ChemicalWatch Factsheet

A Beyond Pesticides/ NCAMP Factsheet

Cyfluthrin

Cyfluthrin, a broad-spectrum synthetic pyrethroid insecticide, structurally resembles the organochlorine DDT more than other pyrethroids. Like DDT, cyfluthrin rapidly accumulates in fatty tissues, including the central nervous system and persists in the environment. In addition, cyfluthrin causes reproductive problems. Like most pyrethroids, cyfluthrin is highly toxic to fish, aquatic organisms and bees.

Cyfluthrin (Laser™, Tempo™, Baythroid™) is used for a wide array of pests in agriculture, in and around the home, and in food handling establishments. First developed by Bayer A/G in 1980, it is marketed by Mobay in the United States.

The DDT-like pesticide causes repetitive discharge and strong excitatory action on the central nervous system, peripheral nerves and skeletal muscle fibers, by interfering with axonal sodium and potassium channels, as does DDT.[1,2,3] As a result, cyfluthrin induces salivation, incoordination, muscle trembling, jerky movements, behavioral changes and convulsions. Cyfluthrin causes axonal degeneration in nerves and necrosis in muscle in rats, [4] as well as nerve degeneration in delayed neurotoxicity studies in hens.[5]

Skin paresthesia - a tingling or burning sensation on the surface of skin - produced by exposure to all pyrethroids also occurs with cyfluthrin.[6,7] Lesions are exacerbated by sensory stimulation such as hot water, heat or sun and by perspiration.

chemicalWATCH Stats:

CAS Registry Number: 68359-37-5
Chemical Class: Synthetic pyrethroid
Use: Broad spectrum insecticide for a variety of agricultural crops
Toxicity rating: Moderately toxic
Signal Words: Caution. Warning. Danger
Health Effects: Cyfluthrin is neurotoxic, causes organ inflammation in many animal studies and induces skin paresthesia.
Environmental Effects: Cyfluthrin is extremely toxic to bees, fish and other aquatic organisms.

In addition to nervous system effects, moderate eye or skin irritation, and paresthesia, allergic skin reactions and mucous membrane irritation of the nose, throat and upper respiratory tract, can occur after dermal contact or inhalation.[8] "Persons with a history of asthma, emphysema, or hyperactive airways disease may be more susceptible to overexposure."[8]

The acute toxicity of cyfluthrin varies widely with both gender (males and females) and species (rats and mice), as well as with the solvent in the formulation. Some solvents can use more rapid absorption from the gastrointestinal tract and higher blood levels.[4] Unfortunately, solvents are not usually listed on products, but are included under the designation "inert," a term for secret ingredient. Reported LD50's, although generally unreliable indications of acute toxicity, are 291 mg/kg for male and 609 mg/kg for female mice orally.[9] The pesticide is more toxic at low temperatures. Oil based formulations of cyfluthrin are more toxic than water based formulations. Degradation products include 4-fluoro-3-phenoxybenzaldehyde and 4-fluoro-3-phenoxybenzoic acid, the latter being significantly more toxic than the parent compound.[10]

Cyfluthrin is clearly highly toxic in acute animal studies. It caused changes in a wide variety of organs such as submaxillary gland, liver, adrenal, spleen, and ovary in rats.[11] Toxic effects on the blood included decreased glucose, red blood cells, hematocrit and hemoglobin.

Tempo™ contains 20% and Baythroid™ 25 % cyfluthrin. In addition to cyfluthrin, piperonyl butoxide and pyrethrins, one Laser™ over-the-counter formulation for flea control contains the hazardous organophosphate chlorpyrifos; Laser Ant and Roach Killer™ contains the methylcarbamate propoxur.[9]

Piperonyl butoxide makes cyfluthrin more toxic by blocking the detoxification process (mixed function oxidase enzymes). Simultaneous exposure to pyrethroids and organophosphates has been shown to increase the inhibition of cholinesterase.[1] Indeed, studies in animals using Laser™ formulations indicate that cyfluthrin and cholinesterase inhibitors are synergistic.[5] There are also hazardous contaminants, such as ethylene oxide, benzene and arsenic in several pyrethroid formulations.[10,12]

In rat reproduction studies, pups had decreased weight and increased deaths.[5] There was resorption of fetuses and miscarriages in rabbits.[4] According to EPA, cyfluthrin is not mutagenic, teratogenic or a skin sensitizer, and is not a carcinogen in chronic feeding and oncogenic studies.[9] EPA considers the database complete.

Immunotoxicity has not been studied however, dogs given the insecticide had small thymuses, a sensitive indicator of suppression of the immune system. In addition, dogs developed stiff gait, incoordination, arched backs, vomiting and diarrhea.[11]

Tolerance levels have been set for cyfluthrin on cottonseed and cotton byproducts. The two-year chronic feeding/ carcinogenicity study in rats with a no observable effect level (NOEL) of 2.5 mg/kg/day was used to set the acceptable daily intake (ADI) at 0.025mg/kg/ day. Male rats had lower body weights, while females displayed kidney inflammation at higher doses (7 mg/kg).

As is typical of synthetic pyrethroids, technical cyfluthrin is highly toxic to aquatic organisms - invertebrates and fish - and is highly toxic to honey bees. LC50's are: 0.68 parts per billion (ppb) for rainbow trout, 1.5 ppb for bluegill, 2.42 parts per trillion (ppt) for mysid shrimp, 3.2 ppt for oyster, and 0.14 ppt for a freshwater invertebrate.[9] EPA calls it "practically nontoxic" to birds.

Cyfluthrin residues are considered immobile in soil, with a half-life of 56 to 63 days in German loam and sandy loam. EPA is not concerned about cyfluthrin's potential to contaminate ground water.

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Tolerances for cyfluthrin were revised in 2002 and then again in 2005 for several food crops, milk and livestock in accordance with the 1996 Food Quality Protection Act (FQPA).

Cyfluthrin *chemicalWATCH* Factsheet Bibliography

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