



USGS Pesticide Data/Studies in Oregon and Washington

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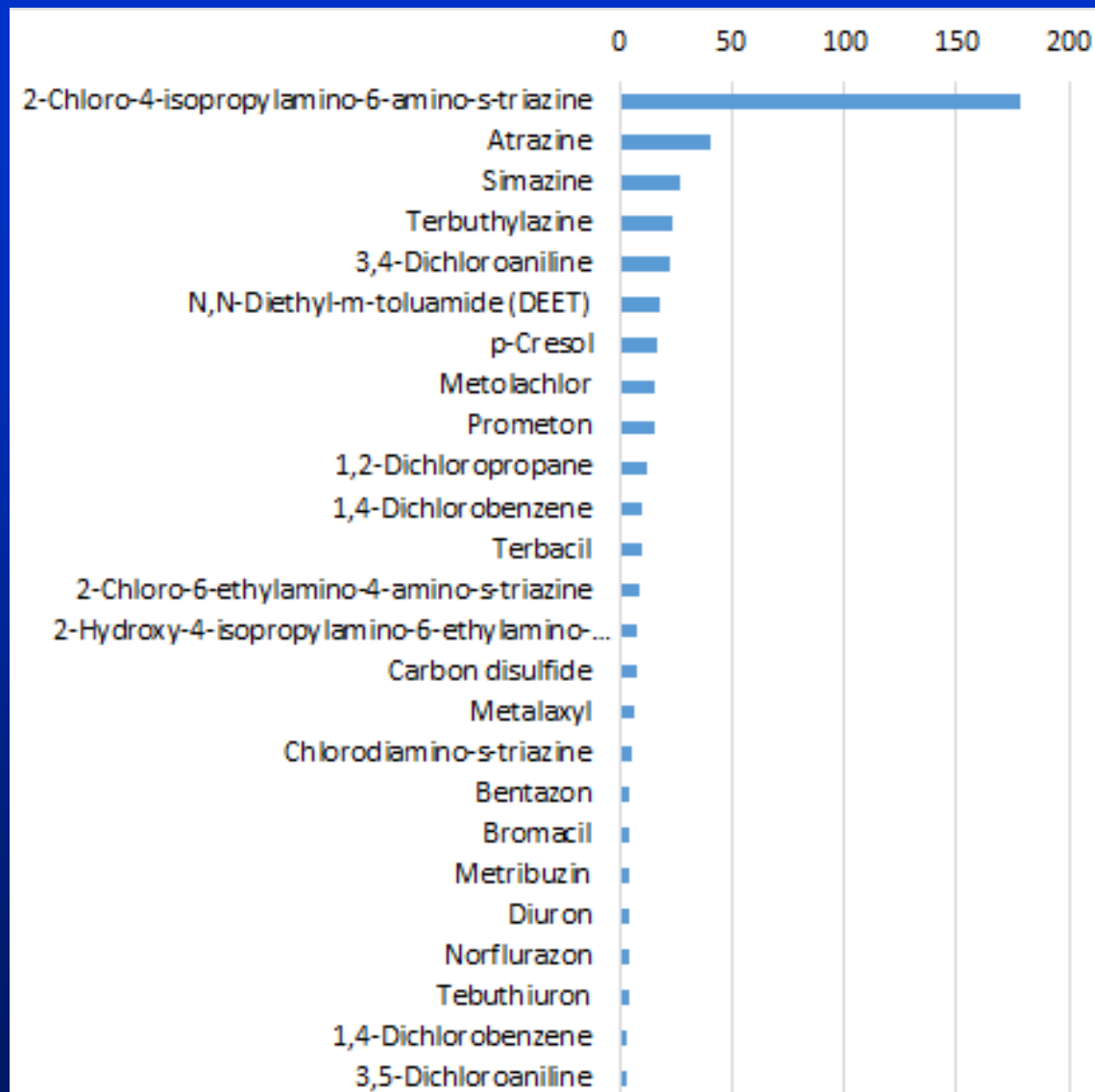
**Oregon ACWA Meeting
Gresham, OR
11-30-2016**

