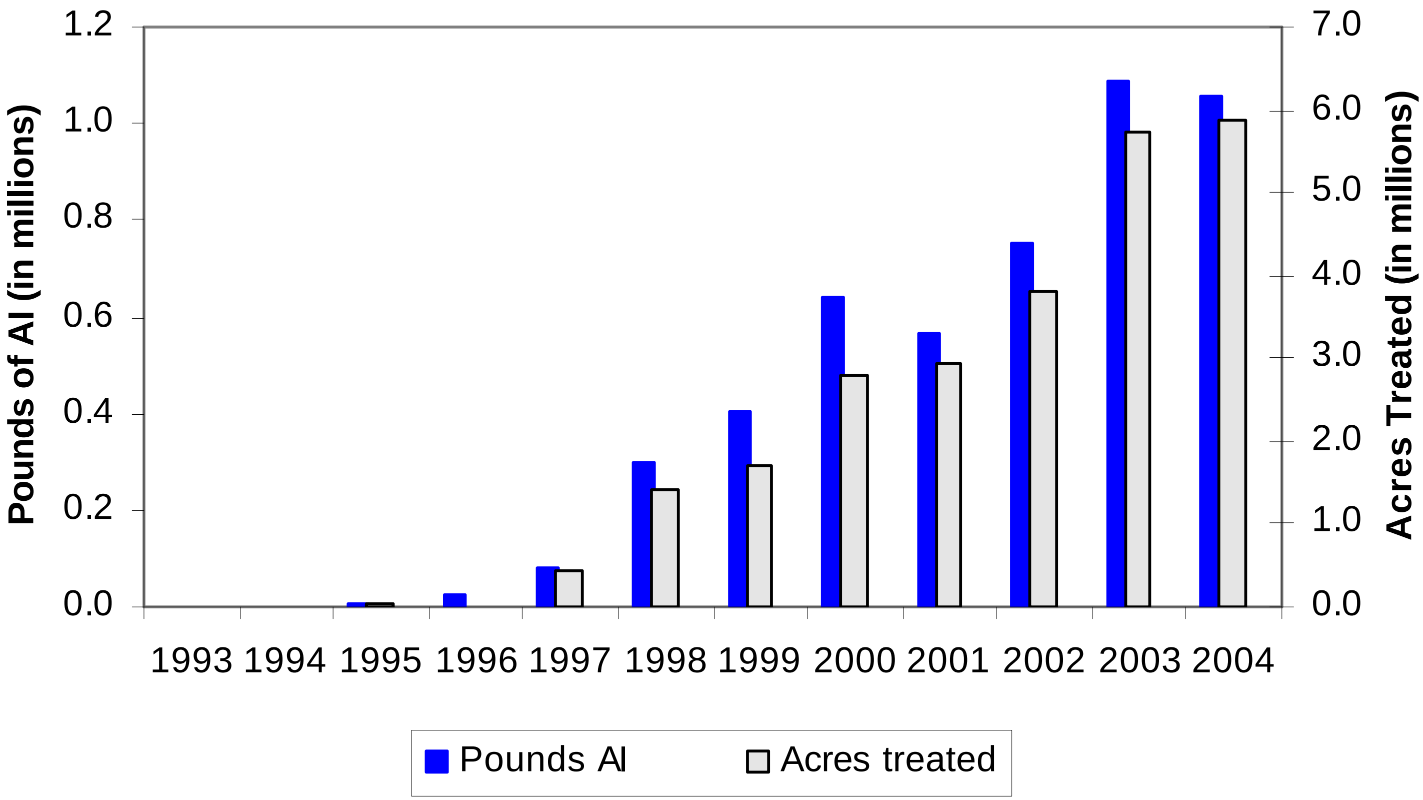
Table 9B. *The reported cumulative acres treated in California with each reduced-risk pesticide. These active ingredients are contained in pesticide products that have been given reduced-risk status by U.S. EPA. Use includes primarily agricultural applications. Zero values in early years likely indicate the pesticide was not yet registered for use. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
1-METHYLCYCLOPROPENE	0	0	0	0	0	0	0	3	<1	9	4
ACETAMIPRID	0	0	0	0	0	0	0	0	87,041	423,398	554,758
ACIBENZOLAR-S-METHYL	0	0	0	0	0	0	0	8,266	39,749	38,316	25,414
AZOXYSTROBIN	0	0	0	28,421	340,507	449,776	581,810	444,032	511,046	690,373	518,422
BIFENAZATE	0	0	0	0	0	0	249	2,173	58,876	97,369	136,234
BISPYRIBAC-SODIUM	0	0	0	0	0	0	0	0	80,499	70,514	94,653
BOSCALID	0	0	0	0	0	0	0	0	0	163	330,761
BUPROFEZIN	0	0	0	18,623	8,382	15,801	1,966	10,012	32,716	61,238	91,529
CARBO METHOXY ETHER CELLULOSE, SODIUM SALT	61	113	235	328	83	77	197	484	5	0	0
CARFENTRAZONE-ETHYL	0	0	0	0	38,578	17,800	0	7,027	16,440	167,610	357,461
CINNAMALDEHYDE	0	0	0	<1	<1	2,418	4,136	1,534	295	105	137
CORN GLUTEN MEAL	0	0	0	0	0	0	0	7	3	0	0
CYPRODINIL	0	0	0	0	122,772	186,536	314,850	282,736	346,342	412,877	401,141
FENHEXAMID	0	0	0	0	0	18,455	57,100	70,069	84,525	113,987	92,304
FIPRONIL	0	0	0	0	0	0	0	1	1	1	25
FLUDIOXONIL	0	0	0	0	0	1,102	343	431	21,654	29,962	28,372
FORCHLORFENURON	0	0	0	0	0	0	0	786	882	1,455	80
HEXAFLUMURON	0	0	0	0	0	0	0	1	0	2	0
IMAZAMOX, AMMONIUM SALT	0	0	0	0	0	0	0	0	34,700	60,827	72,851
INDOXACARB	0	0	0	0	0	0	33,833	390,579	365,901	900,278	493,004
IRON PHOSPHATE	0	0	0	0	205	470	852	1,036	1,929	1,253	2,148
MEFENOXAM	0	0	40	153,858	360,994	335,708	406,191	273,020	283,752	308,528	311,751
METHOXYFENOZIDE	0	0	0	0	0	0	0	0	0	3,239	387,470
METHYL ANTHRANILATE	0	0	0	0	0	0	0	0	81	56	1,458
NOVALURON	0	0	0	0	0	0	0	0	34	319	508
OIL OF PEPPERMINT	0	0	0	0	0	0	0	0	0	0	0
OXYPURINOL	0	0	0	0	0	0	0	0	0	0	0
POTASSIUM BICARBONATE	0	0	0	11	34,010	52,110	60,330	52,654	73,894	106,955	64,957
PROHEXADIONE CALCIUM	0	0	0	0	0	0	0	156	341	852	943

***Table 9B** (cont.)**.** The reported cumulative acres treated in California with each reduced-risk pesticide.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
PYMETROZINE	0	0	0	0	0	98	4,520	10,421	10,859	17,641	55,057
PYRACLOSTROBIN	0	0	0	0	0	0	0	0	0	156,150	495,107
PYRIPROXYFEN	0	0	0	60,164	64,648	35,307	72,934	100,297	142,040	197,811	234,152
SODIUM BICARBONATE	0	0	0	0	0	8	0	0	0	0	100
SPINOSAD	0	0	0	128,313	384,192	541,190	680,424	694,687	731,544	806,260	858,714
TEBUFENOZIDE	0	32,418	14,449	28,620	53,705	52,379	387,464	399,966	348,320	523,303	125,362
THIAMETHOXAM	0	0	0	0	0	0	0	0	255,350	270,843	221,882
TRIFLOXYSTROBIN	0	0	0	0	0	0	198,588	201,521	278,530	312,257	255,432
XANTHINE	0	0	0	0	0	0	0	0	0	0	0
TOTAL	61	32,531	14,724	418,337	1,408,077	1,709,237	2,805,785	2,951,775	3,791,152	5,747,973	5,876,442

Figure 7. *Use trends of reduced-risk pesticides. These active ingredients are contained in pesticide products that have been given reduced-risk status by U.S. EPA. Reported pounds of active ingredient (AI) applied include both agricultural and reportable 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 10A. *The reported pounds of biopesticides applied in California. 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 non-agricultural applications. Zero values in early years likely indicate the pesticide was not yet registered for use. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
(E)-4-TRIDECEN-1-YL-ACETATE	3	12	140	76	65	67	263	182	247	254	131
(E)-5-DECENOL	0	12	71	737	176	246	5	2	2	295	5
(E)-5-DECENYL ACETATE	0	58	339	3,508	844	1,183	26	9	12	889	23
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	<1	0	0	<1	0	<1	0	0	0	<1
(S)-KINOPRENE	11	18	137	121	1,274	357	245	311	326	417	358
(Z)-11-HEXADECEN-1-YL ACETATE	0	0	0	0	0	0	0	0	35	10	10
(Z)-11-HEXADECENAL	0	0	0	0	0	0	0	0	35	10	10
(Z)-4-TRIDECEN-1-YL-ACETATE	<1	<1	4	2	2	2	9	6	8	8	4
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	3	29	2	1	46	229	3	13	2	3	0
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	3	2	2	1	46	242	3	<1	3	3	0
1-DECANOL	1	1	1	<1	<1	<1	<1	<1	0	0	0
1-METHYLCYCLOPROPENE	0	0	0	0	0	0	0	<1	<1	<1	<1
1-NAPHTHALENEACETAMIDE	72	54	99	115	283	333	217	213	88	119	113
ACETIC ACID	<1	0	0	0	0	0	0	0	0	<1	<1
AGROBACTERIUM RADIOBACTER	4	6	14	28	20	7	2	1	4	3	2
AGROBACTERIUM RADIOBACTER, STRAIN K1026	0	0	0	0	0	0	<1	<1	1	<1	<1
ALLYL ISOTHIOCYANATE	0	0	0	<1	0	0	<1	<1	<1	<1	<1
AMINO ETHOXY VINYL GLYCINE HYDROCHLORIDE	0	0	0	0	0	1	<1	1	1	0	0
AMPELOMYCES QUISQUALIS	0	<1	3	9	40	4	4	2	<1	<1	<1
AZADIRACHTIN	71	558	812	840	653	16,764	1,234	1,536	1,483	1,366	2,915
BACILLUS PUMILUS, STRAIN QST 2808	0	0	0	0	0	0	0	0	0	<1	2
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	0	0	0	1,298	4,886	2,274	2,746	7,941	4,667	10,122	14,187
BACILLUS SUBTILIS GB03	0	0	0	<1	<1	<1	<1	1	4	5	7
BACILLUS THURINGIENSIS (BERLINER)	476	1,562	520	177	751	24	76	115	16	11	12
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	1,936	5,115	6,520	7,406	4,273	3,017	4,419	3,953	3,972	5,024	4,088
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	4,935	8,050	10,145	14,210	10,854	10,427	9,065	5,540	5,881	7,548	3,014
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	4,619	6,827	4,059	4,423	12,963	5,038	88,039	24,795	9,778	17,335	13,725

Table 10A (cont.). The reported pounds of biopesticides applied in California.

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	0	0	0	0	0	0	1,562	1,510	4,962	5,754	3,510
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	39,667	39,550	25,890	29,825	20,535	14,154	13,145	30,166	2,667	6,162	3,916
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	2,714	3,391	3,056	1,448	4,548	1,360	1,810	738	1,228	66	21
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	7,042	7,466	3,468	2,752	1,633	213	139	58	19	39	2
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	6,416	8,643	8,689	11,676	9,603	8,730	9,931	12,583	13,391	12,879	14,636
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	10	1	3	26	8	34	18	8	1	2	1
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	0	0	0	0	6	1	33	79	164	130	10
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	0	0	257	15,619	12,522	12,831	16,679	8,749	681	1,503	344
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	0	0	0	0	0	0	<1	<1	0	<1	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	0	0	0	0	0	0	6,482	14,734	439	1,527	930
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN ABTS-1857	0	0	0	0	0	0	0	0	0	21,956	27,075
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	0	0	0	0	0	3	158	498	1,295	562	347
BACILLUS THURINGIENSIS, SUBSP. ISRAELENSIS, STRAIN AM 65-52	0	0	0	0	0	0	0	0	9,485	29,326	23,001
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN ABTS-351, FERMENTATION SOLIDS AND SOLUBLES	0	0	0	0	0	0	0	0	47	538	42,329
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	0	0	<1	57	20,771	21,652	21,081	16,917	24,388	38,698	4,743
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	0	0	3,663	29,895	12,634	8,048	7,146	2,211	258	54	5
BEAUVERIA BASSIANA STRAIN GHA	0	0	1	573	1,243	914	913	678	1,032	715	863
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	305	103	55	0	0	0	0	0
CANOLA OIL	0	0	0	0	0	0	1	5	<1	1	4
CAPSICUM OLEORESIN	220	19	46	2	17	104	3	73	4	5	49

***Table 10A** (cont.). The reported pounds of biopesticides applied in California.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CASTOR OIL	4	<1	1	40	174	24	557	297	504	1,281	363
CINNAMALDEHYDE	0	0	0	<1	<1	6,764	10,332	4,704	806	238	326
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	0	0	3,196	13,792	55,005	94,569	111,246	83,800	73,345	60,429	84,880
CODLING MOTH GRANULOSIS VIRUS	0	321	0	0	0	0	0	0	0	0	0
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08	0	0	0	0	0	0	0	0	103	182	198
CYTOKININ	0	<1	0	0	<1	0	<1	<1	0	<1	0
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
DIHYDRO-5-PENTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
E,E-8,10-DODECADIEN-1-OL	214	1,067	253	431	220	21,029	6,278	6,390	5,126	1,807	1,113
E-11-TETRADECEN-1-YL ACETATE	0	0	0	3	2	548	397	65	122	131	91
E-8-DODECENYL ACETATE	25	38	27	46	57	66	92	73	59	113	122
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	14,341	14,535	30,809	43,815	35,129	28,435	17,904	6,913	3,174	445	114
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	0	7	13	0	34	1	6	1	6	0	2
ESSENTIAL OILS	1	<1	0	<1	11	<1	<1	<1	<1	<1	1
ETHYLENE	0	0	0	0	1	5,073	6	6	3	24	32
EUGENOL	0	<1	0	0	3	0	<1	0	0	0	3
FARNESOL	28	39	53	38	30	36	37	15	10	9	7
GAMMA AMINOBUTYRIC ACID	0	0	0	0	0	0	0	23	3,100	6,077	8,402
GARLIC	2,130	2,549	5,108	8,983	10,203	7,113	899	1,490	684	295	174
GERMAN COCKROACH PHEROMONE	0	0	0	0	0	0	0	0	<1	<1	<1
GIBBERELLINS	30,209	21,037	21,249	23,403	23,085	20,363	21,169	19,743	25,363	20,891	20,350
GIBBERELLINS, POTASSIUM SALT	3	9	<1	1	1	15	<1	1	<1	<1	1
GLIOCLADIUM VIRENS GL-21 (SPORES)	0	15	144	156	104	86	60	314	110	48	30
GLUTAMIC ACID	0	0	0	0	0	0	0	23	3,100	6,077	8,402
HYDROGEN PEROXIDE	0	0	0	0	1	15	82	1,754	2,705	2,595	2,795
HYDROPRENE	681	5,476	1,131	9,305	1,486	1,609	1,700	1,380	1,656	1,035	1,309
IBA	5	8	16	14	38	9	12	18	16	12	19
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	87	151	<1	134	859	499	0	1	0	0	58
LAURYL ALCOHOL	120	580	85	207	111	7,287	486	302	249	243	295
LINALOOL	114	403	391	358	631	229	196	173	274	280	174

***Table 10A** (cont.)**.** The reported pounds of biopesticides applied in California.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	1	1	<1	3	37	15	18	15	22	<1	<1
METHOPRENE (POST 1997 SEE CHEM CODE 5026)	3,027	8,822	3,213	29,905	1,796	10,285	14,303	2,484	5,121	7,874	8,802
METHYL ANTHRANILATE	0	0	6	184	49	57	50	37	85	34	534
METHYL SALICYLATE	<1	0	0	0	0	0	0	<1	0	0	0
MUSCALURE	4	4	3	4	2	5	9	4	1	11	10
MYRISTYL ALCOHOL	25	117	18	42	22	1,502	99	62	51	49	60
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	0	0	0	1,097	8,496	18,824	20,869	45,917	36,280	47,037	39,789
NAA	99	41	18	21	238	14	24	10	6	5	9
NEROLIDOL	23	32	43	31	24	29	30	12	8	7	6
NITROGEN, LIQUIFIED	577,181	540,335	423,124	430,214	1,003,749	424,897	391,469	478,466	561,505	319,550	79,369
NONANOIC ACID	0	4,250	11,787	14,713	11,729	13,303	12,517	14,890	11,559	7,765	7,224
NONANOIC ACID, OTHER RELATED	0	224	620	774	617	700	659	784	608	409	380
NOSEMA LOCUSTAE SPORES	0	0	0	<1	<1	<1	<1	<1	<1	<1	<1
OIL OF ANISE	<1	0	0	0	0	0	0	<1	<1	<1	<1
OIL OF CEDARWOOD	0	0	0	0	0	0	0	0	0	0	0
OIL OF CITRONELLA	1	1	0	13	5	11	1	33	0	10	0
OIL OF LEMONGRASS	1	<1	0	0	0	0	0	0	0	2	0
OIL OF MUSTARD	<1	<1	0	0	0	0	0	0	0	0	0
OXYPURINOL	0	0	0	0	0	0	<1	<1	0	0	0
PAECILOMYCES FUMOSOROSEUS APOPKA STRAIN 97	0	0	0	0	0	0	0	5	0	0	0
PERFUME	0	0	0	0	<1	<1	<1	<1	<1	<1	<1
POLY-D-GLUCOSAMINE	0	0	0	0	0	0	0	0	0	0	<1
POLYHEDRAL OCCLUSION BODIES (OB'S) OF THE NUCLEAR POLYHEDROSIS VIRUS OF HELICOVERPA ZEA (CORN EARWORM)	0	0	0	0	0	0	0	0	0	1	1
POTASSIUM BICARBONATE	0	0	0	28	65,909	92,990	130,462	121,804	179,676	283,851	159,764
PROPYLENE GLYCOL	44,863	54,137	61,455	60,421	67,530	54,281	63,627	58,293	60,369	50,440	44,213
PSEUDOMONAS FLUORESCENS, STRAIN A506	<1	206	3,044	3,639	3,660	2,173	103	1,102	1,361	1,972	841
PSEUDOMONAS SYRINGAE STRAIN ESC-11	0	0	0	0	34	0	0	0	<1	0	20
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	0	0	15	<1	<1	0	0	0	0	0	0
PUTRESCENT WHOLE EGG SOLIDS	234	19	7	15	19	136	112	140	168	186	110
QST 713 STRAIN OF DRIED BACILLUS SUBTILIS	0	0	0	0	0	0	882	7,201	18,869	17,324	16,619

