

**2021/2022 STATUS REPORT
PESTICIDE CONTAMINATION
PREVENTION ACT**

Annual Report



California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring Branch

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EXECUTIVE SUMMARY

SUMMARY

Food and Agricultural Code (FAC) section 13144(b) requires the Department of Pesticide Regulation (DPR) to annually post the following information to DPR's website:

- A list of pesticide active ingredients (A.I.s) registered for agricultural use with groundwater protection data gaps.
- A list of the pesticide A.I.s on the Groundwater Protection List (GWPL).
- The sales and use information for pesticide A.I.s on the GWPL.

As part of the registration process, DPR obtains environmental fate data for each A.I., which includes information on the mobility and persistence of that pesticide. Pesticides that exceed the specific numerical values (SNVs) established by DPR have a greater potential to contaminate groundwater because they are both mobile and persistent in the environment. If the pesticide, when applied, has the potential to pollute groundwater, then it is placed on the GWPL as per FAC section 13145(d).

The 2021/2022 Status Report lists 105 A.I.s that are on the GWPL. This report includes the mean physical-chemical values (with respect to the SNVs), registration status, current California sales and use data, and mode of action for each listed A.I. Due to reporting delays, two years of sales and use data were released simultaneously and therefore both years are included in this report.

There are no data gaps for the currently registered agricultural pesticides; the data requirements for registration are satisfied.

BACKGROUND

The Pesticide Contamination Prevention Act (PCPA) of 1985 added sections 13141–13152 to the FAC and established a set of data requirements for identifying potential groundwater contaminants. As required by the PCPA, registrants of agricultural use pesticides must provide DPR with data on the environmental fate of the A.I.s in their products. DPR established threshold values, or SNVs, for water solubility, soil adsorption, hydrolysis half-life, aerobic soil metabolism half-life, and anaerobic soil metabolism half-life. SNVs provide a basis for estimating the relative risk of groundwater contamination posed by agricultural use pesticides.

As required by the PCPA (FAC section 13145[d]), DPR established the GWPL (Title 3, California Code of Regulations [3 CCR] section 6800) to identify pesticides that have been detected in groundwater and those that pose a risk to groundwater when applied. 3 CCR section 6800(a) includes pesticides that have been detected in groundwater in California and whose use is

regulated to mitigate or prevent further pollution. 3 CCR section 6800(b) includes registered agricultural use pesticides that exceed the SNVs and are applied or injected into the soil or require flood or furrow irrigation within 72 hours after the application. DPR monitors for pesticides included in 3 CCR section 6800(b) to determine whether they have migrated to groundwater. If any are found to have migrated to groundwater because of agricultural use, the PCPA requires DPR to conduct a formal review to determine if the pesticide's use can continue as currently allowed, with modified use restrictions, or if all uses should be prohibited.

Effective 2015, the PCPA was amended and directs the development of a peer reviewed method, using the SNVs, that estimates a pesticide's potential for groundwater contamination (FAC section 13145[e]). This method has undergone scientific peer review and will supersede the process for placing pesticides on the GWPL. This new method is in the process of being implemented and will change the current membership of the GWPL.

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REPORT REQUIREMENTS PURSUANT TO THE PESTICIDE CONTAMINATION PREVENTION ACT

FAC section 13144(b) requires DPR to annually post the following information to the department's website for pesticides registered for agricultural use in California:

1. A list of each pesticide A.I., other specified ingredient, or degradation product of a pesticide A.I. for which there is a groundwater protection data gap.
2. The Groundwater Protection List established pursuant to subdivision (d) of Section 13145 (Table 1).
3. Provide for each pesticide A.I. listed pursuant to number 2, the amount sold in California for the most recent year of available data and where and for what purpose the pesticide was used (Table 2).

The information is presented in two sections:

1. Status of the Groundwater Protection Data Gaps and
2. Physical-Chemical Parameters, Sales, Use, and Mode of Action for Pesticide Active Ingredients on the GWPL, which lists the properties of pesticides identified as potential groundwater pollutants and the SNVs established by DPR.

