

Use Trends of Biopesticides: Cumulative Acres Treated

Text files of data are available at <<https://files.cdpr.ca.gov/pub/outgoing/pur/data/>>. The reported cumulative acres treated with chemicals that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds similar to those found in nature that are not toxic to the target pest (such as pheromones). Use includes primarily agricultural applications (Most nonagricultural pesticide use reports are not required to report acreage. A zero indicates some nonagricultural use occurred, but acreage was not reported. The word "none" indicates no use at all that year). The grand total for acres treated may be less than the sum of acres treated for all chemicals because some products contain more than one active ingredient.

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
(3s, 6r)-3-methyl-6-isopropenyl-9-decen-1-yl acetate	None	None	7	None	24	None	215	8,683	35,138	58,613
(3s, 6s)-3-methyl-6-isopropenyl-9-decen-1-yl acetate	None	None	7	None	24	None	215	8,683	35,138	58,613
(e)-4-tridecen-1-yl-acetate	3,995	None	None	None	1,074	None	None	None	0	11
(e)-5-decen-1-ol	None	None	53	83	20	166	354	348	326	751
(e)-5-decenol	249	166	502	837	639	348	368	832	1,053	582
(e)-5-decenyl acetate	249	166	555	920	659	514	721	1,179	1,379	1,334
(e,e)-9, 11-tetradecadien-1-yl acetate	474	759	608	985	466	645	349	361	364	51
(e,z)-7,9-dodecadien-1-yl acetate	5,168	18,104	22,856	2,479	1,623	None	None	None	None	None
(s)-kinoprene	490	346	506	675	750	990	691	679	871	967
(s)-verbenone	None	None	100	None	None	0	0	3	1	0
(z)-11-hexadecen-1-yl acetate	None	49	None	None	None	None	26	2,994	1,807	3,955
(z)-11-hexadecenal	None	None	None	None	None	74	145	2,951	1,351	876
(z)-4-tridecen-1-yl-acetate	3,995	None	None	None	1,074	None	None	None	0	11
(z)-9-dodecenyl acetate	74	1,814	392	555	1,966	950	None	None	None	None
(z,e)-7,11-hexadecadien-1-yl acetate	1	None	None	None	None	None	None	None	None	None

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
(z,z)-11,13-hexadecadienal	763	11,336	17,283	20,591	38,681	61,037	66,068	67,233	89,479	186,227
(z,z)-7,11-hexadecadien-1-yl acetate	1	None	None	None	None	None	None	None	None	None
1,4-dimethylnaphthalene	0	0	0	0	0	0	0	0	0	0
1,7-dioxaspiro-(5,5)-undecane	0	0	30	43	25	32	None	None	None	None
1-methylcyclopropene	3	1	17	21	14	10	6	13	5	4
1-naphthaleneacetamide	408	315	393	343	394	257	338	319	483	184
2,4-decadienoic acid, ethyl ester, (2e,4z)-	None	None	None	None	179	3,247	1,309	1,014	583	1,609
2-methyl-1-butanol	None	None	None	0	0	0	0	0	0	0
3,13 octadecadien-1-yl acetate	50	131	None	0	None	10	25	None	None	None
3,7-dimethyl-6-octen-1-ol	1,531	788	2,220	3,939	3,545	3,111	4,331	5,936	5,749	4,265
acetic acid	110	162	3,165	3,114	10,301	15,775	10,437	18,729	13,906	15,420
agrobacterium radiobacter	362	690	852	622	664	806	613	99	570	246
agrobacterium radiobacter, strain k1026	81	19	4,947	9,016	754	745	0	None	None	None
allyl isothiocyanate	None	None	0	None	None	None	0	None	None	0
almond, bitter	74	412	271	88	68	73	None	4	198	86
amino ethoxy vinyl glycine hydrochloride	10,179	11,108	14,991	16,371	17,666	20,248	14,254	13,067	25,478	32,244
ammonium bicarbonate	0	0	30	43	25	32	None	None	None	None
ammonium nitrate	726,849	817,488	867,723	1,085,872	953,176	988,173	882,572	829,523	743,851	674,254
ammonium nonanoate	None	None	None	239	284	452	459	320	455	529
ampelomyces quisqualis	2	None	None	None	None	None	None	None	None	None
aspergillus flavus strain af36	None	260	48,833	89,337	147,011	159,586	183,128	188,090	207,277	219,916
aureobasidium pullulans strain dsm 14940	None	None	None	254	2,823	1,569	5,376	8,675	18,112	12,119
aureobasidium pullulans strain dsm 14941	None	None	None	254	2,823	1,569	5,376	8,675	18,112	12,119
azadirachtin	71,787	70,593	99,380	113,976	159,292	193,929	175,604	175,709	151,526	156,435

