IV. TRENDS IN USE IN CERTAIN PESTICIDE CATEGORIES

Reported pesticide use in California in 2001 totaled 151 million pounds, a decline of 37 million pounds from 2000 and the lowest reported pounds applied statewide since full use reporting started in 1990. Since DPR has not received all of Kern County data, the total reported use is greater than 151 million pounds but probably not by more than 5 million pounds based on a statistical analysis of pesticide use in Kern County from the last 5 years.

Production agriculture, the major category of use subject to reporting requirements, accounted for most of the overall decrease in use. Applications for production agriculture dropped by 35 million pounds.

Major crops that showed an overall decline in pesticide pounds applied from 2000 to 2001 included raisin and table grapes (7.2 million pounds), wine grapes (4.8 million pounds), sugar beets (down 3.2 million pounds), processing tomatoes (3.0 million pounds), oranges (2.3 million pounds), carrots (1.6 million pounds), and almonds (down 1.5 million pounds). Major crops and commodities with increased pounds applied included lumber (up 0.3 million pounds), bermudagrass (0.2 million pounds), and strawberries (0.1 million pounds).

The active ingredients with the largest decline in use by pounds were sulfur, petroleum oils, and methyl bromide. Sulfur use declined from 2000 to 2001 by 16 million pounds (25%) yet still remained the most highly used pesticide in 2001, both in pounds applied and acres treated. By pounds, sulfur accounted for 31% of all reported pesticide use. Sulfur is a natural fungicide favored by both conventional and organic farmers. Petroleum oil use declined by 5 million pounds (14%), and methyl bromide use declined by 4 million pounds (39%).

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. Sulfur use, as well as other pesticide use, declined on table and raisin grapes in 2001 possibly because of low commodity prices. Low commodity prices for almond, cotton, rice, and leaf lettuce may have also contributed to decreased use of many pesticides. Growers will try to reduce expenses (such as pesticide applications) if they expect lower prices for their crops. In addition, in 2001, disease and weed pressure were low in most crops resulting in less fungicide and herbicide use. Although acreage decreased for some crops, this decrease was too small to explain most of the decrease in pesticide use. Decreased methyl bromide use can be attributed to fewer new plantings of grapes and some other crops, increased cost, and additional regulatory restrictions placed on its use.

Pesticide use is reported as the number of pounds of active ingredient and the total number of acres treated. The data for pounds include both agricultural and non-agricultural 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 active ingredient, it is counted as three acres treated in the tables and graphs in Section IV of this report.)

Because the 2001 data does not include many reports from Kern County and errors have not been completely identified and corrected, the values should be viewed with caution. However, based on

this data, use declined in nearly all pesticide categories in both pounds of active ingredient applied and cumulative acres treated. Some of the major statistical changes from 2000 to 2001 include:

- Use of insecticide organophosphate and carbamate chemicals, which includes compounds of high regulatory concern, declined by 2.4 million pounds (21%) from 2000 to 2001. Cumulative acres treated with these pesticides declined by 1.5 million acres (18%).

- Chemicals classified as carcinogens declined in overall pounds applied (down 3.1 million pounds or 13%) and in cumulative acres treated (down 3.2 million acres or 47%).

- Chemicals classified as reproductive toxins also showed an overall decline in pounds applied (down 6.0 million pounds or 23%) and cumulative acres treated (down 1.3 million acres or 33%).

- Chemicals categorized as toxic air contaminants, another regulatory concern, decreased by 6.1 million pounds applied (28%). Cumulative acres treated decreased by about 1.5 million acres (34%).

- Chemicals categorized as ground water contaminants decreased by about 553,000 pounds applied (18%). Cumulative acres treated decreased by about 335,000 acres (15%).

- Reduced-risk pesticides decreased by 40,000 pounds applied (7%), but cumulative acres treated increased by 134,000 acres (5%). However, more reduced-risk pesticides had increased use than decreased use. Biopesticides decreased by 66,000 pounds (19%) and decreased by 183,000 cumulative acres treated (17%) from 2000 to 2001.

Since 1994, the reported pounds of pesticides applied has fluctuated from year to year with no general increasing or decreasing trend. 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 1994 to 1998 or the decreased use from 1998 to 2001. However, the trend from 1994 to 2001 was not statistically decreasing or increasing.

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 active ingredient 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 1993 to 2000 (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 iv.) 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 DPR's groundwater protection list (California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800[a]) and norflurazon, which DPR is recommending be listed as a restricted material.
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) Active ingredients 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2
1,080	<1	<1	<1	1	<1	<1	<1	<1	
2,4-DB ACID	0	0	0	0	1,697	6,932	12,397	11,453	16,9
AMITRAZ	4,877	70,363	75,018	55,459	66,439	13,563	7,558	8,087	2
ARSENIC PENTOXIDE	150,200	86,445	83,814	205,089	64,372	50,899	245,238	91,267	259,3
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	1	1	<1	
BENOMYL	536,594	141,586	189,943	148,433	114,406	227,690	133,109	118,601	76,0
BROMACIL, LITHIUM SALT	7,045	11,085	6,517	17,381	9,141	4,686	4,162	4,478	3,2
BROMOXYNIL HEPTANOATE	0	0	0	0	9	263	3,084	34,930	45,9
BROMOXYNIL OCTANOATE	112,643	127,154	119,407	148,480	115,368	120,877	120,338	116,125	78,0
CHLORSULFURON	1,110	1,228	1,485	1,623	2,218	3,046	1,445	2,566	1,2
CYANAZINE	501,962	532,688	641,057	566,632	470,838	277,313	180,487	50,468	17,2
CYCLOATE	51,715	51,035	49,138	44,628	55,459	62,753	49,096	37,408	31,7
DICLOFOP-METHYL	23,082	38,276	16,540	79,874	41,130	24,783	18,710	21,696	11,7
EPTC	698,176	765,576	660,185	703,996	579,245	393,031	448,883	323,254	276,7
ETHYLENE OXIDE	1,471	3	0	0	0	31	2	6	
FENOXAPROP ETHYL	0	5,023	3,731	3,974	3,895	1,504	2,048	979	3
FLUAZIFOP-BUTYL	4,634	2,375	2,148	823	2,028	1,211	516	205	1
HYDRAMETHYLNON	142	227	807	1,741	5,456	3,183	2,267	2,495	2,3
LINURON	230,827	79,950	84,937	84,335	84,621	82,170	78,046	65,511	58,1
METAM-SODIUM	8,588,969	11,122,361	14,975,528	15,253,924	14,969,732	13,729,306	16,774,246	12,844,344	11,346,0
METHYL BROMIDE	14,115,900	16,607,324	17,165,964	16,022,069	15,663,832	13,569,875	15,300,388	10,862,836	6,615,8
METIRAM	0	0	0	0	0	<1	0	0	
MYCLOBUTANIL	86,712	69,941	85,525	89,087	94,375	129,773	94,626	96,139	83,9
NABAM	0	8	1	0	0	50	2	1	
NICOTINE	457	457	228	298	258	83	93	21	
NITRAPYRIN	175	150	639	114	49	407	150	192	
OXADIAZON	19,269	20,488	21,458	25,260	23,196	21,959	19,399	18,168	15,9
OXYDEMETON-METHYL	117,416	111,347	120,101	106,612	115,781	89,789	122,912	110,495	99,0
OXYTHIOQUINOX	6,207	4,474	7,172	6,204	2,709	1,576	2,705	409	1

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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2
POTASSIUM DIMETHYL DITHIO CARBAMATE	21	47	0	0	15	24,795	0	0	
PROPARGITE	1,653,855	1,742,736	1,770,065	1,743,278	1,816,028	1,385,327	1,504,268	1,331,979	1,158,9
RESMETHRIN	1,720	1,069	856	661	594	796	632	600	5
SODIUM DIMETHYL DITHIO CARBAMATE	0	337	1	0	0	8,279	355	1,315	1
STREPTOMYCIN SULFATE	5,110	6,165	9,619	9,494	9,605	14,950	9,406	10,820	7,5
TAU-FLUVALINATE	3,730	4,723	3,787	4,137	3,040	2,827	3,315	2,242	2,2
THIOPHANATE-METHYL	94,265	100,890	116,746	122,862	88,640	65,169	76,040	67,779	66,9
TRIADIMEFON	29,699	24,147	20,692	17,370	12,204	12,919	4,846	3,040	2,8
TRIBUTYLTIN METHACRYLATE	130	1,734	278	185	60	113	270	107	1
TRIFORINE	41,848	32,574	39,729	24,877	6,562	2,752	519	365	
VINCLOZOLIN	37,550	33,661	48,270	60,286	46,908	54,719	52,731	35,658	32,2
WARFARIN	1	<1	<1	1	1	1	1	1	
Grand Total	**27,127,513**	**31,797,646**	**36,321,386**	**35,549,186**	**34,469,914**	**30,389,403**	**35,274,290**	**26,276,042**	**20,313,7**

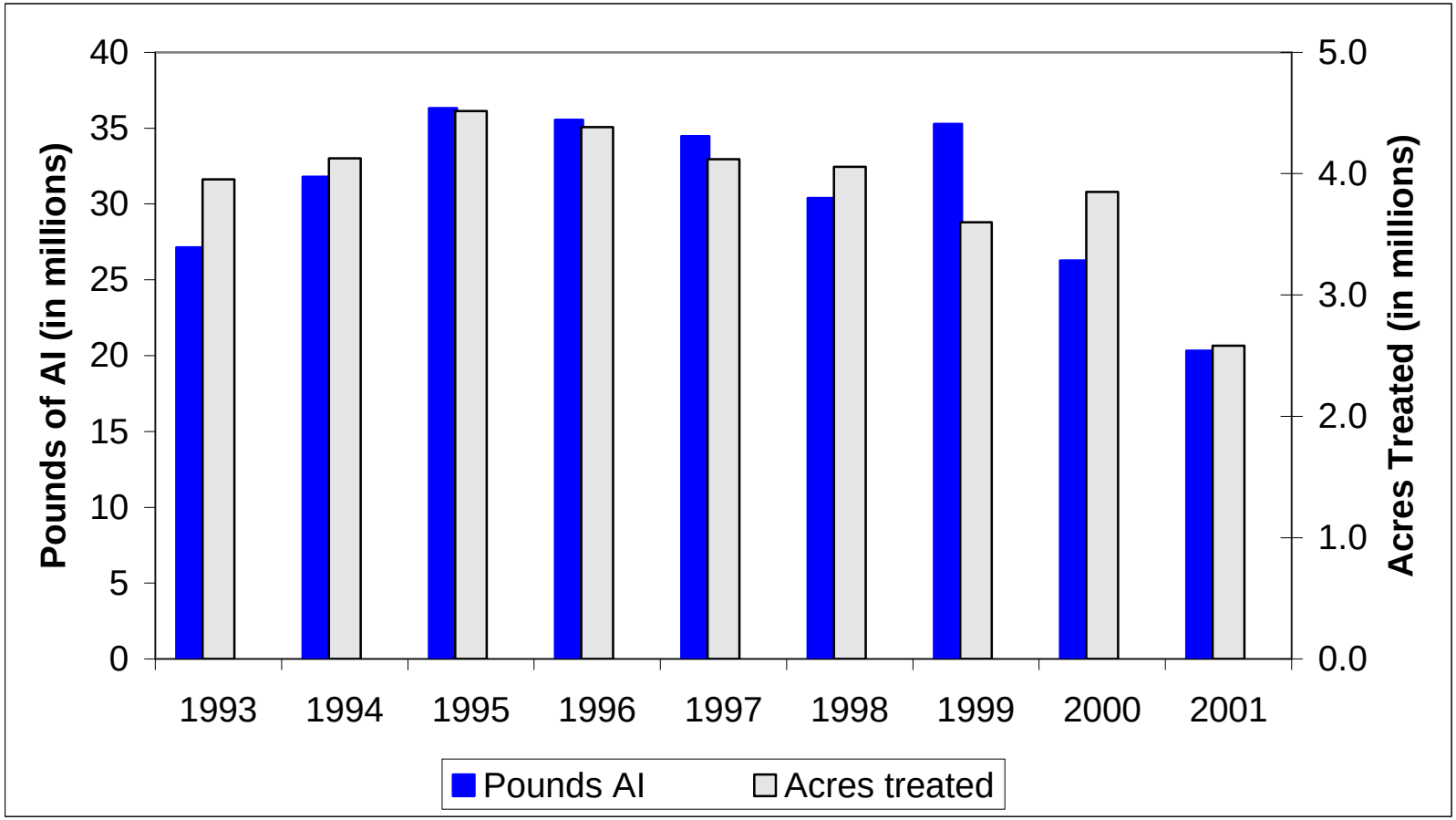
Table 3B. The reported **cumulative acres treated** with pesticides that are on the State's Proposition 65 list of chemicals "known to cause reproductive toxicity". Use includes primarily agricultural applications. The grand total for acres treated may be less than the sum of acres treated for all active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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1,080	0	53	32	25	0	0	0	42	30
2,4-DB ACID	0	0	0	0	2,599	12,167	20,063	19,496	25,843
AMITRAZ	3,391	137,434	174,867	129,857	161,651	28,945	14,684	16,011	1,269
ARSENIC PENTOXIDE	0	660	0	0	0	0	0	709,893	56
ARSENIC TRIOXIDE	0	0	0	0	0	0	0	0	0
BENOMYL	278,444	271,289	360,931	310,563	245,687	434,725	242,796	217,611	135,856
BROMACIL, LITHIUM SALT	0	0	0	0	0	40	40	30	0
BROMOXYNIL HEPTANOATE	0	0	0	0	36	521	9,294	132,820	161,026
BROMOXYNIL OCTANOATE	204,241	245,715	224,276	277,062	224,250	240,997	257,417	313,362	249,839
CHLORSULFURON	41,189	39,962	39,584	54,360	27,628	39,873	30,691	34,528	29,079
CYANAZINE	263,463	284,812	365,520	325,627	288,087	185,082	129,547	56,059	19,708
CYCLOATE	21,600	22,571	20,685	19,597	25,986	29,761	24,555	18,487	15,916
DICLOFOP-METHYL	27,457	47,273	19,314	89,276	47,217	28,296	21,442	24,470	14,198
EPTC	246,970	273,441	241,587	232,820	208,093	141,511	148,685	107,613	99,953
ETHYLENE OXIDE	0	0	0	0	0	194	31	41	0
FENOXAPROP ETHYL	0	33,712	24,153	25,540	24,439	10,480	13,824	8,847	3,820
FLUAZIFOP-BUTYL	6,414	3,824	2,225	1,513	1,537	3,908	806	137	144
HYDRAMETHYLNON	2	0	3	36	35	289	1,615	3,648	2,745
LINURON	111,535	97,887	105,284	104,772	110,067	112,122	111,009	86,317	81,780
METAM-SODIUM	136,218	183,625	199,457	215,899	198,395	154,309	186,300	146,847	118,067
METHYL BROMIDE	89,220	106,694	107,933	96,507	103,068	90,107	102,125	75,741	60,839
METIRAM	0	0	0	0	0	<1	0	0	7
MYCLOBUTANIL	859,361	692,036	841,178	814,268	866,360	1,225,372	887,981	842,639	737,325
NABAM	0	0	0	0	0	55	20	0	60
NICOTINE	348	382	237	167	128	57	36	14	31
NITRAPYRIN	434	261	1,493	147	105	851	329	276	0
OXADIAZON	1,094	1,812	2,400	2,213	1,832	1,933	3,407	2,624	2,637
OXYDEMETON-METHYL	235,013	226,433	253,868	220,824	244,056	186,964	253,281	225,984	200,136
OXYTHIOQUINOX	9,227	6,410	10,000	8,768	5,896	5,306	2,152	817	250