SECTION 1: STATUS OF THE GROUNDWATER PROTECTION DATA GAPS

In 1985, the PCPA required registrants to submit mobility, persistence, and environmental fate data, as stipulated in FAC section 13143(a), for then-registered agricultural pesticides or face penalties. At that time 147 pesticides were subject to the data call-in. As of 2002, all of those historical data gaps have been filled.

If a registrant of an agricultural use pesticide lacks the data required by the PCPA, they may apply for an interim registration, as stipulated in FAC sections 13161-13170. DPR can defer, for up to three years, the submission of no more than three of the following registration data requirements:

- Efficacy
- Octanol-water partition coefficient (K_{ow})
- Soil photolysis
- Field dissipation
- PCPA study that must be repeated to correct errors or conducted under California conditions or guidelines, providing the weight of evidence from all other submitted data support a scientific judgment in favor of interim registration

Except for efficacy data, the deferral of any of the other data results in a “groundwater protection data gap” as defined in FAC section 13142(f). Currently, there are no interim registrations for agricultural use products and, therefore, no groundwater protection data gaps.

SECTION 2: PHYSICAL-CHEMICAL PARAMETERS, SALES, USE, AND MODE OF ACTION FOR ACTIVE INGREDIENTS EXCEEDING THE SPECIFIC NUMERICAL VALUES

FAC section 13144(a) requires DPR to establish thresholds known as SNVs for water solubility, K_{oc} , hydrolysis half-life, aerobic soil metabolism half-life, anaerobic soil metabolism half-life, and field dissipation half-life. These parameters are correlated with the potential of a pesticide to leach to groundwater; pesticides detected in groundwater tend to be more mobile and persistent than those not detected in groundwater. Water solubility and K_{oc} are considered indicators of the mobility of an A.I. within the soil, while the half-lives for hydrolysis, aerobic and anaerobic soil metabolism, and field dissipation are considered indicators of the persistence of the A.I. in the soil.

Statistical comparison procedures were used to calculate the SNVs. Based on nationwide groundwater studies, a list of pesticide A.I.s was created and separated into two groups: (1) A.I.s that had been detected in groundwater as a result of legal agricultural use (leachers) and (2) A.I.s that had been sampled for and not detected in groundwater as a result of legal agricultural use (non-leachers). Values for the physical-chemical parameters of A.I.s in each group were determined from the open literature and DPR-approved studies submitted by pesticide registrants in fulfillment of the data call-in requirements in FAC section 13143. The

data for each parameter were tested for their usefulness in discriminating between leachers and non-leachers by determining whether the means of the two groups were significantly different. The tests showed that the means of the data for water solubility, hydrolysis half-life, K_{oc} , and the anaerobic soil metabolism half-life for chemicals identified as leachers were significantly different from the means of chemicals identified as non-leachers. The SNVs for these properties were established as those values that would accurately identify as leachers 90 percent of the chemicals detected in groundwater due to agricultural use (Wilkerson and Kim, 1986). The means of the two groups for aerobic soil metabolism, however, were not significantly different. Because the PCPA requires DPR to establish an SNV for each physical-chemical parameter, the SNV for the aerobic soil metabolism half-life was set at a value that minimized its importance in the discrimination procedure. Details on the establishment and subsequent revisions to the SNVs can be found in prior reports (Johnson, 1991; Johnson, 1989; Johnson, 1988). The SNVs currently in regulation (3 CCR section 6804) are:

(a) Water solubility	3 ppm
(b) K_{oc}	1,900 cm ³ /g
(c) Hydrolysis half-life	14 days
(d) Aerobic soil metabolism half-life	610 days
(e) Anaerobic soil metabolism half-life	9 days

No values have been established for field dissipation because of insufficient data. In 1989, the SNVs were established by regulation in 3 CCR section 6804 and were last updated in 1993.