Pesticide Leaching to Groundwater is Complex, Driven in Part By:

- **Amount of particular chemical use**
- **Transport pathways (including tile drains and dry wells)**
- **Chemical properties, including water solubility**
- **Nature of soils (at surface and at depth)**
- **Degradation pathways**
- **Pesticide half-lives**

Number of Pesticide Detections in Groundwater

Oregon and Washington 2000-2016

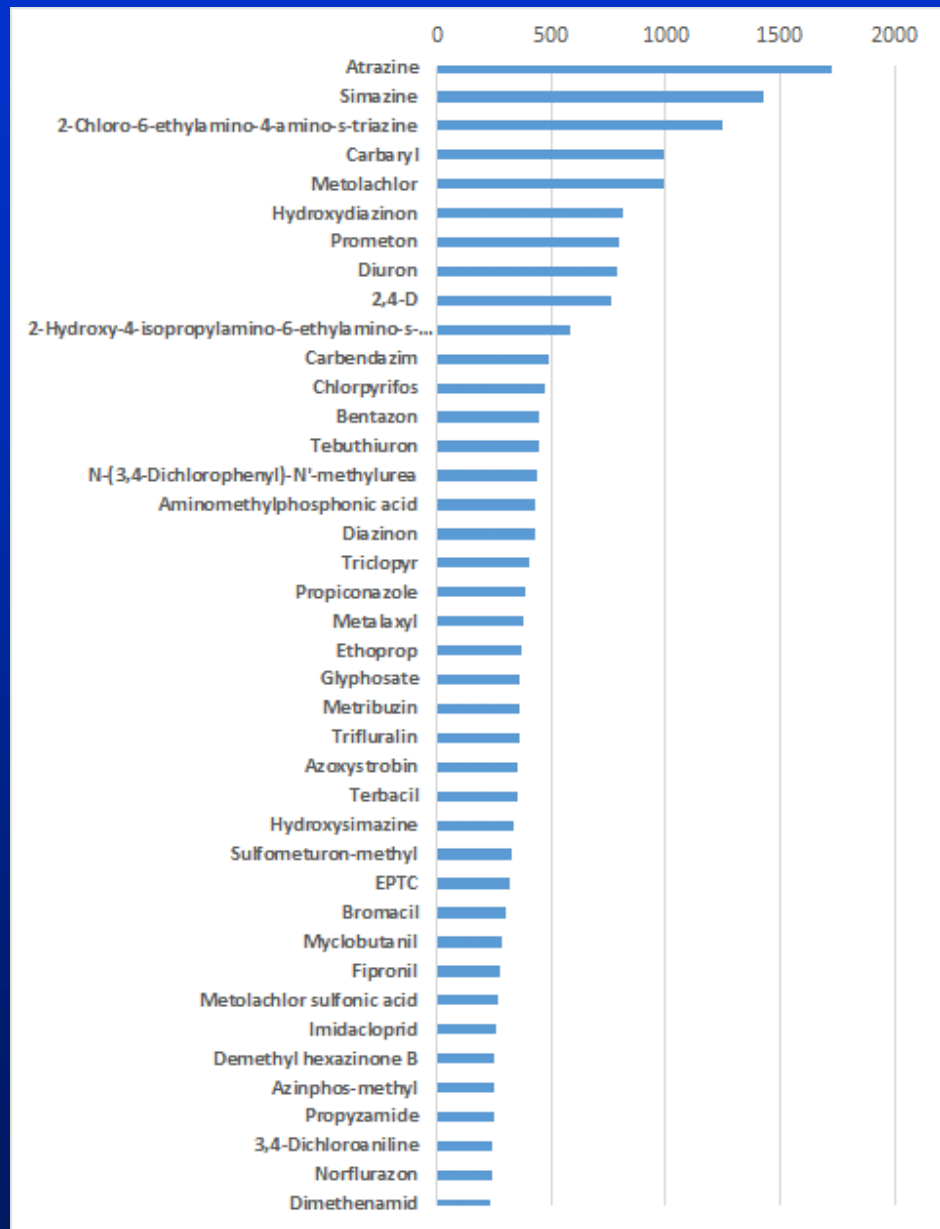


USGS National Water Information System
database, accessed Nov. 29, 2016

Number of Pesticide Detections in Surface Water

Oregon and Washington 2000-2016

USGS National Water Information System
database, accessed Nov. 29, 2016



Clackamas County MS4 Pesticide Study (Municipal Separate Storm Sewer System)



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Tana Haluska, and Michael Cole**



Project funded by:

**Clackamas County MS4 Co-permittees
Clackamas River Water Providers
USGS Cooperative Water Program**



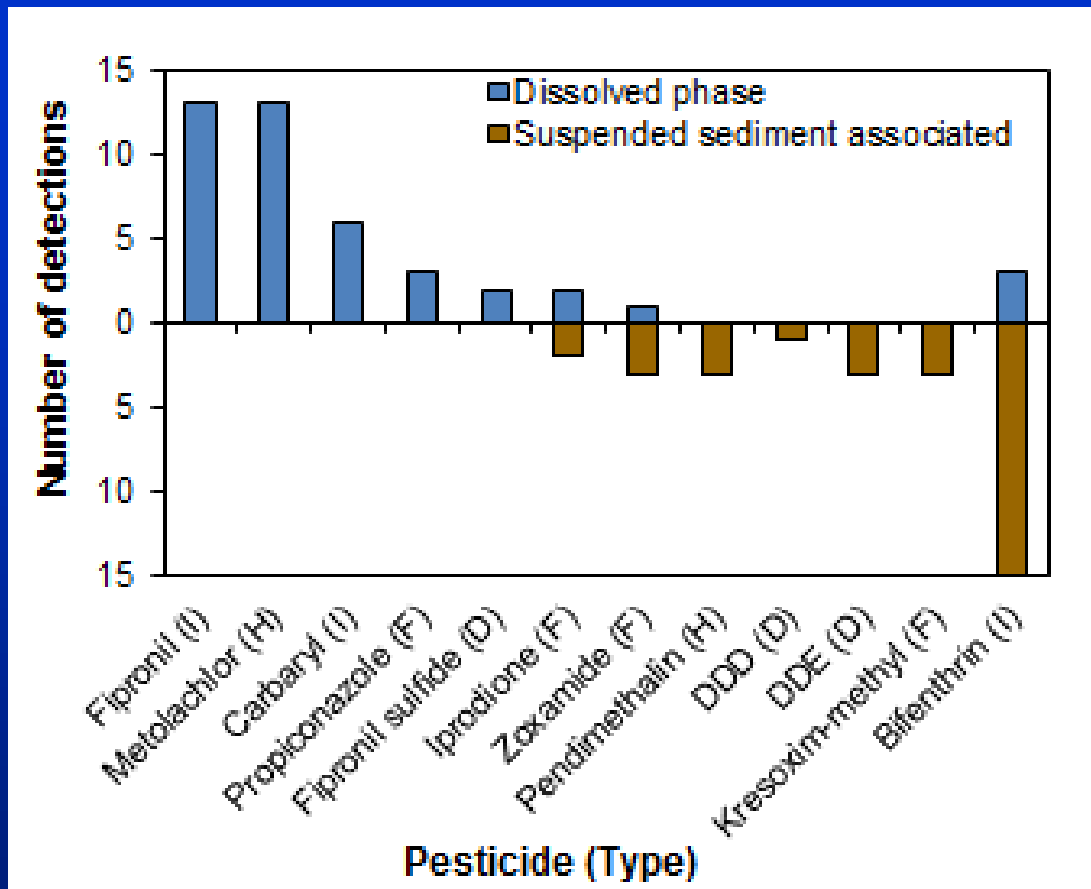
33 Pesticides Detected

Pesticide (type)	Total Number of Detections	Stormwater runoff			
		Storm-water-dissolved (n=20)	Stormwater-suspended sediment (n=20)	SIFT sediment (n=5)	Stream-bed sediment (n=15)
Bifenthrin (I)	33	15%	75%	100%	71%
Fipronil (I)	13	65%	--	--	--
Fipronil desulfinyl (D)	1	5%	--	--	--
Fipronil sulfide (D)	2	10%	--	--	--
Metolachlor (H)	13	65%	--	--	--
<i>p,p'</i> -DDE (D)	13	--	15%	20%	64%
