

Preliminary Screening Information on Possible Pesticide Classes for Future Consideration

Organophosphorus Pesticides, Neonicotinoid Pesticides, Anilide Pesticides

Materials for July 28, 2016 Meeting of Scientific Guidance Panel
for Biomonitoring California¹

At the August 2013 meeting of the Scientific Guidance Panel (SGP), the Office of Environmental Health Hazard Assessment (OEHHA) presented a preliminary screen of four pesticides: glufosinate-ammonium, glyphosate, imidacloprid, and propanil.² The SGP requested that OEHHA prepare potential designated chemical documents on all four pesticides. Rather than evaluating these individually, OEHHA has been reviewing the following three possible pesticide classes that encompass the previously screened pesticides:

- Organophosphorus pesticides
- Neonicotinoid pesticides
- Anilide pesticides

Evaluating chemical classes provides flexibility for the Program to quickly respond to shifts in chemical use; supports the development of broad laboratory panels and non-targeted screening; and uses Program resources efficiently.

This document presents some preliminary screening information on example pesticides in each of these three classes, including:

- Chemical structures
- Pesticide types and example uses
- Pounds applied in California from 2002 to 2014 (selected years)
- Pounds sold in California in 2014

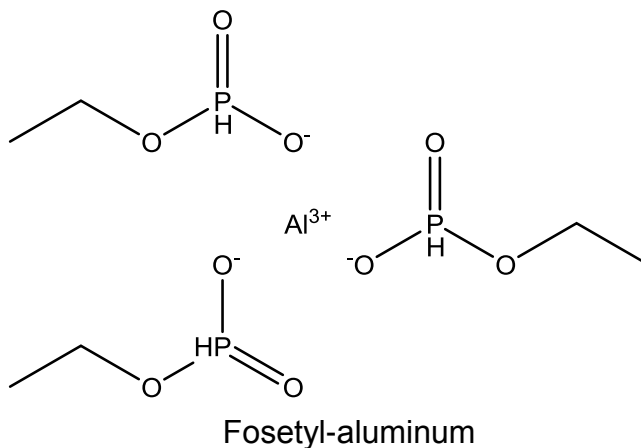
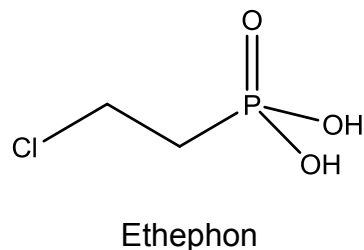
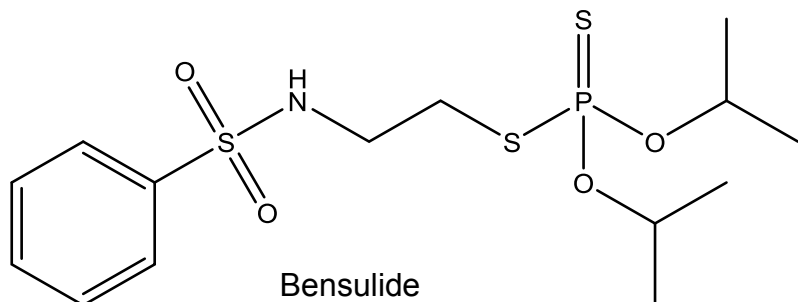
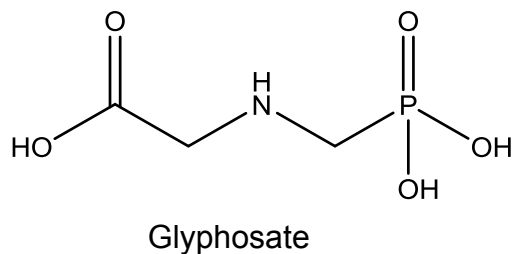
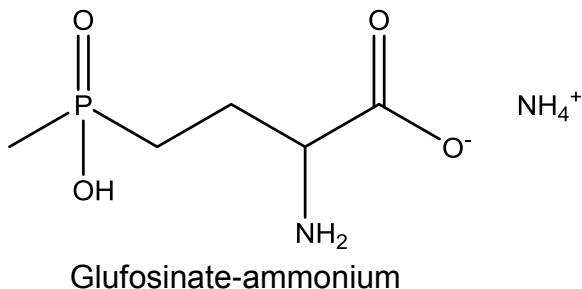
At the July 28 meeting, the Panel will provide input on what next steps, if any, should occur. The SGP could request that OEHHA prepare a potential designated chemical document on one of these pesticide classes for consideration in 2017. The SGP could also propose further screening or continued tracking of one or more of these pesticide classes; advise no further action on any of these classes; and/or suggest other pesticide classes for possible consideration.