DPR typically receives multiple studies for each physical-chemical parameter, which are then averaged together before being compared to their respective SNV. The data included in these studies are evaluated thoroughly and only those that meet certain conditions are included in the average. For solubility, only studies conducted at 20°C are considered. Hydrolysis studies must be carried out between 19°C and 31°C and at a pH between 6.0 and 8.0. These criteria were chosen to reflect ambient, environmental conditions; experiments carried out under extreme temperatures or pH might not be an accurate reflection of a pesticide's fate in the field. Soil adsorption, aerobic soil metabolism, and anaerobic soil metabolism do not have similar requirements.

Currently, A.I.s are placed on the GWPL if they have the potential to pollute groundwater using SNVs for physical and chemical characteristics identified in FAC section 13144(a) and if the following are true about their application method:

- applied to or injected into the soil by ground-based application equipment or by chemigation, or
- the application is followed, within 72 hours, by flood or furrow irrigation

As part of the 2015 PCPA amendment, DPR is reevaluating the procedure for placing A.I.s on the GWPL. DPR developed a more discriminating statistical approach to identify potential leachers. This procedure has undergone scientific peer review and will replace the SNVs.

Table 1. Pesticide active ingredients on the Groundwater Protection List and their respective mean physical-chemical values.

Active Ingredient	Registered (R) or Not Registered (NR)	Solubility (ppm) SNV > 3	K _{oc} (cm ³ /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
2,4-D, 2-ethylhexyl ester	R	1	46	34	333	1
2,4-D, diethanolamine salt	R	657,000	46	34	333	39 ^a
2,4-D, dimethylamine salt	R	657,000	46	34	333	39 ^a
2,4-D, isooctyl ester	R	1	46	34	333	1
Acephate	R	818,000	3	3	6	169
Alachlor	NR	200	131	20	5	30 ^a
Aldicarb	NR	5,870	239	2	2	28 ^a
Aminocyclopyrachlor	R	4,650	32	66	Stable	30 ^a
Aminocyclopyrachlor, potassium salt	R	4,650	32	66	Stable	30 ^a
Aminopyralid, triisopropanolamine salt	R	205,000	15	204	363	31 ^a
Atrazine	R	33	93	146	159	30 ^a
Azoxystrobin	R	6	581	112	119	31 ^a
Bensulfuron methyl	R	281	332	75	168	103
Bensulide	R	6	16,600	432	1,890	220
Bentazon, sodium salt	R	530	116	40	365	30 ^a
Bispyribac-sodium	R	73,000	272	50	101	476
Boscalid	R	5	772	347	303	30 ^a
Bromacil	R	929	17	347	73	30 ^a
Carbaryl	R	116	375	6	87	12
Chlorantraniliprole	R	1	330	523	184	30
Chloropicrin	R	2,000	25	3	<10	191 ^a
Chlorothalonil	R	1	1,790	35	8	49 ^a
Chlorsulfuron	R	28,300	35	28	162	1,230
Clomazone	R	1,100	244	66	19	34 ^a
Clothianidin	R	259	160	214	27	33 ^a
Cycloate	R	95	12,900	43	109	30 ^a
Cyprodinil	R	16	1,470	126	183	32 ^a
Dazomet	R	3,630	W ^b	1	14	1
Diazinon	R	60	1,580	40	16	138
Dicamba, diglycolamine salt	R	675,000	5	10	88	30 ^a

