chemicalWATCH Factsheet

ABAMECTIN

The active ingredient of many abamectin products, like Avid™, Zephyr™, Vertimec™ or Agri-Mek™, is actually a mixture of 80% avermectin B_{1a} and 20% avermectin B_{1b} (FCH 2000). These B_{1a} and B_{1b} avermectins are purified from a chemically complex insecticidal/miticidal toxin produced by an actinomycete bacterium, *Streptomyces avermitilis,* found in soil. Although, abamectin is a natural fermentation product of this bacterium, the pesticide is classified by the U.S. Environmental Protection Agency (EPA) as a class II toxicity pesticide on a scale of I to IV, I being the most toxic.

Mode of Action

Like most other insecticides, avermectins are nerve poisons. They stimulate the gamma-aminobutyric acid (GABA) system, a chemical "transmitter" produced at nerve endings, which inhibits both nerve to nerve and nerve to muscle communication. The affected insect becomes paralyzed, stops feeding, and dies after a few days. Avid™, used against mites and leaf-miners, is said to spare some of the major parasites of the miner and some predacious mites. When applied to foliage, it is absorbed by the leaves, where feeding insects encounter the poison.

Toxicity

Technical avermectin is quite acutely toxic, with an oral rat LD_{50} (lethal dose for 50% of the test rats) of 30 mg/kg. EPA reviewed toxicological data from the manufacturer in connection with a 1987 petition for establishment of a tolerance in citrus oil and citrus pulp. EPA's reviewers found that avermectin does not cause birth defects in rats and rabbits, but can cause cleft palate in mice. The calculated "lowest effect level (LEL)" for the latter effect was quite low at 0.10 mg/kg/day. EPA reviewers stated that "studies on mutagenicity demonstrated an overall negative potential (ETN 1996).

Abamectin has been shown to cause pupil dilation, mild skin irritation, vomiting, convulsions and/or tremors and coma in laboratory animals. Because it is a nerve poison, it can also cause nervous system depression in mammals at very high doses. A study in rats given 0.40 mg/kg/day of abamectin showed decreased lactation, increased stillbirths and an increased likelihood of producing unhealthy offspring, demonstrating a strong chance of similar effects in humans at high enough doses. Abamectin is also very toxic to fish and aquatic invertebrates (FCH 2000).

Environmental Fate

Abamectin is broken down quickly in the soil via photodegradation at the soil surface and microbial degradation in dark, aerobic conditions. The chemicals half-life is about 1 week on an unshaded soil surface and about two weeks to two months underneath the soil surface. It is also rapidly broken down in water, its half-life being four days in pond water and two to four weeks in pond sediment (ETN 1996).

Abamectin *chemicalWATCH* Factsheet Bibliography

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