***Table 10A** (cont.)**.** The reported pounds of biopesticides applied in California.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
S-METHOPRENE	67	77	127	1,806	2,651	409	371	365	863	761	525
SODIUM BICARBONATE	0	0	0	0	0	5	22	230	2,063	0	126
SODIUM LAURYL SULFATE	86	21	9	6	14	8	2	9	<1	<1	3
SOYBEAN OIL	42,462	98,625	25,969	26,656	16,748	59,695	41,901	27,743	31,726	33,006	50,301
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	<1	21	1	2	5	2	7	2	1	1	<1
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	0	0	65	39	60	121	125	116	55	35	37
XANTHINE	0	0	0	0	0	0	<1	<1	0	0	0
XANTHINE	0	0	0	0	0	0	<1	<1	0	0	0
Z,E-9,12-TETRADECADIEN-1-YL ACETATE	0	0	0	0	0	0	0	0	<1	0	0
Z-11-TETRADECEN-1-YL ACETATE	0	0	0	<1	<1	85	61	9	18	19	14
Z-8-DODECENOL	4	6	4	7	10	12	16	13	11	20	22
Z-8-DODECENYL ACETATE	435	659	447	777	888	1,009	1,436	1,127	908	1,737	1,874
Z-9-TETRADECEN-1-OL	0	0	0	0	0	0	0	0	<1	0	0
TOTAL	784,673	835,208	660,394	796,255	1,432,274	982,651	1,036,089	1,021,989	1,118,476	1,037,658	700,310

Table 10B. *The reported cumulative acres treated in California with each biopesticide. Biopesticides includes 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 is less than the sum of acres for all active ingredients because some products contain more than one active ingredient. Zero values in early years likely indicate the pesticide was not yet registered for use. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
(E)-4-TRIDECEN-1-YL-ACETATE	70	706	5,428	3,574	2,886	3,132	12,571	9,159	11,739	10,902	5,555
(E)-5-DECENOL	0	725	1,434	2,187	1,414	1,034	784	1,316	1,206	1,360	809
(E)-5-DECENYL ACETATE	0	725	1,434	2,187	1,414	1,034	784	1,316	1,206	1,360	809
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	0	0	1	0	0	0	0	0	15
(S)-KINOPRENE	55	44	341	179	2,610	888	600	847	869	754	1,864
(Z)-11-HEXADECEN-1-YL ACETATE	0	0	0	0	0	0	0	0	1,053	476	365
(Z)-11-HEXADECENAL	0	0	0	0	0	0	0	0	1,053	476	365
(Z)-4-TRIDECEN-1-YL-ACETATE	70	706	5,428	3,574	2,886	3,132	12,571	9,159	11,739	10,902	5,555
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	588	5,535	2,295	279	82	148	171	128	87	38	0
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	588	2,120	2,295	279	82	148	171	128	87	38	0
1-DECANOL	0	0	0	0	0	0	0	0	0	0	0
1-METHYLCYCLOPROPENE	0	0	0	0	0	0	0	3	<1	9	4
1-NAPHTHALENEACETAMIDE	695	812	1,784	1,820	5,211	5,418	4,135	3,690	1,705	2,355	2,201
ACETIC ACID	23	0	0	0	0	0	0	0	0	734	290
AGROBACTERIUM RADIOBACTER	2,517	2,110	6,048	1,284	5,954	1,517	1,072	514	500	365	493
AGROBACTERIUM RADIOBACTER, STRAIN K1026	0	0	0	0	0	0	4	325	355	716	524
ALLYL ISOTHIOCYANATE	0	0	0	2	0	0	0	1	0	36	0
AMINO ETHOXY VINYL GLYCINE HYDROCHLORIDE	0	0	0	0	75	142	1	6	10	0	0
AMPELOMYCES QUISQUALIS	0	366	4,566	18,628	15,039	8,363	7,156	2,193	540	332	697
AZADIRACHTIN	5,630	51,215	76,386	70,086	64,239	103,078	71,362	73,876	92,133	79,478	64,488
BACILLUS PUMILUS, STRAIN QST 2808	0	0	0	0	0	0	0	0	0	1	4
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	0	0	0	104	84	39	0	0	0	0	0
BACILLUS SUBTILIS GB03	0	0	0	0	0	0	0	0	0	0	379
BACILLUS THURINGIENSIS (BERLINER)	18,412	12,305	7,377	6,109	4,437	301	533	644	535	2	441
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	42,378	108,867	137,786	146,197	82,473	60,262	74,282	71,531	73,888	90,285	63,498

Table 10B (cont). The reported cumulative acres treated in California with each biopesticide.

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	46,069	68,505	84,793	109,951	86,430	85,564	65,923	41,378	45,129	54,037	24,160
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	1,761	738	3,357	4,289	5,242	3,221	2,434	1,964	4,907	14,525	11,189
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	0	0	0	0	0	0	9,474	11,773	43,337	54,540	28,485
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	400,394	574,228	435,707	486,699	342,525	249,709	245,114	141,868	56,866	65,664	69,454
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	16,675	27,972	22,742	11,590	22,097	9,280	11,891	5,818	8,214	384	93
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	56,536	62,435	32,471	19,739	11,015	1,684	845	439	134	338	19
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	104,848	134,225	139,051	175,772	161,858	152,834	143,643	174,400	180,617	158,413	123,786
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	3	0	4	100	6	20	18	7	2	3	1
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	0	0	0	0	87	7	687	1,913	6,279	3,013	268
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	0	0	1,377	87,123	81,541	83,094	118,598	55,515	5,061	8,479	1,766
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	0	0	0	0	0	0	2	0	0	1	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	0	0	0	0	0	0	30,603	76,935	2,571	8,493	6,457
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN ABTS-1857	0	0	0	0	0	0	0	0	0	34,164	38,718
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	0	0	0	0	0	32	1,561	4,718	10,656	4,989	3,465
BACILLUS THURINGIENSIS, SUBSP. ISRAELENSIS, STRAIN AM 65-52	0	0	0	0	0	0	0	0	5	1	3
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN ABTS-351, FERMENTATION SOLIDS AND SOLUBLES	0	0	0	0	0	0	0	0	1,310	924	84,404
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	0	0	24	2,718	202,653	217,136	199,377	170,574	138,223	124,389	44,550

***Table 10B** (cont). The reported cumulative acres treated in California with each biopesticide.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	0	0	6,387	43,741	23,196	14,779	14,698	4,622	546	111	7
BEAUVERIA BASSIANA STRAIN GHA	0	0	3	1,459	2,991	25,510	3,399	2,853	3,673	2,887	4,019
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	0	0	0	0	0	0	0
CANOLA OIL	0	0	0	0	0	0	2	2	2	2	<1
CAPSICUM OLEORESIN	1,055	1,048	582	443	2,762	1,799	261	254	149	318	379
CASTOR OIL	0	0	0	<1	0	<1	1	0	0	0	0
CINNAMALDEHYDE	0	0	0	<1	<1	2,418	4,136	1,534	295	105	137
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	0	0	7,526	13,537	22,092	45,247	49,142	36,602	34,133	38,314	51,009
CODLING MOTH GRANULOSIS VIRUS	0	448	0	0	0	0	0	0	0	0	0
CONIOTHYRIUM MINITANS STRAIN CON/M/91-08	0	0	0	0	0	0	0	0	935	1,352	1,781
CYTOKININ	0	0	0	0	82	0	3	0	0	0	0
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	0	0	0	20	0	0	0	0	0	0	0
DIHYDRO-5-PENTYL-2(3H)-FURANONE	0	0	0	20	0	0	0	0	0	0	0
E,E-8,10-DODECADIEN-1-OL	3,001	3,880	3,811	3,696	4,300	4,514	10,407	10,381	11,841	21,217	17,383
E-11-TETRADECEN-1-YL ACETATE	0	0	0	13	2,171	54,460	38,834	14,063	16,870	10,335	8,836
E-8-DODECENYL ACETATE	4,539	3,870	6,045	9,932	11,791	23,549	22,721	33,383	33,602	39,198	41,752
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	34,056	35,755	69,222	96,678	83,238	59,905	32,372	15,188	7,525	1,160	143
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	0	4	1	0	19	7	6	4	<1	0	1
ESSENTIAL OILS	10	0	0	0	0	0	6	268	0	0	1
ETHYLENE	0	0	0	0	0	2	0	0	0	0	7
EUGENOL	0	0	0	0	1	0	0	0	0	0	15
FARNESOL	15,121	17,721	22,113	16,837	12,543	43,212	25,673	8,495	6,584	5,451	4,294
GAMMA AMINOBUTYRIC ACID	0	0	0	0	0	0	0	320	43,652	87,153	117,477
GARLIC	4,763	3,976	6,586	24,333	12,403	7,376	4,725	2,407	2,756	828	259
GERMAN COCKROACH PHEROMONE	0	0	0	0	0	0	0	0	0	0	0
GIBBERELLINS	414,837	440,001	416,073	455,572	487,195	439,529	464,750	387,488	423,330	430,988	414,075
GIBBERELLINS, POTASSIUM SALT	479	903	101	184	70	1,429	8	188	22	59	170

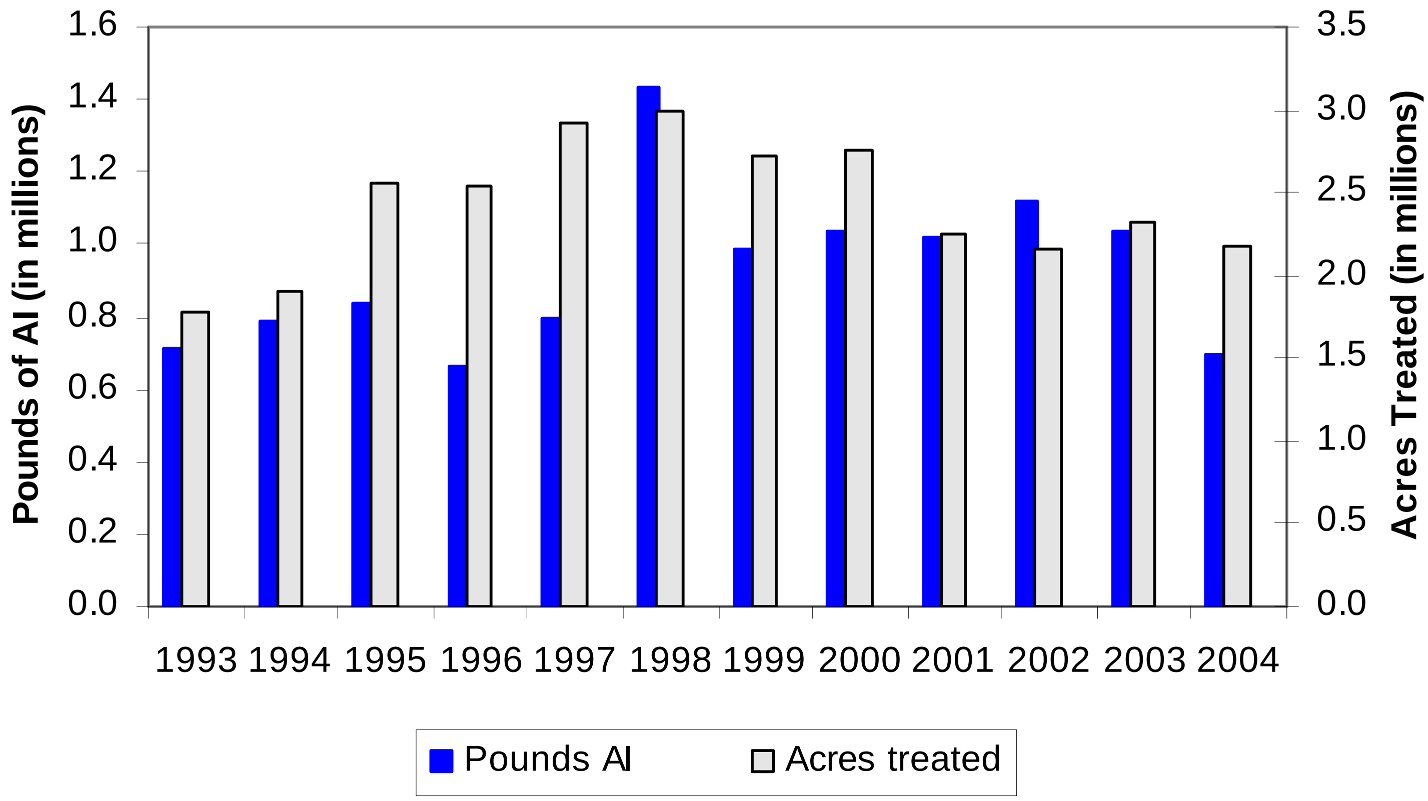
***Table 10B** (cont). The reported cumulative acres treated in California with each biopesticide.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
GLIOCLADIUM VIRENS GL-21 (SPORES)	0	1	21	14	29	12	8	768	6	0	0
GLUTAMIC ACID	0	0	0	0	0	0	0	320	43,652	87,153	117,477
HYDROGEN PEROXIDE	0	0	0	0	0	5	21	485	633	802	1,057
HYDROPRENE	0	0	0	0	1	1	<1	1	0	0	<1
IBA	187	139	104	410	1,319	1,236	266	124	244	232	1,566
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	0	0	<1	0	0	0	0	0	0	0	24
LAURYL ALCOHOL	2,807	3,028	1,798	2,858	2,886	2,666	8,038	6,429	4,635	4,791	6,009
LINALOOL	0	0	0	0	0	0	0	0	0	0	0
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	0	0	0	0	0	0	0	0	0	0	0
METHOPRENE (POST 1997 SEE CHEM CODE 5026)	35	86	65	11	23	58	38	50	0	359	1
METHYL ANTHRANILATE	0	0	0	0	0	0	0	0	81	56	1,458
METHYL SALICYLATE	0	0	0	0	0	0	0	0	0	0	0
MUSCALURE	361	794	1,439	699	979	292	435	189	121	2,283	307
MYRISTYL ALCOHOL	2,807	3,028	1,798	2,858	2,886	2,666	8,038	6,429	4,635	4,791	6,009
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	0	0	0	104	1,514	3,348	3,173	4,392	3,926	4,390	8,348
NAA	28	33	41	364	542	788	172	102	72	75	1,096
NEROLIDOL	15,121	17,721	22,113	16,837	12,543	43,212	25,673	8,495	6,584	5,451	4,294
NITROGEN, LIQUIFIED	0	0	0	0	0	0	0	0	0	0	0
NONANOIC ACID	0	674	518	294	645	573	496	495	443	446	1,075
NONANOIC ACID, OTHER RELATED	0	674	518	294	645	573	496	495	443	446	1,075
NOSEMA LOCUSTAE SPORES	0	0	0	0	7	14	2	9	0	35	37
OIL OF ANISE	0	0	0	0	0	0	0	0	0	0	0
OIL OF CEDARWOOD	0	0	0	0	0	0	0	0	0	0	0
OIL OF CITRONELLA	0	0	0	6	80	24	1	0	0	0	0
OIL OF LEMONGRASS	0	0	0	0	0	0	0	0	0	36	0
OIL OF MUSTARD	0	0	0	0	0	0	0	0	0	0	0
OXYPURINOL	0	0	0	0	0	0	0	0	0	0	0
PAECILOMYCES FUMOSOROSEUS APOPKA STRAIN 97	0	0	0	0	0	0	0	13	0	0	0
PERFUME	0	0	0	0	0	0	70	0	0	0	0
POLY-D-GLUCOSAMINE	0	0	0	0	0	0	0	0	0	0	<1

***Table 10B** (cont)**.** The reported cumulative acres treated in California with each biopesticide.*

AI	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
POLYHEDRAL OCCLUSION BODIES (OB'S) OF THE NUCLEAR POLYHEDROSIS VIRUS OF HELICOVERPA ZEA (CORN EARWORM)	0	0	0	0	0	0	0	0	0	293	742
POTASSIUM BICARBONATE	0	0	0	11	34,010	52,110	60,330	52,654	73,894	106,955	64,957
PROPYLENE GLYCOL	662,069	901,000	1,008,762	1,053,200	1,147,506	924,156	998,115	780,442	726,172	763,911	777,977
PSEUDOMONAS FLUORESCENS, STRAIN A506	8	990	16,951	26,617	29,656	15,760	1,443	11,668	13,126	16,945	6,559
PSEUDOMONAS SYRINGAE STRAIN ESC-11	0	0	0	0	17	0	0	0	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	0	0	0	0	0	0	0	0	0	0	0
PUTRESCENT WHOLE EGG SOLIDS	1,047	68	0	0	0	0	0	0	0	0	0
QST 713 STRAIN OF DRIED BACILLUS SUBTILIS	0	0	0	0	0	0	2,154	15,205	40,573	54,553	58,871
S-METHOPRENE	0	0	0	0	505	<1	567	951	166	21	49
SODIUM BICARBONATE	0	0	0	0	0	8	0	0	0	0	100
SODIUM LAURYL SULFATE	0	<1	0	0	48	0	16	0	29	0	0
SOYBEAN OIL	64,450	86,291	16,839	22,476	10,427	13,609	12,837	11,254	18,627	15,359	9,870
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	<1	13	20	115	34	27	83	50	17	14	5
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	0	0	<1	69	369	456	885	1,048	293	466	833
XANTHINE	0	0	0	0	0	0	0	0	0	0	0
Z,E-9,12-TETRADECADIEN-1-YL ACETATE	0	0	0	0	0	0	0	0	13	0	0
Z-11-TETRADECEN-1-YL ACETATE	0	0	0	13	2,171	54,460	38,834	14,063	16,870	10,335	8,836
Z-8-DODECENOL	4,539	3,870	6,045	9,932	11,791	23,549	22,721	33,383	33,602	39,198	41,752
Z-8-DODECENYL ACETATE	4,539	3,870	6,045	9,932	11,791	23,549	22,721	33,383	33,602	39,198	41,752
Z-9-TETRADECEN-1-OL	0	0	0	0	0	0	0	0	13	0	0
TOTAL	1,902,581	2,548,349	2,546,057	2,918,903	2,989,986	2,722,302	2,754,925	2,249,363	2,152,211	2,326,799	2,174,001

Figure 8. *Use trends of 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 reportable non-agricultural applications. The reported cumulative acres treated include primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.*



V. TRENDS IN PESTICIDE USE IN CERTAIN COMMODITIES

This summary describes possible reasons for changes in pesticide use from 2003 to 2004 for the following commodities: (1) cotton, (2) almonds, (3) wine grapes, (4) table and raisin grapes, (5) alfalfa, (6) rice, (7) processing tomatoes, (8) oranges, (9) head lettuce, (10) peaches and nectarines, (11) strawberries, and (12) carrots. These 12 commodities were chosen because they were treated with more than 5 million pounds of active ingredients (AI) or cumulatively treated on more than 2 million acres, which represents about 70 percent of all reported pesticide use in 2004.