Active Ingredient	Registered (R) or Not Registered (NR)	Solubility (ppm) SNV > 3	K _{oc} (cm ³ /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
Dicamba, dimethylamine salt	R	675,000	5	10	88	30 ^a
Dicamba, sodium salt	R	675,000	5	10	88	30 ^a
Dichlobenil	R	21	211	91	1,040	1,810
Dicloran	R	6	804	549	66	72 ^a
Dimethenamid-P	R	1,450	223	20	53	30 ^a
Dimethoate	R	39,800	11	2	22	68
Dimethomorph	R	12	1,360	75	26	30 ^a
Dinotefuran	R	39,800	30	51	77	365
Dithiopyr	R	1	1,040	871	21,700	30 ^a
Diuron	R	36	499	372	995	1,290
EPTC	R	345	170	42	65	30 ^a
Ethofumesate	R	50	150	93	Stable	2,900
Ethoprop	R	843	161	34	130	449
Fenamidone	R	8	388	7	1,120	411
Flazasulfuron	R	1	168	57	24	17
Fludioxonil	R	2	1,610	102	365	30 ^a
Fluopicolide	R	3	337	415	561	330
Flutolanil	R	10	905	852	5,650	30 ^a
Fosetyl-al	R	136,000	325	1	2	30 ^a
Fosthiazate	R	10	55	34	32	135
Halosulfuron-methyl	R	1,650	124	51	23	14
Hexazinone	R	29,800	642	222	232	56 ^a
Imazamox, ammonium salt	R	4,410	58	134	213	30 ^a
Imazapyr, isopropylamine salt	R	11,300	348	507	30	30 ^a
Imazethapyr, ammonium salt	R	351	54	2,410	568	30 ^a
Imidacloprid	R	514	262	997	27	30 ^a
Indaziflam	R	3	496	99	180	30 ^a
Iprodione	R	12	W	64	32	5
Isoxaben	R	2	351	205	30	1,270
Linuron	R	77	341	22	102	262
Malathion	R	125	291	3	30	6

Active Ingredient	Registered (R) or Not Registered (NR)	Solubility (ppm) SNV > 3	K _{oc} (cm ³ /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
Mefenoxam (Metalaxyl-M)	R	26,000	163	60	W	1,000
Mesotrione	R	9,840	56	18	7	30 ^a
Metalaxyl	R	8,410	163	62	68	1,000
Metaldehyde	R	190	35	67	223	6,150
Metconazole	R	30	1710	639	120	33
Methiocarb	R	27	655	64	64	24
Methomyl	R	54,700	43	46	1	30 ^a
Metolachlor	R	493	190	26	61	200
Metribuzin	R	1,030	106	140	276	4,760
Myclobutanil	R	164	518	66	62	30 ^a
Napropamide	R	74	726	455	51	35 ^a
Nitrapyrin	R	72	333	30	59	8
Norflurazon	R	34	617	172	348	2,650
Orthosulfamuron	R	629	538	25	58	24
Oryzalin	R	3	807	63	10	28 ^a
Penoxsulam	R	470	119	57	8	30 ^a
Phorate	R	29	543	3	14	3
Prometon	R	715	124	459	61	1,130
Prometryn	R	33	277	274	316	28 ^a
Propamocarb hydrochloride	R	101,000	619	77	92	30 ^a
Propanil	R	152	518	2	3	5,000
Propiconazole	R	100	656	72	211	30 ^a
Propyzamide	R	13	889	392	762	42 ^a
Prothioconazole	R	768	1760	1	71	30 ^a
Pyraclostrobin	R	2	9,300	136	3	30 ^a
Pyrazon	NR	380	13,800	124	489	30 ^a
Rimsulfuron	R	3,750	49	21	18	7
S-metolachlor	R	480	185	38	61	200
Siduron	NR	22	201	895	3,770	30 ^a
Simazine	R	6	340	110	71	28 ^a
Sulfentrazone	R	400	169	331	3,300	291

Active Ingredient	Registered (R) or Not Registered (NR)	Solubility (ppm) SNV > 3	K_{oc} (cm³/g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
Sulfometuron-methyl	R	4,250	89	52	116	30 ^a
Tebuconazole	R	32	1,000	597	1,260	28 ^a
Tebuthiuron	R	2,600	90	1,220	1,520	395 ^a
Thiamethoxam	R	4,100	64	229	19	6,080
Thiencarbazone-methyl	R	342	100	36	60	146
Thiobencarb	R	28	530	37	306	160 ^a
Thiophanate-methyl	R	25	225	1	2	41
Triadimefon	R	64	365	6	23	1,760
Triallate	R	3	60	47	20	1,170
Triclopyr, butoxyethyl ester	R	7	62	13	27	7
Triclopyr, triethylamine salt	R	234,000	62	13	1,600	274 ^a
Triflumizole	R	18	1,240	23	67	116
Triticonazole	R	8	523	220	235	30 ^a

^a No degradation occurred during the study. The half-life is greater than the value listed, which is the length of the study.