¹ California Environmental Contaminant Biomonitoring Program, codified at Health and Safety Code section 105440 et seq.

² OEHHA (2013). Screening of Selected Pesticides for Possible Future Consideration as Candidates for Biomonitoring in California. Available at:
<http://biomonitoring.ca.gov/sites/default/files/downloads/PesticideScreen080113.pdf>

Organophosphorus Pesticides

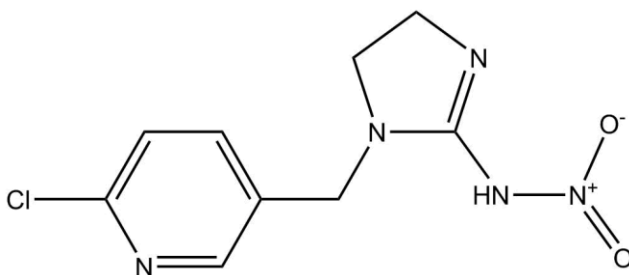
Organophosphorus pesticides are broadly defined here as a structure-based class, i.e., phosphorus-containing organic compounds used as pesticides. Subclasses include organophosphates³, organophosphinates, and organophosphonates. The example organophosphorus pesticides shown below are not on the list of designated chemicals and are in current use in California.



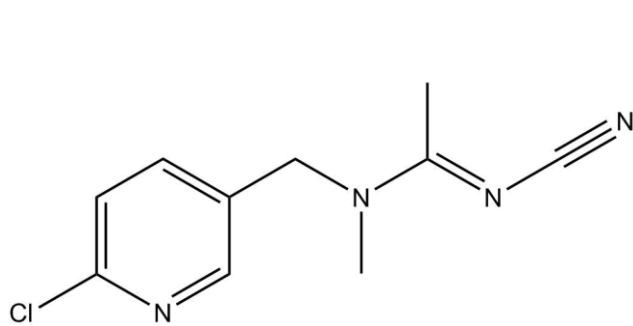
³ A number of organophosphates are already on the [list of designated chemicals](#), based on their inclusion in the [National Biomonitoring Program](#) implemented by the Centers for Disease Control and Prevention.

Neonicotinoid Pesticides

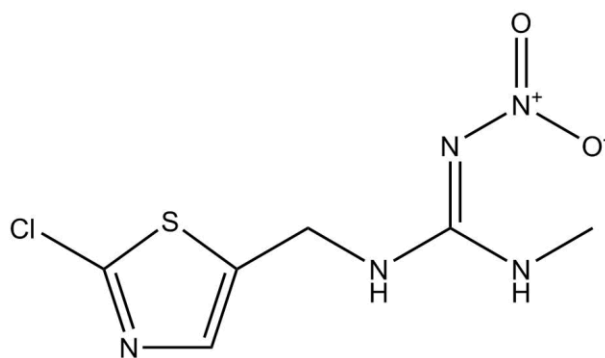
Neonicotinoids are chemically similar to nicotine. Like nicotine, neonicotinoids bind to and activate the nicotinic acetylcholine receptor.



