

**2011 STATUS REPORT  
PESTICIDE CONTAMINATION  
PREVENTION ACT**

Annual Report



California Environmental Protection Agency  
DEPARTMENT OF PESTICIDE REGULATION

March 2012

Report PCPA11

**2011 Status Report  
Pesticide Contamination  
Prevention Act**

**Rick Bergin  
Environmental Scientist**

March 2012

California Environmental Protection Agency  
Department of Pesticide Regulation  
Environmental Monitoring Branch  
P.O. Box 4015  
Sacramento, California 95812-4015  
916-324-0827

Report PCPA11

## **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 Web site:

- 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 with data exceeding specific numerical values (SNVs).
- The sales and use information for the pesticides that exceed the SNVs.

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 SNVs established by DPR have a greater potential to contaminate groundwater because they are both mobile and persistent in the environment.

The 2011 Status Report lists 244 A.I.s that exceed the SNVs, of which 189 are currently registered for use in California. The list includes all pesticides for which there are data on file and that are, or have been, registered for agricultural use. In many cases, an A.I. that is no longer registered for sale in California may still be used until the existing stock is depleted. Occasionally, registrants may propose new uses for an A.I. that is no longer registered. Since the current or potential uses of previously registered A.I.s could threaten groundwater, DPR continues to include them in the list.

There are no data gaps for the listed pesticides; the data requirements for registration are satisfied. As compared to the previous list (2010), the current report includes eight additional A.I.s that exceed the SNVs. 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.

### ***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 Groundwater Protection List (GWPL) (Title 3, California Code of Regulations [3 CCR] section 6800) to identify pesticides that have been found in groundwater and those that pose a risk to groundwater. 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 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 as a result of agricultural use, the PCPA establishes procedures for modifying or canceling the use of such pesticides to mitigate or prevent further pollution.

**TABLE OF CONTENTS**

EXECUTIVE SUMMARY ..... i  
    SUMMARY ..... i  
    BACKGROUND..... i  
TABLE OF CONTENTS ..... iii  
LIST OF TABLES..... iii  
REPORT REQUIREMENTS PURSUANT TO THE PESTICIDE CONTAMINATION  
PREVENTION ACT .....1  
    SECTION 1: STATUS OF THE GROUNDWATER PROTECTION DATA GAPS ..... 2  
    SECTION 2: PHYSICAL-CHEMICAL PARAMETERS, SALES, USE, AND MODE OF  
    ACTION FOR ACTIVE INGREDIENTS EXCEEDING THE SPECIFIC NUMERICAL  
    VALUES ..... 2  
REFERENCES .....25

**LIST OF TABLES**

TABLE 1. A.I.S EXCEEDING THE SNVS AND THEIR RESPECTIVE MEAN  
    PHYSICAL-CHEMICAL VALUES (2011 REPORT). ..... 5  
TABLE 2. PESTICIDE SALES AND USE REPORTED DURING 2010 FOR  
    A.I.S EXCEEDING THE SNVS (2011 REPORT)..... 13  
TABLE 3. DESCRIPTION OF USE FOR CURRENTLY REGISTERED A.I.S  
    EXCEEDING THE SNVS (2011 REPORT). ..... 19

## **REPORT REQUIREMENTS PURSUANT TO THE PESTICIDE CONTAMINATION PREVENTION ACT**

Food and Agricultural Code (FAC) section 13144(b) requires DPR to annually post the following information to the department's Web site 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. A list of pesticides that contain an A.I., other specified ingredient, or degradation product of a pesticide A.I. that is greater than one or more of the numerical values established pursuant to PCPA, or is less than the numerical value in the case of the soil adsorption coefficient, in both of the following categories:
  - (a) Water solubility or soil adsorption coefficient ( $K_{oc}$ ).
  - (b) Hydrolysis, aerobic soil metabolism, anaerobic soil metabolism, or field dissipation.
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.

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 Exceeding the Specific Numerical Values," which lists the properties of pesticides identified as potential leachers 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. The number of pesticides subject to the data call-in at that time was 147. 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 studies.
- Octanol-water partition coefficient (KOW).
- Soil photolysis.
- A field dissipation study.
- A study required by the PCPA that will be redone to correct errors or a study conducted under California conditions or guidelines, if 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. Missing values in the database, indicated by a NA (not available) in Table 1, arise from deficiencies in the upkeep of the database itself, not data gaps, and are currently under investigation.

## ***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 found in ground water tend to be more mobile and persistent than those not found in ground water. 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 found in groundwater as a result of legal agricultural use (nonleachers). 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 was tested for their usefulness in discriminating between leachers and nonleachers 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 nonleachers. The SNVs for these properties were established as those values that would identify as leachers 90 percent of the chemicals found 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) $K_{oc}$                            | 1900 $\text{cm}^3/\text{g}$ |
| (c) Hydrolysis half-life                | 14 days                     |
| (d) Aerobic soil metabolism half-life   | 610 days                    |
| (e) Anaerobic soil metabolism half-life | 9 days                      |

The FAC section 13144 requires SNVs to be at least equal to those established by the U.S. Environmental Protection Agency (EPA). The U.S. EPA has yet to establish an SNV for field dissipation half-life. DPR will establish a SNV for field dissipation half-life once the U.S. EPA implements a value for this parameter

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<sup>0</sup> C are considered. Hydrolysis studies must be carried out between 19<sup>0</sup> C and 31<sup>0</sup> C and at a pH between 6.0 and 8.0. Soil adsorption, aerobic soil metabolism, and anaerobic soil metabolism do not have similar requirements. 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.

Pursuant to FAC sections 13144(b) and 13145(d), pesticide A.I.s are placed on a list of potential leachers if both their mobility and persistence parameter values exceed (or are less than in the case of the  $K_{oc}$ ) the corresponding SNVs. Pesticides are then placed on the GWPL (3 CCR 6800[b]) if any of 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.



Table 1 is a list of AIs that exceed the SNVs and their respective mean physical-chemical values.

Eight A.I.s are new to the 2011 list of AIs that exceed the SNVs. They fall into one of two categories:

1. Newly registered A.I.s added:

- Imazosulfuron (herbicide)
- Indaziflam (herbicide)
- Metconazole (fungicide)
- Prothioconazole (fungicide)
- Pyroxsulam (herbicide)
- Tembotrione (herbicide)
- Zoxamide (fungicide)

2. Previously registered A.I.s added after additional data was entered into the database:

- Aminopyralid, triisopropanolamine salt (herbicide)

PCPA section 13144(b) also requires DPR to provide, for each A.I. in Table 1, the amount sold in California, and where and for what purpose it was used. The 2010 pesticide sales and use data are shown in Table 2. Information on the A.I.s and their modes of action can be found in Table 3.

