

Imidacloprid and Groundwater

Imidacloprid

Imidacloprid is a neonicotinoid insecticide used to control insects on agricultural crops, ornamental and nursery plants, and in residential yards and gardens. In agricultural crops, imidacloprid is mainly used as a seed treatment and leaf spray. In Minnesota, imidacloprid is used indoors to eliminate bed bugs, as a wood treatment to eliminate termites and carpenter ants, to control emerald ash borer, and is in some products that control fleas and ticks on pets.^{1,2}

Imidacloprid in Minnesota Waters

Imidacloprid has been detected in both groundwater and surface water in Minnesota. Most of the groundwater detections are from wells in shallow aquifers in the central sands region of Minnesota. In the Minnesota Department of Agriculture's (MDA) 2019 Water Quality Monitoring Report, ten percent of groundwater samples had detections of imidacloprid and the maximum groundwater concentration was 0.17 µg/L. Between 2015 and 2019, 11 percent of surface water (river and stream) samples in Minnesota had detections of imidacloprid. The maximum detection was 0.11 µg/L.³

In a 2015 study of 108 public drinking water wells, imidacloprid was not detected.⁴ In 2019, MDA detected imidacloprid in 2 percent of samples from 1,103 private drinking water wells in 23 counties across Minnesota; the maximum detection was 0.17 µg/L.³

*One microgram per liter (µg/L) is the same as one part per billion (ppb).

MDH Guidance Value

Based on available information, MDH developed a guidance value of 2 parts per billion (ppb) for imidacloprid in water. MDH does not use guidance values to regulate water quality, but they may be useful for situations in which no regulations exist. MDH develops guidance values to protect people who are most vulnerable to the potentially harmful effects of a contaminant. A person drinking water at or below the guidance value would be at little or no risk for harmful health effects.

Potential Health Effects

In animal studies, exposure to imidacloprid decreased the effectiveness of the immune system. At higher doses than those affecting the immune system, tremors and thyroid lesions occurred. There is no evidence that imidacloprid causes cancer in animals or people.

Potential Exposure to Imidacloprid

You are most likely to be exposed to imidacloprid through use or direct contact with a product containing imidacloprid. This can occur if you apply pesticides containing imidacloprid to your yard or garden, or if you handle pets or pet collars that are treated with imidacloprid. You may also be exposed to imidacloprid by consuming food that was treated with imidacloprid or by drinking water with imidacloprid in it.

Using Imidacloprid Safely

You can limit your exposure to imidacloprid by washing your hands after playing with your pets and by following the directions on the product label for applying imidacloprid to your yard or garden.

Imidacloprid in the Environment

Imidacloprid enters the environment when we use it to control insect pests via granular powders, sprays, injections, and seed treatments. Commonly treated crops in Minnesota include soybeans, wheat, and corn. Imidacloprid is persistent in soils. It leaches into groundwater and is moved into surface water by runoff.⁵ It can break down in surface water within hours when the sun is shining, but persists in groundwater without exposure to sunlight.⁶ There are concerns with toxicity for birds that eat imidacloprid-treated seeds and for honeybees that consume the pollen and nectar from treated plants.^{5,6}

Potential Environment Impacts of Imidacloprid

Imidacloprid is highly toxic to invertebrates and especially insects, including honeybees and other pollinators. In March 2017, the US Environmental Protection Agency (USEPA) reduced its aquatic life benchmark (the level of the chemical in water thought to be safe for aquatic life) for imidacloprid from 1.05 µg/L to 0.010 µg/L, a significant reduction. In 2019, 44 percent of imidacloprid detections in surface waters exceeded USEPA's revised aquatic life benchmark for aquatic life.³

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in drinking water sources and develops health-based guidance values for groundwater. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

References

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3. Minnesota Department of Agriculture (2020). 2019 Water Quality Monitoring Report. <https://wrl.mnpals.net/islandora/object/WRLrepository%3A3580/datastream/PDF/view>
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6. U.S. Environmental Protection Agency (2016). Preliminary Pollinator Assessment to Support the Registration Review of Imidacloprid. <https://www.regulations.gov/document?D=EPA-HQ-OPP-2008-0844-0140>

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SEPTEMBER 2020
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