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

Reported pesticide use in California in 2004 totaled 180 million pounds, an increase of 5.1 million pounds from 2003 (3 percent increase). The AIs with the largest uses by pounds were sulfur, petroleum oils, metam-sodium, mineral oil, and 1,3-dichloropropene (1,3-D). Sulfur use increased by 783,000 pounds (1.5 percent) and was the most highly used non-adjuvant pesticide in 2004, both in pounds applied and acres treated. By pounds, sulfur accounted for 30 percent of all reported pesticide use. Sulfur is a natural fungicide favored by both conventional and organic farmers. Petroleum oil use decreased by 1.5 million pounds (-8.7 percent), metam sodium use decreased by 132,000 pounds (-0.9 percent), mineral oil use increased by 2.8 million pounds (44 percent), and 1,3-D use increased by 1.9 million pounds (28 percent).

DPR data analyses have shown that pesticide use varies from year to year depending upon pest problems, weather, acreage and types of crops planted, economics, and other factors. In general, weather in 2004 was good for crop production. In particular spring was warm and dry so diseases of many crops were low and therefore fungicide use was less in 2004 than in 2003. Pounds applied and acres treated of most of the other major pesticide types increased, except for a decrease in acres treated with insecticides. Herbicide use increased partly because a wet winter promoted the growth of weeds. The hot dry summer was conducive to mite buildups, so miticide use increased.

A dramatic increase occurred in the use of some newer, reduced-risk pesticides such as spinosad, acetamiprid, pyraclostrobin, methoxyfenozide, carfentrazone-ethyl, and boscalid. Prices for most of the 12 crops improved in 2004, which may have also been an incentive to use more pesticides to protect valuable crops.

Sulfur was used mostly to control powdery mildew on grapes; use increased just slightly from 2003 to 2004. Oils and the fumigant 1,3-D had the largest increase in pounds; both increased by 1.9 million pounds. Oils were used mostly on almonds and oranges and use of oils increased over 20 percent in both crops. Oils are low risk pesticides used mostly to control insects and mites. 1,3-D was used mostly on strawberries, carrots, and almonds.

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

By acres treated, the non-adjuvant pesticides with the greatest use in 2004 were sulfur, glyphosate, oxyfluorfen, paraquat dichloride, chlorpyrifos, and abamectin. Use of all of these pesticides, except for chlorpyrifos, increased. Most of the increase in total acres treated was from increased use of glyphosate, oxyfluorfen, and abamectin. Glyphosate was used mostly on rights of way, almond, cotton, landscape maintenance, and wine grapes. Glyphosate use on cotton and almonds increased from 2003 to 2004, because of a trend toward more use of postemergence herbicides and because it is less costly than other herbicides. On cotton, glyphosate use also increased because of increased acreage of varieties genetically engineered to be tolerant to glyphosate. Oxyfluorfen is often applied with glyphosate. Use of abamectin, a miticide, increased because of greater problems with mites in 2004.

Use is given by pounds of AI applied and by acres treated. Acres treated means the cumulative number of acres treated; the acres treated in each application are summed even when the same field is sprayed more than once in a year. (For example, if one acre is treated three times in a season with an individual AI, it is counted as three acres treated).

Cotton

Cotton is grown for fiber, oil, and animal feed and is one of the most widely grown crops in California. Cotton acres planted increased by 11 percent from 2003 to 2004. Two main kinds of cotton are grown: upland and Pima. Most cotton acreage is in upland cotton, but a greater percentage of Pima cotton was planted in 2004 than in 2003. Most cotton is grown in the southern San Joaquin Valley, but a small percentage is grown in Imperial and Riverside counties and several counties in the Sacramento Valley.

***Table 11A**. Total reported pounds of all active ingredients (AIs), acres treated, acres planted, and prices for cotton each year from 2000 to 2004. Planted acres from 2000 to 2003 are from CASS, October 2004; planted acres in 2004 are from CASS, January 2005; marketing year average prices from 2000 to 2004 are from NASS, July 2001, July 2002, July 2003, July 2004, and July 2005.*

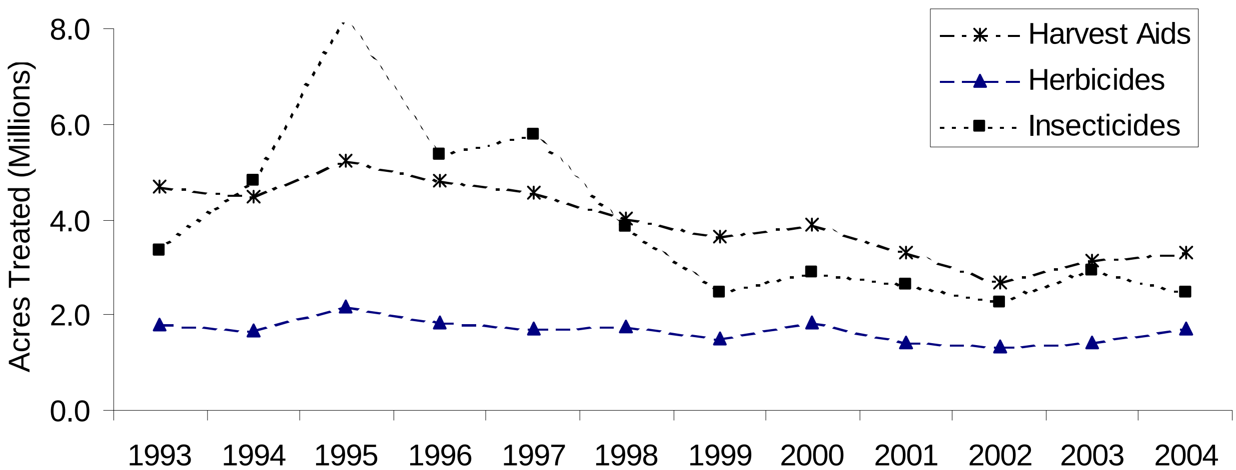
	2000	2001	2002	2003	2004
Lbs AI	9,359,879	8,127,020	7,157,764	7,141,281	7,150,897
Acres Treated	11,685,798	9,632,312	8,298,784	10,467,430	10,422,661

Acres Planted Upland Cotton	775,000	630,000	480,000	550,000	560,000
Acres Planted Pima Cotton	145,000	240,000	210,000	150,000	215,000
Acres Planted Total	920,000	870,000	690,000	700,000	775,000
Price Upland $/lbs	$0.520	$0.416	$0.573	$0.745	$0.555
Price Pima $/lbs	$1.010	$0.856	$0.860	$1.230	$1.010
Acres Roundup-Ready			175,000	220,000	330,400
% Roundup-Ready			25	31	43

__Table 11B__. Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for cotton from 2000 to 2004.

	2000	2001	2002	2003	2004
Lbs AI	10	-13	-12	0	0
Acres Treated	15	-18	-14	26	0
Acres Planted Upland Cotton	27	-19	-24	15	2
Acres Planted Pima Cotton	-40	66	-13	-29	43
Acres Planted Total	8	-5	-21	1	11
Price Upland $/lbs	-7	-20	38	30	-26
Price Pima $/lbs	19	-15	0	43	-18
Acres Roundup-Ready				26	50

__Figure 9__. Acres of cotton treated by all AIs in the major types of pesticides from 1993 to 2004.



Although cotton acreage increased by 11 percent from 2003 to 2004, total pesticide use in pounds of AI and acres treated remained nearly the same; thus pesticide use per acre planted decreased. The decrease in pesticide use was mostly from insecticides, which decreased by 16 percent in acres treated; use of both harvest aids and herbicides increased by 6 percent and 21 percent respectively. The decrease in insecticides was due mostly to decreases in indoxacarb, tebufenozide, and chlorpyrifos. This decrease occurred in Fresno and Merced counties; in all other counties use increased.

The decrease in pounds in pesticide use statewide in cotton was mostly from decreases in sodium chlorate, which is a harvest aid used at a high rate. Other pesticides with large decreases in pounds were chlorpyrifos, sulfur, S,S,S-tributyl phosphorotrithioate, and naled.

In 2004, weather conditions for cotton production were generally good to excellent. Cotton harvest started earlier than normal and yields in most areas were good, but October rain caused some reduction in yields and cotton lint quality in fields not yet harvested. Arthropod pressure was generally low in most areas in 2004. However, spider mites caused some damage mid and late season in some areas. Lygus populations were low compared to most years; however, some problems occurred in a few areas in July and August. Although aphid populations were widespread, populations were not large enough to cause problems except in a few areas. After some early damage from beet armyworms and other lepidopteran pests, very little additional damage occurred. The primary pest problems from July to September were silverleaf whiteflies, which have continued to expand their distribution from previous years. According to the Beltwide Cotton Crop Loss Data, the main arthropod pest treated was mites, followed by silverleaf whitefly, aphids, lygus, and beet armyworm. Growers treated more for mites in 2004 than 2003 and slightly more for whiteflies in 2004, but they treated less for the other pests.

Total insecticide use by acres treated has been decreasing in 1990s: from 2003 to 2004 acres treated with insecticides decreased by 16 percent and pounds insecticide decreased by 7 percent. By acres treated, the major insecticides in cotton in 2004 were acetamiprid, abamectin, chlorpyrifos, aldicarb, and thiamethoxam. A little over one half of the major insecticides decreased in use from 2003 to 2004. By pounds the insecticide with the largest decrease was chlorpyrifos, used mostly for aphids and whiteflies. By acres treated, most of the decreases in insecticides were from indoxacarb and tebufenozide, used mostly for beet armyworm and other lepidopteran pests. Other insecticides with large decreases in pounds or acres treated were thiamethoxam, imidacloprid, naled, and aldicarb. The insecticides with the largest increases in use by pounds were dicofol and propargite, used for mites; by acres treated the largest increase was acetamiprid, used mostly for aphids and whiteflies. Other major insecticides that increased in pounds or acres treated were buprofezin, pyriproxyfen, oxamyl, endosulfan, methoxyfenozide, and abamectin.

The increased pressure from spider mites would explain the increase in use of miticides such as dicofol, propargite, and abamectin. The increased whitefly numbers could partly explain increased use of acetamiprid, buprofezin, and pyriproxyfen. Also, all three of these AIs are fairly new, low risk AIs and are probably replacing use of chlorpyrifos. Use of the low risk pesticides indoxacarb and tebufenozide declined probably because of fewer problems with beet armyworms and lygus.

Throughout the 1990s, herbicide use by acres treated fluctuated from year to year between –22 percent to +30 percent; it increased by 22 percent from 2003 to 2004. By acres treated the major herbicides were glyphosate, trifluralin, oxyfluorfen, pendimethalin, and pyrithiobac-sodium. Use of all of these herbicides increased from 2003 to 2004; only a few other herbicides had decreased use and then only by small amounts. Another herbicide, carfentrazone-ethyl, had twice the use in 2004 as 2003, when it was first used. Glyphosate had the largest increase in use, increasing by 22 percent from 2003 to 2004. It has become the most widely used herbicide in cotton production in recent years, used on more than twice as many acres from 2001 to 2004 as trifluralin, the next most widely-used herbicide.

Glyphosate is effective against many annual and perennial weeds that occur in California cotton fields. It can be used as an early over-the-top herbicide with Roundup-Ready cotton varieties (which are genetically engineered to be resistant to the herbicide glyphosate), or with hooded sprayers for a longer application window. Although it does not offer complete control, it can be an effective material for use in managing annual morningglory, nutsedge, and field bindweed, which continue to be problem weeds affecting an expanding acreage. It can be used as a harvest aid, particularly when late season weeds are also a problem; however, this use has been quite limited to date. It has replaced some other herbicides because of increased acreage of Roundup-Ready cotton.

The increased use of herbicides from 2003 to 2004 may have been due to the increased weed pressure, the result of a wetter than normal winter. Glyphosate use has increased because 59 percent of our Upland cotton is Roundup-Ready. The increased use of carfentrazone-ethyl is most likely because it was first registered late in 2003—growers had little chance to use it then—and they did not know much about the product. In 2004 they became aware of its use as a post directed herbicide, as well as a defoliant, so use increased.

Use of defoliants as harvest aids decreased nearly every year from 1995 to 2002. Although use by pounds also decreased from 2002 to 2004, use by acres treated increased from 2002 to 2004. Use by pounds decreased primarily from decreased use of sodium chlorate, which is used at a high rate. However, the increase in acres treated by harvest aids was slightly less than the increase in cotton acres planted. By acres treated, the major plant growth regulator was mepiquat dichloride; and the major harvest aids used were ethephon, thidiazuron, diuron (diuron and thidiazuron are mostly applied together), paraquat dichloride, and sodium chlorate.

Of the top 10 harvest aids and plant growth regulators, five increased and five decreased in use. Most of the decrease in pounds was due to decrease of sodium chlorate. The largest increase in acres treated was pyraflufen-ethyl, which was first used in 2004. Use of the plant growth regulator (also a harvest aid) mepiquat chloride, which is used mid-season for vegetative growth management, had a large decrease from 2003 to 2004. The use of and perceived need for plant growth regulators such as mepiquat chloride is strongly influenced by both weather conditions and early insect problems that cause fruit loss, both of which can affect relative levels of vegetative growth versus fruit retention and growth. Environmental and plant conditions in 2004 were generally good especially compared to last year when conditions favored late vegetative growth which required more use of mepiquat chloride.

Almonds

Almonds are California's largest tree nut crop in total dollar value and acreage. They are the largest horticultural export from the United States. Approximately 6,000 almond growers produce nearly 100 percent of the commercial domestic supply and more than 75 percent of worldwide production. Nearly 80 countries import California almonds. The United States is by far the largest market for almonds; overseas, Germany is the largest market for almonds, consuming about 16 percent of the export crop, followed by Spain at about 15 percent. Other major importers include the Netherlands, Japan, France, the United Kingdom, Canada, India, and China. The Pacific Rim nations are a rapidly growing market for California almonds.

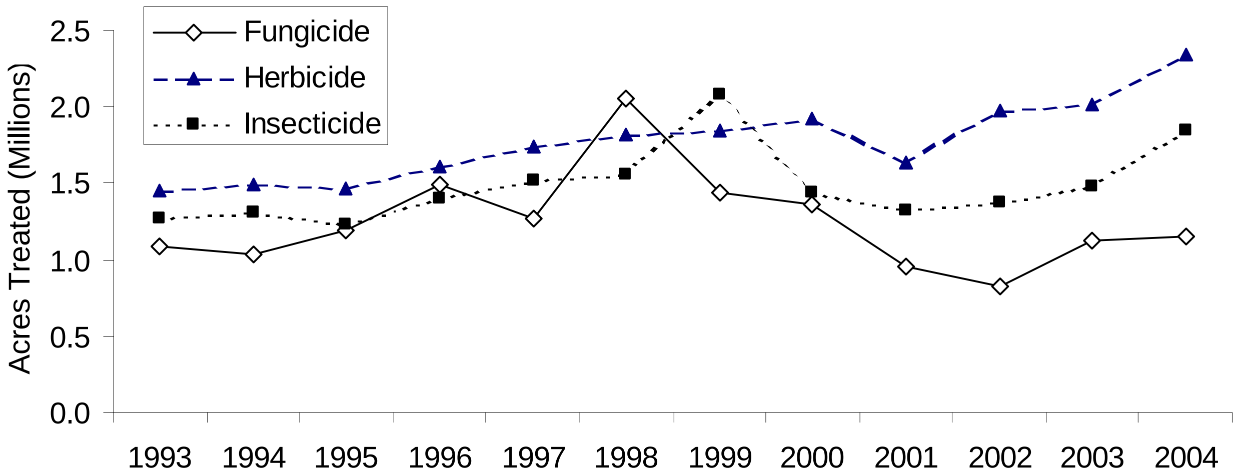
Table 12A. *Total reported pounds of all AIs, acres treated, bearing acres, and prices for almonds each year from 2000 to 2004. Bearing acres from 2000 to 2003 are from CASS, October 2004; bearing acres in 2004 are from NASS, July 2005; all marketing year average prices are from NASS, July 2005.*

	2000	**2001**	**2002**	**2003**	**2004**
Lbs AI	11,637,568	10,161,186	11,935,261	13,374,188	16,197,969
Acres Treated	7,213,842	5,049,101	5,441,005	6,367,669	7,363,704
Acres Bearing	510,000	530,000	545,000	550,000	550,000
Price $/lb	$0.97	$0.91	$1.11	$1.57	$2.21

Table 12B. Percent difference from previous year for reported pounds of all AIs, acres treated, bearing acres, and prices for almonds from 2000 to 2004.

