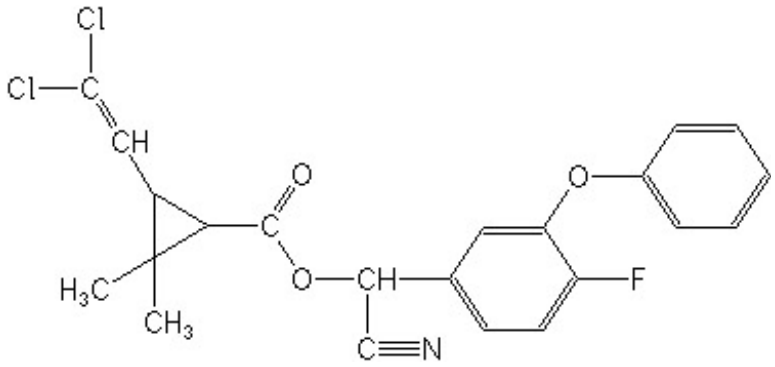
Beta-cyfluthrin



Chemical name: Beta-cyfluthrin
Other names:
alfa-cyano-4-fluoro-3-phenoxybenzyl-3(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate
[cyano-[4-fluoro-3-(phenoxy)phenyl]methyl] 3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane-1-carboxylate
Cyfluthrine, Cyfoxylate, Syfrutrin, Cyfluthine
Compound: $C_{22}H_{18}Cl_2FNO_3$
CAS Number: 68359-37-5 (the same for cyfluthrin)
Pesticide type: insecticide (pyrethroid)

Characteristics

Beta-cyfluthrin is the refined form of the synthetic pyrethroid, cyfluthrin, which is currently in use in a number of formulations in Australia and around the world. Cyfluthrin consists of a mix of four basic forms, or isomers. Two of these are more biologically active than the others and have been isolated and concentrated to create beta-cyfluthrin. Thus beta-cyfluthrin has the same toxicological profile as cyfluthrin. Beta-cyfluthrin has an approximately 2 to 5 times higher acute toxicity than cyfluthrin. Beta-cyfluthrin acts as a contact and stomach poison combining a rapid knock-down effect with long lasting efficacy. It is not systemic in plants.
Synthetic pyrethroids are man-made insecticides created to mimic the chemical properties of the naturally-occurring insecticide pyrethrum, which comes from the crushed petals of the Chrysanthemum flower. They are preffered to the real thing because they offer the added bonus of remaining effective for longer periods of time, sometimes up to 3 months.

Use

It was introduced in 1995 and approved for use in all european countries. It is used in agriculture, horticulture and viticulture to control a wide variety of indoor and outdoor pests including roaches, silverfish, fleas, spiders, ants, crickets, houseflies, ticks, mosquitoes, wasps, hornets, yellow jackets, gnats, earwigs and more. It is also used against migratory locusts and grasshoppers and in public health and hygiene.

Possible hazards and regulation

Beta-cyfluthrin is not an eye or skin irritant. Symptoms of poisoning may include abnormal facial sensation, sensation of prickling, creeping on skin, numbness, headache, dizziness, nausea, vomiting, diarrhea, excessive salivation, fatigue. In severe cases fluid in the lungs and muscle twitching may develop.
US EPA II – warning – moderately toxic
WHO II moderately hazardous

Toxicity

Absorption in mammals is rapid and almost complete (90% eliminated after 2 days). Highest residues are found in fat, liver and kidney.

Toxicity to humans
Beta-cyfluthrin is a skin and eye irritant to humans, but is of a low toxicity (eliminated quickly, not well absorbed into the bloodstream).
ADI 0,003 mg/kg
Acute toxicity limits
Rat LD50 oral is 77 mg/kg, rat LD50 dermal more than 5000 mg/kg. Dog LD50 more than 5000mg/kg.
Acute dermal toxicity is very low (rat LD50 more than 5000mg/kg)

Chronic toxicity:
Lowest relevant oral NOAEL 90-day for dog – 60ppm (1,5mg/kg/day). Dogs exhibited vomiting, diarrhea, decreased body weight gain and clinical neurological symptoms at 360ppm.

Reproductive effects:
Miscarriage and post-implantation resorptions observed in rabbits, delayed ossification and decreased foetal weights in rats.

Ecological effects
Beta-cyfluthrin is highly toxic to fish (acute LC50 0,068 µg/l, long term toxicity NOEC 0,01 µg/l) and aquatic invertebrates (acute 48hour EC50 0,00029mg/l) and moderately toxic to algae (acute 72hour EC50 10mg/l). It is classified as presenting a high risk to honey bees (acute oral toxicity LD50 0,05 µg/bee) and other arthropod species. Moderately toxic to earthworms with acute 14day LC50 around 1000 mg/kg. Practically non toxic to birds.

Carcinogenity: no carcinogenic potential

Mutagenity: no evidence of mutagenity (many in vitro and in vivo studies)
Bioaccumulation: no potential for accumulation
Mobility: very low

Persistence and degradability in environment
Aerobic DT50 in soil typically 13 days. It is not persistent. Low leachability. Once in the water it disappears rapidly as it has low water solubility and extremely high adsorption to organic material.

Limits
Codex Alimentarius (mg/kg): apple 0,1, citrus fruits 0,3, cotton seed 0,7, eggplant 0,2, eggs 0,01, kidney 0,05, meat 1, milk 0,04, potato 0,01, tomato 0,2
Vyhláška 381/2007 Sb.:(mg/kg) cabbage 0,2, cauliflower 0,05, poppy seeds 0,05, meat 0,05, milk and eggs 0,02

Hazard Symbol : T+ very toxic
N dangerous for the environment

Risk Phrases :
R26/28 Very toxic by inhalation and if swallowed
R50 Very toxic to aquatic organisms
R53 May cause long-term adverse effects in the aquatic environment

Safety Phrases :

S1/2 Keep locked up and out of the reach of children
S36/37/39 Wear suitable protective clothing, gloves and eye/face protection
S45 In case of accident or if you feel unwell seek medical advice immediately (show the label where possible)
S60 This material and its container must be disposed of as hazardous waste
S61 Avoid release to the environment. Refer to special instructions/safety data sheet

Links

http://www.fluoridealert.org/pesticides/epage.beta.cyfluthrin.effct.htm
http://sitem.herts.ac.uk/aeru/iupac/Reports/74.htm
http://www.fluorideaction.org/pesticides/cyfluthrin.beta.eu.dec.2002.pdf
http://ec.europa.eu/food/plant/protection/evaluation/existactive/list1-32_en.pdf
http://www.who.int/whopes/quality/en/Cyfluthrin_spec_eval_WHO_Nov_2004.pdf
http://www.codexalimentarius.net/pestres/data/pesticides/details.html?id=157
http:///www.fao.org/fileadmin/templates/agphome/documents/Pests_Pesticides/JMPR/Evaluation07/Cyfluthrin.pdf
http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC41184
http://www.fao.org/ag/AGP/AGPP/Pesticid/Specs/docs/Pdf/new/beta_cyf.pdf
http://www.fluoridealert.org/pesticides/Cyfluthrin.FR.Sept.27.2002.htm
http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPP/Pesticid/Specs/pdf/Beta_cyf.pdf

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