DPR's Registration Branch's Web site, available at

<<http://www.cdpr.ca.gov/docs/registration/regmenu.htm>>, provides updated information on the status of pesticide A.I.s and their respective products. For more information on where pesticides are applied, and in what amounts, please go to DPR's Pesticide Use Reporting Web site, available at <<http://www.cdpr.ca.gov/docs/pur/purmain.htm>>.

**Table 1. A.I.s exceeding the SNVs and their respective mean physical-chemical values (2011 Report).**

A.I.	Currently Registered	Solubility (ppm) SNV > 3	K <sub>oc</sub> (cm <sup>3</sup> /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
2,4-D	X	27,600	46	34	333	39 <sup>a</sup>
2,4-D, 2-ethylhexyl ester	X	1	46	34	333	1
2,4-D, alkanolamine salts		657,000	46	34	333	39 <sup>a</sup>
2,4-D, butoxyethanol ester	X	1	46	34	333	1
2,4-D, butyl ester		9	46	34	333	1
2,4-D, diethanolamine salt	X	657,000	46	34	333	39 <sup>a</sup>
2,4-D, diethylamine salt		657,000	46	34	333	39 <sup>a</sup>
2,4-D, dimethylamine salt	X	657,000	46	34	333	39 <sup>a</sup>
2,4-D, isooctyl ester	X	1	46	34	333	1
2,4-D, isopropyl ester	X	1	46	34	333	1
2,4-D, n-oleyl-1,3-propylenediamine salt		657,000	46	34	333	39 <sup>a</sup>
2,4-D, octyl ester		1	46	34	333	1
2,4-D, triethylamine salt		657,000	46	34	333	39 <sup>a</sup>
2,4-D, triisopropanolamine salt	X	657,000	46	34	333	39 <sup>a</sup>
2,4-D, triisopropylamine salt	X	657,000	46	34	333	39 <sup>a</sup>
4-(2,4-DB), dimethylamine salt	X	742,000	191	25	269	35
Acephate	X	818,000	3	3	6	169
Acetamiprid	X	3,660	343	10	330	35 <sup>a</sup>
Acibenzolar-s-methyl	X	8	1,100	4	50	76
Alachlor	X	200	131	20	5	30 <sup>a</sup>
Aldicarb	X	5,870	239	2	2	28 <sup>a</sup>
Ametryne		204	245	37	189	28
Aminopyralid, triisopropanolamine salt <sup>c</sup>	X	207,000	15	204	363	31 <sup>a</sup>
Amitrole		370,000	121	4	186	34
Anilazine		8	2,210	1	41	19
Atrazine	X	33	93	146	159	30 <sup>a</sup>
Azinphos-methyl	X	28	882	44	68	19
Azoxystrobin	X	6	581	112	119	31 <sup>a</sup>
Bensulfuron methyl	X	281	332	75	168	103
Bensulide	X	6	16,600	432	1,890	220
Bentazon, sodium salt	X	530	116	40	365	30 <sup>a</sup>

A.I.	Currently Registered	Solubility (ppm) SNV > 3	K <sub>oc</sub> (cm <sup>3</sup> /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
Bifenazate	X	4	4,060	1	78	1
Bispyribac-sodium	X	73,000	272	50	101	476
Boscalid	X	5	772	347	303	30 <sup>a</sup>
Bromacil	X	929	17	347	73	30 <sup>a</sup>
Bromoxynil butyrate		27	202	NA <sup>b</sup>	NA	52
Bromoxynil heptanoate	X	27	202	3	4	52
Bromoxynil octanoate	X	13	202	3	4	28
Butylate		44	397	70	64	533
Cacodylic acid		2,570,000	2,660	NA	365	35 <sup>a</sup>
Calcium acid methanearsonate		1,040,000	1,680	269	766	35 <sup>a</sup>
Carbaryl	X	116	375	6	87	12
Carbofuran		351	25	22	20	18
Chlorantraniliprole	X	1	330	523	184	30
Chloropicrin	X	2,000	25	3	NA	191 <sup>a</sup>
Chlorothalonil	X	1	1,790	35	8	49 <sup>a</sup>
Chlorsulfuron	X	28,300	35	28	162	1,230
Clethodim	X	6,630	116	3	191	30 <sup>a</sup>
Clomazone	X	1,100	244	66	19	34 <sup>a</sup>
Clopyralid	X	106,000	5	152	365	30 <sup>a</sup>
Clopyralid, monoethanolamine salt	X	106,000	5	152	365	30 <sup>a</sup>
Clopyralid, triethylamine salt	X	106,000	5	152	365	30 <sup>a</sup>
Clothianidin	X	259	160	214	27	33 <sup>a</sup>
Cyanazine		155	188	15	108	3,680
Cycloate	X	95	12,900	43	109	30 <sup>a</sup>
Cyprodinil	X	16	1,470	126	183	32 <sup>a</sup>
Cyromazine	X	13,600	756	63	97	28 <sup>a</sup>
D-trans Allethrin	X	5	1,410	32	35	547
Dazomet	X	3,630	W <sup>d</sup>	1	14	1
Diazinon	X	60	1,580	40	16	138
Dicamba	X	27,200	5	10	88	30 <sup>a</sup>
Dicamba, diethanolamine salt		675,000	5	10	88	30 <sup>a</sup>
Dicamba, diglycolamine salt	X	675,000	5	10	88	30 <sup>a</sup>
Dicamba, dimethylamine salt	X	675,000	5	10	88	30 <sup>a</sup>

<b>A.I.</b>	<b>Currently Registered</b>	<b>Solubility (ppm) SNV &gt; 3</b>	<b>K<sub>oc</sub> (cm<sup>3</sup>/g) SNV &lt; 1,900</b>	<b>Aerobic metabolism (days) SNV &gt; 610</b>	<b>Anaerobic metabolism (days) SNV &gt; 9</b>	<b>Hydrolysis (days) SNV &gt; 14</b>
Dicamba, monoethanolamine salt		675,000	5	10	88	30 <sup>a</sup>
Dicamba, potassium salt	X	24,900	5	10	88	30 <sup>a</sup>
Dicamba, sodium salt	X	675,000	5	10	88	30 <sup>a</sup>
Dichlobenil	X	21	0	NA	NA	1,810
Dichlorprop-P, dimethylamine salt	X	130,000	16	14	159	30 <sup>a</sup>
Dichlorprop-P, isooctyl ester	X	130,000	16	14	159	30 <sup>a</sup>
Dicloran	X	6	804	549	66	72 <sup>a</sup>
Dicrotophos		NA	74	5	NA	72
Diethatyl-ethyl		120	178	NA	NA	33
Difenoconazole	X	15	6,120	318	361	1,730
Difenzoquat methyl sulfate		817,000	74,100	1,600	6,810	30 <sup>a</sup>
Diflufenzopyr, sodium salt	X	4,200	292	55	164	24
Dimethenamid-P	X	1,450	223	20	53	30 <sup>a</sup>
Dimethipin		4,600	11	NA	1280	60 <sup>a</sup>
Dimethoate	X	39,800	11	2	22	68
Dimethomorph	X	12	1,360	75	26	30 <sup>a</sup>
Dinotefuran	X	39,800	30	51	77	365
Diphenamid		210	107	249	642	31
Diquat dibromide	X	677,000	353,000	3,450	1,060	30 <sup>a</sup>
Disulfoton		12	522	9	NA	177
Dithiopyr	X	1	1,040	871	21,700	NA
Diuron	X	36	499	372	995	1,290
Dodecyl ammonium methanearsonate		1,040,000	1,680	269	766	35
Dodemorph acetate		419	20,200	NA	NA	3,810
Dodine	X	1040	2,570,000	7	365	914
DSMA		1,040,000	1,680	269	766	35
Emamectin benzoate	X	101	283,000	211	427	42 <sup>a</sup>
Endothall, dipotassium salt	X	6310	750	9	8	36 <sup>a</sup>
Endothall, disodium salt		110,000	750	9	8	36 <sup>a</sup>
Endothall, mono (N,N-dimethyl alkylamine) salt	X	6310	750	9	8	36 <sup>a</sup>
EPTC	X	345	170	42	65	30 <sup>a</sup>
Ethofumesate	X	50	150	93	Stable	2,900
Ethoprop	X	843	161	34	130	449