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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	6	0	0	0	0	0	0	0
PROPARGITE	952,438	1,030,485	1,052,358	980,963	989,265	756,098	795,410	704,529	606,400
RESMETHRIN	512	419	222	144	182	160	84,044	33	35
SODIUM DIMETHYL DITHIO CARBAMATE	0	0	0	0	0	253	20	0	60
STREPTOMYCIN SULFATE	49,236	58,703	84,111	84,999	89,336	131,936	76,414	97,019	62,158
TAU-FLUVALINATE	24,386	26,578	19,771	22,156	18,387	14,075	17,343	10,101	10,886
THIOPHANATE-METHYL	91,084	86,803	101,694	128,267	89,556	63,842	81,428	68,422	53,977
TRIADIMEFON	165,472	132,295	118,746	100,142	59,229	79,968	25,719	11,855	9,492
TRIBUTYLTIN METHACRYLATE	0	13	<1	1	<1	1	1	1	<1
TRIFORINE	84,554	64,069	76,411	53,589	17,455	6,352	1,279	751	244
VINCLOZOLIN	49,042	49,519	66,672	82,968	67,373	69,067	63,931	43,629	38,567
WARFARIN	112	192	151	541	382	310	99	556	101
Grand Total	**3,952,441**	**4,125,368**	**4,515,163**	**4,383,613**	**4,118,283**	**4,055,351**	**3,598,505**	**3,848,429**	**2,581,447**

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 includes both agricultural and non-agricultural applications. The reported cumulative acres treated includes 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1,3-DICHLOROPROPENE	47,694	2,122	409,821	1,956,846	2,400,930	2,911,385	3,122,723	4,442,193	4,022,195
ACIFLUORFEN, SODIUM SALT	6	1	6	11	29	<1	10	<1	1
ALACHLOR	44,957	42,854	41,119	45,733	51,259	46,264	29,789	36,468	29,431
ARSENIC ACID	13,014	27,571	37,206	53,777	59,835	52,558	48,029	11,906	12,023
ARSENIC PENTOXIDE	150,200	86,445	83,814	205,089	64,372	50,899	245,238	91,267	259,386
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	1	1	<1	<1
CACODYLIC ACID	51,314	43,685	43,275	31,417	26,060	17,379	15,930	16,091	3,981
CAPTAN	483,507	608,658	734,314	918,588	799,878	1,559,136	965,922	642,755	398,829
CHLOROTHALONIL	826,918	832,288	1,125,790	1,053,319	779,328	1,181,163	753,840	679,746	519,291
CHROMIC ACID	209,555	120,822	117,092	286,521	89,931	71,109	343,543	128,642	363,205
CREOSOTE	479,417	871,469	444,461	491,044	259,086	1,752	4,873	9,879	4,700
DAMINOZIDE	7,763	6,775	6,763	7,944	11,028	10,306	9,411	9,138	11,323
DDVP	3,331	4,798	6,063	13,097	13,636	13,998	12,325	12,488	12,787
DIOCTYL PHTHALATE	10,827	11,748	11,838	10,268	8,457	4,749	3,090	2,644	2,919
DIPROPYL ISOCINCHOMERONATE	<1	2	1	3	<1	<1	0	<1	1
DIURON	1,074,854	1,234,507	1,054,409	1,265,426	1,228,114	1,504,268	1,188,640	1,343,727	1,104,771
ETHOPROP	62,143	51,270	51,104	27,955	23,842	27,949	26,196	16,119	19,046
ETHYLENE OXIDE	1,471	3	0	0	0	31	2	6	3
FENOXYCARB	1,928	1,492	1,673	712	65	552	71	80	86
FOLPET	3	3	2	<1	<1	<1	<1	<1	0
FORMALDEHYDE	13,322	11,864	153,519	334,548	403,824	305,297	111,714	55,300	28,612
IPRODIONE	452,112	431,318	564,127	520,763	424,338	572,287	411,548	422,179	304,888
LINDANE	9,715	5,281	4,507	4,576	5,388	6,293	4,842	4,738	2,388
MANCOZEB	446,086	464,924	659,240	567,866	526,364	987,270	630,968	611,197	430,354
MANEB	625,326	912,903	1,257,122	1,328,318	1,081,124	1,596,876	1,045,567	1,203,322	816,676
METAM-SODIUM	8,588,969	11,122,361	14,975,528	15,253,924	14,969,732	13,729,306	16,774,246	12,844,344	11,346,620
METIRAM	0	0	0	0	0	<1	0	0	2

Table 4A (continued). 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".

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
ORTHO-PHENYLPHENOL	6,232	11,027	14,892	10,349	15,962	11,248	8,600	8,473	4,016
ORTHO-PHENYLPHENOL, SODIUM SALT	63,741	46,825	30,830	33,539	25,389	32,315	29,019	30,708	24,615
OXADIAZON	19,269	20,488	21,458	25,260	23,196	21,959	19,399	18,168	15,903
OXYTHIOQUINOX	6,207	4,474	7,172	6,204	2,709	1,576	2,705	409	149
PARA-DICHLOROBENZENE	37	3	2	4	3	219	86	4	11
PENTACHLOROPHENOL	91,123	40	3	3	8	33	92	466	14
POTASSIUM DICHROMATE	106	596	380	41	50	103	319	554	1
PROPARGITE	1,653,855	1,742,736	1,770,065	1,743,278	1,816,028	1,385,327	1,504,268	1,331,979	1,158,963
PROPOXUR	2,674	2,667	3,296	1,341	1,760	1,604	1,735	2,141	611
PROPYLENE OXIDE	34,764	41,815	131,593	224,495	198,559	198,595	172,556	118,381	99,727
PROPYZAMIDE	110,123	111,797	113,761	106,811	99,292	104,292	104,484	103,705	108,943
SILICA AEROGEL	10,052	14,245	12,599	16,216	10,780	8,483	8,351	11,137	8,832
SODIUM DICHROMATE	0	0	0	180,478	182,185	122,647	32,699	122	329
THIODICARB	<1	0	13,679	122,927	156,002	114,785	60,453	36,844	9,360
VINCLOZOLIN	37,550	33,661	48,270	60,286	46,908	54,719	52,731	35,658	32,206
Grand Total	**15,640,165**	**18,925,542**	**23,950,794**	**26,908,977**	**25,805,453**	**26,708,733**	**27,746,013**	**24,282,979**	**21,157,200**

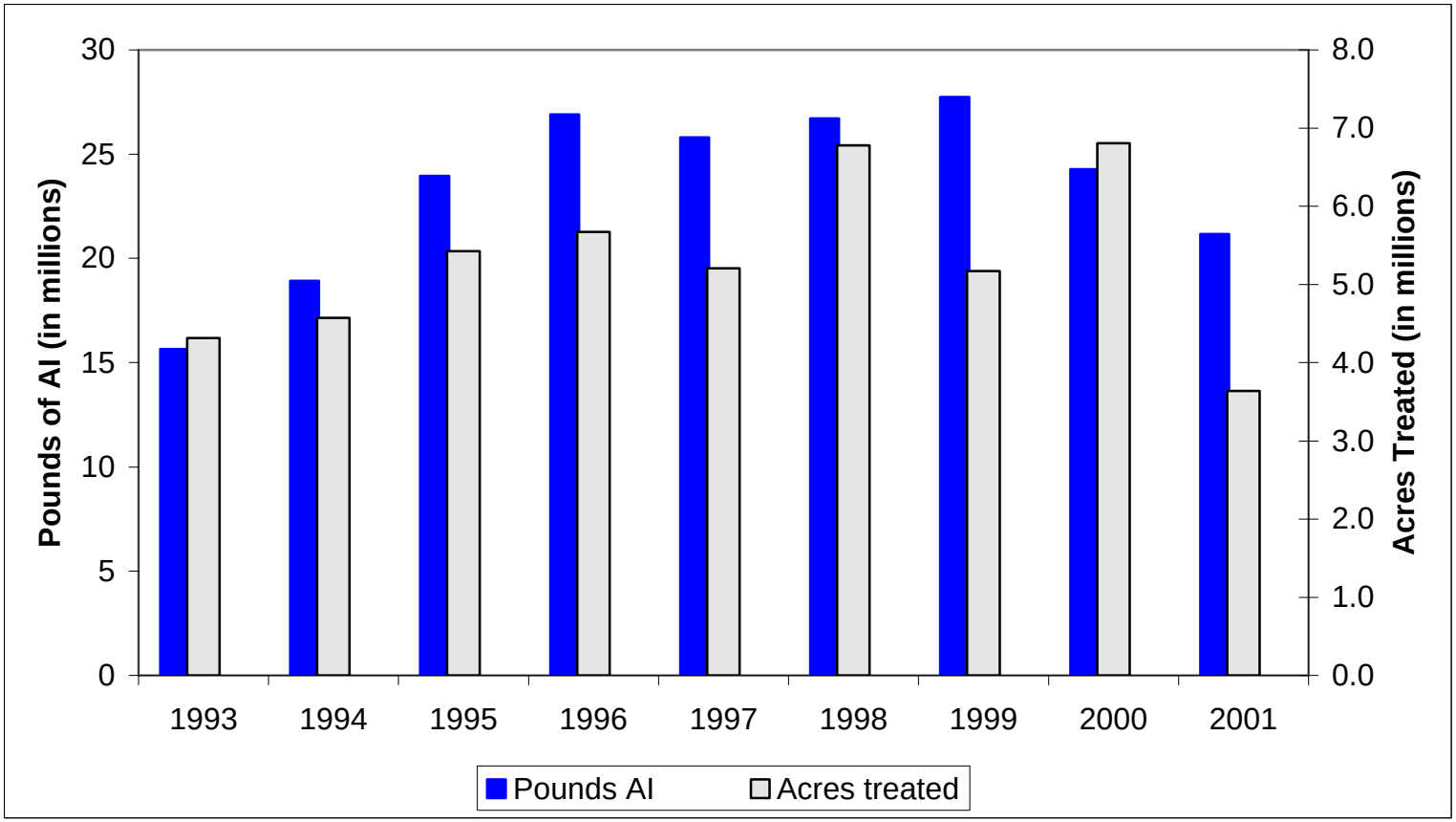
Table 4B. The reported **cumulative acres treated** with pesticides listed by U.S. EPA as B2 carcinogens or on the State's Proposition 65 list of chemicals "known to cause cancer". Use includes primarily agricultural applications. The grand total for acres treated is less than the sum of acres treated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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1,3-DICHLOROPROPENE	823	33	4,174	17,223	22,193	27,059	29,430	33,101	30,313
ACIFLUORFEN, SODIUM SALT	7	2	8	<1	0	0	0	0	0
ALACHLOR	17,637	16,135	15,359	18,181	19,059	16,430	11,008	13,302	11,453
ARSENIC ACID	0	0	0	0	0	0	0	0	0
ARSENIC PENTOXIDE	0	660	0	0	0	0	0	709,893	56
ARSENIC TRIOXIDE	0	0	0	0	0	0	0	0	0
CACODYLIC ACID	326,027	304,060	315,336	251,414	192,816	126,912	111,607	117,656	31,283
CAPTAN	212,563	244,164	295,860	381,989	347,631	602,684	404,731	309,768	215,723
CHLOROTHALONIL	535,201	517,357	674,126	674,086	492,219	796,672	456,007	428,109	312,683
CHROMIC ACID	0	660	0	0	0	0	0	709,893	56
CREOSOTE	0	0	0	0	0	126	11	45	1
DAMINOZIDE	3,262	2,692	2,659	2,653	3,512	4,510	3,107	3,416	6,145
DDVP	683	1,888	1,887	1,499	2,596	3,692	2,180	2,336	3,954
DIOCTYL PHTHALATE	125,572	149,314	145,445	127,521	96,208	61,343	50,587	40,075	44,032
DIPROPYL ISOCINCHOMERONATE	2	50	10	0	0	0	0	5	0
DIURON	414,892	454,829	507,279	685,352	819,993	865,246	849,482	864,334	786,708
ETHOPROP	7,062	5,767	5,470	3,139	3,213	3,784	3,610	3,477	3,542
ETHYLENE OXIDE	0	0	0	0	0	194	31	41	0
FENOXYCARB	1	5	11	5	<1	210	3,707	3,388	3,237
FOLPET	3	<1	0	1	2	0	0	0	0
FORMALDEHYDE	132	15	137	234	12	126	123	47	53
IPRODIONE	721,086	656,402	886,077	804,311	666,336	1,348,367	933,982	2,196,303	500,678
LINDANE	26,921	22,984	19,380	25,352	36,573	32,650	20,930	14,628	13,832
MANCOZEB	262,758	273,836	405,494	351,801	284,134	682,979	387,300	363,260	228,243
MANEB	373,116	512,009	652,122	731,079	624,123	942,083	629,897	611,717	534,925
METAM-SODIUM	136,218	183,625	199,457	215,899	198,395	154,309	186,300	146,847	118,067
METIRAM	0	0	0	0	0	<1	0	0	7

Table 4B (continued). 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".

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
ORTHO-PHENYLPHENOL	6	4	8	67	75	645	583	321	59
ORTHO-PHENYLPHENOL, SODIUM SALT	52	88	47	652	0	20	6,234	18,599	60
OXADIAZON	1,094	1,812	2,400	2,213	1,832	1,933	3,407	2,624	2,637
OXYTHIOQUINOX	9,227	6,410	10,000	8,768	5,896	5,306	2,152	817	250
PARA-DICHLOROBENZENE	<1	0	0	0	0	10	0	0	0
PENTACHLOROPHENOL	0	2	<1	15	4	190	0	59	38
POTASSIUM DICHROMATE	0	0	0	0	0	40	71	40	0
PROPARGITE	952,438	1,030,485	1,052,358	980,963	989,265	756,098	795,410	704,529	606,400
PROPOXUR	<1	14	5	9	73	45	39	26	4
PROPYLENE OXIDE	0	0	0	0	<1	0	573	0	0
PROPYZAMIDE	156,678	157,829	155,773	150,791	140,791	144,864	142,194	137,337	145,281
SILICA AEROGEL	<1	1	1	1	5	<1	2	1	0
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	0
THIODICARB	0	0	22,785	176,788	223,154	155,440	83,796	50,604	13,382
VINCLOZOLIN	49,042	49,519	66,672	82,968	67,373	69,067	63,931	43,629	38,567
Grand Total	**4,313,854**	**4,572,436**	**5,423,776**	**5,672,803**	**5,205,071**	**6,780,718**	**5,168,940**	**6,807,391**	**3,639,017**

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 includes both agricultural and reportable non-agricultural applications. The reported cumulative acres treated includes 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
3-IODO-2-PROPYNYL BUTYL CARBAMATE	<1	0	0	<1	0	1	<1	<1	<1
ACEPHATE	331,453	371,862	458,012	355,350	343,840	384,091	307,272	283,284	240,109
ALDICARB	237,382	225,973	354,500	545,117	530,066	534,665	280,755	329,431	297,882
AZINPHOS METHYL	474,748	418,935	406,230	406,099	336,353	193,069	216,624	185,055	159,688
BENDIOCARB	9,740	4,431	1,526	1,674	259	125	108	593	62
BENSULIDE	55,639	64,796	69,271	94,587	129,784	192,136	242,460	217,111	188,854
BUTYLATE	121,979	108,686	67,179	87,612	84,268	69,805	71,071	31,732	27,640
CARBARYL	773,404	820,787	835,811	809,794	753,801	426,893	387,145	364,968	286,414
CARBOFURAN	289,581	278,108	242,999	220,622	183,321	161,588	138,665	132,427	95,863
CHLORPROPHAM	5,448	3,000	3,230	3,015	2,057	2,321	3,102	3,544	3,504
CHLORPYRIFOS	2,246,121	2,887,838	3,385,416	2,687,809	3,152,564	2,355,626	2,257,936	2,093,382	1,673,183
COUMAPHOS	0	0	0	0	0	0	15	152	97
CYCLOATE	51,715	51,035	49,138	44,628	55,459	62,753	49,096	37,408	31,779
DDVP	3,331	4,798	6,063	13,097	13,636	13,998	12,325	12,488	12,787
DEMETON	2,853	1,238	775	411	0	3	5	2	3
DESMEDIPHAM	8,956	8,588	8,465	6,092	6,188	4,737	6,014	6,703	3,750
DIAZINON	1,412,733	1,358,358	1,216,935	1,093,121	955,108	900,596	979,458	1,053,407	996,943
DICROTOPHOS	66	1	113	3	0	11	122	0	2
DIMETHOATE	586,300	671,948	583,498	419,807	515,798	397,847	485,274	397,177	284,107
DISULFOTON	151,010	134,600	95,972	142,372	128,335	105,327	95,919	75,900	51,545
EPTC	698,176	765,576	660,185	703,996	579,245	393,031	448,883	323,254	276,782
ETHEPHON	859,439	848,134	982,776	951,415	882,802	762,217	734,263	734,792	619,821
ETHION	16,521	4,054	79	2	3	906	64	0	5
ETHOPROP	62,143	51,270	51,104	27,955	23,842	27,949	26,196	16,119	19,046
FENAMIPHOS	232,396	178,781	187,242	189,379	156,280	125,459	107,745	104,505	74,858
FENTHION	146	186	413	141	176	29	22	33	61
FONOFOS	55,991	73,167	74,936	67,969	50,555	25,349	24,216	4,370	580
FORMETANATE HYDROCHLORIDE	182,061	152,622	104,012	106,168	97,907	77,723	65,030	43,941	45,625