	2000	2001	2002	2003	2004
Lbs AI	-22	-13	17	12	21
Acres Treated	-3	-30	8	17	16
Acres Bearing	5	4	3	1	0
Price $/lb	13	-6	22	41	41

Figure 10. *Acres of almonds treated by all AIs in the major types of pesticides from 1993 to 2004.*



After a decline in almond pesticide use (pounds AI and acres treated) from 1998 to 2001, use increased from 2001 to 2004. From 2003 to 2004 use increased—by 21 percent as pounds AI and by 16 percent as acres treated. The rate of insecticide use (i.e., pounds AI per acre) increased by 27 percent, of herbicide use by 22 percent, and of fumigant use by 13 percent. Use in pounds of fungicides showed a slight decrease of 7 percent. Lambda-cyhalothrin, fosetyl-aluminum, bifenazate, carbaryl and hexythiazox showed the largest percent increases in acres treated between 2003 and 2004. The largest percent decreases in use in pounds were for azinphos-methyl, copper ammonium complex, tebufenozide, thiophanate, and chlorophacinone.

In 2004, the major insecticides used (by acres treated) were abamectin, petroleum oil (unclassified), mineral oil, chlorpyrifos and esfenvalerate; the major fungicides were cyprodinil, iprodione, copper hydroxide, and azoxystrobin; the major herbicides used were glyphosate, oxyfluorfen, paraquat dichloride, simazine, and 2,4–D, and the major fumigants used were aluminum phosphide, methyl bromide, and 1,3–dichloropropene (1,3–D).

Different factors play a role in understanding pesticide use trends. The most significant current almond industry trend is the increase in planted acreage. Almond growers report thousands of new acres being planted. Yet, until more technologically sophisticated methods of surveying acreage are employed, available objective data may lag behind actual new acreage. New acreage makes increased treated acres more likely, particularly in the case of a one-time application of a preplant fumigant. Another significant change within the almond industry is a shift from older, more broad spectrum pesticides to newer, reduced-risk compounds.

The 2004 crop was a little larger than 2003 and the price for almonds remains good. The fact that many growers had reduced pesticide applications for several years and were anticipating a more valuable crop may explain, in part, why some growers chose to put on applications to be sure to protect the more valuable 2004 crop. Generally, in a good year growers are more inclined to treat with pesticides to protect the crop, thereby increasing the number of applications.

Growers in the northern growing region used winter sanitation to reduce over-wintering populations of navel orangeworm. Generally, growers in the central and southern region checked for mummies and, if numbers were high, they used a winter sanitation program to help reduce the over-wintering population. In some regions, the combination of just enough mummy nuts missed and the mild winter significantly increased the reject potential. Wet weather was not particularly a problem affecting production. Bloom was a little late, which could explain the increased use of chlorothalonil to control anthracnose. A record-breaking heat wave in the spring set up optimum conditions for mite problems later in the season.

A hot, dry summer resulted in increased pressure from key insect pests. Mites continued to be a problem as evidenced by the increased use of materials such as abamectin, bifenazate and hexythiazox. Growers, particularly in the south tended to shift away from propargite to newer materials that are more effective. Peach twig borer was a concern resulting in an increase in applications. Use of phosmet increased significantly over azinphos- methyl. Use of the reduced-risk material spinosad to control peach twig borer increased in 2004, while use of tebufenozid decreased. Timing of sprays is critical for mid-season navel orange worm control. Use at hull-split could explain the increased use of chlorpyifos and esfenvalerate for both peach twig borer and navel orange worm. Early harvest was practiced, particularly in the south to help prevent late season problems with navel orange worm. Oriental fruit moth was not particularly a problem in 2004. Ant damage was not as much of a problem in 2004 as it was in 2002 and 2003. Use of both pyriproxyfen and chlorpyrifos increased which could be due, in part, to their use to manage ants.

The use of glyphosate and paraquat dichloride was up in 2004. Many growers prefer to use contact herbicides as strip sprays, resulting in increased use. The use of oxyfluorfen also increased. Growers used the material at a low rate to take advantage of its contact action as a boost for glyphosate. The increased use of oryzalin was more than likely due to the fact that the material was available again after being in short supply.

The use of the fumigants methyl bromide and 1,3–D were slightly higher in 2004 compared to 2003. This increase could be attributed to a one-time treatment on newly planted and replanted almond acres. The increase in use of aluminum phosphide would be partly due to increased production.

Wine grapes

California has four major wine grape production regions: 1) North Coast (Lake, Mendocino, Napa, and Sonoma 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). Each region has distinct climatic and topographic characteristics that lead to different pest types, pest pressures, and cultural and pest management practices. From 2003 to 2004, wine grape acreage decreased 3 percent and prices increased 8 percent.

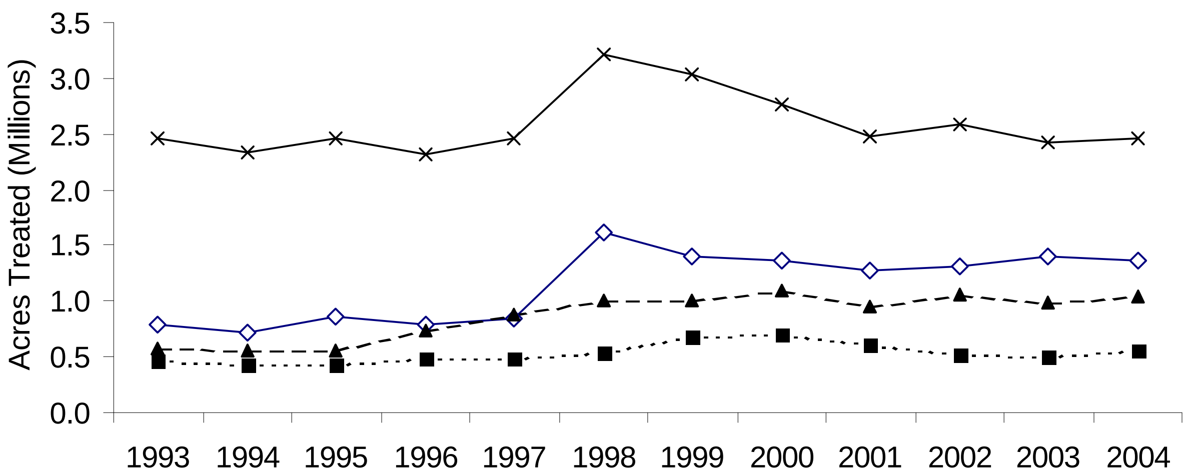
Table 13A. *Total reported pounds of all AIs, acres treated, acres planted, and prices for wine grapes each year from 2000 to 2004. Planted acres from 2000 to 2003 are from CASS, October 2004; planted acres in 2004 are from CASS, March 2005; all marketing year average prices are from NASS, July 2005.*

	2000	2001	2002	2003	2004
Lbs AI	27,615,039	22,780,016	24,110,830	23,464,001	23,800,655
Acres Treated	6,995,285	6,450,654	6,661,166	6,634,578	6,569,139
Acres Planted	568,000	570,000	556,000	529,000	513,000
Price $/ton	$567.00	$597.00	$535.00	$530.00	$570.00

Table 13B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for wine grapes from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	-10	-18	6	-3	1
Acres Treated	-3	-8	3	0	-1
Acres Planted	3	0	-2	-5	-3
Price $/ton	-3	5	-10	-1	8

Figure 11. *Acres of wine grapes treated by all AIs in the major types of pesticides from 1993 to 2004.*



The major fungicides by wine grape acres treated in 2004 were sulfur, myclobutanil, copper hydroxide, trifloxystrobin, and tebuconazole. The major insecticides and miticides were imidacloprid, petroleum distillates, methoxyfenozide, fenpropathrin, and bifenazate. The major herbicides were glyphosate, oxyfluorfen, paraquat, simazine, and oryzalin. Pesticides with large percentage increases in use by weight of AI. in 2004 include petroleum distillates together with other insecticidal and miticidal oils, chlorpyrifos, fenpropathrin, and bifenazate; the herbicides oxyfluorfen, trifluralin, and 2,4-D; and the fumigant 1,3-D. Pesticides with a large decrease in use by weight include the fungicides potassium bicarbonate, mancozeb, cyprodinil, and triflumizole; and the fumigants methyl bromide and metam-sodium.

In 2004, the major factors influencing changes in pesticide use included weather and pest pressures (which varied by region), competition from newer products, application restrictions, efforts by growers to reduce costs, and increasing emphasis on sustainable farming.

Most fungicide applications were for control of powdery mildew. Sulfur use was nearly stable. Total use of other fungicides decreased by weight of AI, however, by about 29 percent from 2003 to 2004. The year 2003 was wet, and fungus infections were severe. In contrast, spring 2004 was exceptionally warm and dry, followed by warm summer temperatures. Disease pressure was low except on the Central Coast, where heavy winter rainfall caused severe fungus problems. Grape maturity and harvest came early. Certain fungicides in specific regions bucked the overall reduced-use trend. Application of lime-sulfur, which is applied to suppress overwintering inoculum of several fungal diseases including powdery mildew, Phomopsis, and canker diseases, increased in the North and Central Coast regions. This might have been an attempt to reduce problems associated with the year before. In addition, the early harvest may have led to lime-sulfur application in November/December, rather than in January/February of 2005. Triflumizole use, though not extensive, increased in the northern San Joaquin Valley. This may have been due in part to an increased preference for liquid fungicides because of a lengthened preharvest interval for sulfur.

Insecticide and miticide use increased substantially by weight of AI from 2003 to 2004, perhaps partly because oils have many attractive, broad-spectrum properties and are low-risk. They can replace a surfactant and eradicate mildew growth, as well as suppressing mites and insects such as grape leafhoppers. Oils are increasingly mixed with fungicides. Infestations of the vine mealybug, a relatively new and extremely serious pest that is tended by ants, were detected in all the major wine grape regions in late 2003 and 2004. Programs for vine mealybug eradication in regions with low populations account for the increased use of chlorpyrifos, which is one of very few control options. Use of the insecticide fenpropathrin decreased by almost half in the North Coast region but increased overall, perhaps due to omnivorous leafroller infestations in the Central Valley. The San Joaquin Valley had a bad mite year in 2004 because of the warm, dry spring. Use of the selective miticide bifenazate increased except on the coast, where conditions were favorable for natural predators and mite pressure was low compared to 2003. Bifenazate is an alternative to older, higher-risk products with longer worker re-entry periods.

Herbicide use increased roughly 8 percent by weight of AI from 2003 to 2004. Higher wine grape prices relaxed cost-cutting pressures somewhat. Postemergent applications of oxyfluorfen and 2,4-D may have increased partly for that reason. Pre-emergence herbicides such as trifluralin, used in strips under the vine row, can be economical and useful for residual control and control of weeds tolerant to glyphosate. Trifluralin, available in inexpensive generic products, is generally not used on the North Coast because heavy soils there do not allow herbicide incorporation; nor was it much used on the Central Coast. Applications jumped in the San Joaquin Valley, however.

Fumigants are usually applied to soil before vineyards are replanted, so trends in overall preharvest fumigant use reflect planting trends. In 2004, increased application of 1,3 D in the Central Coast and Northern San Joaquin Valley regions raised total fumigant use in wine grapes over 25 percent by weight of AI. That fumigant is used to reduce nematode populations and is well suited to nematode control in sandier soils and dry conditions. Except for increased application in the Northern San Joaquin Valley, use of the general purpose fumigant methyl bromide declined in line with regulatory moves to phase it out. Therefore fumigant use patterns also reflect growers' choice of methyl bromide alternatives. A substantial decline in metam-sodium application in the Northern San Joaquin Valley accounts for the large decrease in its overall use. No metam-sodium applications were reported from the Central Coast or southern San Joaquin Valley regions, and its use on the North Coast was insignificant. Use of sodium tetrathiocarbonate, which kills nematodes, phylloxera, and root rots, was greater on the North Coast and in the Southern San Joaquin Valley in 2004, but decreased on the Central Coast. It was not used at all in the northern San Joaquin Valley in 2004.

Table grapes and raisins

Commercial production of table grapes is centered in the southern San Joaquin Valley. The Coachella Valley is California's other significant table grape production area. In an average year, the state produces 90-94 million 19-lb boxes of table grapes, including about 7 million (8 percent) from the Coachella Valley. The southern San Joaquin Valley region includes Fresno, Madera, Tulare, Kern, and Kings counties; the Coachella Valley region includes Riverside, Imperial, and San Bernardino counties. California produced about 300 thousand tons of raisins in 2004. Almost all were from the southern San Joaquin Valley, although a few raisins are produced in the northern San Joaquin Valley region (San Joaquin, Calaveras, Amador, Sacramento, Merced, and Stanislaus counties).

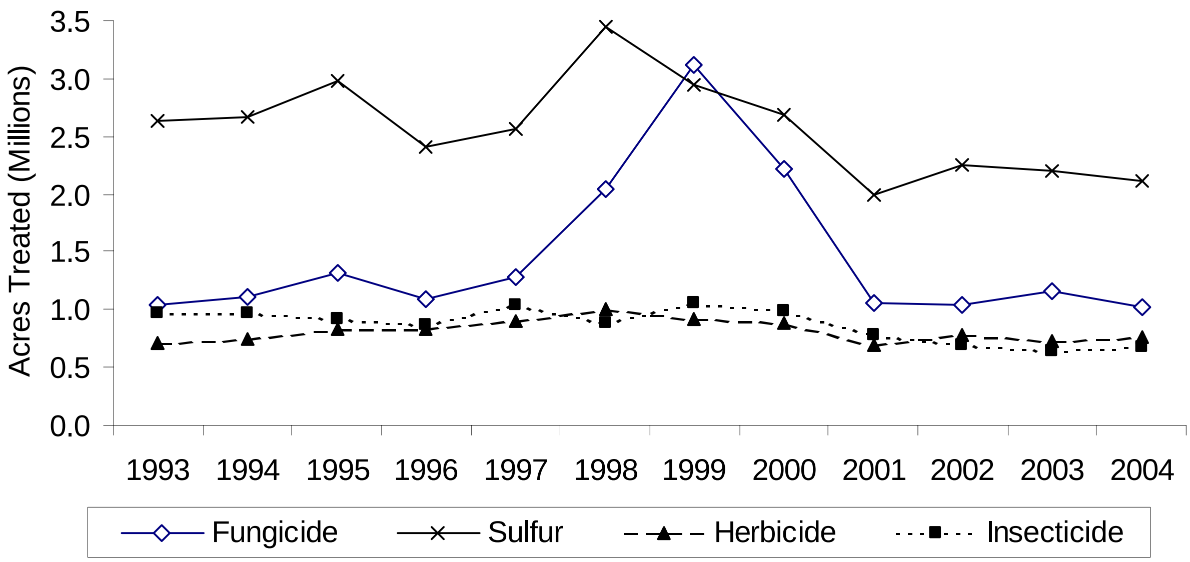
Table 14A. *Total reported pounds of all AIs, acres treated, acres planted, and prices for raisin and table grapes each year from 2000 to 2004. Planted acres in 2000 to 2003 are from CASS October 2004; planted acres in 2004 are from CASS, March 2005; all marketing year average prices are from NASS, July 2005*

	2000	2001	2002	2003	2004
Lbs AI	26,769,275	19,638,930	22,161,940	21,525,587	21,399,811
Acres Treated	8,145,603	5,671,081	5,901,515	5,937,960	5,684,959
Acres Planted Raisin	287,000	283,000	279,000	260,000	248,000
Acres Planted Table	100,000	98,000	97,000	93,000	92,000
Price Raisin $/ton	$166.00	$186.00	$152.00	$170.00	$304.00
Price Table $/ton	$565.00	$610.00	$616.00	$601.00	$695.00

Table 14B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for raisin and table grapes from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	-9	-27	13	-3	-1
Acres Treated	-14	-30	4	1	-4
Acres Planted Raisin	0	-1	-1	-7	-5
Acres Planted Table	0	-2	-1	-4	-1
Price Raisin $/ton	-48	12	-18	12	79
Price Table $/ton	2	8	1	-2	16

Figure 12. *Acres of raisin and table grapes treated by all AIs in the major types of pesticides from 1993 to 2004.*



The major fungicides by acres treated in table and raisin grapes in 2004 were sulfur, myclobutanil, copper hydroxide, tebuconazole, and trifloxystrobin; the major insecticides and miticides were imidacloprid, cryolite, methoxyfenozide, bifenazate, and propargite; and the major herbicides were glyphosate, paraquat, simazine, oxyfluorfen, and diuron. Pesticides with large increases in use by weight in 2004 include the insecticides bifenazate and oils; the herbicides glufosinate-ammonium, oryzalin, and diuron; and the fumigants metam-sodium, 1,3 D, sodium tetrathiocarbonate, and sulfur dioxide. Those with large decreases in use include the fungicides triflumizole, cyprodinil, lime-sulfur, and copper-based products; the insecticides tebufenozide, dimethoate, *Bacillus thuringiensis* and kaolin; the biological nematicide *Myrothecium verrucaria*; and the fumigants methyl bromide, chloropicrin, and aluminum phosphide. Three new pesticides, the insecticide methoxyfenozide and the fungicides pyraclostrobin and boscalid, saw significant use.