<b>A.I.</b>	<b>Currently Registered</b>	<b>Solubility (ppm) SNV &gt; 3</b>	<b>K<sub>oc</sub> (cm<sup>3</sup>/g) SNV &lt; 1,900</b>	<b>Aerobic metabolism (days) SNV &gt; 610</b>	<b>Anaerobic metabolism (days) SNV &gt; 9</b>	<b>Hydrolysis (days) SNV &gt; 14</b>
Fenamidone	X	8	388	7	1,120	411
Fenamiphos		482	341	24	88	301
Fenarimol	X	15	757	1,100	1,620	28
Fenhexamid	X	150	853	1	97	30 <sup>a</sup>
Fenoxycarb	X	6	1,540	85	136	3,140
Fensulfothion		NA	621	NA	NA	144
Fenthion		4	1,870	NA	NA	41
Fipronil	X	22	749	366	123	30 <sup>a</sup>
Flonicamid	X	5,200	13	1	161	30 <sup>a</sup>
Fluazifop-butyl		1	1,770	1	3	30 <sup>a</sup>
Fluazifop-P-butyl	X	1	1,770	1	3	30 <sup>a</sup>
Fludioxonil	X	2	1,610	102	365	30 <sup>a</sup>
Fluometuron		111	80	11	29	469
Fluopicolide	X	3	337	415	561	330
Flurprimidol	X	127	314	NA	3,620	153,000
Flutolanil	X	10	905	852	5,650	30 <sup>a</sup>
Fonofos		17	888	93	183	432
Foramsulfuron	X	32,600	78	28	31	128
Forchlorfenuron	X	39	1,760	578	226	30 <sup>a</sup>
Formetanate hydrochloride	X	822,000	371	8	15	1
Fosetyl-al	X	136,000	325	1	2	30 <sup>a</sup>
Glufosinate-ammonium	X	1,370,000	785	20	37	30 <sup>a</sup>
Glyphosate	X	11,600	6,920	96	22	35 <sup>a</sup>
Glyphosate, isopropylamine salt	X	11,600	6,920	96	22	35 <sup>a</sup>
Glyphosate-trimesium		3,310,000	24,700	6	52	796
Halosulfuron-methyl	X	1,650	124	51	23	14
Hexazinone	X	29,800	642	222	232	56 <sup>a</sup>
Imazamox, ammonium salt	X	4,410	58	134	213	30 <sup>a</sup>
Imazapic		259,000	81	1,200	2,400	30 <sup>a</sup>
Imazapic, ammonium salt	X	259,000	81	1,200	2,400	30 <sup>a</sup>
Imazapyr	X	10,500	348	507	30	30 <sup>a</sup>
Imazapyr, isopropylamine salt	X	11,300	348	507	30	30 <sup>a</sup>
Imazethapyr		351	54	2,410	568	30 <sup>a</sup>

A.I.	Currently Registered	Solubility (ppm) SNV > 3	K <sub>oc</sub> (cm <sup>3</sup> /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
Imazethapyr, ammonium salt	X	351	54	2,410	568	30 <sup>a</sup>
Imazosulfuron <sup>c</sup>	X	1460	241	76	80	382
Imidacloprid	X	514	262	997	27	30 <sup>a</sup>
Indaziflam <sup>c</sup>	X	3	496	99	180	30 <sup>a</sup>
Ipconazole	X	7	2,420	866	NA	30 <sup>a</sup>
Iprodione	X	12	W	64	32	5
Isoxaben	X	2	351	205	30	1,270
Kresoxim-methyl	X	2	437	2	1	34
Linuron	X	77	341	22	102	262
Malathion	X	125	291	3	30	6
Mandipropamid	X	4	859	44	169	30 <sup>a</sup>
MCPA, dimethylamine salt	X	1,470,000	34	24	1,870	30 <sup>a</sup>
MCPP	X	734	26	13	541	31
MCPP, diethanolamine salt		1,060,000	26	13	541	31 <sup>a</sup>
MCPP, dimethylamine salt	X	1,060,000	26	13	541	31
MCPP, potassium salt	X	1,060,000	26	13	541	31
Mecoprop-P	X	869	119	20	NA	30 <sup>a</sup>
Mefenoxam (Metalaxyl-M)	X	26,000	163	60	NA	1,000
Mepiquat chloride	X	500,000	NA	40	359	NA
Mesosulfuron-methyl	X	21	93	39	23	Stable
Metalaxyl	X	8,410	163	62	68	1,000
Metaldehyde	X	190	35	67	223	6,150
Metconazole <sup>c</sup>	X	30	1710	639	120	33
Methamidophos		1,200,000	8	1	NA	21
Methidathion	X	221	341	3	NA	26
Methiocarb	X	27	655	64	64	24
Methomyl	X	54,700	43	46	1	30 <sup>a</sup>
Methoxyfenozide	X	3	501	680	654	30 <sup>a</sup>
Methyl iodide	X	14,200	34	1	2	113
Methyl isothiocyanate	X	8,230	NA	1	NA	20
Methyl parathion	X	70	476	12	1	45
Metiram	X	NA	913	1	15	1,070
Metolachlor	X	493	190	26	61	200

