

Environmental Effects of 40 Commonly Used Lawn Pesticides



Environ. Effects

	Detected in Groundwater	Potential Leacher	Toxic to Birds	Toxic to Fish/ Aquatic Organisms	Toxic to Bees	Toxic to Mammals
Herbicides						
2,4-D*	X ^{1,2,3,4,7}	X ^{3,4}	X ^{1,2,3,11}	X ^{1,2,3,11}	X ^{1,11}	X ^{3,4,12}
Atrazine †	X ¹	X ¹	Possible ¹⁰	X ¹		
Benfluralin	X ⁷		X ^{3,11}	X ^{3,11}	X ^{5,11}	
Bensulide			X ³	X ³	X ³	
Clopyralid	X ^{2,7}	X ^{2,11}	X ¹¹	X ¹¹	X ¹¹	
Dicamba	X ^{2,7}	X ^{1,2,3}	X ^{10,11}	X ^{1,2,3,11}	X ^{5,10,11}	
Diquat Dibromide		X ⁵	X ^{1,3,11}	X ^{1,3,11}	X ^{5,11}	X ¹
Dithiopyr				X ^{5,6,11}	X ^{5,11}	
Fluaziprop-p-butyl				X ^{1,4,6,11}	X ^{1,4}	
Glyphosate*	X ⁸	X ⁵	X ^{1,3,11}	X ^{1,2,11}	X ¹¹	X ⁴
Imazapyr	X ²	X ^{2,3}		X ^{2,5,11}	X ^{5,11}	
Isoxaben		X ¹¹	X ¹¹	X ^{3,11}	X ¹¹	
MCPA	X ^{4,7}	X ^{1,4,11}	X ^{1,3,11}	X ^{1,3,11}	X ⁵	X ³
Mecoprop (MCP)*	X ⁴	X ^{1,2,3,11}	X ^{3,11}	X ²	X ¹¹	X ³
Oxadiazon			Possible ³	X ³	Possible ³	
Oxyfluorfen				X ¹		Possible ³
Pendimethalin*	X ^{3,7}		X ^{1,3,11}	X ^{1,3,11}	X ^{5,11}	X ³
Prodiamine		X ³		X ³		
Sulfentrazone			Possible ³	X ¹³		X ^{3α}
Triclopyr	X ^{2,7}	X ^{1,2,3,11}	X ^{2,3,11}	X ^{2,3,11}	X ^{5,11}	
Trifluralin*	X ^{4,7}			X ^{3,11}	X ^{5,11,12}	
Insecticides						
Abamectin/ Avermectin B1				X ^{1,3}	X ^{1,3}	X ³
Acephate		X ¹	X ^{1,3,10,11}	X ^{3,11}	X ^{1,3,10,11}	X ³
Bifenthrin*†			X ^{1,10,11}	X ^{1,10,11}	X ^{1,10,11}	X ^{1,4}
Carbaryl	X ^{1,3,7}	X ¹¹	X ^{2,11}	X ^{1,2,3,11}	X ^{1,2,3,11}	X ^{3,11}
Cyfluthrin†			Possible ¹⁴	X ¹	X ¹	
Deltamethrin†				X ¹	X ¹	
Fipronil	X ⁷	X ^{5,11}	X ^{2,4,10,11}	X ^{2,4,10,11}	X ^{2,4,10,11}	X ⁴
Imidacloprid ‡	X ⁷	X ^{1,2,10,11}	X ^{1,2,11}	X ^{1,2,11}	X ^{1,2,10,11}	
Malathion*	X ^{1,2,3,7}	X ^{1,3,5}	X ^{1,2,3,10,11}	X ^{1,2,3,10,11}	X ^{1,3,10,11}	X ³
Permethrin*†	X ^{2,7}			X ^{1,2,3,11}	X ^{1,2,3,11}	
Trichlorfon		X ^{1,3,11}	X ^{1,3,11}	X ^{1,3,11}	X ^{1,11}	X ⁴ //
Fungicides						
Azoxystrobin	X ⁹	X ^{3,4,11}	X ¹¹	X ^{3,11}	X ¹¹	
Chlorothalonil	X ²	X ¹	X ³	X ¹		Possible ^{3α}
Metalaxyl			Possible ¹⁴			
Myclobutanil	X ⁷			X ⁵		
Propiconazole	X ⁷	X ³		X ^{3,11}	X ^{5,11}	X ¹¹
Sulfur β		X ¹	X ¹¹	X ¹¹	X ¹¹	
Thiophanate methyl		X ³		X ^{3,11}	X ¹¹	
Ziram		X ^{3,4}	X ^{1,3,11}	X ^{1,3,11}	X ¹¹	X ³
Totals:	21	24	28	39	33	18

Pesticides

**These pesticides are among the top 10 most heavily used pesticides in the home and garden sector from 2008-2012, according to the latest sales and usage data available from EPA (2017), available at https://www.epa.gov/sites/default/files/2017-01/documents/pesticides-industry-sales-usage-2016_0.pdf.*

† EPA lists all synthetic pyrethroids under the same category. While all synthetic pyrethroids have similar toxicological profiles, some may be more or less toxic in certain categories than others. See Beyond Pesticides' synthetic pyrethroid fact sheet at bit.ly/TLBuP8 for additional information.