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
bacillus amyloliquefaciens strain d747	None	None	2,337	29,684	41,678	38,545	57,375	90,617	68,123	77,283
bacillus amyloliquefaciens strain mbi 600	None	None	2	0	None	None	165	1,607	4,793	13,550
bacillus firmus (strain i-1582)	None	None	None	None	12	45	41	43	29	5
bacillus mycoides isolate j	None	None	None	None	None	None	None	11,591	5,455	6,021
bacillus popilliae	None	None	None	0	0	0	0	None	0	None
bacillus pumilus, strain qst 2808	72,582	84,358	76,388	68,138	83,406	89,485	83,285	95,326	84,833	85,661
bacillus sphaericus 2362, serotype h5a5b, strain abts 1743 fermentation solids, spores and insecticidal toxins	9	0	231	38	110	118	233	542	0	1,848
bacillus subtilis gb03	0	6	0	21	302	467	609	2,293	1,473	972
bacillus subtilis strain iab/bs03	None	None	None	None	None	None	None	None	3,277	13,910
bacillus subtilis var. amyloliquefaciens strain fzb24	None	None	406	1,702	3,516	4,328	152	0	None	None
bacillus thuringiensis (berliner)	127	877	292	262	91	249	247	573	186	66
bacillus thuringiensis (berliner), subsp. aizawai, gc-91 protein	40,395	18,657	25,262	22,511	28,611	26,155	25,221	49,005	53,959	64,039
bacillus thuringiensis (berliner), subsp. aizawai, serotype h-7	6,943	7,766	6,064	3,296	2,941	1,360	624	1,025	451	3,146
bacillus thuringiensis (berliner), subsp. israelensis, serotype h-14	1,873	337	773	1,110	1,254	1,713	334	836	149	1,805
bacillus thuringiensis (berliner), subsp. kurstaki strain sa-12	10,721	8,247	15,379	9,925	10,751	10,850	13,714	3,214	326	190
bacillus thuringiensis (berliner), subsp. kurstaki, serotype 3a,3b	2,269	3,063	1,973	818	453	145	274	787	1,358	815

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
bacillus thuringiensis (berliner), subsp. kurstaki, strain eg 2348	688	3,428	645	3,580	4,038	2,502	4,480	4,004	132	88
bacillus thuringiensis (berliner), subsp. kurstaki, strain eg2371	0	0	None	None	None	None	None	None	None	None
bacillus thuringiensis (berliner), subsp. kurstaki, strain sa-11	111,746	84,119	81,588	96,045	111,634	108,411	95,637	121,091	135,126	132,300
bacillus thuringiensis (berliner), subsp. san diego	0	None	None	None	None	None	None	None	None	0
bacillus thuringiensis subspecies kurstaki strain bmp 123	73	None	None	None	None	None	None	None	None	None
bacillus thuringiensis subspecies kurstaki, genetically engineered strain eg7841 lepidopteran active toxin	3	200	373	5	99	116	473	8	3	4,205
bacillus thuringiensis var. kurstaki strain m-200	None	None	None	None	None	0	None	1	0	1
bacillus thuringiensis var. kurstaki, genetically engineered strain eg7826	None	None	1,320	None	None	None	9	None	37	None
bacillus thuringiensis, subsp. aizawai, strain abts-1857	37,209	35,312	41,722	36,837	68,895	70,582	86,966	111,194	104,954	141,569
bacillus thuringiensis, subsp. aizawai, strain sd-1372, lepidopteran active toxin(s)	1,057	640	4	113	47	306	120	77	118	18
bacillus thuringiensis, subsp. israelensis, strain am 65-52	758	1,052	1,305	793	2,524	2,009	1,419	1,088	8,064	3,201
bacillus thuringiensis, subsp. kurstaki, strain abts-351, fermentation solids and solubles	162,444	152,728	165,138	147,816	192,454	153,135	193,896	232,472	214,984	248,465