<b>A.I.</b>	<b>Currently Registered</b>	<b>Solubility (ppm) SNV &gt; 3</b>	<b>K<sub>oc</sub> (cm<sup>3</sup>/g) SNV &lt; 1,900</b>	<b>Aerobic metabolism (days) SNV &gt; 610</b>	<b>Anaerobic metabolism (days) SNV &gt; 9</b>	<b>Hydrolysis (days) SNV &gt; 14</b>
Metribuzin	X	1,030	106	140	276	4,760
Metsulfuron-methyl		NA	57	24	65	30 <sup>a</sup>
Mevinphos		2,000	72	5	17	25
Milbemectin	X	4	2,820	30	241	30 <sup>a</sup>
Molinate		970	199	41	105	1,560
MSMA	X	1,040,000	1,680	269	766	35 <sup>a</sup>
Myclobutanil	X	NA	518	66	62	30 <sup>a</sup>
Napropamide	X	74	726	455	51	35 <sup>a</sup>
Naptalam, sodium salt		249,000	1,170	NA	241	878
Nicosulfuron	X	18,500	37	26	63	30 <sup>a</sup>
Nitrapyrin	X	72	333	30	59	8
Norflurazon	X	34	617	172	348	2,650
Octylammonium methanearsonate		1,040,000	1,680	269	766	35 <sup>a</sup>
Orthosulfamuron	X	629	538	25	58	24
Oryzalin	X	3	807	63	10	28 <sup>a</sup>
Oxydemeton-methyl	X	miscible	30	6	4	40
Paraquat dichloride	X	626,000	NA	620	644	30 <sup>a</sup>
Parathion		13	1,610	58	21	302
Pebulate		100	457	108	257	234
Penoxsulam	X	470	119	57	8	30 <sup>a</sup>
Phenmedipham	X	6	NA	54	47	1
Phorate	X	29	543	3	14	3
Phosalone		3	2,870	NA	NA	51
Phosmet	X	20	3,760	7	27	1
Phosphamidon		NA	66	1	NA	65
Piperalin	X	20	23,600	NA	NA	16
Piperonyl butoxide	X	14	1,810	79	927	251
Profenofos	X	28	2,010	2	3	43
Prohexadione calcium	X	179	570	NA	NA	65
Prometon	X	718	124	459	61	1,130
Prometryn	X	33	277	274	316	28 <sup>a</sup>
Propamocarb hydrochloride	X	101,000	619	77	92	30 <sup>a</sup>
Propanil	X	152	518	2	3	5,000

A.I.	Currently Registered	Solubility (ppm) SNV > 3	K <sub>oc</sub> (cm <sup>3</sup> /g) SNV < 1,900	Aerobic metabolism (days) SNV > 610	Anaerobic metabolism (days) SNV > 9	Hydrolysis (days) SNV > 14
Propiconazole	X	100	656	72	211	30 <sup>a</sup>
Propyzamide	X	13	889	392	762	42 <sup>a</sup>
Prothioconazole <sup>c</sup>	X	768	1760	1	71	30 <sup>a</sup>
Pymetrozine	X	290	1,100	491	91	30 <sup>a</sup>
Pyraclostrobin	X	20	9,300	136	3	30 <sup>a</sup>
Pyrazon	X	380	13,800	124	489	30 <sup>a</sup>
Pyridate		1	55	39	30	1
Pyrithiobac-sodium	X	728,000	14	60	128	35 <sup>a</sup>
Pyroxsulam <sup>c</sup>	X	4240	32	19	32	32
Quinclorac	X	72	37	211	364	30 <sup>a</sup>
Rimsulfuron	X	3,750	49	21	18	7
S-metolachlor	X	480	185	38	61	200
Saflufenacil	X	2,100	27	75	29	270
Sethoxydim	X	6,950	47	7	25	47
Siduron	X	22	201	895	3,770	30 <sup>a</sup>
Simazine	X	6	340	110	71	28 <sup>a</sup>
Spinetoram	X	216	1,510	40	365 <sup>a</sup>	30 <sup>a</sup>
Sulfentrazone	X	400	169	331	3,300	291
Sulfometuron-methyl	X	4,250	89	52	116	30 <sup>a</sup>
Sulfosulfuron	X	710	33	33	136	168
Sulprofos		1	781	77	NA	485
Tebuconazole	X	32	1,000	597	1,260	28 <sup>a</sup>
Tebufenozide	X	1	605	405	179	30 <sup>a</sup>
Tebuthiuron	X	2,600	90	1,220	1,520	395 <sup>a</sup>
Tembotrione <sup>c</sup>	X	19400	110	83	273	30
Terbacil		723	56	520	178	42 <sup>a</sup>
Terbutryn		22	5,600	70	37	354
Terrazole (Etridiazole)	X	105	107	19	1	92
Tetraconazole	X	187	4,680	364 <sup>a</sup>	180 <sup>a</sup>	30 <sup>a</sup>
Thiamethoxam	X	4,100	64	229	NA	6,080
Thiazopyr		2	204	274	338	30 <sup>a</sup>
Thifensulfuron-methyl		5,100	29	NA	27	182
Thiobencarb	X	28	530	37	306	160 <sup>a</sup>



<b>A.I.</b>	<b>Currently Registered</b>	<b>Solubility (ppm) SNV &gt; 3</b>	<b>K<sub>oc</sub> (cm<sup>3</sup>/g) SNV &lt; 1,900</b>	<b>Aerobic metabolism (days) SNV &gt; 610</b>	<b>Anaerobic metabolism (days) SNV &gt; 9</b>	<b>Hydrolysis (days) SNV &gt; 14</b>
Thiophanate-methyl	X	25	225	1	2	41
Tralkoxydim		6	131	5	NA	112
Triadimefon	X	64	365	6	23	1,760
Triallate	X	3	60	47	20	1,170
Triclopyr, butoxyethyl ester	X	7	62	13	27	7
Triclopyr, triethylamine salt	X	234,000	62	13	1,600	NA
Trifloxysulfuron-sodium	X	26	1,770	55	24	20
Triflumizole	X	18	1,240	23	67	116
Triflusulfuron-methyl	X	2,820	61	89	23	32 <sup>a</sup>
Trinexapac-ethyl	X	11,400	440	0	13	456
Triticonazole	X	8	523	220	235	30 <sup>a</sup>
Uniconazole-P	X	8	W	583	W	30 <sup>a</sup>
Vernolate		108	83	83	61	722
Vinclozolin	X	3	260	28	15	1
Zoxamide <sup>c</sup>	X	1	1190	19	14	16

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

<sup>b</sup> Not available; currently under investigation.

<sup>c</sup> New A.I.; these A.I.s were not listed in the 2010 report.

<sup>d</sup> Study has been waived.