Table 5A (continued). The reported **pounds** of cholinesterase inhibiting pesticides used.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
MALATHION	708,469	749,317	801,496	673,379	773,782	645,889	678,105	489,650	532,550
METHAMIDOPHOS	330,178	240,959	500,055	260,255	312,067	244,269	116,256	76,865	46,615
METHIDATHION	451,826	367,447	321,605	328,328	309,154	178,451	177,105	98,129	93,055
METHIOCARB	3,686	4,126	2,672	2,120	4,769	5,384	3,314	2,411	2,257
METHOMYL	528,545	707,814	807,977	679,383	833,758	666,442	551,181	550,591	378,302
METHYL PARATHION	154,452	129,155	140,469	130,614	153,187	158,228	157,594	75,169	59,620
MOLINATE	1,518,002	1,496,227	1,377,257	1,356,258	1,170,699	1,006,025	911,376	1,025,786	732,664
NALED	180,642	457,723	700,676	351,267	615,314	260,048	297,895	255,410	259,572
OXAMYL	71,478	73,440	66,179	82,327	119,441	161,042	128,956	137,989	77,103
OXYDEMETON-METHYL	117,416	111,347	120,101	106,612	115,781	89,789	122,912	110,495	99,624
PARATHION	4,665	6,104	13,642	14,050	5,187	5,766	4,041	3,581	2,589
PEBULATE	191,529	235,690	244,181	202,634	184,015	185,696	225,077	160,018	45,619
PHENMEDIPHAM	9,062	8,863	8,771	6,612	6,621	5,836	6,735	7,478	3,942
PHORATE	151,250	159,146	135,887	160,854	139,725	149,707	93,488	87,974	70,645
PHOSALONE	180	99	52	27	33	11	0	4	0
PHOSMET	204,157	189,415	266,349	395,160	566,484	644,898	638,822	583,116	483,685
POTASSIUM DIMETHYL DITHIO CARBAMATE	21	47	0	0	15	24,795	0	0	0
PROFENOFOS	51,239	263,884	245,420	184,264	150,575	40,433	49,575	43,879	22,011
PROPAMOCARB HYDROCHLORIDE	0	0	0	16,341	10,215	57,121	6,285	4,959	2,288
PROPETAMPHOS	23,804	38,307	77,985	23,249	17,338	9,970	6,074	4,500	3,991
PROPOXUR	2,674	2,667	3,296	1,341	1,760	1,604	1,735	2,141	611
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	920,837	892,441	866,726	760,809	626,684	440,382	345,842	396,827	257,062
SODIUM DIMETHYL DITHIO CARBAMATE	0	337	1	0	0	8,279	355	1,315	173
SULFOTEP	1,141	1,000	509	316	355	213	246	215	267
SULPROFOS	236	876	171	0	119	84	0	0	<1
TETRACHLORVINPHOS	8,247	10,051	7,118	7,056	6,044	5,831	3,975	4,850	4,711
THIOBENCARB	252,423	406,085	559,610	618,412	894,287	724,926	732,505	1,007,249	644,625
THIODICARB	<1	0	13,679	122,927	156,002	114,785	60,453	36,844	9,360
TRICHLORFON	5,607	4,275	4,552	3,327	3,843	2,476	2,779	3,992	3,004
Grand Total	**14,761,098**	**16,045,617**	**17,132,318**	**15,466,155**	**16,158,902**	**13,056,633**	**12,262,468**	**11,623,214**	**9,226,936**

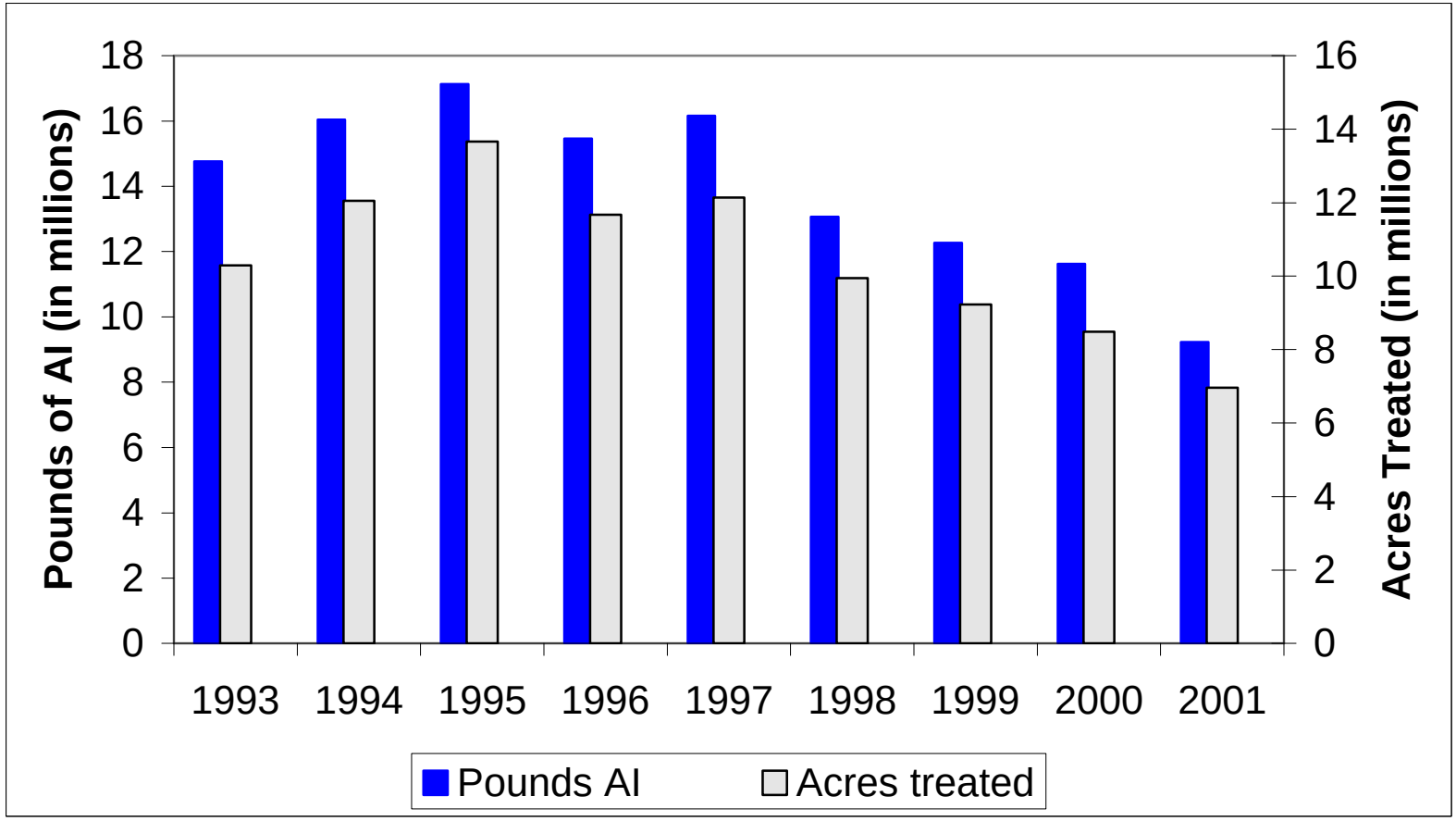
Table 5B. The reported **cumulative acres treated** with cholinesterase-inhibiting pesticides. These pesticides are the currently registered organophosphate and carbamate active ingredients. Use includes primarily agricultural applications. The grand total for acres treated is less than the sum of acres 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
3-IODO-2-PROPYNYL BUTYL CARBAMATE	0	0	0	0	0	150	0	0	40
ACEPHATE	328,012	402,643	489,259	406,607	372,566	403,537	370,111	295,298	266,197
ALDICARB	254,372	256,428	355,717	490,499	442,029	397,890	266,773	314,440	282,453
AZINPHOS METHYL	324,769	293,466	274,347	277,745	233,406	134,334	140,226	118,805	117,484
BENDIOCARB	1,661	1,574	499	188	19	28	11	<1	2
BENSULIDE	15,239	17,446	22,489	31,916	45,795	61,984	80,873	72,866	62,849
BUTYLATE	24,957	23,105	14,864	17,689	17,572	14,259	14,959	6,957	6,270
CARBARYL	285,046	291,147	305,452	312,058	292,721	197,664	216,991	196,264	147,374
CARBOFURAN	397,071	460,647	449,507	364,150	322,064	303,957	272,441	258,441	246,149
CHLORPROPHAM	482	20	0	4	26	106	151	127	112
CHLORPYRIFOS	1,163,147	1,910,520	2,824,142	1,869,874	2,223,551	1,669,859	1,420,414	1,441,819	1,354,772
COUMAPHOS	0	0	0	0	0	0	0	1,339	809
CYCLOATE	21,600	22,571	20,685	19,597	25,986	29,761	24,555	18,487	15,916
DDVP	683	1,888	1,887	1,499	2,596	3,692	2,180	2,336	3,954
DEMETON	5,371	2,490	1,583	1,002	0	18	66	0	56
DESMEDIPHAM	58,486	62,171	71,577	51,183	61,368	56,272	71,977	60,248	34,738
DIAZINON	828,003	878,221	752,898	680,947	530,355	477,804	546,577	478,994	437,609
DICROTOPHOS	0	0	76	9	0	16	11	0	0
DIMETHOATE	1,005,411	1,205,884	1,193,214	955,445	1,097,751	871,305	1,078,024	874,730	639,165
DISULFOTON	127,555	114,949	87,291	147,078	124,319	100,935	86,332	69,018	45,258
EPTC	246,970	273,441	241,587	232,820	208,093	141,511	148,685	107,613	99,953
ETHEPHON	727,925	704,394	806,425	776,247	700,941	653,817	720,773	697,300	631,162
ETHION	6,517	2,093	91	5	2	621	53	0	5
ETHOPROP	7,062	5,767	5,470	3,139	3,213	3,784	3,610	3,477	3,542
FENAMIPHOS	142,914	114,333	112,249	111,729	97,013	72,102	66,100	60,340	36,999
FENTHION	0	0	0	0	0	0	0	0	0
FONOFOS	50,046	58,852	59,041	55,207	36,123	16,926	14,146	2,325	497
FORMETANATE HYDROCHLORIDE	170,117	141,203	100,837	103,521	95,544	77,965	63,047	42,880	45,234

Table 5B (continued). The reported **cumulative acres treated** with cholinesterase-inhibiting pesticides.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
MALATHION	357,210	401,037	425,062	363,635	410,658	383,121	403,646	323,737	290,618
METHAMIDOPHOS	284,160	199,314	418,703	313,618	263,816	290,061	158,079	101,494	63,046
METHIDATHION	315,398	255,006	231,930	245,914	200,528	129,358	115,249	71,992	64,785
METHIOCARB	4,853	3,394	2,129	1,511	2,906	3,523	2,369	2,700	1,864
METHOMYL	932,435	1,215,586	1,425,295	1,145,115	1,376,868	1,118,188	880,910	893,424	627,220
METHYL PARATHION	171,353	137,691	129,976	125,729	125,638	128,675	119,315	43,773	39,449
MOLINATE	388,852	384,031	348,465	357,239	317,680	267,090	246,084	276,315	190,293
NALED	167,034	473,011	702,155	338,861	604,615	251,044	279,898	244,617	234,119
OXAMYL	106,553	115,085	106,205	122,353	176,793	225,380	177,183	179,048	100,264
OXYDEMETON-METHYL	235,013	226,433	253,868	220,824	244,056	186,964	253,281	225,984	200,136
PARATHION	2,459	3,404	6,688	5,099	2,071	2,592	1,976	4,025	2,977
PEBULATE	65,788	76,688	86,494	74,647	69,381	64,501	74,697	51,205	15,122
PHENMEDIPHAM	58,343	62,694	72,060	52,125	62,449	58,649	73,905	61,975	35,215
PHORATE	125,357	133,392	111,217	123,789	106,427	109,759	81,724	71,407	63,160
PHOSALONE	108	47	56	18	64	5	0	10	0
PHOSMET	150,436	136,500	172,539	214,416	236,611	312,707	253,234	219,707	189,363
POTASSIUM DIMETHYL DITHIO CARBAMATE	0	6	0	0	0	0	0	0	0
PROFENOFOS	62,345	336,830	296,860	211,769	162,204	44,641	46,250	46,617	23,700
PROPAMOCARB HYDROCHLORIDE	0	0	0	23,793	14,677	81,050	6,851	17,696	2,625
PROPETAMPHOS	0	0	0	0	0	0	0	0	0
PROPOXUR	<1	14	5	9	73	45	39	26	4
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	652,163	615,978	604,586	531,052	437,505	305,306	245,470	282,844	187,153
SODIUM DIMETHYL DITHIO CARBAMATE	0	0	0	0	0	253	20	0	60
SULFOTEP	1,191	884	537	408	251	241	224	168	314
SULPROFOS	1,273	896	299	0	83	80	0	0	0
TETRACHLORVINPHOS	553	780	519	674	356	3,109	1,543	575	232
THIOBENCARB	65,612	91,906	126,745	159,121	227,658	187,295	186,341	252,506	169,056
THIODICARB	0	0	22,785	176,788	223,154	155,440	83,796	50,604	13,382
TRICHLORFON	2,444	818	1,037	204	149	1,071	97	70	51
Grand Total	**10,285,306**	**12,051,166**	**13,664,563**	**11,666,708**	**12,137,558**	**9,940,972**	**9,227,717**	**8,484,527**	**6,957,638**

