

chemicalWATCH Factsheet

IMIDACLOPRID

Imidacloprid is a systemic, chloro-nicotinyl insecticide used for the control of sucking insects such as fleas, aphids, whiteflies, termites, turf insects, soil insects, and some beetles. It has not been fully evaluated for human health and environmental effects.

Mode of Action

It causes a blockage in a type of neural pathway that is more abundant in insects than in warm-blooded animals, leading to an accumulation of acetylcholine, a neurotransmitter, and resulting in the insect's paralysis and eventual death. It is effective on contact and via stomach action.

Toxicity

Imidacloprid is classified by the Environmental Protection Agency (EPA) as both a toxicity class II and class III pesticide (on a scale of I to IV, I being the highest toxicity class), and must be labeled with the signal word "Warning" or "Caution." Symptoms of acute exposure are expected to be fatigue, twitching, cramps, and muscle weakness including the muscles necessary for breathing. The LD₅₀ is 450 mg/kg body weight in rats and 131 mg/kg in mice. The 24-hour dermal LD₅₀ in rats is >5,000 mg/kg. The airborne concentration that resulted in mortality to half of the test organisms (LC50) is >69 mg/meters cubed air in the form of an aerosol, and >5323 mg/meters

cubed in air in the form of dust. It is considered non-irritating to eyes and skin, and non-sensitizing to skin, though some granular formulations may contain clay as an inert ingredient, which may act as an eye irritant.

In a study of rats fed up to 1,800 parts per million (ppm), the NOEL (No Observable Effect Level) was found to be 100 ppm, with adverse effects including decreased body weight gain in females at 900 ppm and 300 ppm in males. A study of dogs fed up to 2,500 ppm resulted in a NOEL of 1,250 ppm, with adverse effects including some stress to the liver and increased blood cholesterol levels. A reproduction study in rats fed up to 700 ppm resulted in a NOEL of 100 ppm based on decreased pup body weight observed at the 250-ppm dose level. A developmental toxicity study in rats given doses up to 100 ppm during days 6 to 16 of gestation resulted in a NOEL of 30 mg/kg/day based on skeletal abnormalities observed at the next highest dose tested. Another developmental toxicity study with rabbits given doses of imidacloprid during days 6 through 19 of gestation resulted in a NOEL of 24 mg/kg/day based on decreased body weight and skeletal abnormalities at the highest dose tested.

Imidacloprid was found to be weakly mutagenic, testing positive for causing

changes in human lymphocyte chromosomes and for genotoxicity in Chinese hamster ovary cells. It categorized as a "Group E" carcinogen (evidence of noncarcinogenicity for humans) by EPA. In feeding studies in rats, very high doses of imidacloprid were associated with thyroid lesions.

Imidacloprid is quickly and nearly completely absorbed from the gastrointestinal tract and eliminated in urine and feces. Imidacloprid can be phytotoxic when not used according to the manufacturer's specifications.

Ecological Effects

It is considered toxic to upland game and birds, of moderately low toxicity to fish, and highly toxic to bees if used as a foliar application, especially during flowering.

Environmental Fate

In soil, Imidacloprid has a half-life of 48-190 days, breaking down more quickly in soils with plant ground cover. It degrades into the primary metabolite 6-chloronicotinic acid, which eventually breaks down into carbon dioxide. There is low risk for groundwater contamination, it is moderately soluble, and has moderate binding affinity to organic materials in soil. The half-life in water is myth greater than 31 days at a pH of 5, 7, and 9.

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Imidacloprid *chemicalWATCH* Factsheet Bibliography

Extension Toxicology Network (ETN). 1995. Pesticide Information Profiles: Imidacloprid. <<http://ace.orst.edu/cgi-in/mfs/01/pips/imidaclo.htm>>.

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