Powdery mildew is the reason for most of the fungicide use in San Joaquin Valley and Coachella Valley vineyards. Other diseases that growers manage using fungicides are Botrytis bunch rot and Phomopsis cane and leaf spot. In 2004 the total field use of fungicides (as pounds AI) was about 26 percent less than in 2003. Weather was a major factor: whereas early 2003 was wet and cool, causing major fungus problems, spring 2004 was dry and exceptionally warm. The season started with a March heat wave, continued with low pest pressure, and ended with one of the earliest grape harvests on record. Efforts by growers to reduce costs, pressure from wineries and packers to eliminate use of some products, and competition between products further explain year-to-year fluctuations in fungicide use. Application of some fungicides to manage powdery mildew decreased because of a better understanding of efficacy, resistance management, and powdery mildew phenology models that optimize application timing and use. Those models and the availability of cheaper alternatives may account for some of the reduction in triflumizole use. Newer alternatives including pyraclostrobin and boscalid are being substituted for cyprodinil, copper-based fungicides, and lime-sulfur.

The reported use of insecticides and miticides increased slightly by weight in 2004. Changes in use are caused by annual fluctuations in weather conditions and pest pressures, and competition between products with regard to efficacy, cost, and/or risk. Oils are low-risk products for controlling some key insect and mite pests. Although 2004 was not a heavy mite year, local infestations of Willamette mite required late season treatment. Bifenazate, a relatively new selective miticide, is gaining market share because of long worker re-entry periods for alternative products. Dimethoate is used to control leafhoppers, spider mites, and mealybugs, including postharvest treatment of grape and vine mealybugs; some growers are moving to more selective alternative products with fewer restrictions. Low leafhopper pressure, including more effective control of glassy-winged sharpshooter in pest management districts, could have contributed to reduced use of both dimethoate and kaolin. Increased availability of alternatives may have reduced Bt application. The Section 18 emergency registration exemption of tebufenozide for moth control expired in 2003; it was replaced in 2004 by the new insecticide methoxyfenozide.

Total herbicide use (as pounds AI) increased by about 6 percent in 2004, perhaps influenced by increased commodity prices. In 2002-03, weedy vineyards were common because growers were cutting costs. Oryzalin, like diuron, is a preemergence herbicide applied during the dormant period of the crop. It was not available for sale in 2003, but returned to the market in 2004. Use of oryzalin may also have increased because alternative products have resistance problems, are more phytotoxic, and/or pose a greater risk to ground and surface water, with attendant regulatory restrictions. Glufosinate-ammonium is a relatively new post-emergence contact material for grasses and broadleaf weeds. It is expensive, but provides excellent control of hairy fleabane and marestail, which are a significant problem in vineyards in the San Joaquin Valley and have become resistant to some other products.

In 2004, fewer pounds of the biological nematicide *Myrothecium verrucaria* were applied to more acres. Overall use varies because this product is best applied as part of an integrated program, with treatments not repeated year after year.

Use (as pounds AI) of the fumigant methyl bromide diminished in 2004, in line with regulatory moves to phase it out. Chloropicrin, in addition to its fungicidal properties is often formulated as a warning agent in combination with methyl bromide, was correspondingly less used. Metam-sodium and 1,3-D, which are preplant treatments for new vineyards, and sodium tetrathiocarbonate, applied both preplant and postplant against nematodes and phylloxera, can substitute for methyl bromide, at least in part. That may help account for a sizeable increase in the use of those fumigants. Fewer postplant alternatives may be another reason for growers' increased use of sodium tetrathiocarbonate.

Excellent grape quality and the early harvest led to more fruit being used for table grapes and stored for a long period. This increased the amount of sulfur dioxide applied, since table grapes are treated with SO_2 gas on a 7-10 day cycle in order to prevent Botrytis rot during storage. Fewer raisins were produced in 2004 because Thompson Seedless, the main raisin grape variety, commanded high prices not only as table grapes, but also for wine. Therefore, less aluminum phosphide was required to control pests such as raisin moths and Indian meal moths in postharvest storage facilities.

Alfalfa

Alfalfa hay is produced for animal feed. The dairy industry is the biggest market for alfalfa hay production. California's alfalfa value was around $1 billion in 2004, making it the highest value field crop in the state. Most counties in the state produce some alfalfa hay, but half of the state's production comes from Kern, Imperial, Tulare, Merced, and Fresno counties. Harvested alfalfa acres decreased in 2004 by 4 percent compared to 2003 while the price per ton of alfalfa hay increased by 25 percent.

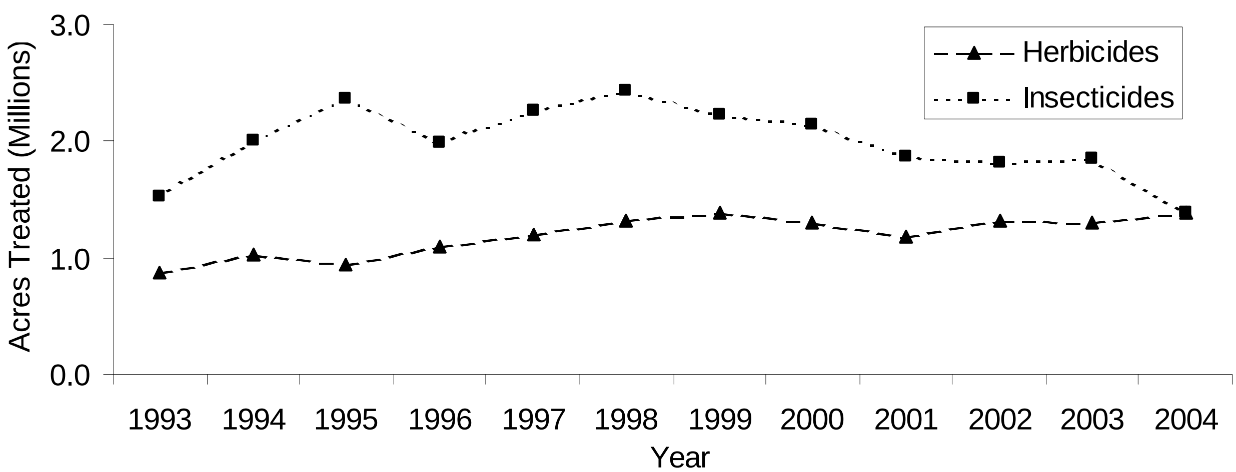
Table 15A. *Total reported pounds of all AIs, acres treated, acres harvested, and prices for alfalfa each year from 2000 to 2004. Harvested acres from 2000 to 2003 are from CASS, October 2004; harvested acres in 2004 are from CASS, January 2005; marketing year average prices from 2000 to 2004 are from NASS, July 2001, July 2002, July 2003, July 2004, and July 2005.*

	2000	2001	2002	2003	2004
Lbs AI	3,315,152	2,919,521	3,008,510	2,921,442	2,662,360
Acres Treated	5,182,465	4,443,511	4,467,000	4,857,298	4,167,860
Acres Harvested	1,020,000	1,010,000	1,160,000	1,090,000	1,050,000
Price $/ton	$92.00	$119.00	$98.00	$93.00	$116.00

Table 15B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for alfalfa from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	-12	-12	3	-3	-9
Acres Treated	-3	-14	0	9	-14
Acres Harvested	-3	-1	15	-6	-4
Price $/ton	2	29	-18	-5	25

Figure 13. *Acres of alfalfa treated by all AIs in the major types of pesticides from 1993 to 2004.*



The total pounds of pesticide AIs applied to alfalfa decreased in the last six years. The total pounds of pesticide AIs used in 2004 declined by 9 percent compared to 2003 to the lowest level in six years. The acres treated with pesticides declined by 14 percent compared to 2003, also falling to the lowest level in six years.

Herbicide use statewide (as pounds AI) remained about the same from 2003 to 2004, decreasing by less than 1 percent. Acres harvested decreased in 2004, which may explain the decreased pounds of herbicide AI used. However, the herbicide use (as acres treated) increased 7 percent in 2004. The increase in acres treated and the decrease in pounds AI in 2004 compared to 2003 would indicate that the amount of herbicide used per acre was less in 2004. The use of several postemergence herbicides increased in 2004 compared to 2003 as follows:

- Paraquat dichloride by 17 percent;
- Imazethapyr by 24 percent;
- 4 (2,4-DB) dimethylamine salt by 63 percent; and
- Sethoxydim and clethodim (used to control grasses postemergence) by 4 and 8 percent, respectively.

Two preemergence herbicides, trifluralin and diuron, accounted for nearly 65 percent of herbicide use in alfalfa (pounds AI) in 2004. Trifluralin use decreased 9 percent in 2004, to the lowest level since 2001. Generally, weather conditions in 2004 resulted in less preemeergence herbicide use, more emerged weeds, and higher amounts of postemergence herbicides to control winter annual weeds.

Most alfalfa acreage is found in four regions of the state: the Intermountain Region, Sacramento Valley, San Joaquin Valley, and Low Desert Region. Regional variations occur when selecting and using individual herbicides. Compared to the acres treated in 2003, acres treated in 2004 with trifluralin increased 480 percent in the Intermountain Region and 72 percent in Sacramento Valley, but decreased 7 percent in the San Joaquin Valley and 18 percent in the Low Desert Region. For paraquat dichloride, acres treated in 2004 compared to 2003 decreased by 40 percent in the Low Desert Region, but increased by 5 percent, 14 percent, and 19 percent, respectively, in the Intermountain Region, Sacramento Valley and San Joaquin Valley. Compared to 2003, imazethapyr use, as acres treated, in 2004 decreased 15 percent in the Sacramento Valley, and increased 59 percent, 33 percent, and 70 percent, respectively, in the Sacramento Valley, San Joaquin Valley and Low Desert Region. The main reason for choosing certain herbicides was the combination of herbicide price and the weather. Some herbicides work better under certain conditions.

Insecticide use (as pounds AI) declined by 23 percent from 592,408pounds AI (1,837,126 acres treated) in 2003 to 456,158 pounds AI (1,370,521 acres treated) in 2004, though the use of dimethoate and methamidophos increased by 16 percent and 71 percent, respectively. Statewide, insect pressure due to Egyptian alfalfa weevil and beet army worm was less in 2004 than in 2003; this decrease in pest pressure may explain the decrease in both pounds AI and acres treated with insecticides.

Statewide, the acres treated with insecticides declined by 29 percent. For specific insecticides, acres treated declined in 2004 compared as follows:

- chlorpyrifos by 30 percent;
- lambda-cyhalothrin by 16 percent;
- indoxacarb by 52 percent;
- methomyl by 65 percent;
- carbofuran by 41 percent;
- permethrin by 48 percent; and
- phosmet by 52 percent.

On a regional basis, differences in acres treated occurred. Acres treated with chlorpyrifos declined by 31 percent in the Sacramento Valley and 44 percent in the San Joaquin Valley, while acres treated with chlorpyrifos increased by 241 percent in the Intermountain Region and 38 percent in the Low Desert Region of the state. Acres treated with lambda-cyhalothrin declined by 59 percent in the Intermountain Region, 21 percent in the San Joaquin Valley, and 23 percent in the Low Desert Region, but increased by 5 percent in the Sacramento Valley. The decline in acres treated with indoxacarb was mainly in San Joaquin Valley and the Low Desert Region, 65 percent and 43 percent, respectively, while the acres treated increased by 12 percent in the Sacramento Valley. The acres treated with methomyl declined by 48 percent in the Sacramento Valley and 70 percent in the San Joaquin Valley.

Rice

California's Sacramento Valley contains more than 95 percent of the state's rice acreage. The remainder is in north to central San Joaquin Valley. The leading rice-producing counties are Colusa, Sutter, Butte, Glenn, and Yolo. Approximately 600,000 acres in the Sacramento Valley are of a soil type restricting the crops to rice or pasture. The remainder of the acreage has greater crop flexibility.

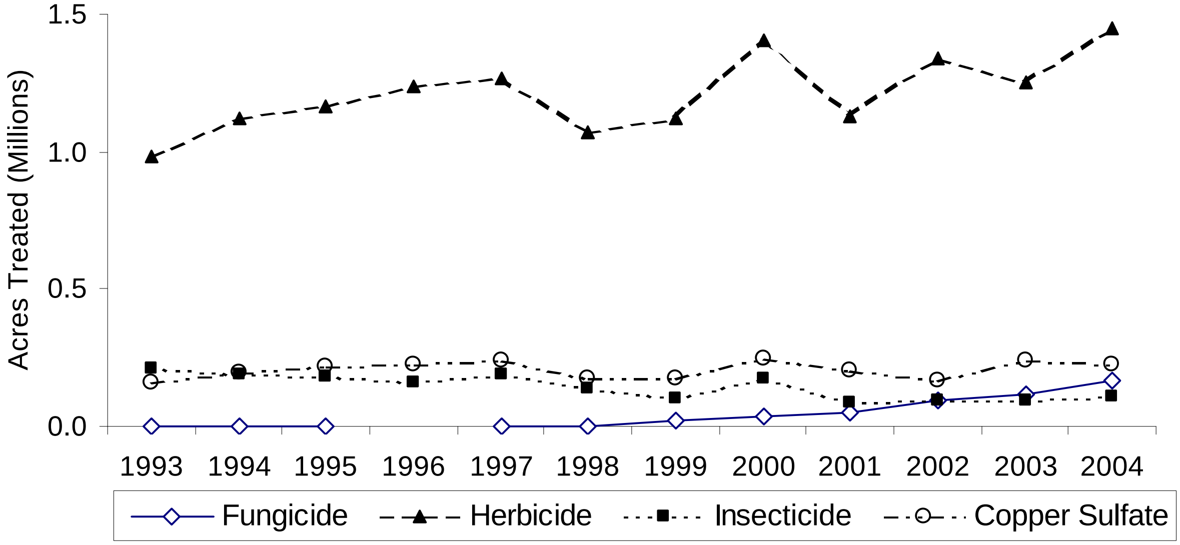
Table 16A. *Total reported pounds of all AIs, acres treated, acres planted, and prices for rice each year from 2000 to 2004. Planted acres from 2000 to 2003 are from NASS, October 2004; planted acres in 2004 are from CASS, January 2005; marketing year average prices from 2000 to 2004 are from NASS, July 2001, July 2002, July 2003, July 2004, and July 2005.*

	2000	2001	2002	2003	2004
Lbs AI	7,084,205	5,945,926	5,962,401	6,490,215	6,615,296
Acres Treated	2,164,498	1,738,355	2,061,850	2,226,949	2,755,210
Acres Planted	550,000	473,000	533,000	509,000	595,000
Price $/cwt	$4.99	$5.28	$6.32	$10.40	$6.95

Table 16B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres planted, and prices for rice from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	43	-16	0	9	2
Acres Treated	32	-20	19	8	24
Acres Planted	8	-14	13	-5	17
Price $/cwt	-28	6	20	65	-33

Figure 14. *Acres of rice treated by all AIs in the major types of pesticides from 1993 to 2004.*



Total pesticide use (as pounds AI) in rice has generally increased since 1993, although most of that increase was due to adjuvants. Pesticide use increased approximately 24 percent from 2003 to 2004 in terms of acres treated, but only increased 2 percent in terms of pounds AI applied. Herbicides accounted for most of the pesticide use; approximately 74 percent of non-adjuvant pesticide acres treated has been with herbicides. Herbicide use has increased slightly during the 1990's and increased by approximately 16 percent from 2003 to 2004. Insecticide use has been decreasing generally and fungicide use increasing. Pesticides with large increases in use include cyhalofop-butyl, bensulfuron-methyl, fenoxaprop-ethyl, (s)-cypermethrin, and azoxystrobin. Pesticides with large decreases in use include molinate, carfentrazone-ethyl, MCPA, and malathion.

The major insecticides by acres treated in rice in 2004 were lambda-cyhalothrin, (s)-cypermethrin, and diflubenzuron; the major herbicides were propanil, triclopyr, cyhalofop-butyl, thiobencarb, and bispyribac-sodium; and the major fungicide was azoxystrobin. The herbicides propanil and trichlopyr were the two most commonly used pesticides. The third most commonly used pesticide was copper sulfate, which is used to control algae and tadpole shrimp.

In 2004, no major shifts in pest pressure occurred. Rice acres planted increased from 509,000 acres in 2003 to 595,000 acres in 2004, a 17 percent increase. Besides increases in planted acreage, reasons for increases in herbicide use include the shift to new herbicides in areas of resistance, and the need for tank mixes and sequential applications for managing herbicide resistant weeds. Reasons for decreases in herbicide use include weed resistance, wet weather causing difficulty with proper application timing, and increased grower confidence with the use of new herbicides on the market. Prices are not a factor in explaining changes in pesticide use because there are few rice pesticides and the modes of action limited, so applications are based on need and not crop price.

