

Imidacloprid

The Pesticide Label: Labels provide directions for the proper use of a pesticide product. *Be sure to read the entire label before using any product.* A signal word on each product label indicates the product's toxicity after a single dose..

CAUTION- low toxicity

WARNING- moderate toxicity

DANGER- high toxicity

What is imidacloprid?

Imidacloprid is an insecticide that was first introduced to the United States in 1994. It is in the chloronicotinyl nitroguanidine class. It is used as a crop and structural pest insecticide, a seed treatment, and a flea-control treatment.

How does imidacloprid work?

Imidacloprid works by disrupting the nervous system of an insect pest. Imidacloprid kills insects by contact and ingestion (3). It is used to control sucking insects and is effective against adult or larval stages of various species (3,4,5). Imidacloprid acts as a competitive inhibitor at nicotinic acetylcholine receptors in the nervous system (1,2). It effectively blocks the signals that are induced by acetylcholine at the post-synaptic membrane, resulting in impairment of normal nerve function (2). Imidacloprid has a higher binding strength to insect nerve receptors than to mammalian receptors (2).

What types of products contain imidacloprid?

- granular and liquid ornamental turf/plant products
- granular and liquid crop plant products
- seed treatments
- structural pest products
- pet care topical solutions

What are some products that contain imidacloprid?

- Merit®
- Admire®
- Provado®
- Imicide™
- Gaucho™
- Premise®
- Advantage™

How toxic is imidacloprid?

Animals

- The *technical* product (94.0% imidacloprid) has a moderate order of toxicity with respect to ingestion in the rat but appears to be less toxic when absorbed by the skin or when inhaled (6).
- Imidacloprid may cause minimal redness to the eyes but is non-irritating to the skin. It does not sensitize the skin (6).
- Signs of toxicity in rats include lethargy, respiratory disturbances, decreased movement, staggering gait, occasional trembling, and spasms (7). See **Laboratory Testing** box.
- Affected organs may include the liver, kidney, thyroid, heart, lung, spleen, adrenal, brain, and gonads (6).
- The *technical* form of imidacloprid carries the signal word "Warning." All *formulated* or *end-use* imidacloprid products in the United States, except Advantage, have the signal word "Caution."

Advantage products carry the signal word “Warning.” See **The Pesticide Label** box (above). Formulated products contain diluted amounts of imidacloprid.

Humans

- Human toxicity data are not available.

Laboratory Testing: Before pesticides are registered by the U.S. EPA, they must undergo laboratory testing for short-term and long-term health effects. In these tests, laboratory animals are purposely fed a pesticide at high doses to cause toxic effects. These tests help scientists judge how these chemicals might affect humans, domestic animals, and wildlife in cases of overexposure. When pesticide products are used according to label directions, toxic effects are not likely to occur because the amount of pesticide that people and animals may be exposed to is low compared to the doses fed to laboratory animals.

How will imidacloprid flea products affect my pet?

- Imidacloprid pet products, such as Advantage, carry the signal word “Warning.” These *formulated* products have a very low toxicity if absorbed through the skin, but in rare instances cause some skin irritation at the application site. These products have low toxicity if ingested (8). The active ingredient is more toxic against insects than mammals (1,2,3).

Effects of imidacloprid on human health and the environment depend on how much imidacloprid is present and the length and frequency of exposure. Effects also depend on the health of a person and/or certain environmental factors.

Does imidacloprid break down and leave the body?

Animals

- The major route of imidacloprid excretion in rats is via urine. Over 90% of an administered dose is eliminated within 24 hours and 96% after 48 hours. Around 75% is excreted in the urine and 21% in the

feces (9). The original compound and breakdown products are excreted from the body (9).

Humans

- Human metabolism data are not available.

Is imidacloprid likely to cause cancer?

Animals

- Imidacloprid showed no evidence of causing cancer in long-term studies using laboratory animals (6). See **Cancer** box.

Humans

- The U.S. EPA has given imidacloprid a Class E cancer rating (evidence of non-carcinogenicity in humans) based on its inability to induce cancer in lab animal studies (10).

Cancer: The U.S. EPA has strict guidelines that require testing of pesticides for their potential to cause cancer. These studies involve feeding laboratory animals large *daily* doses of the pesticide over most of the lifetime of the animal. Based on these tests, and any other available information, EPA gives the pesticide a rating for its ability to cause cancer in human. For example, if a pesticide does not cause cancer in animal tests, then the EPA considers it unlikely the pesticide will cause cancer in humans. Testing for cancer has not been done on human subjects.

Does imidacloprid cause reproductive problems or birth defects?

Animals

- Reproduction studies in rats over several generations show that reproductive toxicity occurs at the higher doses tested. See **Laboratory Testing** box. Clinical signs include decreased body weights in litters and decreased pup body weight gain (6,7).
- Imidacloprid did produce an increase in skeletal abnormalities and reduced body weights in fetal rats and rabbits at the higher doses tested (6,7).

Humans

- Human reproductive and developmental toxicity data are not available.

What happens to imidacloprid in the environment?

Soil: In laboratory studies, imidacloprid has a half-life of greater than one year in oxygenated sandy loam soil (6). See **Half-life** box. Imidacloprid is somewhat mobile in the soil. Due to its persistence and mobility, imidacloprid may have a potential to contaminate groundwater (6).

Anaerobic metabolism: Imidacloprid has a half-life of 27 days in silt loam sediment that lacks oxygen (6).

Hydrolysis: Imidacloprid is stable to breakdown by water at mildly acid (lower pH) to neutral pH. It degrades with a half-life of 355 days in more basic (higher pH) solutions (6).

Photodegradation: In studies where imidacloprid was exposed to light, it had a half-life of one hour in water and 39 days on sandy loam soil (6).

Half-life is the time required for half of a compound to degrade or be eliminated from the body.

1 half-life	= 50% remaining
2 half-lives	= 25% remaining
3 half-lives	= 12% remaining
4 half-lives	= 6% remaining
5 half-lives	= 3% remaining

Remember that the amount of chemical remaining after a half-life will always depend on the amount of the chemical originally applied.

What effect does imidacloprid have on wildlife?

- Imidacloprid is slightly toxic to fish and moderately toxic to aquatic invertebrates (6).
- Imidacloprid is highly toxic to bees and should not be applied to vegetation when bees are foraging (6).
- Imidacloprid has been found to be highly toxic to the house sparrow, moderately toxic to upland game birds, and slightly to not toxic to waterfowl (6). Imidacloprid appears to repel birds when used as a

seed treatment (11,12).

- Imidacloprid is moderately toxic to earthworms (5).

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