<i>p,p'</i> -DDD (D)	2	--	5%	--	7%
Pendimethalin (H)	9	--	15%	100%	7%
Trifluralin (H)	8	--	--	80%	29%
Dithiopyr (H)	7	--	--	60%	29%
Carbaryl (I)	6	30%	--	--	--
Iprodione (F)	4	10%	10%	--	--
Zoxamide (F)	4	5%	15%	--	--
Kresoxim-methyl (F)	3	--	15%	--	--
Metalaxyl (F)	3	--	--	--	21%
Pentachloroanisole (D)	3	--	--	20%	14%
Prodiamine (H)	3	--	--	40%	7%
Propiconazole (F)	3	15%	--	--	--
Cypermethrin (I)	2	--	--	--	14%
Oxyfluorfen (H)	2	--	--	20%	7%

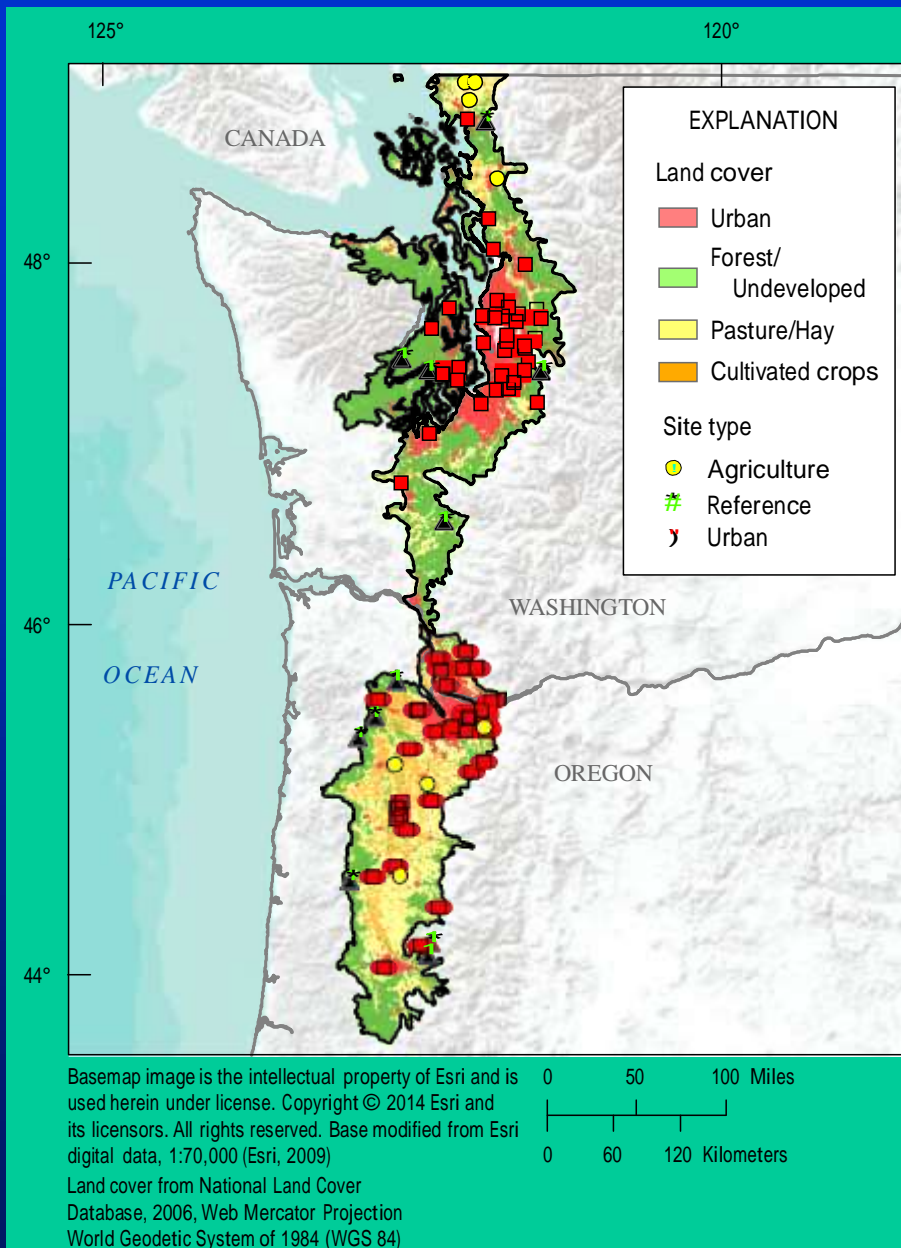
Environ Monitoring and Assessment (2016) 188:345