^b Study has been waived.

Table 2. Pesticide sales and use reported during 2020 and 2021 for pesticide active ingredients on the Groundwater Protection List and a description of their use (CDPR, 2023a; CDPR, 2023b; Meister, 2012; Tomlin, 2003).

Active Ingredient (A.I.)	Registered (R) or Not Registered (NR)	2020 Pounds A.I. Sold	2020 Pounds A.I. Applied	2021 Pounds A.I. Sold	2021 Pounds A.I. Applied	Use	Description
2,4-D, 2-ethylhexyl ester	R	41,531	20,374	18,871	18,082	Herbicide	Selective, systemic
2,4-D, diethanolamine salt	R	6,687	3,383	11,800	2,900	Herbicide	Selective, systemic
2,4-D, dimethylamine salt	R	925,298	357,106	1,323,048	330,765	Herbicide	Selective, systemic
2,4-D, isooctyl ester	R	12,154	373	13,189	615	Herbicide	Selective, systemic
Acephate	R	207,455	123,746	170,157	121,348	Insecticide	Contact, systemic
Alachlor	NR	0	0	0	9	Herbicide	Pre-emergent
Aldicarb	NR	0	0	0	0	Insecticide	Broad spectrum
Aminocyclopyrachlor	R	0	112	480	123	Herbicide	Selective, systemic
Aminocyclopyrachlor, potassium salt	R	3,844	4,951	7,661	3,724	Herbicide	Selective, systemic
Aminopyralid, triisopropanolamine salt	R	46,318	33,274	83,758	22,870	Herbicide	Broadleaf control
Atrazine	R	24,465	20,679	20,332	15,941	Herbicide	Selective, residual
Azoxystrobin	R	189,222	290,372	255,394	252,962	Fungicide	Foliar
Bensulfuron methyl	R	532	533	0	209	Herbicide	Selective
Bensulide	R	397,092	336,684	398,175	341,080	Herbicide	Selective, pre-emergent
Bentazon, sodium salt	R	14,210	7,256	12,074	7,120	Herbicide	Selective, pre-emergent
Bispyribac-sodium	R	14,988	6,137	11,573	4,179	Herbicide	Selective, post-emergent
Boscalid	R	149,638	123,625	180,404	119,823	Fungicide	Broad spectrum
Bromacil	R	15,417	16,437	4,151	15,064	Herbicide	Pre-emergent
Carbaryl	R	149,857	110,403	155,705	99,400	Insecticide	Broad spectrum
Chlorantraniliprole	R	80,890	187,651	67,163	198,942	Insecticide	Soil, foliar
Chloropicrin	R	23,206,402	8,371,470	8,727,411	8,506,655	Fumigant	Space, commodity, soil
Chlorothalonil	R	355,638	1,149,824	262,535	915,058	Fungicide	Broad spectrum, protectant
Chlorsulfuron	R	25	2,356	2	2,140	Herbicide	Selective
Clomazone	R	19,413	42,818	1,880	29,701	Herbicide	Broad spectrum, pre-emergent
Clothianidin	R	26,157	24,450	20,180	12,987	Insecticide	Systemic
Cycloate	R	55,169	41,520	44,405	41,710	Herbicide	Selective, preplant
Cyprodinil	R	101,343	138,325	115,540	119,547	Fungicide	Systemic
Dazomet	R	59,937	22,048	78,344	43,421	Fumigant	Preplant