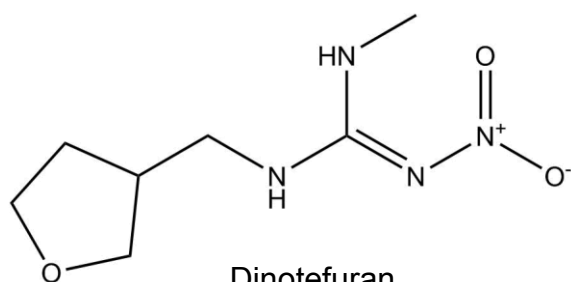
Imidacloprid



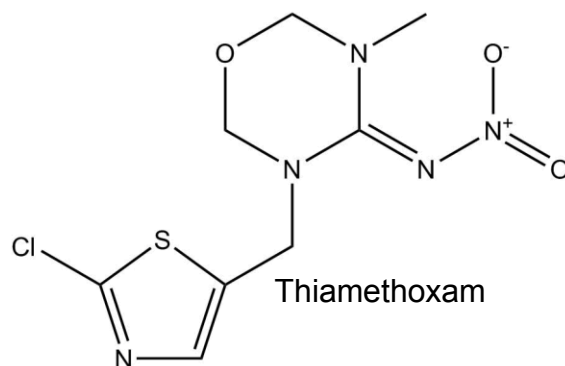
Acetamiprid



Clothianidin



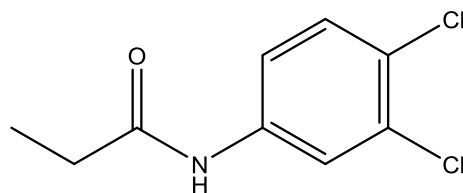
Dinotefuran



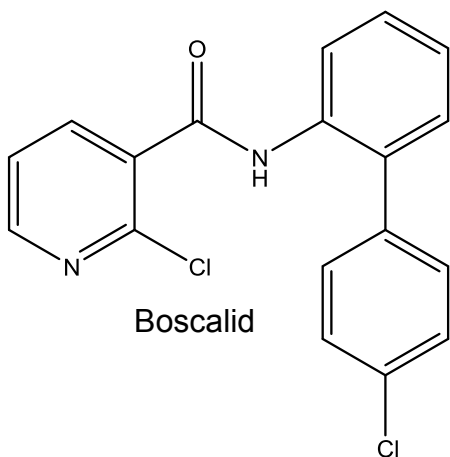
Thiamethoxam

Anilide Pesticides

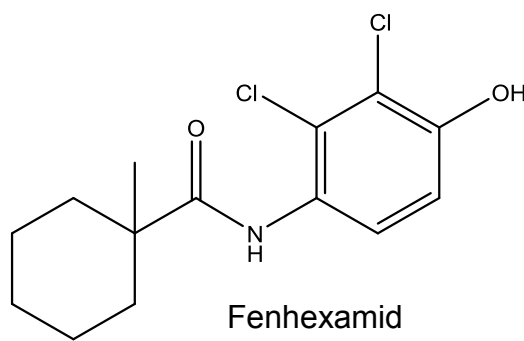
Anilide pesticides contain an amide group ($-\text{CONH}_2$) in which one hydrogen is replaced by a phenyl group. This is a diverse structure-based chemical class, with many sub-types. Propanil, the previously screened pesticide in this class, is similar in structure to diuron and linuron (both of which are on the list of designated chemicals as “herbicides - substituted ureas”, but also contain the anilide sub-structure); all three share a common breakdown product (3,4-dichloroaniline). If the SGP selects anilide pesticides for further review, OEHHA would examine more specific options for class names and definitions.