Over the years, the proportion of acres planted that have been treated has increased gradually, although this change was minimal from 2003 to 2004. Since herbicides account for most pesticide use in rice, it is safe to assume that the gradual increase in total rice pesticide use parallels the problem of increasing herbicide resistance. Resistance has also forced an increasingly higher use of foliar herbicides applied in pin-point (flood water management systems) with water drained. This brings new flushes of weeds, particularly sprangletop and barnyardgrass, which explains the increase in use of herbicides like cyhalofop-butyl.

When considering pounds AI used per acre treated, there is an initial dramatic increase from 1999 until 2001, which probably has a lot to do with resistance. However, since then, there has been a steady and significant decrease in the amount of AI used per treated acre. In 2004 growers used 30 percent less herbicide AI per treated acre than in 2001, and about 18 percent less than 2003. This is due to the introduction of new compounds, such as bispyribac-sodium, clomazone, and cyhalofop-butyl that are used at very low rates. When considering the pounds AI used per acre planted, the total pounds of herbicide AI decreased by about 13 percent from 2003 to 2004, in spite of increased acreage that was planted.

The increases in the use of certain herbicides (propanil, bispyribac-sodium, clomazone, and bensulfuron-methyl) accompany fairly closely the increase in planted acreage plus the decrease in thiocarbamates (thiobencarb and molinate), carfentrazone-ethyl and MCPA use. More clomazone is used as growers learn how to use it. Mounting resistance problems with late watergrass (mimic) prompt growers to use bispyribac-sodium at the highest labeled rates, which are recommended for that purpose. The increased use of bensulfuron methyl is surprising, although the area treated is still small. This may reflect in part the recent difficulties in controlling rice field bulrush with carfentrazone-ethyl and the reduction in MCPA use. The large increase in cyhalofop-butyl use reflects the reduction in thiobencarb use (a sprangletop herbicide) and the mounting sprangletop problems resulting from an increasing use of pin-point systems for foliar herbicide application prompted by watergrass resistance, as discussed above.

Lambda-cyhalothrin is an insecticide used primarily for rice water weevil control and secondarily for armyworm control. Its use declined mainly due to competition from (s)–cypermethrin that was registered for the first time in California rice in 2003. Insect pressure is low for California rice and lambda-cyhalothrin is used on approximately 10 percent of all rice planted in California.

Copper sulfate is the only algaecide registered for use on California rice, and one of the few products acceptable for organic rice production. The product doubles as an insecticide, which is very important to organic rice growers.

Azoxystrobin is reduced-risk and the only foliar fungicide registered for use on California rice. Disease pressure is low for California rice, which is the reason azoxystrobin is used on approximately one-fifth the total acres planted.

Tomato (Processing)

Virtually all of the 281,000 acres of processing tomatoes harvested in 2004 were located in the Sacramento Valley or San Joaquin Valley. The increase in harvested acreage from 2003 to 2004 (nearly 7,000 acres, or 3 percent) partly explains the 5 percent increase in pesticide use from 10,943,940 to 11,536,133 pounds. A 12 percent increase in sulfur use—an additional 840,000 pounds over 2003 levels—also contributed significantly to the overall increase in pesticide use.

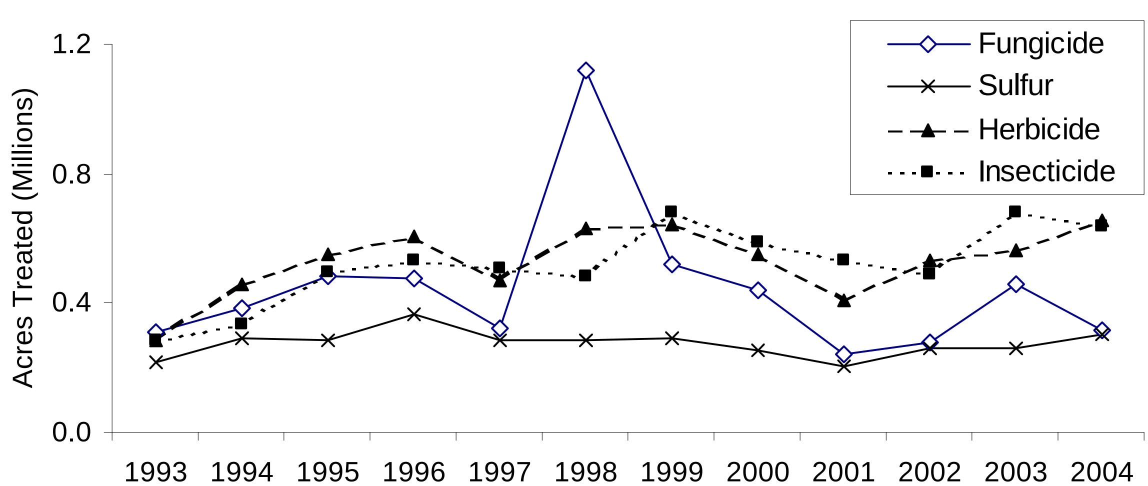
Table 17A. *Total reported pounds of all AIs, acres treated, acres harvested, and prices for processing tomatoes each year from 2000 to 2004. Harvested acres from 2000 to 2003 are from CASS, October 2004; harvested acres in 2004 are from NASS, January 2005; marketing year average prices from 2000 to 2001 are from NASS, January 2002; prices from 2002 to 2004 are from NASS, January 2005.*

	2000	**2001**	**2002**	**2003**	**2004**
Lbs AI	10,665,766	7,917,190	10,645,872	10,943,940	11,531,813
Acres Treated	2,403,573	1,893,948	2,031,786	2,677,473	2,516,672
Acres Harvested	271,000	254,000	291,000	274,000	281,000
Price $/ton	$58.60	$57.50	$56.80	$57.20	$57.40

Table 17B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for processing tomatoes from 2000 to 2004.*

	2000	**2001**	**2002**	**2003**	**2004**
Lbs AI	-16	-26	34	3	5
Acres Treated	-13	-21	7	32	-6
Acres Harvested	-18	-6	15	-6	3
Price $/ton	-17	-2	-1	1	0

Figure 15. *Acres of processing tomatoes treated by all AIs in the major types of pesticides from 1993 to 2004.*



Insecticide use (total pounds AI) decreased by 24 percent over 2003 and was lower than any time since 1993. The use of insecticides considered high-risk decreased 23 percent. Methomyl use decreased from 45,867 pounds in 2003 to 12,423 pounds in 2004 due to less concern for curly top in the south; the use of dimethoate was the inverse of methomyl, increasing from 24,250 pounds in 2003 to 39,188 pounds in 2003**.** Use of tebufenazide led a drop in the use of low-risk insecticides, accounting for nearly 70 percent (11,261 pounds) of the overall 41 percent drop in low-risk insecticide use. Methoxyfenozide substituted for tebufenazide in many cases, with use climbing from zero pounds in 2003 to 5,779 pounds in 2004. Both are used for armyworm control. Acetamiprid, a relatively new insecticide used for aphids, was another low-risk insecticide to increase, going from 173 pounds in 2003 to 1,732 pounds in 2004.

Growers continue to be concerned about the costs and availability of hand labor, reflected in a large increase in herbicide use (21 percent). The use of the three major herbicides—metolochlor, trifluralin, and glyphosate—increased (pounds used) by 77 percent, 9 percent, and 26 percent respectively. These three herbicides accounted for 91 percent of total pounds of herbicide use on processing tomatoes in 2004. Rimsulfuron use increased in terms of total acres treated, going from 119,809 treated acres in 2003 to 146,534 treated acres in 2004 but accounting for less than 1 percent of total pounds used. Transplant tomatoes continue to increase, resulting in increased use of metolochlor and decreased use of pebulate (down 74 percent) and napropamide (down 23 percent).

Two pesticides, sulfur and metam-sodium, made up over 83 percent of the total pounds of AIs applied to tomatoes in 2004, continuing a trend from the last three years. Sulfur is used for russet mite and powdery mildew, annual pests throughout California. Powdery mildew required early applications of sulfur in 2004 and remained a concern all year, explaining the increase in sulfur use. Metam-sodium is used as a preplant herbicide for both direct seeded and transplanted tomatoes.

Weather in April and May of 2004 returned to normal compared to the heavy spring rains of 2003. In the south there was no recorded rain in April, May, June or during harvest in August and September. Less bacterial speck and other early season diseases resulted in a 45 percent drop in fungicide use to more normal levels. The use of copper fungicides decreased precipitously, from 119,064 pounds in 2003 to 20,589 pounds in 2004. Use of mancozeb and maneb decreased 66 percent and 83 percent, respectively, partly attributable to less use in tank mix combinations with copper for the bacterial disease control program. Use of chlorothalonil decreased 15 percent due to a comparatively dry August and September in 2004.

Oranges

Oranges are the eighth highest value crop grown in California. Eighty-six percent of California oranges are grown in the San Joaquin Valley. The rest are grown in the South East region (five percent, in Riverside and San Bernardino counties) and on the South Coast (about seven percent of the state's acreage, mostly in Ventura and San Diego).

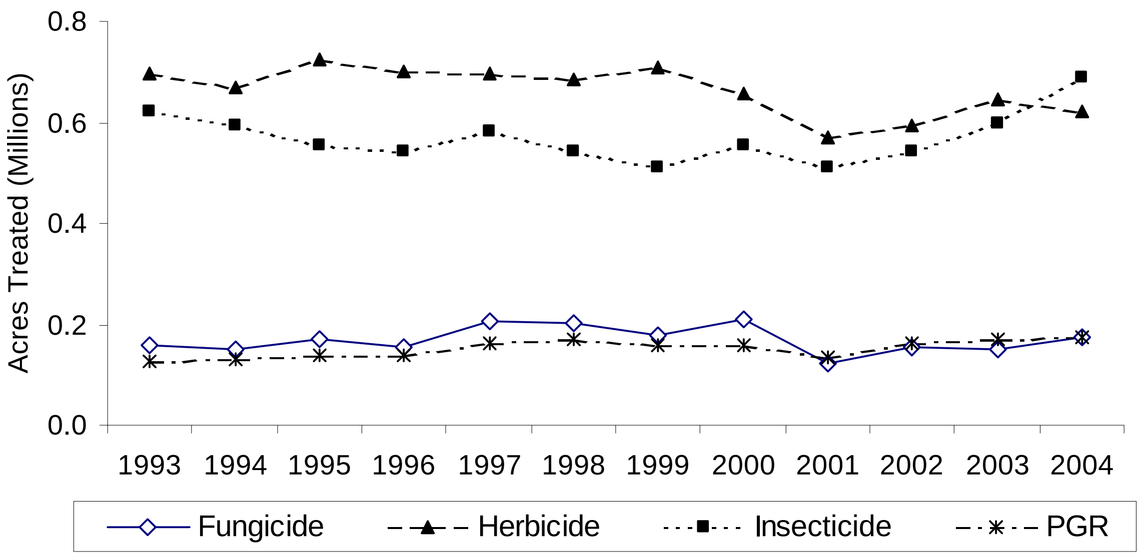
Table 18A. *Total reported pounds of all AIs, acres treated, bearing acres, and prices for oranges each year from 2000 to 2004. Bearing acres from 2000 to 2003 are from CASS, October 2004; bearing acres in 2003-04 are from NASS, September 2004; marketing year average prices (equivalent P.H.D.) in 2000 to 2001 are from NASS, July 2003; prices in 2002 to 2004 are from NASS, July 2005. A box is about 75 pounds of oranges.*

	2000	2001	2002	2003	2004
Lbs AI	8,569,479	6,293,041	6,949,452	7,237,990	9,603,848
Acres Treated	2,181,618	1,727,085	1,910,155	2,050,026	2,249,087
Acres Bearing	199,000	198,000	195,000	189,500	182,000
Price $/box	$5.40	$9.44	$10.85	$7.51	$10.72

Table 18B. *Percent difference from previous year for reported pounds of all AIs, acres treated, bearing acres, and prices for oranges from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	-2	-27	10	4	33
Acres Treated	7	-21	11	7	10
Acres Bearing	-2	-1	-2	-3	-4
Price $/box	-52	75	15	-31	43

Figure 16. *Acres of oranges treated by all AIs in the major types of pesticides from 1993 to 2004.*



Total pesticide use (as pounds AI) in oranges between 2003 and 2004 increased from approximately 7.2 million pounds to approximately 9.6 million pounds, a change of 25 percent. Most of the change was due to increased insecticide use.

Overall insecticide use was up 20 percent from 2003, a change of over one million pounds. Insecticides used most (acres treated) in 2004 were chlorpyrifos, spinosad, petroleum oil, mineral oil, cyfluthrin and pyriproxifen. This list changes in terms of pounds AI used to petroleum oil and distillates, mineral oil, chlorpyrifos and cryolite. The discrepancy lies in the wide variation in rates applied for the various pesticides [some pesticides are applied at high rates (pounds per acre treated), e.g., petroleum oil, and some at very low rates, e.g., spinosad and cyfluthrin]. Between 2003 and 2004 large increases were reported in the use of mineral oil, chlorpyrifos and the reduced-risk insecticide spinosad. Carbaryl use decreased by 49 percent between 2003 and 2004 and pyriproxyfen use increased by 25 percent.

Kaolin and sulfur are used as both fungicides and insecticides. Use of kaolin went up in both acres treated and pounds and use of sulfur went down in acres treated and pounds.

Overall, fungicide use increased by 19 percent from 2003 to 2004. The highest used fungicides by acres treated were copper hydroxide, copper sulfate, copper oxide and mefenoxam. High fungicide use by pounds included the copper compounds and imazalil. There was a large increase in acreage treated with mefenoxam, a reduced-risk fungicide. Use increased by 43 percent between 2003 and 2004, but the actual amount used was less than 2,200 pounds in 2004.

Use of herbicides in oranges decreased slightly between 2003 and 2004. The herbicides used most in both acres treated and pounds AI were two types of glyphosate, diuron, bromacil and simazine. Amount used of almost all twelve of the top-used herbicide AIs decreased slightly between 2003 and 2004. The major exception to the overall decrease was oryzalin. The amount used and acres treated in 2004 were doubled over the preceding year.

Acres treated with fumigants increased between 2003 and 2004, although use of some individual AIs, such as metam sodium, decreased. The top three fumigants used in both acres treated and pounds were aluminum phosphide, 1,3-D and methyl bromide. The highest increase was in use of 1,3-D, which increased in pounds used and acres treated. Pounds used of methyl bromide increased, although acres treated decreased. The fumigants were not used on large acreages but since they are used at high rates, the amount used is significant, particularly for 1,3-D. The total of fumigants used in 2004 was 269,048 pounds on 2,337 acres and almost all of this was 1,3-D. Acreage appears low since fumigants are also used in post-harvest treatments where acreage is not a valid measurement.

According to NOAA (2005), the citrus growing regions of California remain in a severe drought with another dry year (the fifth in a row). California had a wet winter and a warm, dry spring. Temperatures were above normal across California especially in the spring. Fall was wet and cold with precipitation was above average across the state and temperatures were below normal.

Petroleum oil, petroleum distillates and mineral oil are broad-spectrum insecticides for aphids, mites and scales and the oils are also used as an adjuvant in pesticide treatments. Chlorpyrifos is a broad-spectrum insecticide for insects, cyfluthrin is used for citrus thrips, katydids and glassy-winged sharpshooter and spinosad is used for citrus thrips. Kaolin is a whitewash that is used to make citrus trees less attractive to glassy winged sharpshooter and is being used by some growers to reduce heat stress. *Bacillus thuringiensis* is used for caterpillar pests. Pyriproxyfen, an insect growth regulator, and carbaryl are used to manage scale insects.

Use of carbaryl decreased from 2003 to 2004, due to lower efficacy for scale pests relative to other insecticides. Growers are rotating the use of buprofezin and pyriproxyfen to control red scale. Citrus thrips are developing resistance to pyrethroids, so growers are using spinosad and cyfluthrin instead. The increase in chlorpyrifos was due to the dramatic increase in citricola scale and katydids in citrus groves. Growers are tank-mixing cyfluthrin, fenpropathrin, or chlorpyrifos with the spinosad used for citrus thrips in order to control katydids, which appear at the same time as thrips. Pesticide costs are increasing since the newer reduced-risk insecticides are more expensive. Growers needed to use more pesticides since orange production was down while prices were high in 2004.

Sulfur, copper hydroxide, copper sulfate and copper oxide are used to prevent Phytophthora gummosis, Phytophthora root rot, and fruit diseases such as brown rot and Septoria spot. Sulfur can also be used to control mites and citrus thrips**.** Mefenoxam, a reduced-risk fungicide, is used for Phytophthora diseases. Imazalil is used as a postharvest application on non-stored commodities.

The unusually wet late half of the year partially accounts for the increase in the use of copper products since they are used to protect the fruit. Treatments for Septoria spot for Korean exports are now required, resulting in more use of copper sprays. Wet weather encourages the growth of Phytophthora diseases so growers need to use mefanoxem to control those diseases.

The herbicide glyphosate is used to control weeds post-emergence. Diuron, bromacil and simazine are used for pre-emergent weed control. Growers use herbicides to prepare the ground prior to planting. Decreased use of glyphosate, simazine and diuron are most likely due to ground water regulations.

Pounds used of the preplant fumigants methyl bromide and 1-3-D almost doubled. These fumigants are used to protect newly planted orange trees from nematodes and soil diseases such as Phytophthora root rot. This increased use appears to be caused by large-scale removal of Valencia oranges and their replacement by other varieties of citrus. The market for Valencia oranges had been poor, although improving recently, and many growers bulldozed these blocks and replaced these trees with other varieties of citrus. Another use for methyl bromide is as a post-harvest treatment on the fruit.