Active Ingredient (A.I.)	Registered (R) or Not Registered (NR)	2020 Pounds A.I. Sold	2020 Pounds A.I. Applied	2021 Pounds A.I. Sold	2021 Pounds A.I. Applied	Use	Description
Diazinon	R	114,142	45,569	95,675	36,397	Insecticide/nematicide	Soil/foliar/seed
Dicamba, diglycolamine salt	R	47,019	35,130	98,694	31,987	Herbicide	Selective, systemic
Dicamba, dimethylamine salt	R	89,443	11,654	60,115	6,215	Herbicide	Selective, systemic
Dicamba, sodium salt	R	6,717	4,252	4,874	4,084	Herbicide	Selective, systemic
Dichlobenil	R	85,966	79,751	16,976	85,647	Herbicide	Selective, cellulose
Dicloran	R	21,666	21,465	20,150	18,110	Fungicide	Pre/post-harvest
Dimethenamid-P	R	19,113	16,363	173,028	15,958	Herbicide	Selective, pre-emergent
Dimethoate	R	105,058	150,757	50,351	92,231	Insecticide/acaricide	Systemic
Dimethomorph	R	70,237	22,265	114,977	24,456	Fungicide	Selective, post-emergent
Dinotefuran	R	35,920	78,961	28,928	63,682	Insecticide	Selective, systemic
Dithiopyr	R	69,341	57,399	161,968	47,733	Herbicide	Pre/post-emergent
Diuron	R	322,876	163,195	421,177	111,737	Herbicide	Selective, general
EPTC	R	261,019	177,457	177,880	132,576	Herbicide	Selective
Ethofumesate	R	13,273	12,510	23,986	9,177	Herbicide	Selective
Ethoprop	R	13,664	7,792	21,435	9,490	Insecticide/nematicide	Soil
Fenamidone	R	17,467	21,276	2,432	20,505	Fungicide	Broad spectrum, foliar, soil
Flazasulfuron	R	214	1,409	272	1,453	Herbicide	Systemic, pre/post-emergent
Fludioxonil	R	37,598	44,385	42,709	46,024	Fungicide	Contact
Fluopicolide	R	27,213	6,194	23,747	4,542	Fungicide	Foliar, soil
Flutolanil	R	4,862	5,038	1,745	5,706	Fungicide	Systemic
Fosetyl-AL, technical	R	175,427	157,517	170,696	144,344	Fungicide	Systemic, preventative
Fosthiazate	R	0	0	0	0	Nematicide	Systemic
Halosulfuron-methyl	R	5,846	10,972	5,202	11,424	Herbicide	Pre/post-emergent
Hexazinone	R	2,991	60,373	2,440	59,840	Herbicide	Contact, residual
Imazamox, ammonium salt	R	5,138	5,617	19,940	5,032	Herbicide	Selective, post-emergent
Imazapyr, isopropylamine salt	R	50,706	40,028	44,567	50,948	Herbicide	Broad-spectrum, systemic
Imazethapyr, ammonium salt	R	5,810	5,471	12,292	4,389	Herbicide	Selective, pre/post-emergent
Imidacloprid	R	522,962	378,658	756,620	330,718	Insecticide	Systemic
Indaziflam	R	49,419	41,825	31,276	38,582	Herbicide	Soil, pre-emergent
Iprodione	R	346,037	79,230	162,117	63,808	Fungicide	Contact