‡ Imidacloprid is a systemic insecticide in the neonicotinoid chemical class, which is linked to bee decline.

// Based on in-vitro mammalian cell study.

α Dietary Exposure

¥ Atrazine has residential uses in Southeast United States.

β Least Toxic

Description

This chart bases most toxicity determination on interpretations and conclusions of studies by university, government, or organization databases that classify chemical compounds and supports the strongest evidence. However, there is a body of scientific literature which aims to resolve discrepancies in health effects through the Beyond Pesticides' Gateway on Pesticide Hazards and Safe Pest Management. Empty cells may refer to either insufficient data or if the chemical is considered relatively non-toxic based on currently available data. The column labeled "Potential to Leach" refers to a chemical's potential to move into deeper soil layers and eventually into groundwater. The column labeled "Toxic to Mammals" refers to conclusions based on evidence from studies done on non-human mammals.

The list of 40 commonly used lawn chemicals is based on information provided by the General Accounting Office 1990 Report, "Lawn Care Pesticides: Risks Remain Uncertain While Prohibited Safety Claims Continue," U.S. Environmental Protection Agency (EPA) National Pesticide Survey (1990), Farm Chemicals Handbook (1989), The National Home and Garden Pesticide Use Survey by Research Triangle Institute, NC (1992), multiple state reports, current EPA Environmental Impact Statements, and Risk Assessments, EPA national sales and usage data, best-selling products at Lowe's and Home Depot, and Beyond Pesticides' information requests.

For more information on hazards associated with pesticides, including peer-reviewed studies not incorporated in this document, please see Beyond Pesticides' Gateway on Pesticide Hazards and Safe Pest Management at www.beyondpesticides.org/gateway. For questions and other inquiries, please contact our office at 202-543-5450, email info@beyondpesticides.org or visit us on the web at www.beyondpesticides.org.

Citations

1. Extension Toxicology Network (EXTOXNET) Pesticide Information Profiles. Available at: <http://extoxnet.orst.edu/pips/ghindex.html>.
2. Northwest Coalition for Alternatives to Pesticides (NCAP), Pesticide Factsheets. Available at: <http://www.pesticide.org/get-the-facts/pesticide-factsheets>.
3. U.S. EPA, Office of Prevention, Pesticides and Toxic Substances, Reregistration Eligibility Decisions (REDs), Interim REDs (iREDs) and RED Factsheets. Available at: <http://www.epa.gov/pesticides/reregistration/status.htm>.
4. National Library of Medicine. TOXNET Hazardous Substances Database. Available at: <http://toxnet.nlm.nih.gov/cgi-bin/sis/htmlgen?HSDB>.
5. Pesticide Action Network Pesticide Database. Available at: <http://www.pesticideinfo.org>.
6. Fluoride Action Alert Pesticide Project Factsheets. Available at: <http://www.fluoridealert.org/f-pesticides.htm>.
7. U.S. Geological Survey, Water Quality in Principal Aquifers of the United States, 1991–2010. 2015. Available at: <http://pubs.usgs.gov/circ/1360/>.
8. Battaglin, W.A., M.T. Meyer, K.M. Kuivila, and J.E. Dietze. Glyphosate and Its Degradation Product AMPA Occur Frequently and Widely in
9. U.S. Soils, Surface Water, Groundwater, and Precipitation. Journal of the American Water Resources Association (JAWRA) 50(2): 275-290. 2014. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/jawr.12159/abstract>.
10. U.S. Geological Survey. Occurrence of Fungicides and Other Pesticides in Surface. Water, Groundwater, and Sediment from Three Targeted-Use Areas in the United States. 2013. Available at: <http://www.sciencedirect.com/science/article/pii/S0045653512005218>.
11. National Pesticide Information Center (NCPIC). Available at: <http://npic.orst.edu/index.html>.
12. University of Hertfordshire. PPDB: Pesticide Properties Database. Available at: <http://sitem.herts.ac.uk/aeru/ppdb/en/>.
13. U.S. Forest Service. Human Health and Ecological Risk Assessment. Available at: <http://www.fs.fed.us/foresthealth/pesticide/risk.shtml>.
14. U.S. EPA, Office of Prevention, Pesticides and Toxic Substances, New Active Ingredients Factsheets: <http://web.archive.org/web/20120107215849/http://www.epa.gov/opprd001/factsheets/index.htm>
15. Mineau, P., A. Baril, B.T. Collins, J. Duffe, G. Joerman, R. Luttik. 2001. Reference values for comparing the acute toxicity of pesticides to birds. Reviews of Environmental Contamination and Toxicology 170:13-74. https://training.fws.gov/resources/course-resources/pesticides/Terrestrial%20Effects/2001_Acute%20toxicity%20reference%20values.pdf. [National Wildlife Research Centre, Canadian Wildlife Service, Environment Canada]



BEYOND PESTICIDES
701 E Street, SE ■ Washington DC 20003
202-543-5450 phone ■ 202-543-4791 fax
info@beyondpesticides.org ■ www.beyondpesticides.org

Last Updated October 2021