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
bacillus thuringiensis, subsp. kurstaki, strain hd-1	18,465	16,218	15,228	10,138	7,887	10,593	1,361	895	141	224
bacillus thuringiensis, var. kurstaki delta endotoxins cry 1a(c) and cry 1c (genetically engineered) encapsulated in pseudomonas fluorescens (killed)	2	0	10	None	0	None	0	None	2	None
bacteriophage active against xanthomonas campestris pv. vesicatoria and pseudomonas syringae pv. tomato	None	11	25	21	12	None	None	1	None	9
balsam fir oil	0	None	0	0	0	0	0	None	0	0
beauveria bassiana hf 23	None	None	None	None	None	None	32	69	81	114
beauveria bassiana strain gha	1,686	2,706	4,011	6,857	10,900	14,356	11,145	16,957	17,983	14,645
beta-conglutin	None	None	None	None	None	9,032	12,422	15,510	9,584	6,671
buffalo gourd root powder	138	None	25	161	200	224	114	154	194	197
burkholderia sp strain a396 cells and fermentation media	None	None	None	None	196	5,531	6,816	17,303	35,115	82,875
butyl mercaptan	None	None	0	None	None	None	None	None	None	None
calcium salts of phosphorous acid	None	None	None	None	None	None	None	None	None	0
canola oil	4,786	3,872	2,329	5,788	4,272	7,455	20,351	47,851	74,759	61,311
capsicum oleoresin	388	238	576	546	1,541	1,997	2,084	3,777	6,459	4,936
carbon dioxide	0	26	1,796	5	20	19	2	0	0	0
castor oil	0	0	0	0	0	0	0	None	0	None
chenopodium ambrosioides near ambrosioides	9,265	6,868	13,401	22,574	25,820	19,072	15,804	15,002	635	267
chromobacterium subtsugae strain praa4-1	None	None	1,424	38,138	61,191	62,467	43,365	48,875	55,891	53,130
cinnamaldehyde	None	0	None	None	None	None	None	110	0	None
citral	15	None	None	None	None	None	None	None	None	None
citric acid	1,205,718	1,335,401	1,389,828	1,542,679	1,686,277	1,923,049	2,202,219	2,158,320	2,189,752	2,344,169