Head (Iceberg) Lettuce

Head lettuce is grown in four regions in the state: the central coastal area (Monterey, San Benito, Santa Cruz, and Santa Clara counties); the southern coastal area (Santa Barbara, Ventura, and San Luis Obispo counties); the San Joaquin Valley (Fresno, Kings, and Kern counties); and the southern deserts (Imperial and Riverside counties). In 2004, 59 percent of all California head lettuce was planted in the central coastal area, 17 percent in the southern coastal area, 12 percent in the San Joaquin Valley, and 11 percent in the southern deserts. California produces 70 to 75 percent of the head lettuce grown in the United States annually. In this analysis, the central and southern coastal areas are combined.

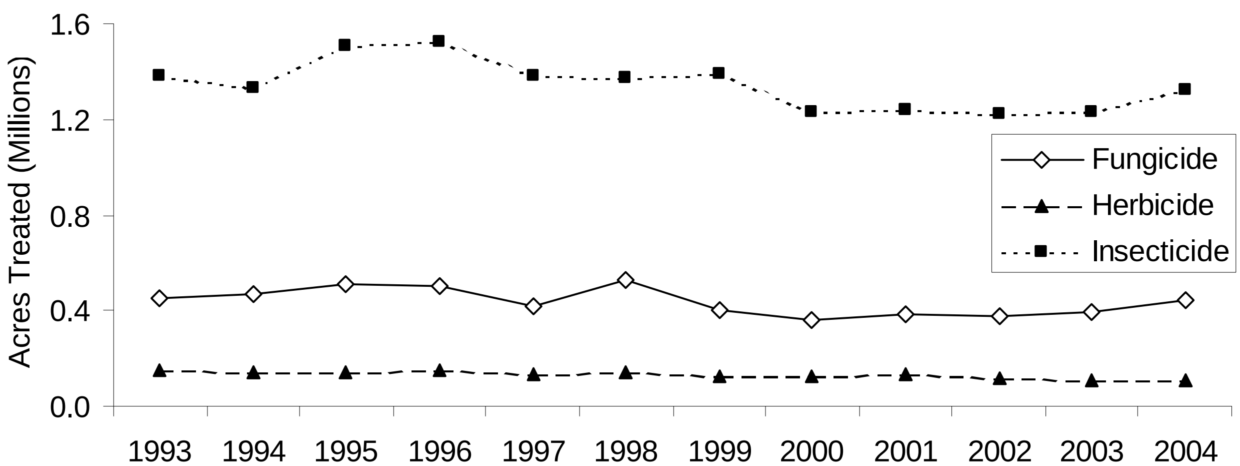
Table 19A. *Total reported pounds of all AIs, acres treated, acres harvested, and prices for head lettuce each year from 2000 to 2004. Harvested acres from 2000 to 2003 are from NASS, October 2004; harvested acres in 2004 are from NASS, January 2005; all marketing year average prices are from NASS, July 2005.*

	2000	**2001**	**2002**	**2003**	**2004**
Lbs AI	1,770,426	1,431,087	1,440,302	1,468,612	1,617,854
Acres Treated	2,028,305	2,071,215	2,008,936	2,042,801	2,226,577
Acres Harvested	130,000	128,000	130,000	135,000	139,000
Price $/lb	$18.80	$18.50	$14.90	$21.00	$15.10

Table 19B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for head lettuce from 2000 to 2004.*

	2000	**2001**	**2002**	**2003**	**2004**
Lbs AI	9	-19	1	2	10
Acres Treated	-9	2	-3	2	9
Acres Harvested	-7	-2	2	4	3
Price $/lb	37	-2	-19	41	-28

Figure 17. *Acres of head lettuce treated by all AIs in the major types of pesticides from 1993 to 2004.*



Pesticide use (as pounds AI) on head lettuce gradually declined from 1995 through 2003, but increased in 2004. Major pesticides with the largest percent increase in acres treated were diazinon**,** imidacloprid**,** (S)-cypermethrin, dimethomorph, benefin, and metam-sodium. Major pesticides with the largest percent decrease were permethrin, methomyl, and fosetyl-al. During 2004, the top insecticides used (by acres treated) were diazinon, spinosad, permethrin, imidacloprid, acephate and (S)-cypermethrin. The main fungicides used were maneb, dimethomorph, iprodione, fosetyl-al, and vinclozolin. Three herbicides dominated?   propyzamide (pronamide), bensulide, and benefin. Metam-sodium was the main fumigant used, followed by 1,3–dichloropropene, chloropicrin, and methyl bromide. Overall use of insecticides, fungicides, and fumigants rose during 2004 (both as acres and pounds treated). Use of insecticides varied among the different lettuce-growing areas. In the coastal area, more acres were treated with insecticides during 2004 than 2003. Use of low-risk insecticides increased by 28 percent, while that of high-risk pesticides increased by 12 percent. Insecticide use decreased by 4 percent in the southern deserts, and remained constant in the San Joaquin Valley. There was a 3 percent increase from 2003 to 2004 in acres of head lettuce harvested. Fungicide use increased by acres treated for the coastal area and southern deserts, possibly due to a wet winter and early spring along the coast, and a wet early summer in the southern desert, which led to outbreaks of diseases such as downy mildew. Although acreage of fungicides used increased during 2004, fewer pounds were used during 2004 than 2003, possibly because more products were used that are applied at a low rate.

The insecticides permethrin, spinosad, and emamectin are used to manage larvae of beet armyworm and cabbage looper, primarily pests in the southern deserts. Use of permethrin and spinosad dropped in the central coast and southern deserts in 2004, possibly due to less worm pressure. In the coastal area and San Joaquin Valley, use of emamectin increased, possibly because growers are substituting it for permethrin and spinosad. The decrease in spinosad use may have also resulted from lower populations of thrips, which have become serious pests in coastal and desert regions of California. Use of indoxacarb, an effective reduced-risk material for worms, decreased in all lettuce-growing regions. In the coastal area, insecticides such as avermectin are replacing permethrin to manage leafminers. Avermectin use in 2004 increased by 30 percent in Monterey County due to mounting leafminer pressure. In 2003, avermectin use had fallen off from previous years because leafminers posed little problem in this area. Use of cyromazine, a leafminer larvicide, increased by about 70 percent in the coastal area, thanks to a registration change that reduces plantback restrictions. Cyromazine also costs less than avermectin.

Diazinon is a preplant treatment applied to manage soil pests. Its use increased by 5 percent in the coastal area due to higher-than-normal pressure from symphylans. Diazinon use increased by 47 percent in the southern deserts, where it is often used for stand-establishment pests such as crickets, darkling ground beetles, earwigs, and sowbugs. In the coastal area, use of acephate and the neonicotinoid insecticide, imidacloprid, increased because lettuce aphids were plentiful. Use of another neonicotinoid insecticide, acetamiprid, also increased.

In 2004, maneb was the dominant fungicide used in head lettuce production, primarily to control downy mildew and prevent anthracnose. In the coastal area, less maneb was used in 2004 than in 2003, but a new material for downy mildew, dimethomorph, was used on 41,000 acres. Use of fosetyl-al fell from 2003 to 2004, possibly due to downy mildew tolerance. Use of acibenzolar-S-methyl, first registered for lettuce in 2001, increased seven-fold between 2001 and 2002, but fell four-fold from 2003 to 2004. This new reduced-risk fungicide stimulates plants to resist the pathogen that causes downy mildew. Although characterized as more effective against downy mildew than fosetyl-al, acibenzolar-S-methyl is more expensive. Use of iprodione in 2004 was higher than in 2003, although use of vinclozolin, also used for lettuce drop management, was lower. Use of another lettuce drop fungicide, dicloran, also decreased. Another new biofungicide, QST 713 strain of dried *Bacillus subtilis*, was used on three times more acres in 2002 than in 2001, but use fell in 2003, and even more so in 2004. First registered for use on lettuce in 2000, *B. subtilis* manages bacterial leaf spot and was the most frequently used bactericide. Although acreage of fungicides used increased during 2004, fewer pounds were used during 2004 than 2003, possibly attributable to increased use of products that are applied at a low rate such as dimethomorph.

Herbicide use increased by less than one percent from 2003 to 2004. Some of the increase may be due to the popularity of planting 80-inch instead of 40-inch beds with five instead of two seed lines. This practice can increase lettuce production by a third, but slightly more herbicide is applied to the wider beds. Use of propyzamide (pronamide), applied as a postplant–preemergence herbicide, increased from 2003 to 2004, especially in the southern deserts. As consistent with its use for the past ten years, propyzamide was applied to many more acres than the preemergence bensulide, which targets small-seeded annual grasses and is not as effective as propyzamide in the coastal areas. Use of benefin, a pre-plant herbicide, increased from 2003 to 2004, especially in the San Joaquin Valley.

Nematodes are not economic pests of head lettuce, so soil is primarily fumigated to control soil-borne diseases. In 2004, fumigants were used on fewer than 4 percent of all lettuce acreage. Fumigants, however, are heavy materials, so application in pounds can seem high. For example, in 2004, 95 acres of head lettuce throughout California were treated with methyl bromide, which translated to 21,400 pounds. Yet, the acreage treated represented only about 0.7 percent of head lettuce acreage. Although mainly used to eliminate soil-borne diseases, metam-sodium also controls weeds in lettuce fields, if somewhat unreliably. In 2004, fields fumigated with metam-sodium represented less than 3 percent of all lettuce acreage. Use of 1,3–D increased by half, but only a fraction of lettuce acreage was treated. The third most widely used fumigant, chloropicrin, reduces soil populations of Verticillium wilt and lettuce drop (Sclerotinia drop) alone or when combined with methyl bromide or 1,3–dichloropropene. From 2003 to 2004, use of chloropicrin dropped by a third.

Peaches and Nectarines

California ranks first in the United States in growing peaches and nectarines, producing 77 percent of the peaches and 96 percent of the nectarines in 2004. The state produced 100 percent of U.S. processed peaches and 60 percent of U.S. fresh market peaches. Clingstone peaches comprise about 57 percent of the total peach crop in California, and are used exclusively for processing into canned and frozen products (including baby food) and juice. California freestone peach production for fresh shipping represents 30 percent of the annual tonnage. Fresh market nectarines comprise approximately 98 percent of the annual tonnage. Clingstone peach acreage increased slightly in 2004, while freestone peach and nectarine acreage remained unchanged. Peaches and nectarines are discussed together because pest management issues for the two crops are very similar.

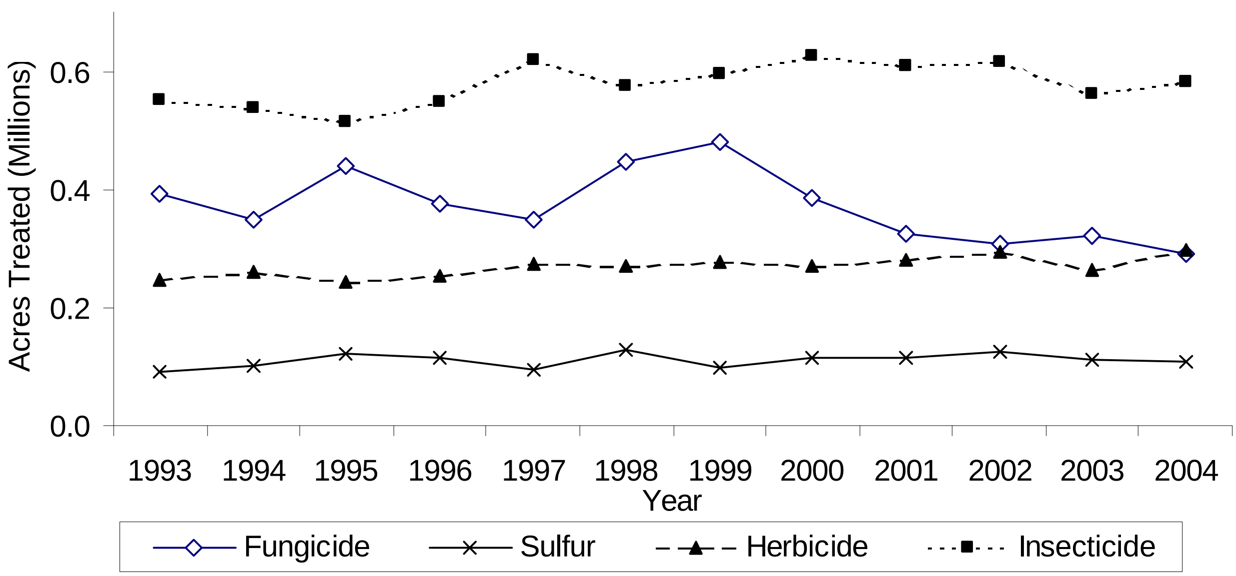
Table 20A. *Total reported pounds of all active ingredients (AIs), acres treated, bearing acres, and prices for peaches and nectarines each year from 2000 to 2004. Bearing acres for peaches and nectarines from 2000 to 2003 are from CASS, October 2004; bearing acres in 2004 are from NASS, July 2005; marketing year average prices for fresh peach from 2000 to 2004 are from NASS, July 2001, July 2002, July 2003, July 2004, and July 2005; prices for nectarines all years are from NASS, July 2005.*

	2000	2001	2002	2003	2004
Lbs AI	6,762,775	6,003,210	6,510,986	6,486,355	6,432,523
Acres Treated	1,687,752	1,609,554	1,581,916	1,496,833	1,518,626
Acres Bearing Peach	65,200	65,800	68,000	68,000	69,000
Acres Bearing Nectarine	35,500	36,500	36,500	36,500	36,500
Acres Bearing Total	100,700	102,300	104,500	104,500	105,500
Price $/ton Peach	$380.00	$428.00	$418.00	$406.00	$341.00
Price $/ton Nectarine	$398.00	$464.00	$382.00	$436.00	$342.00

Table 20B. *Percent difference from previous year for reported pounds of all AIs, acres treated, bearing acres, and prices for peaches and nectarines from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	14	-11	8	0	-1
Acres Treated	-1	-5	-2	-5	1
Acres Bearing Peach	-2	1	3	0	1
Acres Bearing Nectarine	0	3	0	0	0
Acres Bearing Total	-1	2	2	0	1
Price $/tons Peach	-4	13	-2	-3	-16
Price $/tons Nectarine	-3	17	-18	14	-22

Figure 18. *Acres of peaches and nectarines treated by all AIs in the major types of pesticides from 1993 to 2004.*



Peach and nectarine acreage treated with the major categories of pesticides has fluctuated from year to year since 1993 without substantial increasing or decreasing trends. Total pounds of pesticide AI applied and total acres treated changed very little in 2004. The major insecticides used (by acres treated) in peaches and nectarines in 2004 were oils, esfenvalerate, phosmet, the pheromones E–8–dodecenyl acetate, Z–8–dodecenyl acetate, and Z–8–dodecenol, chlorpyrifos, and spinosad; the major fungicides used were sulfur, copper products, propiconazole, ziram, and iprodione; and the major herbicides used were glyphosate, oxyfluorfen, paraquat dichloride, simazine, and 2,4-D.

The largest change in pesticide use was an increase in the total weight of herbicides applied. Pesticides with the greatest percentage increase in pounds AI applied on peaches and nectarines from 2003 to 2004 were the insecticide carbaryl and the miticide hexythiazox; the herbicides glyphosate, oryzalin, oxyfluorfen, 2,4-D, and pendimethalin; and the fumigants chloropicrin and sodium tetrathiocarbonate. Major pesticides with the greatest percentage decreases were the miticide fenbutatin-oxide and the fungicides chlorothalonil, captan, and fenbuconazole.
Three new pesticides, the insecticide methoxyfenozide and the fungicides pyraclostrobin and boscalid, saw significant use.

Crop prices, particularly for nectarines, were down substantially in 2004. When prices go down growers look for ways to reduce production costs, such as reducing pesticide applications. No major changes were clearly attributable to cost-cutting alone, however. The weather in 2004 had an important impact on pesticide use. It was favorable for stone fruit production, particularly in the northern region. A sunny February brought on early bloom, which was battered by rain. Nevertheless, fruit set was generally good. A March heat wave enhanced pollination of late varieties, and by the end of the month early varieties were beginning to show fruit. Continued warm, dry weather led to an early, high quality clingstone peach crop with a slightly higher per acre yield than in 2003. Freestone peaches and nectarines were harvested 10-14 days early and were also of good quality; per acre yield declined slightly due to varieties not sizing to their normal potential.

Controlling San Jose scale is a primary concern for freestone peach growers in the San Joaquin Valley. Heavier infestations require a dormant organophosphate spray plus oil or pyriproxyfen. If infestations are light, as they were in 2004, then oil alone is used. Katydids continue to be a secondary pest of concern. As growers continue to move away from using broad-spectrum pesticides, the incidence of fruit damage by katydids is more prevalent. Phosmet, methomyl, and spinosad are reportedly used to control katydid; the use of the first two increased modestly by pounds AI in 2004, while spinosad application decreased slightly. Many producers used pheromone mating disruption to control Oriental fruit moth and peach twig borer. The March heat brought moth flights on early, however, and some pests had an extra generation during 2004. The new insecticide methoxyfenozide is used for moth control. The long, dry growing season was also favorable for mites. Weather may account for a slight overall increase by weight in the use of insecticides and miticides, including considerable increases in carbaryl and hexythiazox. Clingstone peach growers are using less of the miticide fenbutatin-oxide because of resistance problems.

In comparison to a wet 2003, the warm, dry spring of 2004 reduced disease pressure and can account for the modest decline in fungicide applications by weight of AI. Sulfur use dropped 8 percent. Overall use of other fungicides, including chlorothalonil, captan, and fenbuconazole, was down by about 4 percent. New, lower-risk alternatives such as pyraclostrobin and boscalid are being substituted for older products.

Similarly, the long, dry 2004 stone fruit growing season meant a longer control period for weeds. This may largely account for the 32 percent overall increase in herbicide applications by weight of AI, including substantially greater use of glyphosate, oryzalin, oxyfluorfen, 2,4-D, and pendimethalin.