**Table 2. Pesticide sales and use reported during 2010 for A.I.s exceeding the SNVs (2011 Report).**

<b>A.I.</b>	<b>Currently Registered</b>	<b>Pounds A.I. Sold</b>	<b>Pounds A.I. Applied</b>
2,4-D	X	125,191.5	12,525.0
2,4-D, 2-ethylhexyl ester	X	41,532.5	73,826.6
2,4-D, alkanolamine salts		0.0	516.2
2,4-D, butoxyethanol	X	5,739.4	1,368.3
2,4-D, butyl ester		0.0	2.7
2,4-D, diethanolamine salt	X	10,224.0	6,840.3
2,4-D, diethylamine salt		0.0	0.0
2,4-D, dimethylamine salt	X	1,193,169.2	487,125.4
2,4-D, isooctyl ester	X	39,410.0	4,213.6
2,4-D, isopropyl ester	X	12,400.9	11,603.4
2,4-D, n-oleyl-1,3-propylenediamine salt		0.0	0.0
2,4-D, octyl ester		0.0	0.0
2,4-D, triethylamine salt		0.0	2,828.6
2,4-D, triisopropanolamine salt	X	2,673.9	2,092.3
2,4-D, triisopropylamine salt	X	1,534.0	1,613.1
4-(2,4-DB), dimethylamine salt	X	67,552.2	37,478.0
Acephate	X	199,613.4	134,972.6
Acetamiprid	X	38,946.4	26,654.6
Acibenzolar-s-methyl	X	1,913.9	1,819.5
Alachlor	X	14,312.3	9,935.6
Aldicarb	X	110,659.5	64,626.2
Ametryne		0.0	0.0
Aminopyralid, triisopropanolamine salt	X	21,413.2	24,072.8
Amitrole		0.0	3.7
Anilazine		0.0	1.3
Atrazine	X	35,272.0	28,937.1
Azinphos-methyl	X	2,400.0	1,618.9
Azoxystrobin	X	157,913.2	118,019.8
Bensulfuron methyl	X	43,295.3	2,713.8
Bensulide	X	295,415.6	270,307.7
Bentazon, sodium salt	X	13,885.3	7,446.9
Bifenazate	X	103,971.1	65,564.1
Bispyribac-sodium	X	16,062.1	2,854.7
Boscalid	X	308,185.6	232,943.1
Bromacil	X	104,375.3	67,759.2
Bromoxynil butyrate		0.0	0.0
Bromoxynil heptanoate	X	39,528.6	25,432.4
Bromoxynil octanoate	X	68,747.4	44,746.1
Butylate		0.0	298.9
Cacodylic acid		0.0	2.8
Calcium acid methanearsonate		0.0	0.8
Carbaryl	X	255,005.0	113,091.0

<b>A.I.</b>	<b>Currently Registered</b>	<b>Pounds A.I. Sold</b>	<b>Pounds A.I. Applied</b>
Carbofuran		1,024.8	4.1
Chlorantraniliprole	X	55,463.4	37,766.2
Chloropicrin	X	5,010,376.5	6,307,265.9
Chlorothalonil	X	1,174,740.2	954,646.0
Chlorsulfuron	X	4,447.4	3,385.9
Clethodim	X	61,237.8	38,527.8
Clomazone	X	123,680.0	90,604.7
Clopyralid	X	0.0	9.6
Clopyralid, monoethanolamine salt	X	11,599.3	5,986.4
Clopyralid, triethylamine salt	X	519.5	315.1
Clothianidin	X	3,512.3	3,295.1
Cyanazine		0.0	0.0
Cycloate	X	42,256.3	27,292.4
Cyprodinil	X	168,591.6	137,724.6
Cyromazine	X	6,767.4	5,764.9
D-trans Allethrin	X	1,458.2	76.1
Dazomet	X	49,677.3	60,106.0
Diazinon	X	165,714.5	126,792.5
Dicamba	X	8,397.4	1,005.4
Dicamba, diethanolamine salt		0.0	0.0
Dicamba, diglycolamine salt	X	70,621.3	47,643.8
Dicamba, dimethylamine salt	X	54,402.2	18,277.3
Dicamba, monoethanolamine salt		0.0	0.0
Dicamba, potassium salt	X	670.9	0.0
Dicamba, sodium salt	X	9,066.8	6,286.4
Dichlobenil	X	63,185.5	23,855.6
Dichlorprop-P, dimethylamine salt	X	23,153.2	8.9
Dichlorprop-P, isooctyl ester	X	207.4	91.6
Dicloran	X	72,817.4	59,826.6
Dicrotophos		0.0	0.0
Diethyl-ethyl		0.0	0.0
Difenoconazole	X	19,538.7	8,303.6
Difenzoquat methyl sulfate		0.0	0.0
Diflufenzopyr, sodium salt	X	733.4	589.9
Dimethenamid-P	X	4,122.9	2,807.1
Dimethipin		0.0	0.0
Dimethoate	X	288,583.5	210,128.3
Dimethomorph	X	4,994.3	4,400.6
Dinotefuran	X	10,574.7	7,799.8
Diphenamid		0.0	0.0
Diquat dibromide	X	165,182.3	71,129.3
Disulfoton		16,902.1	9,084.7
Dithiopyr	X	158,097.2	19,435.4
Diuron	X	1,044,548.5	584,128.2

<b>A.I.</b>	<b>Currently Registered</b>	<b>Pounds A.I. Sold</b>	<b>Pounds A.I. Applied</b>
Dodecyl ammonium methanearsonate		0.0	0.0
Dodemorph acetate		0.0	0.0
Dodine	X	1,067.7	4,875.6
DSMA		0.0	0.0
Enamectin benzoate	X	1,177.0	1,129.8
Endothall, dipotassium salt	X	31,909.2	11,749.6
Endothall, disodium salt		0.0	0.0
Endothall, mono (N,N-dimethyl alkylamine) salt	X	5,122.8	2,433.5
EPTC	X	226,987.5	118,508.8
Ethofumesate	X	28,533.3	12,796.8
Ethoprop	X	17,088.9	5,494.8
Fenamidone	X	35,920.6	26,749.6
Fenamiphos		0.0	8,977.5
Fenarimol	X	3,725.1	3,437.4
Fenhexamid	X	125,494.8	79,475.6
Fenoxycarb	X	0.3	2.7
Fensulfothion		0.0	0.0
Fenthion		0.0	4.0
Fipronil	X	19,864.0	38,375.3
Flonicamid	X	14,798.9	18,624.8
Fluazifop-butyl		0.0	11.5
Fluazifop-P-butyl	X	16,334.0	9,538.5
Fludioxonil	X	34,162.5	21,955.0
Fluometuron		0.0	0.0
Fluopicolide	X	10,342.9	1,729.7
Flurprimidol	X	9.9	5.9
Flutolanil	X	17,552.9	10,688.2
Fonofos		0.0	0.1
Foramsulfuron	X	334.1	275.5
Forchlorfenuron	X	696.1	400.2
Formetanate hydrochloride	X	42,412.0	30,313.3
Fosetyl-al	X	342,878.8	272,061.8
Glufosinate-ammonium	X	1,078,218.2	658,157.3
Glyphosate	X	975,562.1	764,826.2
Glyphosate, isopropylamine salt	X	12,636,297.7	5,726,200.9
Glyphosate-trimesium		0.0	534.9
Halosulfuron-methyl	X	6,215.8	10,468.8
Hexazinone	X	161,472.5	97,452.7
Imazamox, ammonium salt	X	4,572.5	3,613.5
Imazapic		0.0	0.0
Imazapic, ammonium salt	X	674.8	0.1
Imazapyr	X	22.5	3.3
Imazapyr, isopropylamine salt	X	56,404.1	36,239.0
Imazethapyr		0.0	43.9