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
clarified hydrophobic extract of neem oil	42,281	41,125	43,193	60,212	85,369	87,917	65,680	59,527	47,146	52,387
codling moth granulosis virus	984	3,468	3,445	4,341	4,530	3,683	2,938	4,426	4,922	5,431
coniothyrium minitans strain con/m/91-08	395	1,107	1,697	4,286	4,886	6,194	4,105	5,134	3,250	1,978
corn syrup	12,877	27,721	27,760	15,992	14,206	18,817	18,940	48,655	74,201	63,447
cottonseed oil	129,722	177,732	95,344	98,797	78,736	67,349	41,034	36,856	35,581	32,028
coyote urine	0	12	0	0	0	0	0	0	0	0
cytokinin (as kinetin)	None	199	2,409	352	3,290	1,966	1,910	3,506	5,052	1,159
diallyl disulfide	None	None	None	None	None	None	225	223	None	None
dihydro-5-heptyl-2(3h)-furanone	0	None	None	None	None	None	None	None	None	3
dihydro-5-pentyl-2(3h)-furanone	0	None	None	None	None	None	None	None	None	3
e,e-8,10-dodecadien-1-ol	15,283	17,872	15,908	18,241	16,548	10,763	12,918	17,123	15,873	15,728
e-11-tetradecen-1-yl acetate	5,405	1,701	4,485	4,396	489	696	369	1,000	421	557
e-8-dodecenyl acetate	49,591	45,667	49,300	47,640	41,405	42,645	39,638	38,315	42,108	45,489
encapsulated delta endotoxin of bacillus thuringiensis var. kurstaki in killed pseudomonas fluorescens	None	0	0	None	None	None	None	None	None	None
essential oils	4	0	0	0	0	0	181	61	169	137
ethylene	4	70	49	36	21	28	77	26	17	16
eucalyptus oil	2	0	None	None	None	None	None	None	None	None
eugenol	None	None	0	0	0	0	0	0	0	None
farnesol	1,597	826	2,227	3,940	3,547	3,121	4,331	5,936	5,749	4,265
fenugreek	74	412	271	88	68	73	None	4	198	86
ferric sodium edta	None	3,049	8,428	8,038	10,540	12,522	13,115	13,697	14,410	11,970
fish oil	None	0	382	252	None	None	66	None	None	None
formic acid	60	1	369	5	178	1,203	60	1	402	0
fox urine	0	12	0	0	0	0	0	0	0	0
gamma aminobutyric acid	835	542	1,811	576	314	287	None	None	None	None
garlic	1,123	1,369	12,410	14,485	8,509	4,767	7,185	3,819	6,615	8,091
geraniol	1,531	788	2,220	3,939	3,545	3,111	4,331	5,936	5,749	4,265
german cockroach pheromone	0	0	0	0	0	None	0	0	0	0
gibberellins	493,721	514,357	531,046	550,518	530,086	523,059	544,711	501,854	506,495	528,782

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
gibberellins, potassium salt	34	150	795	None	None	None	None	58	None	None
gliocladium virens gl-21 (spores)	1,401	1,076	3,172	5,444	5,187	7,439	7,140	4,914	4,300	2,061
glutamic acid	835	542	1,811	576	314	287	None	None	None	None
gs-omega/kappa-hxtx-hv1a (versitide peptide)	None	None	None	None	None	None	1	None	1	324
harpin protein	1,631	1,582	115	95	1	None	112	0	None	None
heptyl butyrate	0	0	0	0	0	0	0	0	0	0
hydrogen peroxide	23,208	39,194	21,877	22,957	27,951	32,676	69,022	65,570	103,675	298,012
hydroprene	0	0	2	4	0	0	7	28	35	31
iba	227	1,156	1,283	962	940	489	808	1,437	528	812
indole	None	None	None	0	None	0	0	0	0	0
iron hedta	None	None	0	2	0	0	0	2	0	0
iron phosphate	6,345	5,477	6,519	6,286	8,109	8,618	13,322	11,992	9,259	10,394
kaolin	82,636	51,100	57,877	80,075	88,044	101,645	115,468	103,356	98,979	80,602
kinoprene	4	9	3	6	25	7	3	0	6	0
lactic acid	None	None	None	None	None	38	59	225	3	99
lactose	81,278	92,348	68,442	80,242	61,764	81,390	77,746	74,127	70,358	72,014
lagenidium giganteum (california strain)	None	None	2	None	None	None	None	None	None	None
lauryl alcohol	5,495	6,443	6,681	7,807	5,681	5,725	4,718	4,354	4,793	3,735
lavandulyl senecioate	7,025	11,754	6,666	5,869	6,294	8,424	18,076	74,825	141,775	193,912
limonene	29,621	15,514	73,605	29,577	32,924	45,208	40,224	68,084	54,171	47,975
linalool	0	0	0	0	2	0	0	0	0	0
margosa oil	40	4,260	7,977	9,546	19,013	19,917	25,805	32,268	23,518	37,552
menthol	2	0	None	20	None	None	None	None	None	None
metarhizium anisopliae strain f52	None	None	202	133	634	122	55	2	0	1
metarhizium anisopliae, var. anisopliae, strain esf1	0	0	None	None	None	None	None	None	None	None
methoprene	4	896	0	0	0	0	42	106	0	710
methyl anthranilate	380	2,043	215	1,092	808	895	1,463	2,490	2,041	1,908
methyl eugenol	None	0	None	0	None	None	0	0	0	0
methyl nonyl ketone	0	None	None	0	0	0	0	0	0	0
methyl salicylate	None	None	None	None	None	None	None	10	44	None
muscalure	300	68	40	50	139	41	19	178	125	29
myristyl alcohol	5,495	6,443	6,681	7,807	5,681	5,725	4,718	4,354	4,793	3,735