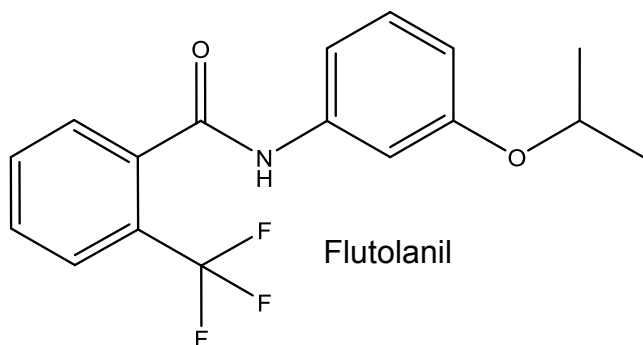
Propanil



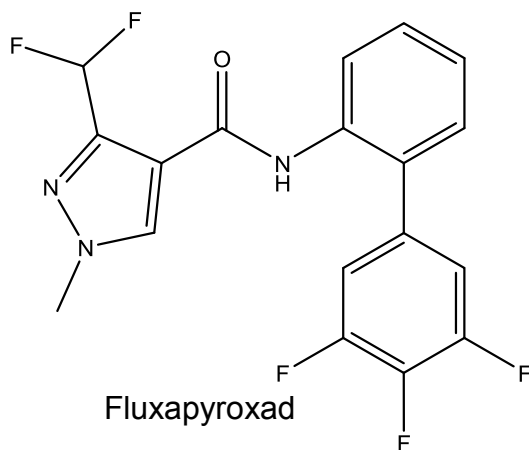
Boscalid



Fenhexamid



Flutolanil



Fluxapyroxad

Summary of California Use Information on Possible Pesticide Classes

Possible pesticide class	Example pesticides	Type and example uses ^{1,2}	Rank in top 100 pesticides used statewide in 2014 ³	Pounds applied in CA (selected years) ⁴	Pounds sold in CA in 2014 ⁵
Organophosphorus	Glufosinate-ammonium ⁶	Type: Herbicide Crops: Grapes, almonds Other uses: Rights-of-way	--	2014: 139,368 2011: 740,327 2008: 344,200 2005: 26,826 2002: 7,522	723,798
	Glyphosate ⁶	Type: Herbicide Crops: Tree nuts (e.g., almonds), grapes, corn, cotton Other uses: Rights-of-way, landscape maintenance	7 [†]	2014: 10,605,865 [‡] 2011: 10,745,583 2008: 6,915,055 2005: 7,007,365 2002: 5,992,056	22,524,790 [‡]
	Bensulide	Type: Herbicide Crops: Lettuce, broccoli Other uses: Landscape maintenance (e.g., golf courses)	58	2014: 318,705 2011: 288,344 2008: 231,843 2005: 244,996 2002: 196,249	372,092
	Ethephon	Type: Plant growth regulator Crops: Cotton, walnuts Other uses: Landscape maintenance	49	2014: 346,796 2011: 548,802 2008: 295,631 2005: 638,780 2002: 538,553	448,865
	Fosetyl-aluminum	Type: Fungicide Crops: Lettuce, spinach Other uses: Landscape maintenance	75	2014: 230,655 2011: 285,185 2008: 166,422 2005: 432,328 2002: 298,150	276,289

[†] The potassium salt of glyphosate was rank 7; the isopropylamine salt was rank 8.

[‡] For glyphosate, the values shown for pounds applied and pounds sold are for the parent compound and all its salts.

Possible Pesticide Classes

Use Information (cont.)

Possible pesticide class	Example pesticides	Type and example uses ^{1,2}	Rank in top 100 pesticides used statewide in 2014 ³	Pounds applied in CA (selected years) ⁴	Pounds sold in CA in 2014 ⁵
Neonicotinoid	Imidacloprid ⁶	Type: Insecticide Crops: Grapes, processing tomatoes, lettuce Other uses: Structural pest control, pet pesticide	46	2014: 373,738 2011: 290,291 2008: 159,407 2005: 162,254 2002: 224,730	542,262
	Acetamiprid	Type: Insecticide Crops: Cotton, walnuts, strawberries	--	2014: 48,933 2011: 34,785 2008: 80,488 2005: 30,968 2002: 6,632	51,536
	Clothianidin	Type: Insecticide Crops: Grapes, almonds	--	2014: 17,918 2011: 31,540 2008: 1,395 2005: 0 2002: 0	20,916
	Dinotefuran	Type: Insecticide Crops: Processing tomatoes, cotton Other uses: Pet pesticide	--	2014: 11,951 2011: 6,175 2008: 12,451 2005: 193 2002: 0	13,170
	Thiamethoxam	Type: Insecticide Crops: Oranges, lettuce, onions Other uses: Landscape maintenance	--	2014: 35,307 2011: 17,613 2008: 13,437 2005: 15,907 2002: 11,091	33,179