<b>A.I.</b>	<b>Currently Registered</b>	<b>Pounds A.I. Sold</b>	<b>Pounds A.I. Applied</b>
Imazethapyr, ammonium salt	X	6,561.9	5,356.6
Imazosulfuron	X	0.0	0.0
Imidacloprid	X	531,663.6	266,429.0
Indaziflam	X	0.0	0.0
Ipconazole	X	0.0	0.0
Iprodione	X	443,304.2	348,541.5
Isoxaben	X	24,121.1	20,271.5
Kresoxim-methyl	X	39,813.3	31,977.2
Linuron	X	127,644.2	48,454.2
Malathion	X	794,864.3	556,136.9
Mandipropamid	X	26,773.4	25,196.2
MCPA, dimethylamine salt	X	397,982.3	230,977.0
MCPP	X	1,565.2	93.5
MCPP, diethanolamine salt		0.0	0.0
MCPP, dimethylamine	X	281.4	654.7
MCPP, potassium salt	X	2,082.5	893.2
Mecoprop-P	X	46,681.3	2,496.5
Mefenoxam (Metalaxyl-M)	X	95,432.1	57,101.9
Mepiquat chloride	X	17,163.6	13,232.8
Mesosulfuron-methyl	X	1,667.5	910.5
Metalaxyl	X	2,939.4	166.1
Metaldehyde	X	265,021.5	61,900.8
Metconazole	X	21,686.0	14,042.1
Methamidophos		7,838.8	9,624.8
Methidathion	X	51,545.3	51,190.0
Methiocarb	X	4,833.0	3,503.0
Methomyl	X	290,312.1	231,432.9
Methoxyfenozide	X	194,734.5	181,800.6
Methyl iodide	X	0.0	0.0
Methyl isothiocyanate	X	0.0	72.7
Methyl parathion	X	27,609.1	21,426.9
Metiram	X	0.0	0.0
Metolachlor	X	100,729.0	34,484.8
Metribuzin	X	45,893.1	18,618.9
Metsulfuron-methyl		0.0	0.0
Mevinphos		0.0	23.5
Milbemectin	X	0.0	0.7
Molinate		0.0	24.0
MSMA	X	84,920.5	19,767.6
Myclobutanil	X	86,048.9	65,290.7
Napropamide	X	29,920.7	15,359.9
Naptalam, sodium salt		0.0	0.0
Nicosulfuron	X	487.4	308.9
Nitrapyrin	X	0.0	210.8

<b>A.I.</b>	<b>Currently Registered</b>	<b>Pounds A.I. Sold</b>	<b>Pounds A.I. Applied</b>
Norflurazon	X	73,027.3	43,685.6
Octylammonium methanearsonate		0.0	0.0
Orthosulfamuron	X	329.6	665.1
Oryzalin	X	1,187,686.8	602,039.8
Oxydemeton-methyl	X	24,505.4	71,286.1
Paraquat dichloride	X	3,656,075.4	2,238,921.9
Parathion		0.0	284.6
Pebulate		0.0	0.0
Penoxsulam	X	10,891.0	5,015.8
Phenmedipham	X	2,687.3	2,448.1
Phorate	X	32,472.0	14,155.7
Phosalone		0.0	0.0
Phosmet	X	83,023.0	114,994.8
Phosphamidon		0.0	24.0
Piperalin	X	1,048.7	861.2
Piperonyl butoxide	X	116,473.4	54,976.4
Profenofos	X	0.0	1,551.6
Prohexadione calcium	X	330.0	66.7
Prometon	X	2,953.2	6.5
Prometryn	X	65,210.0	42,197.3
Propamocarb hydrochloride	X	112,702.3	99,463.1
Propanil	X	2,246,215.4	1,993,021.5
Propiconazole	X	139,665.0	92,671.7
Propyzamide	X	55,232.0	51,350.5
Prothioconazole	X	0.0	0.0
Pymetrozine	X	15,976.9	3,820.2
Pyraclostrobin	X	171,144.6	133,843.8
Pyrazon	X	0.0	121.0
Pyridate		0.0	0.0
Pyrithiobac-sodium	X	1,040.6	1,261.9
Pyroxsulam	X	0.0	0.0
Quinclorac	X	40,696.8	2,122.5
Rimsulfuron	X	14,279.2	10,882.4
S-metolachlor	X	460,056.2	279,566.4
Saflufenacil	X	4,144.7	3,212.6
Sethoxydim	X	37,289.5	19,940.7
Siduron	X	5,914.0	2,737.0
Simazine	X	678,055.2	378,157.5
Spinetoram	X	38,133.9	26,028.2
Sulfentrazone	X	8,370.2	731.6
Sulfometuron-methyl	X	12,785.9	11,149.0
Sulfosulfuron	X	308.8	38.9
Sulprofos		0.0	0.0
Tebuconazole	X	57,422.4	49,296.6

<b>A.I.</b>	<b>Currently Registered</b>	<b>Pounds A.I. Sold</b>	<b>Pounds A.I. Applied</b>
Tebufenozide	X	472.6	309.7
Tebuthiuron	X	4,784.3	3,989.5
Tembotrione	X	0.0	0.0
Terbacil		0.0	0.0
Terbutryn		0.0	10.0
Terrazole (Etridiazole)	X	1,250.3	1,500.2
Tetraconazole	X	5,106.8	2,740.9
Thiamethoxam	X	24,001.3	15,095.3
Thiazopyr		0.0	130.2
Thifensulfuron-methyl		0.0	0.0
Thiobencarb	X	374,840.9	258,402.2
Thiophanate-methyl	X	153,626.4	114,474.5
Tralkoxydim		808.2	522.3
Triadimefon	X	1,691.4	2,152.7
Triallate	X	13,369.7	878.7
Triclopyr, butoxyethyl ester	X	141,782.4	67,738.4
Triclopyr, triethylamine salt	X	188,164.2	83,640.9
Trifloxysulfuron-sodium	X	107.3	539.4
Triflumizole	X	61,884.9	41,273.6
Triflusulfuron-methyl	X	431.5	465.8
Trinexapac-ethyl	X	5,391.4	4,185.1
Triticonazole	X	491.9	296.7
Uniconazole-P	X	2.7	1.8
Vernolate		0.0	0.0
Vinclozolin	X	360.0	216.9
Zoxamide	X	0.0	0.0
<b>Total</b>	<b>189</b>	<b>42,229,898.6</b>	<b>28,026,514.8</b>