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



USE TRENDS OF PESTICIDES ON DPR'S GROUNDWATER PROTECTION LIST

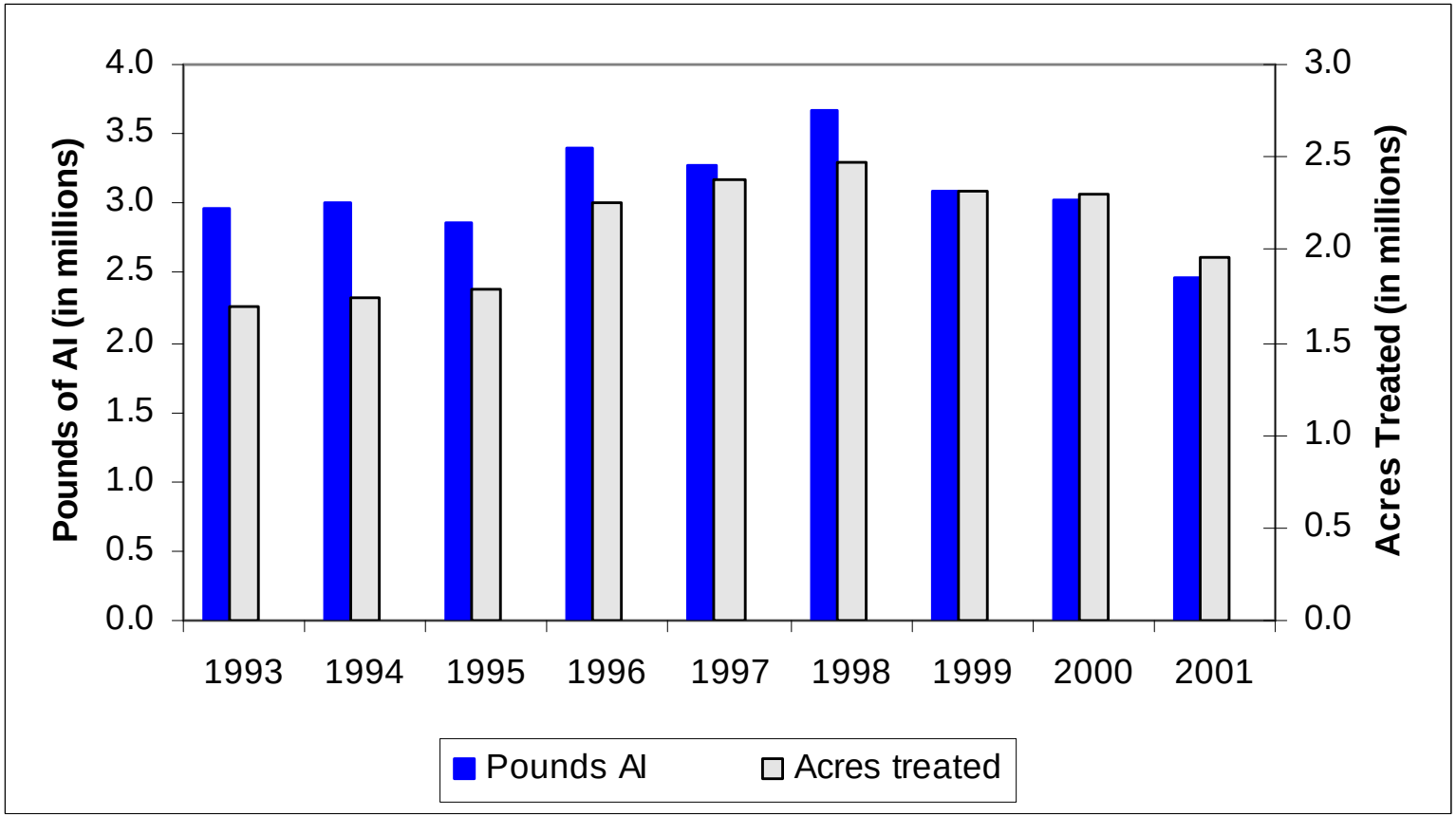
Table 6A. The reported **pounds** of pesticides on DPR's groundwater protection list. These pesticides are the currently registered active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6800(a). Use includes both agricultural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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
ALACHLOR	44,957	42,854	41,119	45,733	51,259	46,264	29,789	36,468	29,431
ALDICARB	237,382	225,973	354,500	545,117	530,066	534,665	280,755	329,431	297,882
ATRAZINE	44,485	46,497	36,078	57,018	46,568	54,840	69,549	55,284	62,872
ATRAZINE, OTHER RELATED	2,365	2,480	1,932	3,062	2,502	2,943	3,706	2,952	1,321
BENTAZON, SODIUM SALT	1,017	1,175	655	1,518	1,907	1,757	1,837	1,210	275
BROMACIL	117,128	104,052	95,444	98,293	82,424	84,645	75,613	67,753	55,857
BROMACIL, LITHIUM SALT	7,045	11,085	6,517	17,381	9,141	4,686	4,162	4,478	3,217
DIURON	1,074,854	1,234,507	1,054,409	1,265,426	1,228,114	1,504,268	1,188,640	1,343,727	1,104,771
HEXAZINONE	138,913	136,991	92,819	137,536	129,259	114,073	93,669	83,994	99,302
METOLACHLOR	165,457	160,638	182,519	186,093	212,714	260,231	350,295	145,305	24,800
NORFLURAZON	164,451	154,383	153,138	196,142	212,621	265,886	286,214	257,651	209,807
PROMETON	41	84	117	68	20	22	4	28	2
SIMAZINE	957,812	890,353	837,366	839,209	764,586	794,758	696,574	700,588	586,223
Grand Total	**2,955,907**	**3,011,072**	**2,856,612**	**3,392,594**	**3,271,179**	**3,669,038**	**3,080,806**	**3,028,869**	**2,475,759**

Table 6B. The reported **cumulative acres treated** in California with 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). 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
ALACHLOR	17,637	16,135	15,359	18,181	19,059	16,430	11,008	13,302	11,453
ALDICARB	254,372	256,428	355,717	490,499	442,029	397,890	266,773	314,440	282,453
ATRAZINE	23,617	32,065	22,234	32,043	27,257	37,556	39,881	34,524	33,376
ATRAZINE, OTHER RELATED	23,617	32,065	22,234	32,042	27,257	37,529	39,876	34,524	33,376
BENTAZON, SODIUM SALT	1,107	1,688	805	1,460	2,010	1,904	1,968	1,502	432
BROMACIL	78,423	65,421	66,289	62,206	58,722	57,136	53,861	42,458	30,149
BROMACIL, LITHIUM SALT	0	0	0	0	0	40	40	30	0
DIURON	414,892	454,829	507,279	685,352	819,993	865,246	849,482	864,334	786,708
HEXAZINONE	154,114	172,211	98,108	161,991	161,865	165,647	155,621	144,798	127,896
METOLACHLOR	66,238	73,410	78,661	83,519	96,798	123,463	166,908	71,423	12,915
NORFLURAZON	142,274	139,498	133,585	179,015	186,991	214,144	217,178	230,836	192,141
PROMETON	11	8	23	27	8	85	18	51	0
SIMAZINE	615,003	589,560	573,735	607,228	613,237	647,072	611,626	619,639	514,155
Grand Total	**1,690,665**	**1,736,961**	**1,786,329**	**2,260,126**	**2,370,987**	**2,472,909**	**2,322,204**	**2,301,946**	**1,964,001**

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 includes both agricultural and reportable non-agricultural applications. The reported cumulative acres treated includes primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.



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

Table 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1,3-DICHLOROPROPENE	47,694	2,122	409,821	1,956,846	2,400,930	2,911,385	3,122,723	4,442,193	4,022,195
2,4-D	26,462	27,544	23,995	22,089	10,227	3,868	3,060	2,065	1,787
2,4-D, 2-ETHYLHEXYL ESTER	12	71	278	10	1,313	13,750	72,225	12,557	13,706
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	35,378	28,863	30,642	27,954	25,684	29,061	15,992	5,654	674
2,4-D, BUTOXYETHANOL ESTER	47,601	67,414	31,743	38,567	13,263	12,140	5,628	6,107	5,336
2,4-D, BUTOXYPROPYL ESTER	1,921	1,166	224	61	13	569	5	4	3
2,4-D, BUTYL ESTER	0	1	39	0	0	2,169	8	0	<1
2,4-D, DIETHANOLAMINE SALT	1,572	714	1,938	3,003	24,809	14,965	5,843	13,002	6,652
2,4-D, DIMETHYLAMINE SALT	350,293	399,046	454,658	468,771	428,874	422,673	355,318	426,211	398,568
2,4-D, DODECYLAMINE SALT	0	5	16	8	58	75	730	0	257
2,4-D, HEPTYLAMINE SALT	0	0	86	<1	0	0	46	0	0
2,4-D, ISOOCTYL ESTER	2,659	1,212	13,466	7,822	60,356	46,603	17,387	6,914	15,822
2,4-D, ISOPROPYL ESTER	4,540	4,508	5,077	5,090	6,543	7,510	6,879	8,260	6,618
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	670	672	37	35	0	3	7	11	0
2,4-D, OCTYL ESTER	0	0	15	0	0	0	0	0	0
2,4-D, PROPYL ESTER	2,515	2,326	2,032	1,774	1,575	999	1,822	783	391
2,4-D, TETRADECYLAMINE SALT	0	1	4	2	13	17	170	0	60
2,4-D, TRIETHYLAMINE SALT	107,782	121,241	105,656	93,876	34,610	5,688	2,344	1,038	634
2,4-D, TRIISOPROPYLAMINE SALT	10	24	6	2	3	5	6	0	5
ACROLEIN	298,535	336,993	362,773	322,578	341,245	264,207	328,238	290,180	233,928
ARSENIC ACID	13,014	27,571	37,206	53,777	59,835	52,558	48,029	11,906	12,023
ARSENIC PENTOXIDE	150,200	86,445	83,814	205,089	64,372	50,899	245,238	91,267	259,386
ARSENIC TRIOXIDE	<1	<1	<1	<1	<1	1	1	<1	<1
CAPTAN	483,507	608,658	734,314	918,588	799,878	1,559,136	965,922	642,755	398,829
CAPTAN, OTHER RELATED	12,093	14,890	17,831	21,729	19,448	54,940	22,216	14,617	9,007
CARBARYL	773,404	820,787	835,811	809,794	753,801	426,893	387,145	364,968	286,414
CHLORINE	466,825	750,653	2,815,119	330,017	423,469	422,252	628,546	678,417	297,086
CHROMIC ACID	209,555	120,822	117,092	286,521	89,931	71,109	343,543	128,642	363,205

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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
DDVP	3,331	4,798	6,063	13,097	13,636	13,998	12,325	12,488	12,787
ETHYLENE OXIDE	1,471	3	0	0	0	31	2	6	3
FORMALDEHYDE	13,322	11,864	153,519	334,548	403,824	305,297	111,714	55,300	28,612
HYDROGEN CHLORIDE	32	206	224	1,938	129	762	11,067	3,316	4,276
LINDANE	9,715	5,281	4,507	4,576	5,388	6,293	4,842	4,738	2,388
MANCOZEB	446,086	464,924	659,240	567,866	526,364	987,270	630,968	611,197	430,354
MANEB	625,326	912,903	1,257,122	1,328,318	1,081,124	1,596,876	1,045,567	1,203,322	816,676
META-CRESOL	5	2	2	3	6	8	11	14	1
METHANOL	1,920	100	27	0	0	0	3	<1	0
METHOXYCHLOR	1,412	692	1,049	484	358	566	16	26	41
METHOXYCHLOR, OTHER RELATED	52	90	139	62	44	11	<1	0	<1
METHYL BROMIDE	14,115,900	16,607,324	17,165,964	16,022,069	15,663,832	13,569,875	15,300,388	10,862,836	6,615,844
METHYL PARATHION	154,452	129,155	140,469	130,614	153,187	158,228	157,594	75,169	59,620
NAPHTHALENE	1	1	<1	0	1	333	<1	0	0
PARA-DICHLOROBENZENE	37	3	2	4	3	219	86	4	11
PARATHION	4,665	6,104	13,642	14,050	5,187	5,766	4,041	3,581	2,589
PCNB	87,672	91,601	109,755	83,087	89,548	88,036	67,424	62,224	50,248
PCP, OTHER RELATED	10,596	5	<1	<1	1	2	11	54	2
PCP, SODIUM SALT	2,361	0	0	0	0	2	0	0	<1
PCP, SODIUM SALT, OTHER RELATED	329	0	0	0	0	0	0	0	0
PENTACHLOROPHENOL	91,123	40	3	3	8	33	92	466	14
PHOSPHORUS	132	29	34	58	14	12	9	22	3
POTASSIUM PERMANGANATE	0	0	0	0	0	243	0	0	0
PROPOXUR	2,674	2,667	3,296	1,341	1,760	1,604	1,735	2,141	611
PROPYLENE OXIDE	34,764	41,815	131,593	224,495	198,559	198,595	172,556	118,381	99,727
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	920,837	892,441	866,726	760,809	626,684	440,382	345,842	396,827	257,062
SODIUM CYANIDE	1,597	1,754	1,347	1,338	2,197	3,280	1,098	2,178	2,437
SODIUM DICHROMATE	0	0	0	180,478	182,185	122,647	32,699	122	329
TRIFLURALIN	1,193,363	1,261,342	1,380,785	1,143,695	1,191,780	1,219,810	1,260,536	1,158,293	927,398
XYLENE	45,125	29,001	17,944	12,619	8,511	5,366	4,847	4,292	9,544
Grand Total	**20,804,542**	**23,887,897**	**27,997,144**	**26,399,557**	**25,714,580**	**25,099,021**	**25,744,544**	**21,724,546**	**15,653,163**