Possible Pesticide Classes

Use Information (cont.)

Possible pesticide class	Example pesticides	Type and example uses ^{1,2}	Rank in top 100 pesticides used statewide in 2014 ³	Pounds applied in CA (selected years) ⁴	Pounds sold in CA in 2014 ⁵
Anilide	Propanil ⁶	Type: Herbicide Food crop: Rice	15	2014: 1,901,310 2011: 2,221,773 2008: 1,724,068 2005: 1,418,131 2002: 1,470,535	3,039,894
	Boscalid	Type: Fungicide Crops: Grapes, almonds, lettuce	77	2014: 226,066 2011: 239,819 2008: 183,699 2005: 162,849 2002: 0	319,448
	Fenhexamid	Type: Fungicide Crops: Strawberries, grapes	--	2014: 85,804 2011: 82,294 2008: 51,765 2005: 71,068 2002: 50,663	108,031
	Flutolanil	Type: Fungicide Major use: Landscape maintenance	--	2014: 6,998 2011: 7,430 2008: 14,486 2005: 11,088 2002: 9,957	7,096
	Fluxapyroxad	Type: Fungicide Crops: Processing tomatoes, almonds	--	2014: 10,190 2011: 0 2008: 0 2005: 0 2002: 0	26,525

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- ¹ California Department of Pesticide Regulation (DPR), Pesticide Use Report 2014, available at: <http://www.cdpr.ca.gov/docs/pur/pur14rep/chmrpt14.pdf>. This report covers “agricultural use” of pesticides, which is broadly defined to include use on crops as well as landscape maintenance, for example. For further explanation refer to pages 7-8 of the above report.
- ² DPR Product/Label Database, available at: <http://www.cdpr.ca.gov/docs/label/labelque.htm>. This database lists all pesticide products registered for use in California, including pesticides for consumer home and garden use and spot treatments for pets.
- ³ DPR list of top 100 pesticides used in California in 2014, based on pounds applied for “agricultural uses”, available at: http://www.cdpr.ca.gov/docs/pur/pur14rep/top_100_ais_lbs14.pdf.
- ⁴ DPR Pesticide Use Reports from years: 2002, 2005, 2008, 2011, and 2014, accessible from: <http://www.cdpr.ca.gov/docs/pur/purmain.htm>. These reports provide data on pounds of “agricultural use” of pesticides (see Table footnote 1).
- ⁵ DPR report of Pesticides Sold in California for Year 2014, available at: <http://www.cdpr.ca.gov/docs/mill/pdsd2014.pdf>. This report contains self-reported data from pesticide registrants, pest control dealers, and pesticide brokers on the total pounds of each active ingredient they sell for any use in California (i.e., agricultural, institutional, and/or home use). Reporting is required for the first point of sale in the state by any seller registered with DPR, including, for example, retail stores and on-line purveyors. Because these data are self-reported, however, DPR cannot attest to their complete accuracy. For more details, please see: <http://www.cdpr.ca.gov/docs/mill/nopdsold.htm>.
- ⁶ Included in OEHHA (2013), Screening of Selected Pesticides for Possible Future Consideration as Candidates for Biomonitoring in California, available at: <http://biomonitoring.ca.gov/sites/default/files/downloads/PesticideScreen080113.pdf>