**Table 3. Description of use for currently registered A.I.s exceeding the SNVs (2011 report).**

<b>A.I.</b>	<b>Use</b>	<b>Description</b>
2,4-D	Herbicide	Selective, systemic
2,4-D, 2-ethylhexyl ester	Herbicide	Selective, systemic
2,4-D, butoxyethanol and isooctyl esters	Herbicide	Selective, systemic
2,4-D, diethanolamine salt	Herbicide	Selective, systemic
2,4-D, dimethylamine salt	Herbicide	Selective, systemic
2,4-D, isooctyl ester	Herbicide	Selective, systemic
2,4-D, isopropyl ester	Herbicide	Selective, systemic
2,4-D, triisopropanolamine salt	Herbicide	Selective, systemic
2,4-D, triisopropylamine salt	Herbicide	Selective, systemic
4(2,4-DB), dimethylamine salts	Herbicide	Selective, post-emergent
Acephate	Insecticide	Contact, systemic
Acetamiprid	Insecticide	Systemic
Acibenzolar-s-methyl	Fungicide	Selective, systemic
Alachlor	Herbicide	Pre-emergent
Aldicarb	Insecticide/ acaricide	Systemic
Aminopyralid, triisopropanolamine salt	Herbicide	Broadleaf control
Atrazine	Herbicide	Selective, residual
Azinphos-methyl	Insecticide	Contact, non-systemic
Azoxystrobin	Fungicide	Foliar
Bensulfuron methyl	Herbicide	Selective
Bensulide	Herbicide	Selective, pre-emergent
Bentazon, sodium salt	Herbicide	Selective, pre-emergent
Bifenazate	Insecticide/ acaricide, miticide	Contact
Bispyribac-sodium	Herbicide	Selective, post-emergent
Boscalid	Fungicide	Broad spectrum
Bromacil	Herbicide	Pre-emergent
Bromoxynil heptanoate	Herbicide	Selective, post-emergent
Bromoxynil octanoate	Herbicide	Selective, post-emergent
Carbaryl	Insecticide	Broad spectrum
Chlorantraniliprole	Insecticide	Soil, foliar
Chloropicrin	Warning agent/ fumigant	Space, commodity, soil
Chlorothalonil	Fungicide	Broad spectrum, protectant



<b>A.I.</b>	<b>Use</b>	<b>Description</b>
Chlorsulfuron	Herbicide	Selective
Clethodim	Herbicide	Systemic, post-emergent
Clomazone	Herbicide	Broad spectrum, pre-emergent
Clopyralid	Herbicide	Selective, post-emergent
Clopyralid, monoethanolamine salt	Herbicide	Selective, post-emergent
Clopyralid, triethylamine salt	Herbicide	Selective, post-emergent
Clothianidin	Insecticide	Systemic
Cycloate	Herbicide	Selective, preplant
Cyprodinil	Fungicide	Systemic
Cyromazine	Insecticide	Growth regulator
D-trans Allethrin	Insecticide	Broad Spectrum
Dazomet	Fungicide/ nematocide/ herbicide/ slimicide	Preplant
Diazinon	Insecticide/ nematocide	Soil/foliar/seed
Dicamba	Herbicide	Selective, systemic
Dicamba, diglycolamine salt	Herbicide	Selective, systemic
Dicamba, dimethylamine salt	Herbicide	Selective, systemic
Dicamba, potassium salt	Herbicide	Selective, systemic
Dicamba, sodium salt	Herbicide	Selective, systemic
Dichlobenil	Herbicide	Selective, cellulose
Dichlorprop-P, dimethylamine salt	Herbicide	Selective, post-emergent
Dichlorprop-P, isooctyl ester	Herbicide	Selective, post-emergent
Dicloran	Fungicide	Pre-, post-harvest
Difenoconazole	Fungicide	Systemic, broad spectrum
Diflufenzopyr, sodium salt	Herbicide	Selective, post-emergent
Dimethenamid-P	Herbicide	Selective, pre-emergent
Dimethoate	Insecticide/ acaricide	Systemic
Dimethomorph	Fungicide	Selective, post-emergent
Dinotefuran	Insecticide	Selective, systemic
Diquat dibromide	Desiccant/ herbicide	Contact
Dithiopyr	Herbicide	Pre-, post-emergent
Diuron	Herbicide	Selective, general
Dodine	Fungicide	Systemic, preventative, foliar
Emamectin benzoate	Insecticide	Systemic, contact
Endothall, dipotassium salt	Herbicide/ algicide/ growth regulator	Pre-, post-emergent

<b>A.I.</b>	<b>Use</b>	<b>Description</b>
Endothall, mono (N,N-dimethyl alkylamine) salt	Desiccant/ algicide	Contact
EPTC	Herbicide	Selective
Ethofumesate	Herbicide	Selective
Ethoprop	Insecticide/ nematocide	Soil
Fenamidone	Fungicide	Broad spectrum, foliar, soil
Fenarimol	Fungicide	Systemic, foliar
Fenhexamid	Fungicide	Systemic, curative, foliar
Fenoxycarb	Insecticide	Growth regulator
Fipronil	Insecticide	Contact, stomach
Flonicamid	Insecticide	Contact, stomach
Fluazifop-P-butyl	Herbicide	Selective, post-emergent
Fludioxonil	Fungicide	Contact
Fluopicolide	Fungicide	Foliar, soil
Flurprimidol	Herbicide	Selective, post-emergent
Flutolanil	Fungicide	Systemic
Foramsulfuron	Herbicide	Selective, post-emergent
Forchlorfenuron	Plant Growth Regulator	Increase cell growth
Formetanate hydrochloride	Acaricide/ insecticide	Foliar
Fosetyl-AL, technical	Fungicide	Systemic, preventative
Glufosinate-ammonium	Herbicide	Selective
Glyphosate	Herbicide	Nonselective, post-emergent
Glyphosate, isopropylamine salt	Herbicide	Nonselective, post-emergent
Halosulfuron-methyl	Herbicide	Pre-, post-emergent
Hexazinone	Herbicide	Contact, residual
Imazamox, ammonium salt	Herbicide	Selective, post-emergent
Imazapic, ammonium salt	Herbicide	Selective, pre-, post-emergent
Imazapyr	Herbicide	Broad-spectrum, systemic
Imazapyr, isopropylamine salt	Herbicide	Broad-spectrum, systemic
Imazethapyr, ammonium salt	Herbicide	Selective, pre-, post-emergent
Imazosulfuron	Herbicide	Broadleaf control
Imidacloprid	Insecticide	Systemic
Indaziflam	Herbicide	Soil, pre-emergent
Ipconazole	Fungicide	Systemic, broad spectrum
Iprodione	Fungicide	Contact