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
myrothecium verrucaria, dried fermentation solids & solubles, strain aarc-0255	4,840	5,136	4,274	4,456	3,637	8,775	6,473	4,075	5,037	4,966
n6-benzyl adenine	3,352	1,691	1,666	2,954	2,630	2,595	2,999	2,322	3,160	5,415
naa	38	219	655	293	109	210	84	84	17	18
naa, ammonium salt	9,140	9,075	11,922	10,611	9,703	9,966	778	671	2,792	1,728
naa, ethyl ester	23	396	384	113	189	37	45	7,899	8,232	9,856
naa, potassium salt	None	None	None	6	110	35	8,819	8,650	5,764	5,725
naa, sodium salt	None	None	None	153	85	55	11	None	None	22
natamycin	None	None	None	7	32	35	27	5	None	90
nerolidol	1,597	826	2,227	3,940	3,547	3,121	4,331	5,936	5,749	4,265
nitrogen, liquefied	0	0	0	0	5	None	None	None	None	None
nonanoic acid	412	828	480	2,166	2,074	1,040	653	1,889	1,394	581
nonanoic acid, other related	412	828	460	2,166	2,074	1,040	653	1,219	619	488
nosema locustae spores	12	12	1,612	1,207	910	750	50	0	1	None
oil of anise	None	0	0	0	0	0	0	0	0	0
oil of black pepper	0	0	0	0	0	0	0	0	0	0
oil of cedarwood	15	None	None	None	None	0	0	None	None	None
oil of citronella	34	48	None	None	0	0	0	0	0	0
oil of geranium	15	None	None	None	None	None	None	None	None	None
oil of jojoba	8,255	1,762	1,077	316	323	83	16	5	None	7
oil of lemon eucalyptus	None	0	0	None	None	None	None	None	None	None
oil of orange	None	None	None	None	None	21,472	37,651	66,215	53,681	47,199
oil of peppermint	15	None	None	None	None	None	None	None	None	None
oxypurinol	None	None	None	None	6	None	None	None	None	None
paecilomyces fumosoroseus apopka strain 97	None	None	2,113	12,822	18,487	19,076	31,000	26,577	15,462	23,736
pantoea agglomerans strain e325, nrrl b-21856	55	25	50	50	None	None	None	None	None	None
phenylethyl propionate	0	0	0	0	0	0	0	0	0	0
phosphoric acid, monopotassium salt	1,021	1,275	561	219	0	1,837	3,142	2,284	2,025	570
piperine	0	0	0	0	0	0	0	0	0	0