Pesticide Partitioning

- 70% of detections in stormwater were dissolved vs 30% on suspended sediment
- Water solubility and K_{oc} (organic carbon partitioning coefficient) were good predictors of the dominant phase pesticides were found



Environmental Monitoring and Assessment (2016) 188:345



2015 Pacific Northwest Regional Stream Quality Assessment

- 88 Sites Sampled
- Focus on Urban Environment
- Spring 2015 was Hot and Dry
- Minimal Rain - No Storms Sampled
- Results May Underestimate Occurrence and/or Concentrations of Pesticides

Pesticide Methods

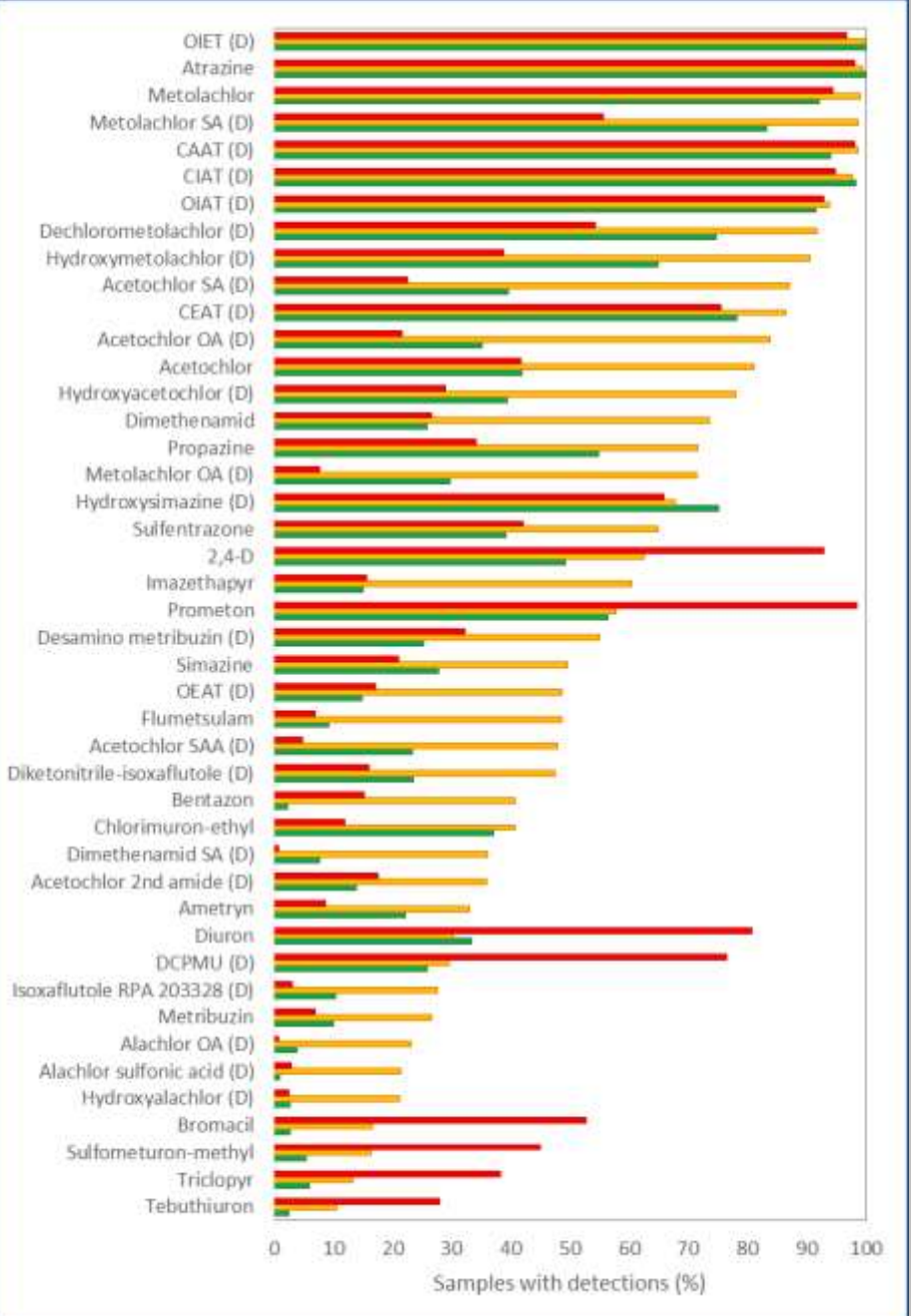
- Mark Sandstrom, USGS NWQL (2016 Method)
 - DOI: [10.3133/tm5B11](https://doi.org/10.3133/tm5B11)
- Liquid chromatography-tandem mass spectrometry (LC-MS/MS)
- 229 pesticides compounds (113 pesticides and 116 pesticide degradates) in filtered water
- The pesticides represent a broad range of chemical classes and were selected based on criteria such as current-use intensity, probability of occurrence in streams and groundwater, and toxicity to humans or aquatic organisms.

Results

n = 221 OR
n = 256 WA

■ Urban ■ Crop >25% ■ Crops <20%

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USGS Unpublished Data Subject to Revision



