Occurrence and Sources of Pesticides to Urban Wastewater and the Environment

Jennifer Teerlink, Kelly Moran, Yina Xie, Robert Budd, Diana Lin, and Rebecca Sutton
EPA Office of Water

Federal

Clean Water Act

California

Porter-Cologne

State Water Resources Control Board

EPA Office of Pesticide Programs

Federal Insecticide, Fungicide, and Rodenticide Act

Food and Agricultural Code

Department of Pesticide Regulation
Prevention: Registration

Response: Continuous Evaluation
What Pesticide Data is Available?

- 100s of registered pesticides
- Data reported for 81 pesticides in the United States
- 41 pesticides detected
<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Inf./Eff.</th>
<th>Range (ng/L)</th>
<th>Median (ng/L)</th>
<th>DF (%)</th>
<th>No. of Samples</th>
<th>No. of Facilities</th>
<th>Chronic USEPA</th>
<th>Log $K_{ow}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permethrin</td>
<td>Inf.</td>
<td>30-3,800</td>
<td>180-315</td>
<td>100</td>
<td>80</td>
<td>32</td>
<td>14 ng/L</td>
<td>6.5</td>
</tr>
<tr>
<td></td>
<td>Eff.</td>
<td>&lt;1-170</td>
<td>&lt;1-21.4</td>
<td>64</td>
<td>90</td>
<td>34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fipronil</td>
<td>Inf.</td>
<td>&lt;20-146</td>
<td>30-70.5</td>
<td>66</td>
<td>41</td>
<td>33</td>
<td>11 ng/L</td>
<td>4.0</td>
</tr>
<tr>
<td></td>
<td>Eff.</td>
<td>&lt;0.5-340</td>
<td>30-104</td>
<td>67</td>
<td>57</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Imidacloprid</td>
<td>Inf.</td>
<td>30-306</td>
<td>51.4-161</td>
<td>100</td>
<td>21</td>
<td>17</td>
<td>10 ng/L</td>
<td>0.57</td>
</tr>
<tr>
<td></td>
<td>Eff.</td>
<td>18.5-305</td>
<td>48.3-164</td>
<td>100</td>
<td>25</td>
<td>21</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Average annual pesticide use and estimated urban consumer use 2011-2015

- Pesticide Use Reporting of Professional Applications
- Estimated Consumer:
  - Outdoor Only
  - Mixed
  - Clothing
  - Pets
  - Indoor Only
Distribution of consumer use type by active ingredient.
Fipronil

Key Data Gaps and Future Challenges

• Improve down-the-drain modeling capabilities for product registration
• Gather temporal and spatial monitoring data for pesticide and degradates in wastewater influent and effluent.
• Gather data on biosolids.
• Determine washoff % specific to use pattern and active ingredients.
• Gather monitoring data for suspected intensive use scenarios:
  • Nurseries including cannabis
  • Bed bug mitigation
  • Commercial laundry (uniforms)
  • Building materials
• Evaluate impact of decreasing per capita water use.
Thank you!

Jennifer.Teerlink@cdpr.ca.gov