Total fumigant use by weight decreased slightly, by about 2 percent. The all-purpose fumigant methyl bromide is coming under increasing regulatory restriction. Preplant use of methyl bromide in stone fruit orchards held steady while acreage treated declined somewhat, perhaps due to changes in the pattern of strip treatments. There was a small decline in the postharvest use of methyl bromide. One reason for substantial increases in field application of the fumigants chloropicrin and sodium tetrathiocarbonate may be that they are alternatives to methyl bromide, at least in part.

Strawberries

Strawberries are grown mostly for fresh market. Depending on market prices, some are processed. California strawberry production occurs primarily along the central and southern coast, with small but significant production occurring in the Central Valley.

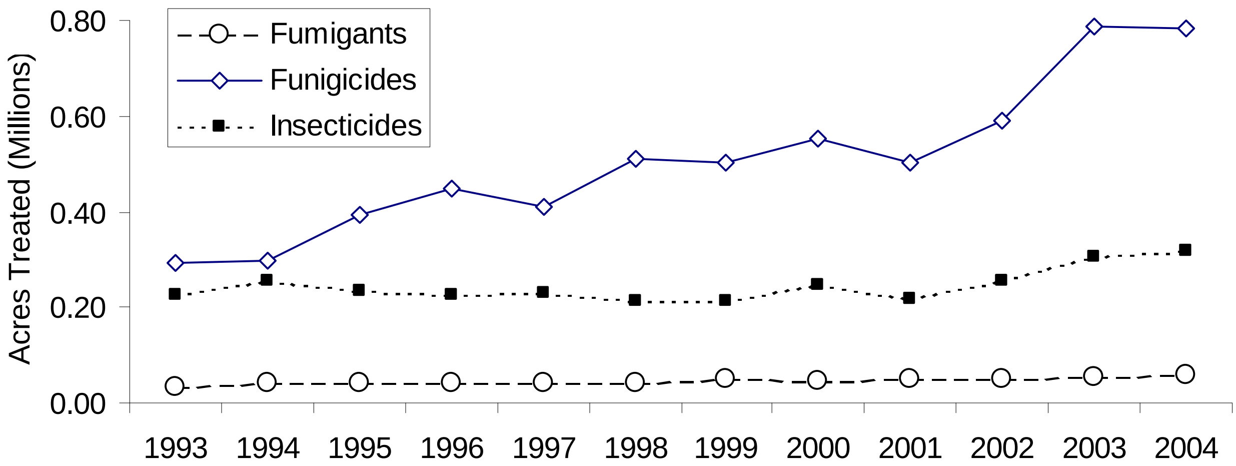
Table 21A. *Total reported pounds of all AIs, acres treated, acres harvested, and prices for strawberries each year from 2000 to 2004. Harvested acres from 2000 to 2003 are from CASS, October 2004; harvested acres in 2004 are from NASS, July 2005; all marketing year average prices are from NASS, July 2005.*

	2000	2001	2002	2003	2004
Lbs AI	7,742,885	7,892,756	8,208,032	9,175,187	9,566,254
Acres Treated	1,018,119	874,220	981,748	1,267,524	1,241,172
Acres Harvested	27,600	26,400	28,500	29,600	33,200
Price $/cwt	$61.40	$70.60	$67.40	$72.80	$74.20

Table 21B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for strawberries from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	-12	2	4	12	4
Acres Treated	13	-14	12	29	-2
Acres Harvested	7	-4	8	4	12
Price $/cwt	-15	15	-5	8	2

Figure 19. *Acres of strawberries treated by all AIs in the major types of pesticides from 1993 to 2004.*



The major pesticides with greatest increase in percent of acres treated from 2003 to 2004 were boscalid, triflumizole, pyraclostrobin, sulfur, malathion, and fenpropathrin. The major pesticides with greatest decreased use per acre were, captan, thiram, myclobutanil, and *Bacillus thuringiensis* (Berliner).

The major pests of strawberries are botrytis, powdery mildew, and lygus bugs in the northern growing areas. Worms (various moth and beetle larvae) especially cutworms and beet armyworms continue to be particularly troublesome in the southern growing areas. The amount of strawberry acreage treated with pesticides has increased since 1993, with the exception of 1997, 2001, and 2004. In terms of total pounds AI, between 1993 and 2004 pesticide use increased most years except for 1997 and 2000. Fungicides and insecticides account for nearly all pesticide use increases seen during this period.

Most of the pesticides used, as measured by acres treated, were fungicides. Between 2003 and 2004 fungicide use held almost constant with a decrease of less than 1 percent. The major fungicides by acres treated in 2004 were captan, sulfur, fenhexamid, pyraclostrobin, and myclobutanil. The older registered fungicides (captan, thiram, thiophanate-methyl, and benomyl) and the newly registered fenhexamid, fludioxonil and cyprodinil are generally used to control Botrytis fruit rot, a major disease of strawberries. All of these products declined in use in 2004 in terms of pounds applied except thiophanate- methyl use, which increased slightly. This increase was likely due to increased acreage, specifically of summer planted strawberries. General declines in use of these products resulted from less favorable weather conditions for the development of Botrytis fruit rot. Thiram use continued the decline seen in 2003 over 2002 also because it was likely replaced by captan for resistance management. Following a 104 percent increase in 2003, thiophanate-methyl increased another 3 percent, and continues to replace benomyl as an inexpensive systemic fungicide. The manufacturer has voluntarily canceled benomyl.

Conventional strawberry growers primarily used sulfur and myclobutanil to control powdery mildew. Sulfur is inexpensive and is also used by organic growers. Increased acreage of both conventional and organic growers might also have contributed to the increased use of sulfur despite somewhat less favorable weather conditions for disease development in 2004 over 2003. Nevertheless, powdery mildew pressure was high and many growers use sulfur exclusively to help control it. Boscalid, trifumizole and pyraclostrobin are new and effective fungicides for powdery mildew control first reported in 2003. Acres treated with these products increased substantially in 2004 over 2003. Boscalid is also used in combination with pyraclostrobin. Azoxystrobin is another new fungicide for strawberries that is very effective against anthracnose. Its use increased by 9 percent in 2004 over 2003.

Insecticide use increased by almost 4 percent. The major insecticides by acres treated were malathion, spinosad, methomyl, fenpropathrin, naled, bifenazate, *Bacillus thuringiensis*, hexythiazox and abamectin. Use of all major broad-spectrum insecticides, such as malathion, methomyl, naled, fenpropathrin, and chlorpyrifos, increased due to increased acreage and pest pressure [primarily lygus, and worms (moth and beetle larvae)] in 2004. Fenpropathrin use increased primarily because it is one of only a few products effective against lygus bugs, which have become an increasing problem. It is also used in combination with malathion to control whitefly. Pyriproxyfen, a newly registered insect growth regulator, is effective against white flies. Pyriproxyfen increased in use in 2003 but then declined by 41 percent in 2004. Reduction of whitefly pressure has lead to lower use of pyriproxyphen and imidacloprid (also a growth regulator) in favor of pyrethroids mixed with malathion. Reduction of petroleum oil use may have resulted in part from replacement by bifenazate (which became available in 2002 for strawberries) and by neem oil. Reduction in two-spotted spider mite pressure in 2004 may also have resulted in some reduction in petroleum oil use. Reduction in use of *Bacillus thuringiensis* (all forms) is in part due to the greater effectiveness of spinosad for cutworm and beet armyworm control. Most conventional growers used the miticide biphenazate in 2003; its use remained relatively unchanged in 2004 despite increases in strawberry acreage. Some of the increased insecticide use over all might also be due to reduced use of methyl bromide and the change (from broadcast to bed fumigation) in the way methyl bromide alternatives were applied in 2003 and 2004. For instance, this change might have increased the usage of chlorpyrifos for worm control.

Strawberry production relies on several fumigants. Overall fumigant use increased by 9 percent, including chloropicrin, 1,3–D, metam sodium and metam potassium, with methyl bromide use declining. Fumigants usually are applied at higher rates than other pesticide types, such as fungicides and insecticides. Fumigants are applied at high rates, in part, because they treat a volume of space rather than a surface area such as leaves and stems of plants. Thus, the pounds applied are large relative to other pesticide types even though the number of applications or number of acres treated may be relatively small. Fumigants accounted for about 86 percent of all pesticide AIs by pounds applied in strawberries. Acres treated with methyl bromide decreased 10 percent from 20,593 acres in 2003 to 18,467 acres 2004. Methyl bromide pounds used decreased by 13 percent, from 3,671,982 pounds in 2003 to 3,190,832 pounds in 2004, despite a 12 percent increase in acres harvested. Decline in methyl bromide use continues a steady trend since a peak in 1999. This decrease in methyl bromide use was likely a result of increase in price for this fumigant due to the Montreal Protocol phase-out, and use of less costly replacements such as 1,3-D. However, township caps on 1,3-D are limiting use of this AI as well. Growers also appear to be replacing methyl bromide with 1,3–D formulated with various percentages of chloropicrin, chloropicrin alone, and metam sodium. 1,3–D use both in pounds and in acres treated with this fumigant increased 70 percent in 2004. Chloropicrin use in acres treated increased by 4.5 percent from 27,016 acres in 2003 to 28,242 acres in 2004. Acres treated with metam sodium increased by 55 percent from 1,127 acres in 2003 to 1,741 acres in 2004. Metam sodium is generally more effective in controlling weeds, but less effective than 1,3-D or 1,3-D plus chloropicrin against soil-borne diseases and nematodes.

Carrots

California is the largest producer of carrots in the United States, accounting for about 65 percent of all U.S. carrot production. California produces more than 1.1 million tons of carrots annually on about 70,000 acres, with a total crop value of nearly $448 million. Carrots are grown for fresh market and processing. California has four main production regions for carrots: the San Joaquin Valley (Kern County), with significant production in Cuyama Valley (San Luis Obispo and Santa Barbara counties); the low desert (Imperial and Riverside counties); the high desert (Los Angeles County); and the central coast (Monterey County). The San Joaquin Valley accounts for more than half the state's acreage.

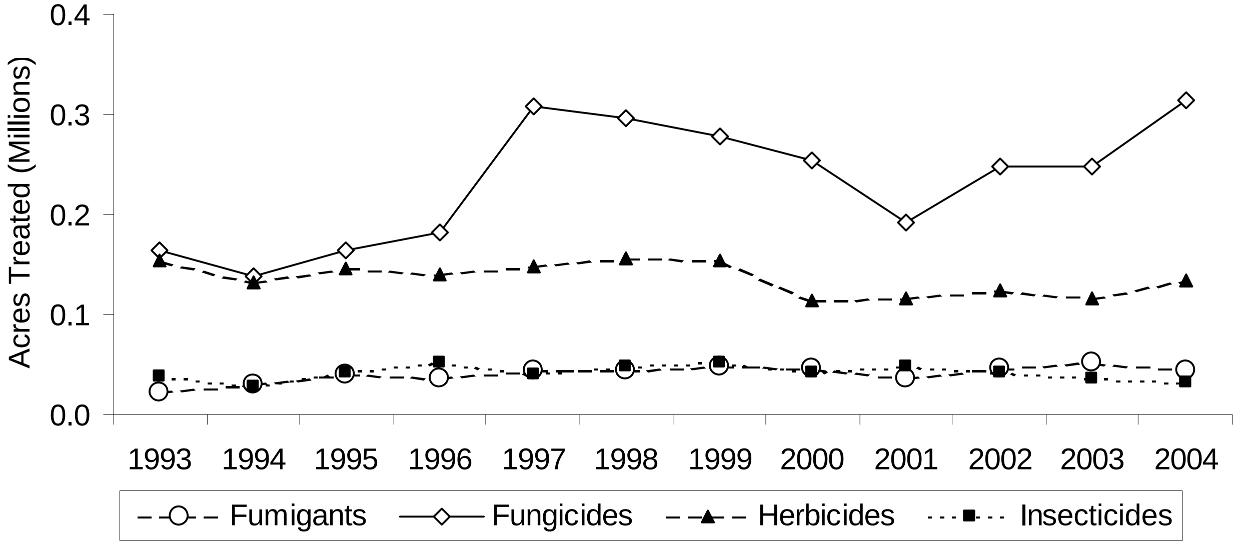
Table 22A. *Total reported pounds of all AIs, acres treated, acres harvested, and prices for carrots each year from 2000 to 2004. Harvested acres of all carrots in 2000 to 2001 are from CDFA, 2002; harvested acres in 2002 and 2003 are from California Vegetable Review, CASS, January 2004; all marketing year average prices for fresh carrots are from NASS, July 2005.*

	2000	2001	2002	2003	2004
Lbs AI	7,582,107	6,506,317	7,823,438	8,613,683	8,075,913
Acres Treated	412,294	359,125	426,126	448,463	503,022
Acres Harvested	73,900	72,300	71,100	71,500	70,800
Price $/cwt	$13.30	$18.10	$20.30	$20.40	$21.70

Table 22B. *Percent difference from previous year for reported pounds of all AIs, acres treated, acres harvested, and prices for carrots from 2000 to 2004.*

	2000	2001	2002	2003	2004
Lbs AI	-12	-14	20	10	-6
Acres Treated	-16	-13	19	5	12
Acres Harvested	-1	-2	-2	1	-1
Price $/cwt	-23	36	12	0	6

Figure 20. *Acres of carrots treated by all AIs in the major types of pesticides from 1993 to 2004.*



Pesticide use (as acres treated) in carrots remained fairly constant between 1993 to 2004 except for an increase in fungicide use and a smaller increase in fumigant use. Pesticides used most (as measured by acres treated) were mefenoxam, linuron, trifluralin, iprodione, metam-sodium, sulfur, pyraclostrobin, copper hydroxide, chlorothalonil, 1,3-D, and fluazifop-p-butyl. The major pesticides with increased percentage in acres treated were polybutenes, boscalid, carbaryl, glyphosate, isopropylamine salt, pyraclostrobin, copper oxide, *Bacillus thuringiensis*, sulfur, and fluazifop-p-butyl. The major pesticides with decreased percentage use were tau-fluvalinate, fluazifop-p-butyl, cyfluthrin, azoxystrobin, and bifenthrin.

Cumulatively, the most used pesticide category for carrots, as measured by acres treated, was fungicides. From 2003 to 2004 acres treated with fungicides increased 27 percent while pounds increased by 4 percent. The most applied fungicides in 2004 were sulfur, chlorothalonil, copper hydroxide, mefenoxam, iprodione, copper oxide (ous), pyraclostrobin (registered in 2003), and azoxystrobin (registered in 2001). Alternaria leaf blight, a major foliar disease, is generally controlled by iprodione, chlorothalonil, pyraclostrobin, or azoxystrobin. Azoxystrobin and pyraclostrobin are strobilurins with the same mode of action. Increased use of pyraclostrobin probably resulted from market factors related to competition with azoxystrobin rather than to resistance to iprodione, although resistance has been documented. Weather conditions were normal without unusual Alternaria leaf blight development. Cavity spot is a major, troublesome soil-borne fungal disease that is commonly controlled by applying mefenoxam or metam sodium (a soil fumigant). Growers might have relied less on metam sodium use, which declined by 14 percent by weight, to manage this root disease in 2004, resulting in an increased use of mefenoxam. Powdery mildew is primarily controlled by sulfur, which is inexpensive and especially popular with organic growers. Azoxystrobin is an alternative to sulfur, although more expensive.

The main herbicides used in carrot production were linuron, trifluralin, fluazifop-p-butyl, and glyphosate. The two most important are linuron (55,620 pounds, 75,865 acres treated) and trifluralin (29,486 pounds, 39,934 acres treated). Linuron, a postemergence herbicide, provides good control of broadleaf weeds and small grasses. Trifluralin, a preemergent herbicide, is used by carrot growers to complement linuron for weed management. There are no alternatives to trifluralin. However, metam sodium and crop rotation may be more effective for controlling specific weeds, e.g., nut sedges, especially purple nutsedge.

Carrot production relies on the fumigants 1,3-D, chloropicrin, and metam sodium. These fumigants are used at high rates to control soil-borne pests. Methyl bromide is no longer used on carrots. In 2004, fumigants accounted for about 82 percent of the total pounds of pesticide AIs applied to carrots. This figure is unchanged from 2003 because both pounds of fumigants and total pounds of pesticide used declined. Although acres treated with fumigants decreased by 14 percent, 1,3–D use increased by 5 percent. Use of metam sodium, primarily for weeds, soil-borne pathogens, and nematodes, declined 19 percent (acres treated) and14 percent (pounds). Chloropicrin use also decreased by 45 percent (acres treated) and 27 percent (pounds). Chloropicrin like metam sodium appears to have decreased due primarily to concerns about off-gassing. These products are perhaps being replaced to some extent by mefenoxam as described above. Chloropicrin is not used by itself in carrot production, but it is contained in a formulation of 1,3-D. Therefore, increased use of 1,3–D formulations that do not contain chloropicrin is suggested. 1,3-D is used primarily to control various nematodes and secondarily against wireworms and symphylans. Overall pounds of fumigant declined 8 percent in carrot production.

Insects are generally not a major problem in carrot production, except for white flies that are controlled with esfenvalerate. The major insecticides used in 2004 were esfenvalerate, diazinon, methomyl, cyfluthrin, malathion, bifenthrin, tau-fluvalinate, carbaryl, and spinosad. In 2004, esfenvalerate and methomyl use (as acres treated) decreased 45 and 51 percent respectively due to decreased white fly pressure and growers switching to carbaryl. Use of foliar spray formulations of carbaryl for control of armyworms, leafhoppers, and flea beetles increased 3.66-fold, while bait formulations increased 100-fold. Baits are used primarily to control migratory pests including saltmarsh caterpillars and cutworms.

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