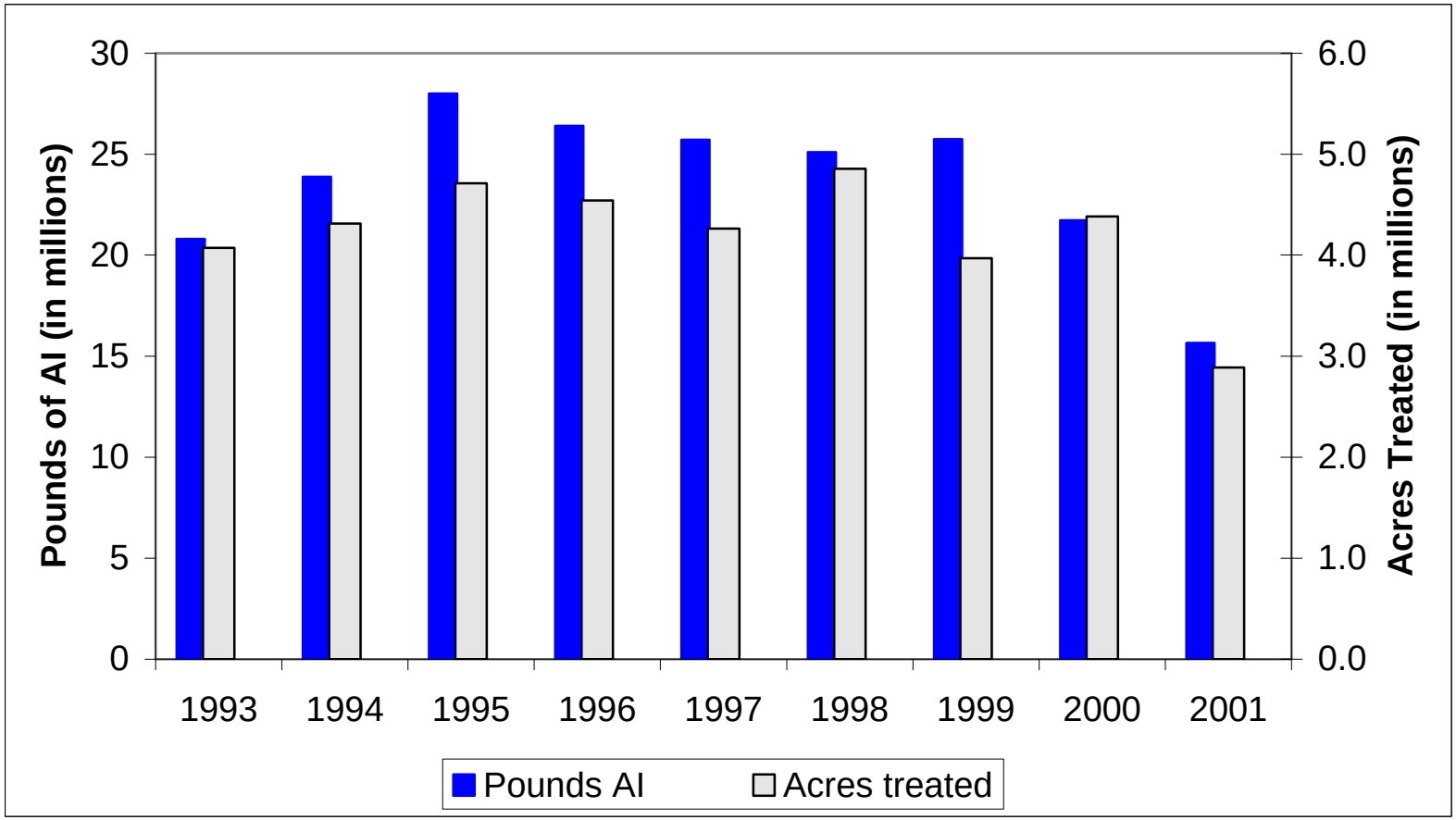
Table 7B. The reported **cumulative acres treated** in California with pesticides on DPR's toxic air contaminants list. These pesticides are the currently registered active ingredients listed in the California Code of Regulations, Title 3, Division 6, Chapter 4, Subchapter 1, Article 1, Section 6860. 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1,3-DICHLOROPROPENE	823	33	4,174	17,223	22,193	27,059	29,430	33,101	30,313
2,4-D	156,294	156,563	151,453	137,230	50,709	11,649	7,791	5,054	3,952
2,4-D, 2-ETHYLHEXYL ESTER	80	65	385	160	729	6,867	7,624	7,833	6,919
2,4-D, ALKANOLAMINE SALTS (ETHANOL AND ISOPROPANOL AMINES)	33,132	26,138	22,298	21,872	20,055	22,117	11,843	5,711	359
2,4-D, BUTOXYETHANOL ESTER	35,573	46,343	29,933	35,599	13,504	13,798	7,198	7,013	5,633
2,4-D, BUTOXYPROPYL ESTER	63	100	5	2	51	105	37	5	9
2,4-D, BUTYL ESTER	0	0	0	0	0	307	37	24	1
2,4-D, DIETHANOLAMINE SALT	1,710	933	4,683	8,721	88,149	58,239	23,884	49,357	27,666
2,4-D, DIMETHYLAMINE SALT	388,083	474,599	524,146	540,728	527,870	477,967	411,858	495,513	475,317
2,4-D, DODECYLAMINE SALT	0	0	0	0	76	82	1,481	0	262
2,4-D, HEPTYLAMINE SALT	0	0	18	<1	0	0	29	0	0
2,4-D, ISOOCTYL ESTER	220	379	3,497	5,163	35,045	29,179	14,449	3,970	16,375
2,4-D, ISOPROPYL ESTER	61,243	63,244	72,878	69,081	87,492	101,141	100,837	103,938	88,849
2,4-D, N-OLEYL-1,3-PROPYLENEDIAMINE SALT	1,475	449	36	26	0	2	3	0	0
2,4-D, OCTYL ESTER	0	0	0	0	0	0	0	0	0
2,4-D, PROPYL ESTER	33,904	28,812	22,655	23,846	21,479	14,356	15,542	11,278	5,200
2,4-D, TETRADECYLAMINE SALT	0	0	0	0	76	82	1,481	0	262
2,4-D, TRIETHYLAMINE SALT	149,513	152,474	146,454	131,679	46,600	7,381	2,638	1,311	1,257
2,4-D, TRIISOPROPYLAMINE SALT	0	0	0	0	0	0	0	0	0
ACROLEIN	243	888	3,190	2,462	1,514	292	3,981	873	1,409
ARSENIC ACID	0	0	0	0	0	0	0	0	0
ARSENIC PENTOXIDE	0	660	0	0	0	0	0	709,893	56
ARSENIC TRIOXIDE	0	0	0	0	0	0	0	0	0
CAPTAN	212,563	244,164	295,860	381,989	347,631	602,684	404,731	309,768	215,723
CAPTAN, OTHER RELATED	210,620	244,097	295,831	381,989	347,235	602,585	404,511	309,116	215,712
CARBARYL	285,046	291,147	305,452	312,058	292,721	197,664	216,991	196,264	147,374
CHLORINE	4	0	290	0	1,005	1,329	46,611	37,220	95
CHROMIC ACID	0	660	0	0	0	0	0	709,893	56

Table 7B (continued). The reported **cumulative acres treated** in California with pesticides on the toxic air contaminants list.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
DDVP	683	1,888	1,887	1,499	2,596	3,692	2,180	2,336	3,954
ETHYLENE OXIDE	0	0	0	0	0	194	31	41	0
FORMALDEHYDE	132	15	137	234	12	126	123	47	53
HYDROGEN CHLORIDE	0	1	0	1	0	16	0	0	27
LINDANE	26,921	22,984	19,380	25,352	36,573	32,650	20,930	14,628	13,832
MANCOZEB	262,758	273,836	405,494	351,801	284,134	682,979	387,300	363,260	228,243
MANEB	373,116	512,009	652,122	731,079	624,123	942,083	629,897	611,717	534,925
META-CRESOL	1,585	930	1,279	1,309	3,488	1,407	657	3,142	517
METHANOL	5	0	0	0	0	0	0	14	0
METHOXYCHLOR	233	220	30	19	131	194	140	197	88
METHOXYCHLOR, OTHER RELATED	1	70	5	9	52	5	0	0	0
METHYL BROMIDE	89,220	106,694	107,933	96,507	103,068	90,107	102,125	75,741	60,839
METHYL PARATHION	171,353	137,691	129,976	125,729	125,638	128,675	119,315	43,773	39,449
NAPHTHALENE	0	0	0	0	0	0	0	0	0
PARA-DICHLOROBENZENE	<1	0	0	0	0	10	0	0	0
PARATHION	2,459	3,404	6,688	5,099	2,071	2,592	1,976	4,025	2,977
PCNB	61,114	55,371	53,079	44,187	29,169	39,090	28,324	28,628	25,831
PCP, OTHER RELATED	0	2	<1	15	4	15	0	59	38
PCP, SODIUM SALT	0	0	0	0	0	20	0	0	0
PCP, SODIUM SALT, OTHER RELATED	0	0	0	0	0	0	0	0	0
PENTACHLOROPHENOL	0	2	<1	15	4	190	0	59	38
PHOSPHORUS	7,751	3,435	1,908	69	790	965	5,701	2,847	252
POTASSIUM PERMANGANATE	0	0	0	0	0	20	0	0	0
PROPOXUR	<1	14	5	9	73	45	39	26	4
PROPYLENE OXIDE	0	0	0	0	<1	0	573	0	0
S,S,S-TRIBUTYL PHOSPHOROTRITHIOATE	652,163	615,978	604,586	531,052	437,505	305,306	245,470	282,844	187,153
SODIUM CYANIDE	0	82,520	6,040	3,020	84,800	53,285	0	0	0
SODIUM DICHROMATE	0	0	0	0	0	0	0	0	0
TRIFLURALIN	1,195,142	1,160,072	1,282,997	1,086,892	1,131,033	1,083,219	1,159,648	1,038,856	800,821
XYLENE	48,402	28,673	28,870	24,221	13,568	11,327	3,325	6,208	9,665
Grand Total	**4,075,141**	**4,314,920**	**4,712,133**	**4,543,850**	**4,263,180**	**4,856,462**	**3,969,270**	**4,385,803**	**2,888,534**

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 includes both agricultural and reportable non-agricultural applications. The reported cumulative acres treated includes primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.



Use Trends of Oil Pesticides

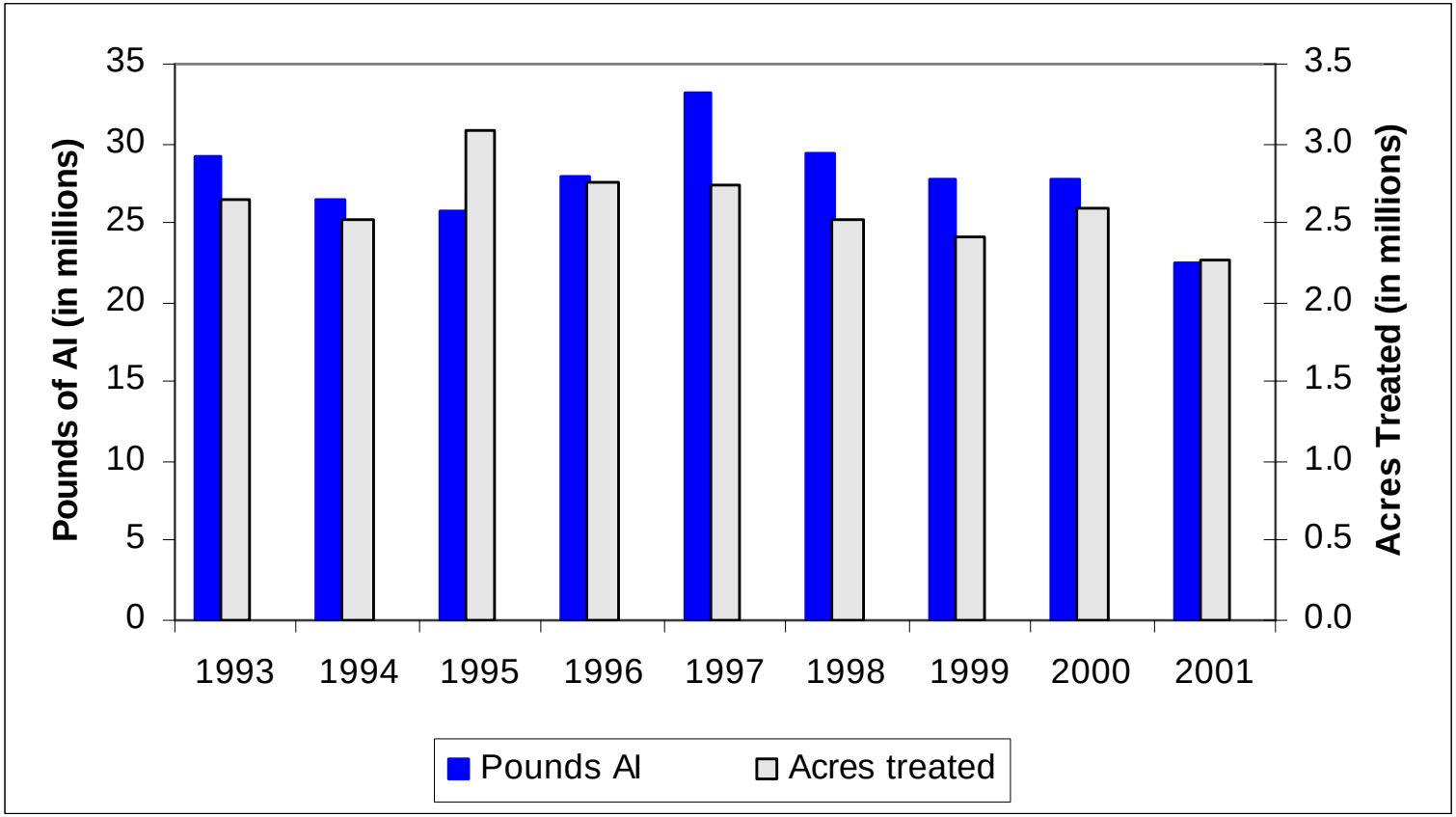
Table 8A. The reported **pounds** of oil pesticides. As a broad group, oil pesticides and other petroleum distillates are on U.S. EPA's list of B2 carcinogens or the State's Proposition 65 list of chemicals "known to cause cancer." However, these classifications do not distinguish among oil pesticides 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
COAL TAR HYDROCARBONS	0	0	0	0	0	0	0	0	50
ISOPARAFFINIC HYDROCARBONS	12	8	10	5	2	35	8	13	1
KEROSENE	153,411	152,200	145,743	120,700	101,293	90,108	70,398	84,552	48,295
MINERAL OIL	2,709,864	3,444,484	3,350,535	4,797,876	5,542,530	5,286,094	4,418,280	3,898,819	3,603,445
NAPHTHA, HEAVY AROMATIC	56	27	26	143	83	0	0	0	29
PETROLEUM DERIVATIVE RESIN	1,117	551	4	94	15	6	1	3	1
PETROLEUM DISTILLATES	3,200,539	2,279,777	2,459,518	1,711,402	1,798,960	1,612,875	2,419,417	2,306,453	1,741,593
PETROLEUM DISTILLATES, ALIPHATIC	0	0	0	0	0	0	0	<1	7
PETROLEUM DISTILLATES, AROMATIC	81,286	64,526	31,535	14,630	13,961	35,085	9,925	10,400	2,472
PETROLEUM DISTILLATES, REFINED	21,107	63,524	45,967	38,396	45,094	60,337	114,329	927,949	842,733
PETROLEUM HYDROCARBONS	834,097	367,133	658,774	857,846	788,309	514,308	399,129	395,846	498,760
PETROLEUM NAPHTHENIC OILS	28	320	0	12	1	9	2	3	91
PETROLEUM OIL, PARAFFIN BASED	446,829	440,464	434,878	312,359	267,704	0	310,988	344,350	342,100
PETROLEUM OIL, UNCLASSIFIED	21,756,717	19,674,078	18,687,636	20,063,955	24,633,153	21,723,758	20,084,263	19,750,914	15,414,858
PETROLEUM SULFONATES	1	1	<1	4	1	<1	<1	1	<1
Grand Total	**29,205,063**	**26,487,094**	**25,814,626**	**27,917,420**	**33,191,107**	**29,322,615**	**27,826,740**	**27,719,301**	**22,494,436**

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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
COAL TAR HYDROCARBONS	0	0	0	0	0	0	0	0	0
ISOPARAFFINIC HYDROCARBONS	0	<1	0	0	0	0	0	0	0
KEROSENE	264,450	284,864	333,112	289,469	240,080	223,822	179,961	227,734	138,896
MINERAL OIL	84,845	130,688	144,413	190,550	191,954	615,564	163,976	157,520	169,050
NAPHTHA, HEAVY AROMATIC	0	0	0	0	0	0	0	0	11
PETROLEUM DERIVATIVE RESIN	2,089	1,321	3	191	50	13	1	0	0
PETROLEUM DISTILLATES	304,055	340,671	440,375	378,714	308,206	279,400	229,371	286,348	218,834
PETROLEUM DISTILLATES, ALIPHATIC	0	0	0	0	0	0	0	0	5,104
PETROLEUM DISTILLATES, AROMATIC	73,592	66,414	53,211	12,324	19,003	2,153	7,088	6,238	1,865
PETROLEUM DISTILLATES, REFINED	1,809	4,173	3,976	5,145	6,146	6,162	12,495	42,145	48,446
PETROLEUM HYDROCARBONS	525,361	429,456	724,415	759,453	714,126	640,560	579,964	598,157	609,076
PETROLEUM NAPHTHENIC OILS	12	540	0	73	0	50	37	0	5,119
PETROLEUM OIL, PARAFFIN BASED	756,399	664,715	680,590	464,508	443,059	0	470,204	461,939	445,313
PETROLEUM OIL, UNCLASSIFIED	631,281	603,690	703,859	663,575	811,902	753,904	775,828	817,752	631,079
PETROLEUM SULFONATES	0	0	<1	<1	<1	0	<1	10	0
Grand Total	**2,643,705**	**2,525,982**	**3,083,794**	**2,763,830**	**2,734,441**	**2,521,578**	**2,418,828**	**2,597,820**	**2,261,716**

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 includes both agricultural and reportable non-agricultural applications. The reported cumulative acres treated includes primarily agricultural applications. Data are from the Department of Pesticide Regulation's Pesticide Use Reports.