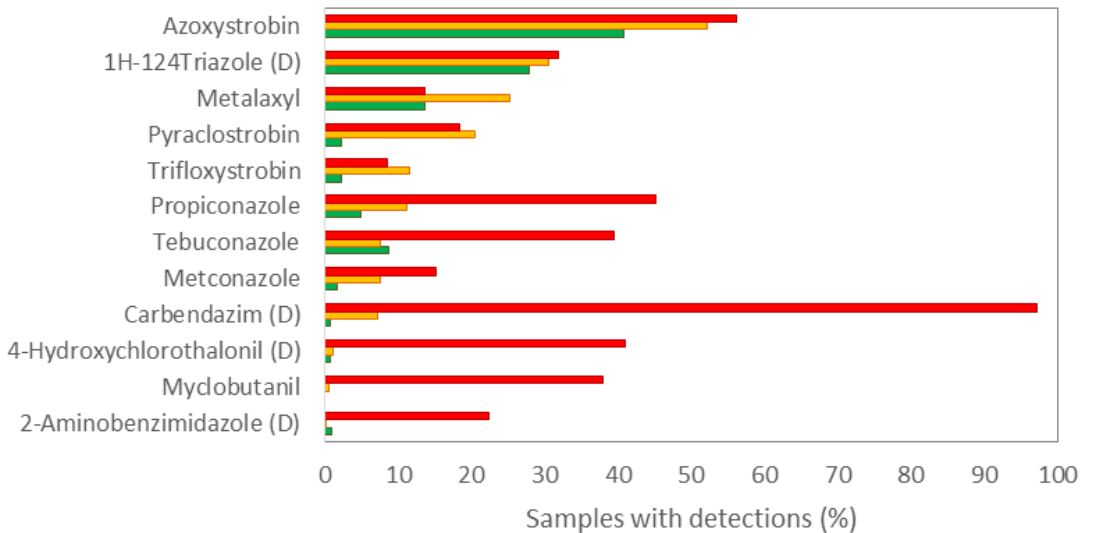
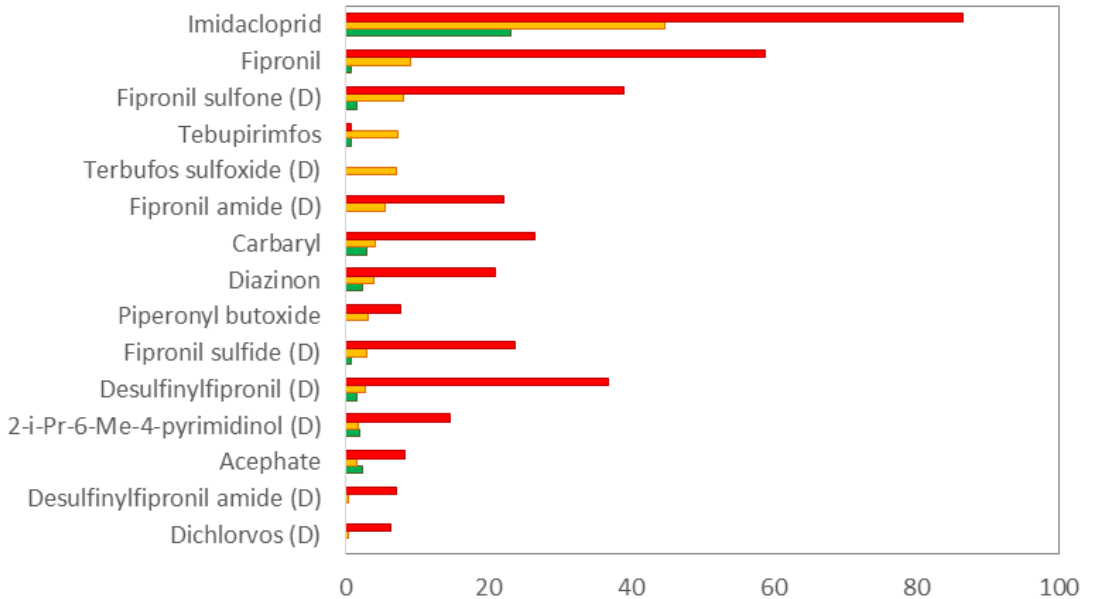
Results

INSECTICIDES

FUNGICIDES

n = 221 OR
n = 256 WA

Urban Crop >25% Crops <20%



Other sources of information

Snyder, D.T., 2008, Estimated depth to ground water and configuration of the water table in the Portland, Oregon area: U.S. Geological Survey Scientific Investigations Report 2008-5059, 40 p. (Available at <http://pubs.usgs.gov/sir/2008/5059/>)

Groundwater Ubiquity Score

Gustafson, D. I., 1989, Groundwater ubiquity score—A simple method for assessing pesticide leachability: Environmental Toxicology and Chemistry, vol. 8, p. 339-357.