<b>A.I.</b>	<b>Use</b>	<b>Description</b>
Isoxaben	Herbicide	Soil, pre-emergent
Kresoxim-methyl	Fungicide	Non-systemic, preventive
Linuron	Herbicide	Selective
Malathion	Insecticide	Nonsystemic foliar
Mandipropamid	Fungicide	Foliar
MCPA, dimethylamine salt	Herbicide	Plant growth regulator
MCPP acid (mecoprop, MCPPA)	Herbicide	Systemic
MCPP, dimethylamine salt	Herbicide	Systemic
MCPP, potassium salt	Herbicide	Systemic
Mecoprop-P	Herbicide	Systemic hormone-type
Mefenoxam	Fungicide	Seed treatment, soil, foliar
Mepiquat chloride	Bioregulator	Harvest aid
Mesosulfuron-methyl	Herbicide	Selective, post-emergent
Metalaxyl	Fungicide	Seed treatment, soil, foliar
Metaldehyde	Molluscicide	Contact
Metconazole	Fungicide	Systemic
Methidathion	Insecticide/ acaricide	Nonsystemic
Methiocarb	Insecticide/ acaricide	Nonsystemic
Methomyl	Insecticide	Broad spectrum
Methoxyfenozide	Insecticide	Insect growth regulator
Methyl iodide	Fumigant	Soil, preplant
Methyl isothiocyanate	Fumigant	Soil, preplant
Methyl parathion	Insecticide	Broad spectrum
Metiram	Fungicide	EBDC type, broad spectrum
Metolachlor	Herbicide	Selective, pre-emergent
Metribuzin	Herbicide	Selective, systemic
Milbemectin	Insecticide/ miticide	Contact, stomach action
MSMA	Herbicide	Post-emergent
Myclobutanil	Fungicide	Systemic, broad spectrum
Napropamide	Herbicide	Selective
Nicosulfuron	Herbicide	Selective, systemic
Nitrapyrin	Nitrification inhibitor	Selective
Norflurazon	Herbicide	Selective, preplant
Orthosulfamuron	Herbicide	Selective, post-emergent

<b>A.I.</b>	<b>Use</b>	<b>Description</b>
Oryzalin	Herbicide	Selective, pre-emergent
Oxydematon-methyl	Insecticide/ acaricide	Systemic, contact
Paraquat dichloride	Desiccant/ herbicide	Contact
Penoxsulam	Herbicide	Post-emergent
Phenmedipham	Herbicide	Post-emergent
Phorate	Insecticide	Systemic, soil
Phosmet	Insecticide	Broad spectrum
Piperalin	Fungicide	Ornamental
Piperonyl butoxide, technical	Synergist	Pyrethroids/Pyrethrins
Profenofos	Insecticide/ acaricide	Broad spectrum
Prohexadione calcium	Herbicide	Plant growth regulator
Prometon	Herbicide	Pre- and post-emergent
Prometryn	Herbicide	Selective, pre-, post-emergent
Propamocarb hydrochloride	Fungicide	Selective
Propanil	Herbicide	Contact, post-emergent
Propiconazole	Fungicide	Foliar
Propyzamide	Herbicide	Pre-, post-emergent
Prothioconazole	Fungicide	Foliar, soil, seed treatment
Pymetrozine	Insecticide	Systemic, soil or foliar
Pyraclostrobin	Fungicide	Foliar, respiration inhibitor
Pyrazon	Herbicide	Pre-, early post-emergent
Pyrithiobac sodium	Herbicide	Pre-, post-emergent
Pyroxsulam	Herbicide	Post-emergent
Quinclorac	Herbicide	Selective, pre-, post-emergent
Rimsulfuron	Herbicide	Selective, systemic
S-metolachlor	Herbicide	Selective, preplant
Saflufenacil	Herbicide	Selective, pre-emergent
Sethoxydim	Herbicide	Systemic, post-emergent
Siduron	Herbicide	Selective, pre-emergent
Simazine	Herbicide	Selective
Spinetoram	Insecticide	Selective
Sulfentrazone	Herbicide	Selective, pre-, post-emergent
Sulfometuron-methyl	Herbicide	Contact, residual
Sulfosulfuron	Herbicide	Selective, pre-, post-emergent

<b>A.I.</b>	<b>Use</b>	<b>Description</b>
Tebuconazole	Fungicide	Systemic
Tebufenozide	Insecticide	Systemic
Tebuthiuron	Herbicide	Nonselective
Tembotrione	Herbicide	Selective, post-emergent
Terrazole (Etridiazole)	Fungicide	Ornamental, turf
Tetraconazole	Fungicide	Foliar
Thiamethoxam	Insecticide	Systemic
Thiobencarb	Herbicide	Pre-, post-emergent
Thiophanate-methyl	Fungicide	Systemic, broad spectrum
Triadimefon	Fungicide	Systemic
Triallate	Herbicide	Selective, pre-emergent
Triclopyr, butoxyethyl ester	Herbicide	Systemic, post-emergent
Triclopyr, triethylamine salts	Herbicide	Systemic, post-emergent
Trifloxysulfuron-sodium	Herbicide	Selective, post-emergent
Triflumizole	Fungicide	Systemic, broad spectrum
Triflusulfuron-methyl	Herbicide	Plant growth regulator
Trinexapac-ethyl	Herbicide	Plant growth regulator
Triticonazole	Fungicide	Systemic, broad spectrum
Uniconazole-p	Herbicide	Plant growth regulator
Vinclozolin	Fungicide	Contact, broad spectrum
Zoxamide	Fungicide	Foliar

## REFERENCES

Crop Protection Handbook. 2012. Meister Publishing Company. Willoughby, Ohio.

Johnson, B. 1991. Setting Specific Numerical Values April 1991. EH91-06. Available at: <<http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh9106.pdf>>. (Verified January 31, 2008). California Department of Pesticide Regulation, Sacramento, California.

Johnson, B. 1989. Setting Specific Numerical Values October 1989. EH89-13. Available at: <<http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh8913.pdf>>. (Verified January 31, 2008). California Department of Pesticide Regulation, Sacramento, California.

Johnson, B. 1988. Setting Specific Numerical Values November 1988. EH88-12. Available at: <<http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh8812.pdf>>. (Verified January 31, 2008). California Department of Pesticide Regulation, Sacramento, California.

Merck Index, 12th edition. 1996. Merck and Company, Incorporation. Rahway, New Jersey.

Thomson, W.T. 2000. Agricultural Chemicals. Books I to IV. Thomson Publications. Fresno, California.

Wilkerson, M.R., K.D. Kim. 1986. The Pesticide Contamination Prevention Act: Setting Specific Numerical Values. EH86-02. Available at: <<http://www.cdpr.ca.gov/docs/emon/pubs/ehapreps/eh8602.pdf>>. (Verified January 31, 2008). California Department of Pesticide Regulation, Sacramento, California.