Use Trends of Reduced-Risk Pesticides

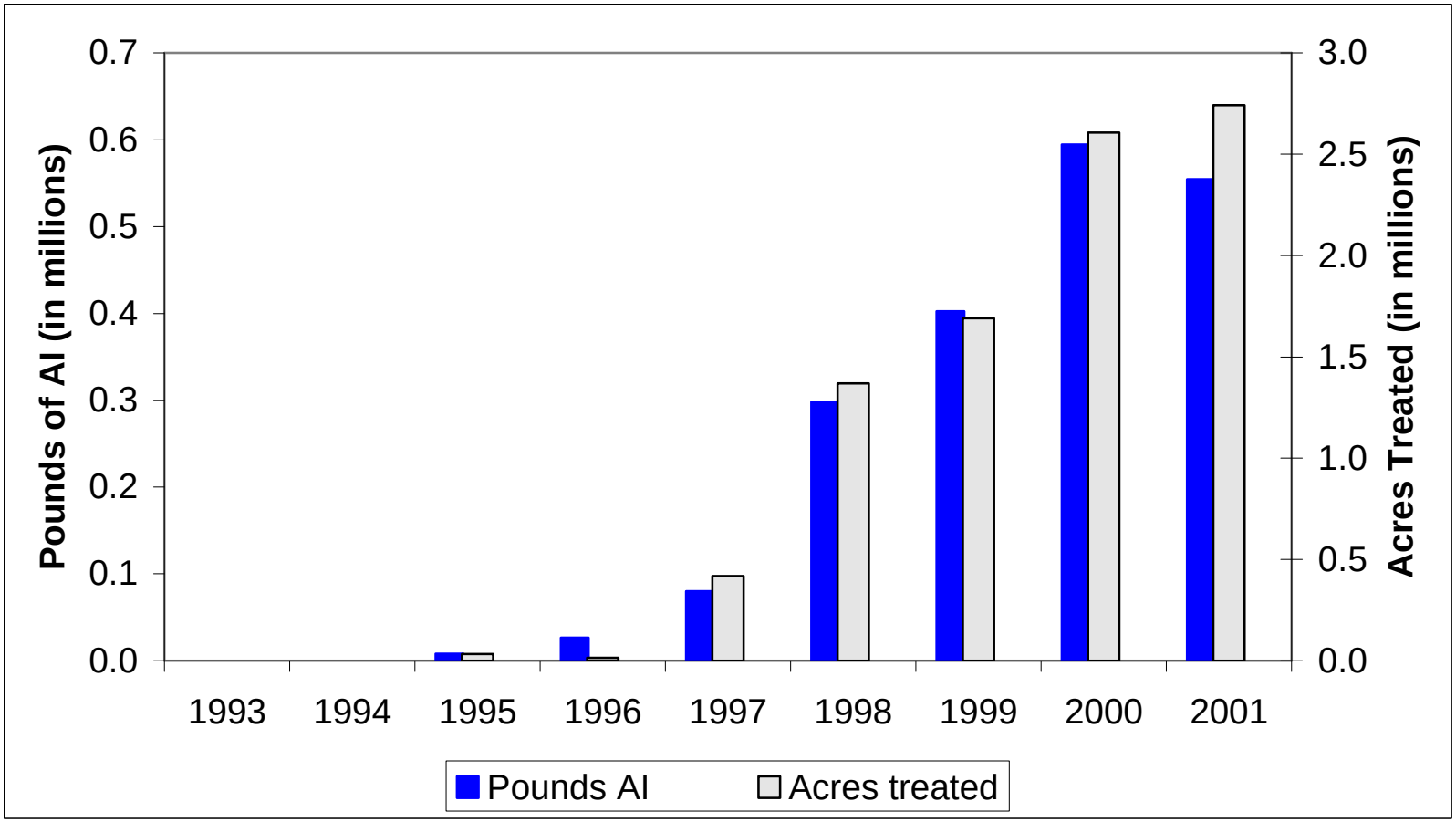
Table 9A. The reported **pounds** of reduced-risk pesticides applied in California. These active ingredients are contained in pesticide products that have been given reduced-risk status by U.S. EPA. Use includes both agricultural and non-agricultural applications. Zero values in early years likely indicate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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1-METHYLCYCLOPROPENE	0	0	0	0	0	0	0	0	<1
ACIBENZOLAR-S-METHYL	0	0	0	0	0	0	0	0	219
AZOXYSTROBIN	0	0	0	0	23,851	69,232	95,723	114,968	85,559
BIFENAZATE	0	0	0	0	0	0	0	92	520
BUPROFEZIN	0	0	0	0	6,987	8,459	22,244	678	3,439
CARBO METHOXY ETHER CELLULOSE, SODIUM SALT	0	92	184	22,994	1,032	723	638	436	543
CINNAMALDEHYDE	0	0	0	0	<1	<1	6,764	10,332	4,703
CORN GLUTEN MEAL	0	0	0	0	0	0	2,490	4,590	2,744
CYPRODINIL	0	0	0	0	0	48,417	56,268	98,773	81,201
FENHEXAMID	0	0	0	0	0	0	12,386	36,240	39,464
FIPRONIL	0	0	0	0	<1	1	2	662	7,849
FLUDIOXONIL	0	0	0	0	0	551	349	568	965
FORCHLORFENURON	0	0	0	0	0	0	0	0	43
HEXAFLUMURON	0	0	<1	<1	<1	2	8	8	12
INDOXACARB	0	0	0	0	0	0	0	3,535	29,011
IRON PHOSPHATE	0	0	0	0	0	66	187	340	617
MEFENOXAM	0	0	0	43	29,078	59,960	55,942	60,266	49,874
METHYL ANTHRANILATE	0	0	0	6	184	49	57	50	36
OIL OF PEPPERMINT	0	0	0	0	0	0	0	0	<1
OXYPURINOL	0	0	0	0	0	0	0	<1	<1
POTASSIUM BICARBONATE	0	0	0	0	28	65,909	92,990	130,462	121,787
PROHEXADIONE CALCIUM	0	0	0	0	0	0	0	0	46
PYMETROZINE	0	0	0	0	0	0	18	829	1,284
PYRIPROXYFEN	0	0	0	0	3,220	6,072	3,096	14,040	7,663
SODIUM BICARBONATE	29	0	0	0	0	0	5	22	230
SPINOSAD	0	0	0	0	10,146	29,717	44,573	55,442	51,040
TEBUFENOZIDE	0	0	7,955	3,463	5,300	9,178	8,815	62,310	65,717
XANTHINE	0	0	0	0	0	0	0	<1	<1
Grand Total	**29**	**92**	**8,138**	**26,506**	**79,825**	**298,337**	**402,554**	**594,641**	**554,566**

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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
1-METHYLCYCLOPROPENE	0	0	0	0	0	0	0	0	3
ACIBENZOLAR-S-METHYL	0	0	0	0	0	0	0	0	7,897
AZOXYSTROBIN	0	0	0	0	28,421	340,507	449,776	581,810	443,842
BIFENAZATE	0	0	0	0	0	0	0	249	2,170
BUPROFEZIN	0	0	0	0	18,623	8,382	15,801	1,966	10,012
CARBO METHOXY ETHER CELLULOSE, SODIUM SALT	0	61	113	235	328	83	77	197	484
CINNAMALDEHYDE	0	0	0	0	<1	<1	2,418	4,136	1,533
CORN GLUTEN MEAL	0	0	0	0	0	0	0	0	7
CYPRODINIL	0	0	0	0	0	122,772	186,536	314,850	282,706
FENHEXAMID	0	0	0	0	0	0	18,455	57,100	69,907
FIPRONIL	0	0	0	0	0	0	0	0	1
FLUDIOXONIL	0	0	0	0	0	0	1,102	343	431
FORCHLORFENURON	0	0	0	0	0	0	0	0	786
HEXAFLUMURON	0	0	0	0	0	0	0	0	1
INDOXACARB	0	0	0	0	0	0	0	33,833	390,524
IRON PHOSPHATE	0	0	0	0	0	205	470	852	1,036
MEFENOXAM	0	0	0	40	153,858	360,994	335,708	406,191	272,665
METHYL ANTHRANILATE	0	0	0	0	0	0	0	0	0
OIL OF PEPPERMINT	0	0	0	0	0	0	0	0	0
OXYPURINOL	0	0	0	0	0	0	0	0	0
POTASSIUM BICARBONATE	0	0	0	0	11	34,010	52,110	60,330	52,647
PROHEXADIONE CALCIUM	0	0	0	0	0	0	0	0	156
PYMETROZINE	0	0	0	0	0	0	98	4,520	10,421
PYRIPROXYFEN	0	0	0	0	60,164	64,648	35,307	72,934	100,297
SODIUM BICARBONATE	0	0	0	0	0	0	8	0	0
SPINOSAD	0	0	0	0	128,313	384,192	541,190	680,424	694,264
TEBUFENOZIDE	0	0	32,418	14,449	28,620	53,705	52,379	387,464	399,891
XANTHINE	0	0	0	0	0	0	0	0	0
Grand Total	**0**	**61**	**32,531**	**14,724**	**418,337**	**1,369,499**	**1,691,436**	**2,607,197**	**2,741,558**

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 includes both agricultural and reportable non-agricultural applications. The reported cumulative acres treated includes 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
(E)-4-TRIDECEN-1-YL-ACETATE	13	3	12	140	76	65	67	252	182
(E)-5-DECENOL	0	0	12	71	737	176	246	5	2
(E)-5-DECENYL ACETATE	0	0	58	339	3,508	844	1,183	26	9
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	<1	0	0	<1	0	<1	0
(Z)-4-TRIDECEN-1-YL-ACETATE	4	<1	<1	4	2	2	2	8	6
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	16	3	29	2	1	46	229	3	13
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	1	3	2	2	1	46	242	3	<1
1-DECANOL	4	1	1	1	<1	<1	<1	<1	<1
AGROBACTERIUM RADIOBACTER	2	4	6	14	28	20	7	2	1
AMPELOMYCES QUISQUALIS	0	0	<1	3	9	40	4	4	2
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	0	0	0	0	1,298	4,886	2,274	2,746	7,939
BACILLUS SUBTILIS GB03	0	0	0	0	<1	<1	<1	<1	1
BACILLUS THURINGIENSIS (BERLINER)	1,071	476	1,562	536	179	751	115	112	335
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	711	1,936	5,115	6,520	7,406	4,273	3,017	4,419	3,932
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	802	4,935	8,050	10,145	14,210	10,854	10,427	9,065	5,536
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	9,236	4,619	6,827	4,059	4,423	12,963	5,038	88,039	24,793
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	0	0	0	0	0	0	0	1,562	1,510
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	32,834	39,667	39,550	25,890	29,825	20,535	14,154	13,114	30,158
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	0	2,714	3,391	3,056	1,448	4,548	1,360	1,574	611
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	8,291	7,042	7,466	3,468	2,752	1,633	213	139	58
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	7,865	6,416	8,643	8,689	11,676	9,603	8,730	9,928	12,573
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	44	10	1	3	26	8	34	18	8
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	0	0	0	0	0	6	1	33	79
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	0	0	0	257	15,619	12,522	12,831	16,679	8,749
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	0	0	0	0	0	0	0	<1	<1
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	0	0	0	0	0	0	0	6,482	14,733
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	0	0	0	0	0	0	3	158	494
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	0	0	0	<1	57	20,771	21,652	21,081	16,917
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	0	0	0	3,663	29,895	12,634	8,048	7,123	2,211

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

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
BEAUVERIA BASSIANA STRAIN GHA	0	0	0	1	573	1,243	914	913	678
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	305	103	55	0	0
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	0	0	0	3,196	13,792	55,005	94,569	110,012	82,400
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1
DIHYDRO-5-PENTYL-2(3H)-FURANONE	<1	<1	<1	<1	<1	<1	<1	<1	<1
E,E-8,10-DODECADIEN-1-OL	98	214	1,067	253	431	220	21,029	6,278	6,390
E-11-TETRADECEN-1-YL ACETATE	0	0	0	0	3	2	548	397	64
E-8-DODECENYL ACETATE	7	25	38	27	46	57	66	92	73
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	7,959	14,341	14,535	30,809	43,815	35,129	28,435	17,904	6,482
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	2	0	7	13	0	34	1	6	1
GLIOCLADIUM VIRENS GL-21 (SPORES)	0	0	15	144	156	104	86	58	314
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	0	87	151	<1	134	859	499	0	1
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	0	1	1	<1	3	37	15	18	15
METHYL ANTHRANILATE	0	0	0	6	184	49	57	50	36
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAIN AARC-0255	0	0	0	0	1,097	8,496	18,824	20,846	45,425
NOSEMA LOCUSTAE SPORES	<1	0	0	0	<1	<1	<1	<1	<1
PSEUDOMONAS FLUORESCENS, STRAIN A506	0	<1	206	3,044	3,639	3,660	2,173	103	1,102
PSEUDOMONAS SYRINGAE STRAIN ESC-11	0	0	0	0	0	34	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	0	0	0	15	<1	<1	0	0	0
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	0	<1	21	1	2	5	2	4	2
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	0	0	0	65	39	60	121	124	116
Z-11-TETRADECEN-1-YL ACETATE	0	0	0	0	<1	<1	85	61	9
Z-8-DODECENOL	1	4	6	4	7	10	12	16	13
Z-8-DODECENYL ACETATE	125	435	659	447	777	888	1,009	1,436	1,126
Grand Total	**69,088**	**82,935**	**97,433**	**104,888**	**188,180**	**223,221**	**258,374**	**340,894**	**275,100**

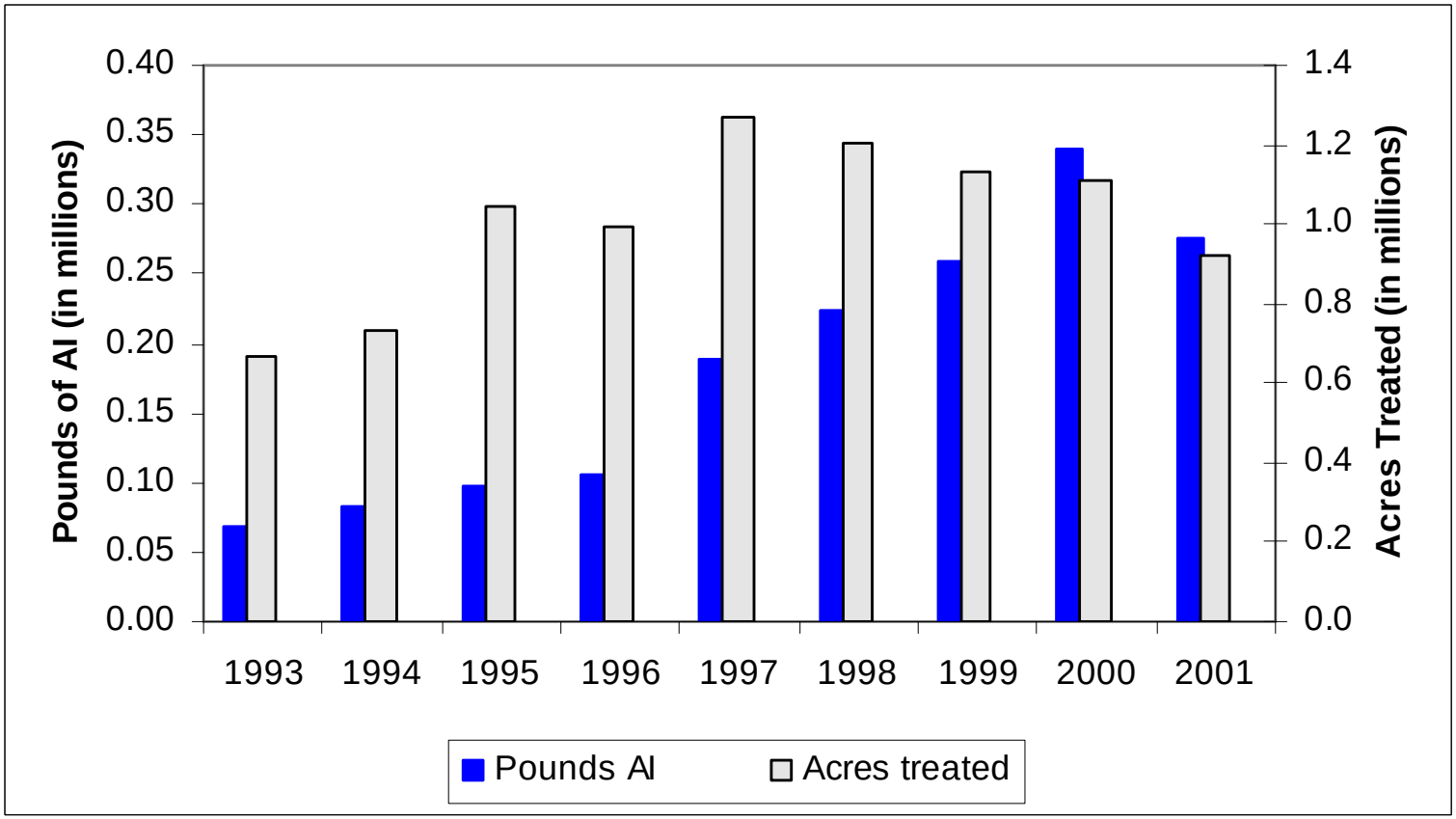
Table 10B. The reported **cumulative acres treated** in California with each biopesticide. Biopesticides includes microorganisms and naturally occurring compounds, or compounds essentially identical to naturally occurring compounds that are not toxic to the target pest (such as pheromones). Use includes 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.

