

Pesticide Toxicity Profile: Strobilurin Pesticides¹

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This document provides a general overview of human toxicity, provides a listing of laboratory animal and wildlife toxicities and a cross reference of chemical, common and trade names of the strobilurin pesticides registered for use in Florida.

General

The strobilurin pesticides are a group of relatively new fungicides, with azoxystrobin receiving EPA registration in 1997. Trifloxystrobin followed in 1999 and most recently, pyraclostrobin received registration. They are effective against several important plant pathogens, but also have some unique properties. They are the first family of fungicides to provide control of all three major types of plant pathogenic fungi and because of their strong affinity for plant waxes, they are capable of translocating from the upper leaf surface to the lower, providing control on both surfaces. The strobilurins have a wide range of sites where they may be applied and dependent upon product, they are registered for use on citrus, small and tree fruits, turfgrass, field and vegetable crops and many specialty commodities. Soon after they were released, resistance was first reported with certain fungi in Asia and Europe, and

this has since occurred in North America. Because the strobilurins have a very site-specific mode of action (mitochondrial respiration inhibition resulting in prevention of spore germination and mycelial growth), they have a relatively high resistance risk. Strobilurin products pre-packaged with fungicides having different modes of action, including chlorothalonil, propiconazole, fludioxonil, or mefenoxam are commercially available. Product formulations of the strobilurins include dry flowables or water dispersible granules, emulsifiable concentrates, and liquid flowables.

Toxicity

The strobilurin pesticides are regarded as a family of relatively safe pesticides in terms of acute, chronic, and long-term effects. With acute oral, dermal, and inhalation effects, they are classified Category III and carry the signal word CAUTION on their labels. In other terms, this translates into the following quantities that would be expected to cause acute toxicity to a 150 pound person: oral ingestion of 500 to 5,000 mg/kg body weight, dermal exposure of 2,000 to 20,000 mg/kg body weight, or inhalation of 2.0 to 20.0 mg/l. The acute oral ingestion would

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equate to one ounce to one pint as the lethal dose. They are considered to be non-oncogenic in rat chronic toxicity studies. There were no reports of reproductive, teratogenic, developmental or carcinogenic effects; they are quickly metabolized and excreted. The strobilurins are toxic to fish and aquatic invertebrates. Their product labels have statements regarding use precautions around water and areas of groundwater concern. Other ecological effects appear to be negligible. Mammalian toxicities for the strobilurin pesticides are shown in Table 1. Table 2 lists the toxicities to wildlife by the common name of the pesticide. Table 3 provides a cross listing of many of the trade names that these products are registered and sold by in Florida.

Additional Information

Crop Protection Handbook. 2005. vol. 91.
Willoughby, Ohio: Meister Publishing Co.
<http://www.meisterpro.com/mpn>.

Nesheim, O.N. 2002. Toxicity of pesticides.
UF/IFAS EDIS Document PI-13.
<http://edis.ifas.ufl.edu/PI008>.

Seyler, L.A., et.al. 1994. Extension toxicology
network (EXTOXNET). Cornell University and
Michigan State University.
<http://extoxnet.orst.edu/index.html>. Visited
September 2005.

Table 1. Strobilurin pesticide mammalian toxicities (mg/kg of body weight).

Common name	Rat oral LD ₅₀	Rabbit dermal LD ₅₀
Azoxystrobin	>5,000	>2,000 (rat)
Kresoxim-methyl	>5,000	>2,000 (rat)
Pyraclostrobin	>500 - >2,000	>4,000 (rat)
Trifloxystrobin	>4,000	>2,000

Table 2. Strobilurin pesticide wildlife toxicity ranges.

Common name	Bird acute oral LD ₅₀ (mg/kg)*	Fish (ppm)**	Bee [†]
Azoxystrobin	PNT	HT	PNT
Kresoxim-methyl	57	MT	---
Pyraclostrobin	ST – PNT	HT	PNT
Trifloxystrobin	ST – PNT	HT - VHT	PNT

*Bird LD₅₀ : Practically nontoxic (PNT) = >2,000; slightly toxic (ST) = 501 – 2,000; moderately toxic (MT) = 51 – 500; highly toxic (HT) = 10 – 50; very highly toxic (VHT) = <10.

**Fish LC₅₀ : PNT = >100; ST = 10 – 100; MT = 1 – 10; HT = 0.1 – 1; VHT = <0.1.

[†]Bee: HT = highly toxic (kills upon contact as well as residues); MT = moderately toxic (kills if applied over bees); PNT = relatively nontoxic (relatively few precautions necessary).

Table 3. Cross reference list of common, trade and chemical names of strobilurin pesticides.

Common name	Trade names*	Chemical name
Azoxystrobin	Abound®, Amistar®, Dynasty®, Heritage®, Quadris®	Methyl (E)-2-2-6-(cyanophenoxy)pyrimidin-4-yloxy-phenyl-3-methoxyacrylate
Iodomethane	Midas®	Iodomethane
Kresoxim-methyl	Sovran®	Methyl (E)-2-methoxylimino-2(2-(o-toloxymethyl) phenyl) acetate
Pyraclostrobin	Cabrio®, Headline®	Carbamic acid [2-[[[1-(4-chlorophenyl)-1H-pyrazol-3-yl]oxy]methyl]phenyl]methoxy-, methyl ester
Trifloxystrobin	Flint®, Gem®, Compass®	Benzeneacetic acid, (E,E)-alpha-(methoxyimino)-2-(((1-(3-trifluoromethyl)phenyl)ethylidene)amino)oxy)methyl)-methyl ester

*Does not include manufacturers' prepackaged mixtures.