Active Ingredient (A.I.)	Registered (R) or Not Registered (NR)	2020 Pounds A.I. Sold	2020 Pounds A.I. Applied	2021 Pounds A.I. Sold	2021 Pounds A.I. Applied	Use	Description
Isoxaben	R	29,725	32,316	71,979	30,247	Herbicide	Soil, pre-emergent
Linuron	R	69,088	47,997	61,831	44,474	Herbicide	Selective
Malathion	R	423,455	359,324	437,098	251,759	Insecticide	Nonsystemic foliar
Mefenoxam	R	60,452	96,712	170,951	87,832	Fungicide	Seed treatment, soil, foliar
Mesotrione	R	1,061	18,998	6,368	15,865	Herbicide	Foliar, pre/post-emergent
Metalaxyl	R	1,006	1,433	553	2,866	Fungicide	Seed treatment, soil, foliar
Metaldehyde	R	63,218	34,469	51,694	30,720	Molluscicide	Contact
Metconazole	R	86,082	59,260	83,112	44,318	Fungicide	Systemic
Methiocarb	R	3,570	1,327	294	1,002	Insecticide/acaricide	Nonsystemic
Methomyl	R	263,811	258,553	258,271	235,595	Insecticide	Broad spectrum
Metolachlor	R	36,981	41,898	36,494	29,023	Herbicide	Selective, pre-emergent
Metribuzin	R	15,106	33,573	34,173	31,669	Herbicide	Selective, systemic
Myclobutanil	R	17,725	42,397	18,259	38,941	Fungicide	Systemic, broad spectrum
Napropamide	R	25,001	15,877	38,664	16,741	Herbicide	Selective, pre-emergent
Nitrapyrin	R	0	0	297	106	Nitrification inhibitor	Selective
Norflurazon	R	0	3,393	0	2,109	Herbicide	Selective, preplant
Orthosulfamuron	R	0	0	0	1,036	Herbicide	Selective, post-emergent
Oryzalin	R	29,763	131,582	11,256	36,578	Herbicide	Selective, pre-emergent
Penoxsulam	R	8,426	6,997	10,682	5,827	Herbicide	Post-emergent
Phorate	R	15,304	17,841	14,864	10,604	Insecticide	Systemic, soil
Prometon	R	48	0	71	0	Herbicide	Pre/post-emergent
Prometryn	R	24,857	47,737	51,660	46,811	Herbicide	Selective, pre/post-emergent
Propamocarb hydrochloride	R	67,280	72,817	100,247	69,305	Fungicide	Selective
Propanil	R	3,029,743	2,068,395	2,844,306	1,968,013	Herbicide	Contact, post-emergent
Propiconazole	R	91,136	123,903	89,721	102,577	Fungicide	Foliar
Propyzamide	R	135,557	118,921	197,516	114,751	Herbicide	Pre-, post-emergent
Prothioconazole	R	4	0	0	0	Fungicide	Foliar, soil, seed treatment
Pyraclostrobin	R	161,797	125,798	406,882	121,329	Fungicide	Foliar, respiration inhibitor
Pyrazon	NR	0	0	0	0	Herbicide	Pre/early post-emergent
Rimsulfuron	R	34,596	38,962	13,735	37,663	Herbicide	Selective, systemic

Active Ingredient (A.I.)	Registered (R) or Not Registered (NR)	2020 Pounds A.I. Sold	2020 Pounds A.I. Applied	2021 Pounds A.I. Sold	2021 Pounds A.I. Applied	Use	Description
S-metolachlor	R	374,733	302,381	537,620	292,504	Herbicide	Selective, preplant
Siduron	NR	939	843	0	946	Herbicide	Selective, pre-emergent
Simazine	R	90,469	71,561	147,668	57,984	Herbicide	Selective
Sulfentrazone	R	28,473	3,226	72,657	4,078	Herbicide	Selective, pre/post-emergent
Sulfometuron-methyl	R	1,426	7,703	983	10,031	Herbicide	Contact, residual
Tebuconazole	R	177,183	135,991	111,153	128,525	Fungicide	Systemic
Tebuthiuron	R	1,121	2,675	985	2,223	Herbicide	Nonselective
Thiamethoxam	R	46,799	50,659	134,938	40,435	Insecticide	Systemic
Thiencarbazono-methyl	R	49	18	69	21	Herbicide	Selective, post-emergent
Thiobencarb	R	751,233	595,147	360,228	394,055	Herbicide	Pre/post-emergent
Thiophanate-methyl	R	202,331	167,428	179,875	154,521	Fungicide	Systemic, broad spectrum
Triadimefon	R	348	957	469	903	Fungicide	Systemic
Triallate	R	0	287	490	898	Herbicide	Selective, pre-emergent
Triclopyr, butoxyethyl ester	R	144,572	71,607	213,359	46,487	Herbicide	Systemic, post-emergent
Triclopyr, triethylamine salt	R	237,657	252,978	197,466	185,877	Herbicide	Systemic, post-emergent
Triflumizole	R	25,899	24,795	35,018	17,059	Fungicide	Systemic, broad spectrum
Triticonazole	R	785	662	468	601	Fungicide	Systemic, broad spectrum
Total	105	35,409,634	18,667,814	21,734,926	17,418,079		

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