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
(E)-4-TRIDECEN-1-YL-ACETATE	783	70	706	5,428	3,574	2,886	3,132	12,571	9,159
(E)-5-DECENOL	0	0	725	1,434	2,187	1,414	1,034	784	1,316
(E)-5-DECENYL ACETATE	0	0	725	1,434	2,187	1,414	1,034	784	1,316
(R,Z)-5-(1-DECENYL) DIHYDRO-2-(3H)-FURANONE	0	0	0	0	0	1	0	0	0
(Z)-4-TRIDECEN-1-YL-ACETATE	783	70	706	5,428	3,574	2,886	3,132	12,571	9,159
(Z,E)-7,11-HEXADECADIEN-1-YL ACETATE	2,785	588	5,535	2,295	279	82	148	171	128
(Z,Z)-7,11-HEXADECADIEN-1-YL ACETATE	1,350	588	2,120	2,295	279	82	148	171	128
1-DECANOL	0	0	0	0	0	0	0	0	0
AGROBACTERIUM RADIOBACTER	3,233	2,517	2,110	6,048	1,284	5,954	1,517	1,072	514
AMPELOMYCES QUISQUALIS	0	0	366	4,566	18,628	15,039	8,363	7,156	2,193
BACILLUS SPHAERICUS, SEROTYPE H-5A5B, STRAIN 2362	0	0	0	0	104	84	39	0	0
BACILLUS SUBTILIS GB03	0	0	0	0	0	0	0	0	0
BACILLUS THURINGIENSIS (BERLINER)	18,233	18,412	12,305	8,368	6,286	4,437	5,561	3,345	16,813
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, GC-91 PROTEIN	14,233	42,378	108,867	137,786	146,197	82,473	60,262	74,282	71,254
BACILLUS THURINGIENSIS (BERLINER), SUBSP. AIZAWAI, SEROTYPE H-7	7,694	46,069	68,505	84,793	109,951	86,430	85,564	65,923	41,359
BACILLUS THURINGIENSIS (BERLINER), SUBSP. ISRAELENSIS, SEROTYPE H-14	3,754	1,761	738	3,357	4,289	5,242	3,221	2,434	1,964
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI STRAIN SA-12	0	0	0	0	0	0	0	9,474	11,773
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, SEROTYPE 3A,3B	388,663	400,394	574,228	435,707	486,699	342,525	249,709	245,114	141,864
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG 2348	0	16,675	27,972	22,742	11,590	22,097	9,280	11,891	5,818
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN EG2371	72,452	56,536	62,435	32,471	19,739	11,015	1,684	845	439
BACILLUS THURINGIENSIS (BERLINER), SUBSP. KURSTAKI, STRAIN SA-11	135,320	104,848	134,225	139,051	175,772	161,858	152,834	143,643	174,269
BACILLUS THURINGIENSIS (BERLINER), SUBSP. SAN DIEGO	8	3	0	4	100	6	20	18	7
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI STRAIN BMP 123	0	0	0	0	0	87	7	687	1,913
BACILLUS THURINGIENSIS SUBSPECIES KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7841 LEPIDOPTERAN ACTIVE TOXIN	0	0	0	1,377	87,123	81,541	83,094	118,598	55,515
BACILLUS THURINGIENSIS VAR. KURSTAKI STRAIN M-200	0	0	0	0	0	0	0	2	0
BACILLUS THURINGIENSIS VAR. KURSTAKI, GENETICALLY ENGINEERED STRAIN EG7826	0	0	0	0	0	0	0	30,603	76,935
BACILLUS THURINGIENSIS, SUBSP. AIZAWAI, STRAIN SD-1372, LEPIDOPTERAN ACTIVE TOXIN(S)	0	0	0	0	0	0	32	1,561	4,658
BACILLUS THURINGIENSIS, SUBSP. KURSTAKI, STRAIN HD-1	0	0	0	24	2,718	202,653	217,136	199,377	170,574
BACILLUS THURINGIENSIS, VAR. KURSTAKI DELTA ENDOTOXINS CRY 1A(C) AND CRY 1C (GENETICALLY ENGINEERED) ENCAPSULATED IN PSEUDOMONAS FLUORESCENS (KILLED)	0	0	0	6,387	43,741	23,196	14,779	14,698	4,622

Table 10B (continued). 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).

Active Ingredient	1993	1994	1995	1996	1997	1998	1999	2000	2001
BEAUVERIA BASSIANA STRAIN GHA	0	0	0	3	1,459	2,991	25,510	3,399	2,853
CANDIDA OLEOPHILA ISOLATE I-182	0	0	0	0	0	0	0	0	0
CLARIFIED HYDROPHOBIC EXTRACT OF NEEM OIL	0	0	0	7,526	13,537	22,092	45,247	49,142	36,597
DIHYDRO-5-HEPTYL-2(3H)-FURANONE	0	0	0	0	20	0	0	0	0
DIHYDRO-5-PENTYL-2(3H)-FURANONE	0	0	0	0	20	0	0	0	0
E,E-8,10-DODECADIEN-1-OL	2,719	3,001	3,880	3,811	3,696	4,300	4,514	10,407	10,381
E-11-TETRADECEN-1-YL ACETATE	0	0	0	0	13	2,171	54,460	38,834	14,037
E-8-DODECENYL ACETATE	3,112	4,539	3,870	6,045	9,932	11,791	23,549	22,721	33,324
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. KURSTAKI IN KILLED PSEUDOMONAS FLUORESCENS	17,826	34,056	35,755	69,222	96,678	83,238	59,905	32,372	15,188
ENCAPSULATED DELTA ENDOTOXIN OF BACILLUS THURINGIENSIS VAR. SAN DIEGO IN KILLED PSEUDOMONAS FLUORESCENS	0	0	4	1	0	19	7	6	4
GLIOCLADIUM VIRENS GL-21 (SPORES)	0	0	1	21	14	29	12	8	768
LAGENIDIUM GIGANTEUM (CALIFORNIA STRAIN)	0	0	0	<1	0	0	0	0	0
METARHIZIUM ANISOPLIAE, VAR. ANISOPLIAE, STRAIN ESF1	0	0	0	0	0	0	0	0	0
METHYL ANTHRANILATE	0	0	0	0	0	0	0	0	0
MYROTHECIUM VERRUCARIA, DRIED FERMENTATION SOLIDS & SOLUBLES, STRAI	0	0	0	0	104	1,514	3,348	3,173	4,392
NOSEMA LOCUSTAE SPORES	13	0	0	0	0	7	14	2	9
PSEUDOMONAS FLUORESCENS, STRAIN A506	0	8	990	16,951	26,617	29,656	15,760	1,443	11,668
PSEUDOMONAS SYRINGAE STRAIN ESC-11	0	0	0	0	0	17	0	0	0
PSEUDOMONAS SYRINGAE, STRAIN ESC-10	0	0	0	0	0	0	0	0	0
STREPTOMYCES GRISEOVIRIDIS STRAIN K61	0	<1	13	20	115	34	27	83	50
TRICHODERMA HARZIANUM RIFAI STRAIN KRL-AG2	0	0	0	<1	69	369	456	885	1,048
Z-11-TETRADECEN-1-YL ACETATE	0	0	0	0	13	2,171	54,460	38,834	14,037
Z-8-DODECENOL	3,112	4,539	3,870	6,045	9,932	11,791	23,549	22,721	33,324
Z-8-DODECENYL ACETATE	3,112	4,539	3,870	6,045	9,932	11,791	23,549	22,721	33,324
Grand Total	**670,828**	**731,855**	**1,043,230**	**995,437**	**1,272,516**	**1,207,251**	**1,130,225**	**1,106,724**	**923,406**

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 includes both agricultural and reportable non-agricultural applications. The reported cumulative acres treated includes 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 2000 to 2001 for the following commodities: (1) grapes (wine), (2) grapes (table and raisin), (3) almonds, (4) cotton, (5) strawberry, (6) tomato (processing), (7) rice, (8) peaches and nectarines, (9) head lettuce, and (10) leaf lettuce. These ten commodities were chosen because they had the greatest pesticide use or were of particular interest to DPR.

Information used to develop this section was drawn from phone interviews with pest control advisors, University of California Cooperative Extension farm advisors and specialists, researchers, commodity association representatives, and growers. 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 fro changes in pesticide use. Thus, these explanations are based on anecdotal information, not rigorous statistical analyses.

Reported pesticide use in California in 2001 totaled 151 million pounds, a decline of 37 million pounds from 2000 and the lowest reported pounds applied statewide since full use reporting started in 1990. The active ingredients with the largest decline in use by pounds were sulfur, petroleum oils, and methyl bromide. Sulfur use declined from 2000 to 2001 by 16 million pounds (25%) yet still remained the most highly used pesticide in 2001, both in pounds applied and acres treated. By pounds, sulfur accounted for 31% of all reported pesticide use. Sulfur is a natural fungicide favored by both conventional and organic farmers. Petroleum oil use declined by 5 million pounds (14%), and methyl bromide use declined by 4 million pounds (39%).

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. Sulfur use, as well as other pesticide use, declined on table and raisin grapes in 2001 possibly because of low commodity prices. Low commodity prices for almond, cotton, rice, and lettuce may have also contributed to decreased use of many pesticides. Growers will try to reduce expenses (such as pesticide applications) if they expect lower prices for their crops. In addition, in 2001, disease and weed pressure were low in most crops resulting in less fungicide and herbicide use. Although acreage decreased for some crops, this decrease was too small to explain most of the decrease in pesticide use. Decreased methyl bromide use can be attributed to fewer new plantings of grapes and some other crops, increased cost, and additional regulatory restrictions placed on its use.

Not all of Kern County PUR data was available at the time of publication. When we receive Kern County data, we will add carrots and oranges to our summary. In 2000, 44% of the pounds reported on carrots and 24% of the use on oranges were from Kern. Based on the data currently received from Kern, only 30% of the use on carrots and 17% of the use on oranges are from Kern County suggesting that many records of use on carrots and oranges have not yet been received.

Use is given by pounds of active ingredient 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 active ingredient, it is counted as three acres treated).

Grapes

Wine grapes: Total pounds of active ingredient (AI) on wine grapes decreased by 4.8 million pounds from 2000 to 2001 (from 27.7 million pounds to 22.8 million pounds, an 18% decrease). The acres treated decreased by 0.6 million acres (7.1 million to 6.5 million acres, an 8% decrease). Wine grape acreage showed a small increase of 2,000 acres from 2000 to 2001 (from 568,000 acres to 570,000 acres, a 0.4% increase) (CASS 2002b). From 2000 to 2001, the price per ton increased from $628 to $679 per ton for red wines and decreased from $500 to $491 per ton for white wines (CASS 2002c).

About 83% of the decreased pesticide use was due to less sulfur (from 23.7 million pounds to 19.7 million pounds, a 17% decrease). In addition to sulfur, oryzalin, methyl bromide, calcium hydroxide, copper oxychloride sulfate, and fenamiphos showed major decreases in use. Fungicide use (such as sulfur, copper oxychloride sulfate, myclobutanil, iprodione, benomyl, copper hydroxide, and mancozeb) decreased primarily because disease pressure was low. The dry 2001 spring lead to reduced powdery mildew pressure. Fungicide use may have also decreased because of greater use of a computer model for predicting powdery mildew development, allowing growers to reduce the number of applications. In contrast, lime sulfur use increased by 50,885 pounds (from 83,666 to 134,555). Lime sulfur, which had been widely used about 10 years ago, costs less and may have replaced some of these fungicides. Potassium bicarbonate became available to use in 1998. Since that time, its use has generally increased possibly because it is acceptable for organic production, and organic acreage has increased. Tebuconazole is a very popular new fungicide product that we would expect growers to use more in the future as reports of its success circulate.

Use of the fumigant methyl bromide decreased, in part because the federally-mandated phaseout has decreased supply and increased cost. In addition, DPR restrictions, including buffer zones and acreage restrictions, have also impacted use. Use of fenamiphos also decreased. Fenamiphos is a nematicide that is used to treat acreage before it is planted. Since fewer acres were planted to new vineyards, the need to treat acreage before it was planted has decreased.

Overall, the use of insecticides decreased from 2000 to 2001, since leafhopper and mite pressure was low, in general. Cryolite use decreased by 115,063 pounds from 2000 to 2001 (from 272,053 to 156,900 pounds, a 42% decrease). It is being replaced by new alternatives like imidacloprid which increased from 5,751 to 6,632 pounds and from 119,390 to 146,492 acres treated. Also, some wineries ask their growers not to use cryolite because it can be detected in the wines. Methomyl use decreased, although growers will use it late in the season when they are concerned about mealybugs. However, growers try to avoid using methomyl due to worker illness concerns. Although

the use of potash soap rose from 8,010 pounds in 2000 to 11,345 pounds in 2001, that use is still more than 50% less than in previous years (1993-1999).

The warm, dry growing season of 2001 delayed weed germination, thus decreasing the need for herbicide applications. Among herbicides, the largest decrease in use was for oryzalin. (A factory explosion significantly reduced the availability of oryzalin statewide.)

Table grapes and raisins: Total pounds of AI on raisins and table grapes decreased by 7.2 million pounds from 2000 to 2001 (from 26.8 million pounds to 19.6 million pounds, a 27% decrease). The acres treated decreased by 2.7 million acres (9.5 million to 6.8 million acres, an 28% decrease). Raisin grape acreage showed a small decrease of 4,000 acres from 2000 to 2001 (from 287,000 acres to 283,000 acres, a 1.4% decrease), and table grape acreage decreased 2,000 acres from 2000 to 2001 (from 100,000 acres to 98,000 acres, a 2.0% decrease) (CASS 2002b). For raisins, the price decreased from $125 per ton in 2000 to $86 per ton in 2001; for table grapes, the price decreased from $118 per ton in 2000 to $87 per ton in 2001 (CASS 2002c).

Total pounds of fungicide used (sulfur, myclobutanil, iprodione, benomyl, copper hydroxide, copper oxychloride sulfate, mancozeb, copper, ziram, and benomyl) continued to decrease from 2000 to 2001. Because 2000 and 2001 were low on disease pressure, use of these fungicides decreased. Unlike the trend in wine grapes, tebuconazole (a new active ingredient) and potassium bicarbonate use in table grapes and raisins decreased from 2000 to 2001 probably due to lower crop prices for the raisin and table grape growers. Since it was less expensive, use of lime sulfur increased from 2000 to 2001 (a 15% increase).

Like the trend in wine grapes, use of fumigants (methyl bromide, 1,3-dichloropropene, and sodium tetrathiocarbonate) decreased, in part due to growers not planting new acreage.

Overall, use of insecticides decreased. Cryolite use decreased by 565,141 pounds (a 37% decrease); use of dimethoate also decreased. These AIs are being replaced by kaolin (a new active ingredient) and imadicloprid to control glassy-winged sharpshooter and other pests. Experimental results from pyridaben show that it provides good mite control and is used instead of propargite for safety reasons and because mites have not developed resistance as they have to other miticides. Propargite use decreased 54%.

Herbicide use in general decreased because 2001 was a warm, dry year, which delayed weed germination. Growers used less herbicide by narrowing the width of the sprayed row and using new spray technology to reduce the rate of application. Also growers probably replaced some herbicide applications with more cultivation. Growers selected a particular herbicide based largely on cost which may explain why use of trifluralin (a less expensive material) increased.