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
polyhedral occlusion bodies (ob's) of the nuclear polyhedrosis virus of helicoverpa zea (corn earworm)	302	14,752	1,297	337	518	1,011	4,902	8,857	8,803	4,958
polyoxin d, zinc salt	19,082	69,822	95,645	143,483	165,601	191,654	231,719	242,628	263,694	305,023
potassium bicarbonate	101,283	118,891	75,445	85,935	85,701	112,047	156,452	162,483	125,356	155,643
potassium phosphite	92,671	82,403	115,913	131,623	214,917	199,571	299,256	387,641	411,299	544,518
potassium silicate	48	808	537	3,524	12,973	13,499	12,133	14,938	8,228	12,930
potassium sorbate	105	None	None	None	None	None	None	None	None	None
propylene glycol	591,332	664,307	676,714	974,932	1,069,976	1,107,639	1,122,784	1,209,430	1,186,274	1,274,555
propyleneglycol monolaurate	12	None	None	159	76	None	None	None	None	None
pseudomonas fluorescens, strain a506	1,472	1,281	372	431	1,178	376	601	524	533	328
pseudomonas syringae, strain esc-10	3	None	None	0	None	None	None	None	None	None
purpureocillium lilacinum strain 251	1,115	2,330	3,531	20,039	25,826	32,089	26,924	22,752	15,917	11,164
putrescent whole egg solids	2	0	0	0	0	0	0	0	0	0
pythium oligandrum dv74	None	2	2	63	None	None	None	None	None	None
qst 713 strain of dried bacillus subtilis	100,689	118,105	124,794	141,336	138,006	140,825	130,217	128,151	144,934	177,192
quillaja	22,949	30,225	22,907	28,538	30,232	31,107	53,339	53,857	69,277	54,684
reynoutria sachalinensis	70,363	90,750	94,114	96,190	95,988	105,535	128,066	125,137	112,061	138,542
s-abscisic acid	5,200	9,558	14,974	11,645	12,761	11,202	11,471	12,079	8,770	7,937
s-methoprene	65,114	62,653	87,637	49,491	53,371	102,129	76,961	53,963	71,339	105,757
sawdust	0	None	74	109	None	None	160	None	None	None
sesame oil	1,912	1,938	39	1	None	None	None	None	6	None
silver nitrate	0	0	5	None	None	None	0	1	None	2
sodium bicarbonate	1	967	1,026	291	544	706	796	162	1	None
sodium carbonate peroxyhydrate	3,666	6,566	13,797	11,764	17,035	8,051	10,137	7,129	12,824	12,065
sodium chloride	0	2	73	207	135	66	134	144	42	100
sodium lauryl sulfate	0	0	0	0	0	0	0	0	0	0
sorbitol octanoate	None	42	None	None	None	None	None	0	None	None
soybean oil	6,845	3,636	3,303	4,524	6,275	5,476	7,018	7,910	18,419	29,841
streptomyces griseoviridis strain k61	0	1	0	5	10	18	5	4	5	2

Chemical	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
streptomyces lydicus wyec 108	6,998	6,404	10,367	16,071	14,050	16,546	20,473	15,970	10,221	15,115
sucrose octanoate	1,172	148	1	5	10	2	12	0	None	None
sugar	1,527	5,807	4,843	1,062	1,427	452	504	86	212	160
thyme	0	0	0	0	0	0	0	0	0	0
thyme oil	None	None	None	None	None	0	0	0	0	0
thymol	423	10	18	1	1	1,267	490	44	311	608
trichoderma harzianum rifai strain krl-ag2	7,253	871	1,088	994	2,497	2,346	2,207	2,244	2,404	2,412
trichoderma icc 012 asperellum	None	86	704	604	35	251	159	92	139	444
trichoderma icc 080 gamsii	None	86	704	604	35	251	159	92	139	444
trimethylamine	None	None	None	0	None	0	0	0	0	0
ulocladium oudemansii (u3 strain)	None	None	None	19	707	406	150	28	1,674	1,151
vanillin	74	412	271	88	68	73	None	4	198	86
vegetable oil	292,501	458,756	266,226	350,771	243,680	311,693	405,341	603,896	584,672	513,526
xanthine	None	None	None	None	6	None	None	None	None	None
yeast	1,307	5,261	3,729	325	142	220	25	6	14	0
yucca schidigera	2,316	4,907	16,093	19,524	11,285	7,347	9,376	6,289	10,926	14,630
z,e-9,12- tetradecadien-1-yl acetate	0	49	0	0	0	0	0	43	507	3,079
z-11-tetradecen-1-yl acetate	4,931	942	3,877	3,411	23	51	20	639	57	506
z-8-dodecenol	49,591	45,667	49,300	47,640	41,405	42,645	39,638	38,315	42,108	45,489
z-8-dodecenyl acetate	49,591	45,667	49,300	47,640	41,405	42,645	39,638	38,315	42,108	45,489
Total	4,911,776	5,515,352	5,590,357	6,551,958	6,925,101	7,487,765	8,018,179	8,560,056	8,635,253	9,570,282