Almonds
Total pounds of AI used on almonds decreased by 1.5 million pounds (13%), from 11.6 million pounds in 2000 to 10.1 million pounds in 2001, and acres treated decreased by 2.2 million acres (7.3 million to 5.1 million acres, a 30% decrease). California almond acreage was unchanged from 2000 to 2001 (595,000 acres) (CASS 2002d), though the percentage of non-bearing acreage decreased from 16% to 13%. This decrease indicates fewer new plantings in recent years, which may have affected herbicide and fumigant use. Kern, Merced, Stanislaus and Fresno counties remain the largest almond producing counties.

The decrease in commodity prices was the biggest contributor to less pesticide use. Almond prices decreased over the two-year period from $0.97 per pound in 2000 to $0.90 per pound in 2001 (NASS 2002a). In addition, the California almond industry is involved in a long-term program to reduce pesticide use by demonstrating effective alternative pest management practices to growers and pest control advisors.

Methyl bromide use decreased by 67%, from 171,825 pounds in 2000 to 56,888 pounds in 2001. Chloropicrin and metam-sodium use increased from 2000 to 2001. They continue to replace methyl bromide as fumigants for new plantings. Diazinon and chlorpyrifos use continued to decrease as growers find alternatives for control of peach twig borer. Fungicide use, particularly in the San Joaquin Valley, decreased due to dry weather conditions during and after bloom. Most pre-emergence herbicides (simazine, oxyfluorfen, norflurazon, and oryzalin) decreased as growers try to reduce costs. Oryzalin was not available to growers during most of 2000 and all of 2001 due to factory shutdown, which explains the dramatic decrease of oryzalin use. The year 2001 was somewhat dry and did not require as many post-emergence sprays with a combination of glyphosate and oxyfluorfen.

Cotton
Total pounds of AI on cotton decreased by 1.2 million pounds from 2000 to 2001 (from 9.3 million to 8.1 million pounds, a 13% decrease), and acres treated decreased by 2.2 million acres (12.2 million to 10.0 million acres, an 18% decrease). Use of all pesticide types (insecticides, herbicides, fungicides, and defoliants) decreased with the largest decrease occurring in herbicides. Insecticide use decreased from 1.8 million to 1.5 million pounds (18%); defoliant use decreased from 4.4 million to 4.1 million pounds (7%); herbicide use decreased from 1.6 million to 1.1 million (30%); and fungicide use decreased from 82,000 to 58,000 pounds (29%). Of the major pesticide uses reported, the only increases were in glyphosate, naled, endosulfan, cyfluthrin, imidacloprid, carbofuran, endothall, diuron, and thidiazuron.

Cotton acres planted decreased from 920,000 acres to 870,000 acres, a 5% decrease (CASS 2002a), so the decrease in acres planted cannot explain most of the decrease in pesticide use. Lower cotton prices may explain some of the reduced pesticide use. In 2000, market year average prices for Pima cotton were $1.01 per pound, down to $0.94 per pound in 2001. The same trend occurred for upland cotton ($0.52 per pound in 2000 to $0.435 in 2001) (NASS 2002).

Insecticide use in general decreased because of lower pest populations, especially lygus bugs and mites. Aphids and whitefly populations were higher late in the season but were probably not treated more than usual. Use of most defoliants decreased from 2000 to 2001. The only exceptions were diuron and thidiazuron, which are used at lower rates. Defoliant use varies from year-to-year depending on weather conditions before harvest which has a large effect on cotton defoliation. Different chemicals work better in different conditions. Also, there has been a relative increase in Pima cotton acreage which requires somewhat different defoliants.

Herbicide use, except for glyphosate, decreased probably because of increased plantings of glyphosate-resistant cotton. Traditionally, growers use pre-plant herbicides. However, glyphosate-resistant cotton allows glyphosate treatment during the growing season. Cyanazine is used mostly in cotton in California. Its use peaked in cotton at 577,000 pounds in 1995. Since 1995, its use has dropped dramatically each year. From 2000 to 2001 its use decreased by 25,000 pounds (from 40,000 pounds in 2000 to 15,000 pounds in 2001, a 63% decrease). The U.S. Environmental Protection Agency (EPA) has identified cyanazine as a major ground water contaminant. Under a voluntary agreement reached several years ago between the U.S. EPA and Du Pont Agricultural Products, use of cyanazine is being phased-out; use of existing stocks is to cease by December 31, 2002.

Strawberry

Total pounds of AI on strawberries increased by 0.15 million pounds from 2000 to 2001 (from 7.74 million to 7.89 million pounds, a 2% increase). Acres treated decreased by 0.15 million acres from 2000 to 2001 (1.03 million to 0.88 million acres, a 15% decrease). In 2000, the total acreage planted to strawberries was 26,339. Of that total, 25,022 acres were fumigated and 1,317 acres were not treated with fumigants (California Strawberry Commission). In 2001, total acreage planted to strawberries decreased to 25,143 acres. Of that acreage, 23,886 acres were fumigated and 1,257 acres were not fumigated. In 2000, the market year average price of strawberries was $61.40 per hundredweight (Cwt; 1 Cwt = 100 pounds); in 2001 it increased to $70.60 per Cwt (NASS 2002b)[1].

Strawberry production relies on several pesticides (such as the fumigants methyl bromide, chloropicrin, 1,3-D, and metam-sodium) that are generally used at high rates. Fumigants are applied at high rates, in part, because they usually are used to treat a volume of space rather than a surface area such as the leaves and stems of plants. Thus, the pounds applied is large even though the number of applications or number of acres treated may be relatively small. Fumigants accounted for about 89% of all pesticide active ingredients by pounds applied in strawberries. Methyl bromide use decreased by

[1] The California Strawberry Commission provided the following information about prices that growers received for strawberries in 2000 and 2001. In 2000, the yearly weighted average price for fresh market strawberries was $5.59 per crate (1 crate = 11.5 pounds) and $3.89 per crate (1 crate = 18 pounds) for processed strawberries. In 2001, the yearly weighted average price increased to $7.00 per crate for fresh market and to $5.20 per crate for processed strawberries.

457,355 pounds from 2000 to 2001 (from 4.2 million to 3.8 million pounds, an 11% decrease). This decrease in methyl bromide use is likely due to an increase in its cost and expanded restrictions that DPR placed on field applications. Methyl bromide was replaced by other fumigants (chloropicrin, 1,3-D, and metam-sodium) whose use increased by 806,000 pounds.

The use of the major fungicides (sulfur, captan, thiram, iprodione, and myclobutanil), decreased from 2000 to 2001 by 158,000 pounds, likely due to the dry weather in 2001. The dry weather likely resulted in less disease pressure. Growers use the fungicide fosetyl-al to control soil borne diseases. Its use also decreased by 1,201 pounds from 2000 to 2001; however, no clear explanation appears to exist for this decrease.

Tomato (Processing)

Total pounds of AI on processing tomatoes in 2001 decreased by almost 3 million pounds (from 10.7 million pounds in 2000 to 7.7 million pounds in 2001, a 28% decrease). Treated acreage was down 516,000 acres (from 2.4 million to 1.9 million acres, a 21% decrease). Tomato acreage decreased by 31,000 acres (from 289,000 acres in 2000 to 258,000 acres in 2001, an 11% decrease) (CASS 2002a).

A major factor in the reduction of pesticides used was the reduction in acres planted. Also, growers in the Sacramento Valley and Northern San Joaquin Valley (San Joaquin County) used almost 70% transplants as opposed to direct seed in 2001. Because transplants go in later, at the lay-by stage, there would probably be a reduction in the use of pre-emergent herbicides, as well as a reduction in some insecticides and fungicides that would be used only at the early seedling stage.

Another factor is the shift in planted acres from the Sacramento and Northern San Joaquin Valleys to the Southern San Joaquin Valley. Pesticide use is reportedly lower due to reduced insect pressure (earlier harvest) and reduced disease pressure (lower rainfall and hot spring conditions in 2001 with 9 days in May over 100 degrees in Fresno County).

In addition, the price for processing tomatoes was down forcing growers to reduce input costs. This low price may help to explain the decreased use of glyphosate, which is used to control weeds on ditch banks and other non-crop areas; glyphosate use was down 57% in 2001 as compared to 2000.

Rice

Total pounds of AI on rice decreased by 1.2 million pounds from 2000 to 2001 (from 7.1 million to 5.9 million pounds, a 16% decrease). Total acres treated with pesticides decreased by 0.4 million acres from 2000 to 2001 (from 2.3 million to 1.9 million acres, a 19% decrease). Total acres of rice planted decreased by 77,000 acres from 2000 to 2001 (from 550,000 to 473,000 acres, a 14% decrease) (CASS 2002a). The market average price for rice decreased from ($4.99 per Cwt) in 2000 to ($3.60) per Cwt in 2001 (NASS 2002b).

AIs used for weed control accounted for the largest portion of the decrease in total pounds of AIs used. Molinate, thiobencarb, and triclopyr accounted for 57% (681,299 pounds) of the 1.2 million pound decrease in total pounds of AIs used. The lower rice acreage explains the decrease in most pesticides. Other reasons for the decreased use of molinate and thiobencarb include increased weed resistance and the availability of the new herbicide cyhalofop-butyl. In addition, delayed phytotoxic syndrome (herbicide breakdown product becomes phytotoxic to rice) in certain areas contributed to reduced use of thiobencarb.

Although propanil use increased slightly (24,269 pounds, an 18% increase) from 2000 to 2001, this increase is substantial given the reduced rice acreage in 2001. Factors contributing to increased propanil use include: its increased use in place of molinate and thiobencarb (due to resistance issues), and its increased use in place of bensulfuron for control of sedges and broadleaf weeds resistant to bensulfuron.

Carbofuran was not used in 2001 since its registration was cancelled. Combined use of lambda cyhalothrin and diflubenzuron replaced carbofuran for rice water weevil control. The decrease in use of both lambda cyhalothrin and diflubenzuron is largely due to the combined use of these materials (for rice water weevil) that reduces the rates of each. The decrease in rice acreage also accounts for their decreased use. Carbaryl use for armyworm control has been largely replaced by the more effective lambda cyhalothrin. From 2000 to 2001, pounds of copper sulfate, used to control algae and tadpole shrimp, decreased by 503,205 pounds (from 3.2 million to 2.7 million pounds, a 16% decrease). It was used more in 2000 to control a large algae problem that decreased in 2001. The reduced rice acreage also accounts for its decreased use.

Peaches/Nectarines

Total pounds of AI on peaches and nectarines decreased by about 780,000 pounds, and acres treated decreased by 980,000 acres from 2000 to 2001. Considering the nine years (1993-2001) for which data were compared, 2001 ranked the second lowest, while 2000 ranked the third highest. Total pounds of AI used appear to remain relatively constant since 1993. Growers received $0.219 per pound for peaches in August 2000 compared to $0.216 per pound in August 2001 (NASS 2002b).

The largest decreases (in pounds of AI) were in “petroleum oil, unclassified,” copper hydroxide, copper sulfate, methyl bromide, “petroleum distillates, refined,” and chlorpyrifos. The largest increases were in phosmet, mineral oils, 1,3-D, petroleum distillates, and propargite.

“Petroleum oil, unclassified” is mostly used during the dormant season. We are not sure why its use decreased in 2001. One reason may be weather since these applications are highly subject to weather factors. If it is dry early in the dormant season, growers use less for fear of phytotoxicity, while exceptionally wet seasons may make fields too muddy for access. Copper-based fungicides decreased significantly in 2001. These are usually applied prophylactically with dormant oils for peach leaf curl and brown rot. Whatever caused growers to reduce dormant oil application might have also reduced copper use.

Growers have continued the trend of using 1,3-D instead of methyl bromide to kill soil pests during replanting operations.

Pest control applicators (PCAs) report that most growers are using phosmet as an in-season insecticide in place of other, more toxic chemicals, such as methomyl. Above-average infestations of mites occurred in 2001, which could account for increases in both propargite and mineral oils. Use of certain high-toxicity OPs and carbamates such as methomyl, azinphos-methyl, methidathion, and diazinon continued to decrease. Chlorpyrifos use also decreased for the first time since 1995, possibly also related to the decrease in dormant spray use. Many growers now add esfenvalerate to their dormant oil sprays, either alone or with organophosphates, for better control of peach twig borer (PTB). The convenience and low price of this strategy may account for the decline in Bt use since its peak in 1998. Bt is an effective reduced-risk material primarily used for PTB control; however, multiple applications are generally required.

Lettuce

Head (iceberg) lettuce: Total pounds of AI on head lettuce decreased by 0.4 million pounds from 2000 to 2001 (from 1.8 million to 1.4 million pounds, a 19% decrease), but acres treated increased by 0.1 million acres (from 2.7 million to 2.8 million acres, a 4% increase). Head lettuce acres increased from 130,000 acres in 2000 to 137,000 acres in 2001 (a 5% increase) (CASS 2002a). In 2000, market year average price for head lettuce was $18.8 Cwt; in 2001, it was $18.1 Cwt (NASS 2002b).

The greatest decreases in pounds were due to a reduction in use of the soil fumigants methyl bromide, metam-sodium, and chloropicrin, which together decreased by 0.2 million pounds (from 526,000 to 307,000, a 42% decrease). However, these materials are generally used at high rates. Although they accounted for 21% of all pounds applied to head lettuce in 2001, they accounted for only 0.06% by acres treated.

By acres, the greatest decrease was with the insecticide methomyl. Methomyl is used for beet armyworm and other caterpillars, and these pests were more of a problem in 2000. Also, in 2001 growers rotated in some of the newer reduced-risk materials such as spinosad. However, use of the insecticide diazinon rose, but this is the only effective material for soil pests, and the increase was possibly due to more extensive acreage in 2001 than in 2000.

Use of herbicides increased slightly, again possibly due to increased acreage. In the Imperial Valley, use of the pre-emergent herbicide bensulide was up, possibly due to earlier plantings of lettuce. Use of fungicides increased somewhat, possibly due to cooler-than-usual spring weather in the San Joaquin and Salinas Valleys.

Leaf lettuce: Total pounds of AI on leaf lettuce decreased by 100,000 pounds from 2000 to 2001 (from 887,000 to 787,000 pounds, an 11% decrease), but acres treated increased by 67,000 (from 1.34 million to 1.41 million acres, 5% increase). Leaf lettuce acreage increased from 81,000 to 91,000 (a 12% increase) (CASS 2002a). In 2000, the market year average price was $29.6 per Cwt, and in 2001 it was $24.8 per Cwt (NASS 2002b).

The pest management problems and practices associated with the cultivation of both head (iceberg) and leaf lettuce varieties are nearly the same, and many of the same trends were seen for both crops. As with head lettuce, a reduction in use of the soil fumigants (methyl bromide, metam-sodium, and chloropicrin) accounted for a large proportion of the decrease in pounds from 2000 to 2001, decreasing by 104,000 pounds (from 293,000 to 189,000, a 35% decrease). However, although these fumigants accounted for 24% of the total pounds applied in leaf lettuce in 2001, they accounted for only 0.08% of the acres treated.

Use of insecticides generally increased from 2000 to 2001, except for methomyl and dimethoate. Methomyl is used for beet armyworm and other caterpillars that were plentiful in 2000. Also in 2001, growers continued to use some of the newer reduced-risk materials such as spinosad and imidacloprid. Increases in the use of other insecticides may have been due to increased acreage in 2001.

Use of herbicides increased from 2000 to 2001, mainly due to increased use of the pre-emergent herbicide bensulide, which is mostly used in desert areas such as the Imperial Valley. In this area, more early than late leaf lettuce was planted during 2001, and more bensulide is needed for earlier plantings. Use of fungicides rose somewhat, possibly due to cooler-than-usual spring weather in the San Joaquin and Salinas Valleys.

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California Strawberry Commission

Commodity Associations and Commissions

County Agricultural Commissioners

Growers

Pest Control Advisors

UC Cooperative Extension Area IPM Advisors

UC Cooperative Extension Farm Advisors

UC Cooperative Extension Specialists

UC Researchers

USDA-Agricultural Research Service

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