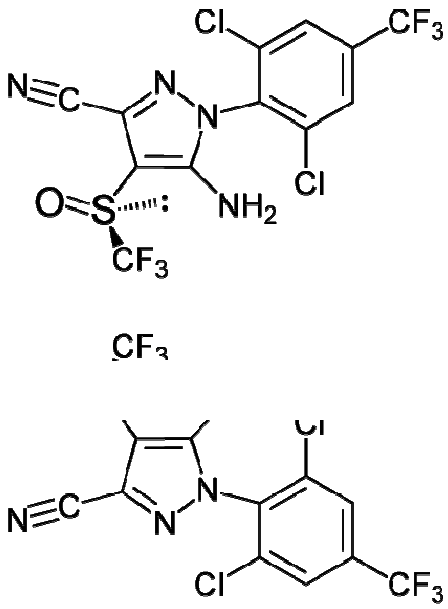

Name: Fipronil

CAS: 120068-37-3

Molecular formula: $C_{12}H_4Cl_2F_6N_4OS$

Characteristics

Fipronil is a broad spectrum insecticide that disrupts the insect central nervous system by blocking the passage of chloride ions through the GABA receptor and glutamate-gated chloride channels (GluCl), components of the central nervous system. This causes hyperexcitation of contaminated insects' nerves and muscles. Insect specificity of fipronil may come from a better efficacy on GABA receptor but also on the fact that GluCl does not exist in mammals.

Fipronil is a slow acting poison. When mixed with a bait it allows the poisoned insect time to return to the colony or haborage. In cockroaches the feces and carcass can contain sufficient residual pesticide to kill others in the same nesting site. In ants, the sharing of the bait among colony members assists in the spreading of the poison throughout the colony. With the cascading effect, the projected kill rate is about 95% in 3 days for ants and cockroaches.

Toxic baiting with Fipronil has also been shown to be extremely effective in locally eliminating German wasps (Yellow jacket). All colonies within foraging range are completely eliminated within one week. Unlike broadcast applications, this application does not expose beneficial insects such as honeybees to the pesticide.

Fipronil was discovered and developed by Rhône-Poulenc between 1985-87 and placed on the market in 1993. Between 1987 and 1996 fipronil was evaluated on more than 250 insect pests on 60 crops worldwide and crop protection accounted for about 39% of total fipronil production in 1997.

Fipronil as marketed under the name Regent is used against major lepidopterous and orthopterous pests on a wide range of field and horticultural crops and against coleopterous larvae in soils. It is also employed for cockroach and ant control under the trade names Goliath and Nexa including in the US, where it is also used against pests of field corn, golf courses and commercial turf (trade name Chipco Choice). It has been used under the trade name Adonis for locust control in Madagascar and in Kazakhstan.

Fipronil controls effectively termite pests and was shown to be effective in field trials in Africa and Australia where it is marketed under the name Termidor.

In 1999, 400,000 hectares were treated with Regent. It became the leading imported product in the area of rice insecticides, the second biggest crop protection market after cotton in China. In the UK, provisional approval for five years has been granted for fipronil use as a public hygiene insecticide.

Fipronil is also the main active ingredient of Frontline, a treatment used in fighting ticks and fleas infestations in dogs and cats.

Health issues

Animals

Fipronil is highly toxic to certain groups of gallinaceous birds, while being relatively innocuous to passerine and wildfowl. It is also highly toxic for the fringe-toed lizard. It is highly toxic to bees and termites. It appears to reduce the longevity and fecundity of female braconid parasitoids. It is virtually non-toxic to earthworms.

Fipronil is very highly toxic for crustaceans, insects and zooplankton. It is highly toxic to fish and toxicity to fish varies with species as it is very highly toxic to bluegill sunfish, highly toxic to rainbow trout and highly toxic to European carp. It is also very highly toxic to one of the African tilapia.

Wildlife impacts include the following:

- Fipronil is highly toxic to fish and aquatic invertebrates. Its tendency to bind to sediments and its low water solubility may reduce the potential hazard to aquatic wildlife.
- Fipronil is toxic to bees and should not be applied to vegetation when bees are foraging.
- Fipronil has been found to be highly toxic to upland game birds, but is practically non-toxic to waterfowl and other bird species. One of the metabolites of fipronil has a higher toxicity to birds than the parent compound itself.

Humans

Toxicity on humans has been tested in few studies, more commonly involving human cells which were used in carcinogenicity studies but with no adverse effects. Yet, fipronil has been classified as a Group C (Possible Human) Carcinogen based on an increase in thyroid follicular cell tumors in both sexes of the rat. Still, fipronil is considered slightly irritating to the skin, while moderately irritating to the eyes in both humans and animals and there is no evidence suggesting that it may cause birth defects.

Carcinogenity IARC

2A – Possible Human Carcinogen

Environment

In May 2003, the DGAL (Direction Générale de l'Alimentation du ministère de l'Agriculture) indicated a case of bee mortality observed in Southern France related to Fipronil acute toxicity. Intoxication was linked to defective seed treatment, which generated dust. In February 2003, the French Ministry of Agriculture decided to temporarily suspend the sale of BASF crop protection products containing fipronil in France. The seed treatment involved has since been forbidden. Fipronil was used in a broad spraying to control locusts in Madagascar in a program that began in 1997.

Synonyms

5-Amino-1-(2,6-dichlor-4-(trifluormethyl) fenyl) -4 - (1, R, S) - (trifluormethyl) sulfinyl)-1H-pyrazol-3-carbonitrile, A82 (PDP zákoníku), Fiprinil, Fipronil, Fipronil 1,5%

Hazardous symbols

Dangerous for the environment

R phrases
R51: Toxic to aquatic organisms
R 57 Toxic to bees

S phrases
S7: Keep container tightly closed
S39: Wear eye/face protection

Links

http://en.wikipedia.org/wiki/Fipronil

http://www.iarc.fr/cgi-bin/htsearch

http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC41279

http://www.fluoridealert.org/pesticides/msds/fipronil.large.roach.bait.sta.pdf

http://npic.orst.edu/factsheets/fipronil.pdf

http://www.pan-uk.org/pestnews/Actives/fipronil.htm

This chemical profile is developed with the financial assistance of the European Union . Its contents are sole responsibility of Arnika Association and Armenian Women for Health and Healthy Environment and can under no circumstances be regarded as reflecting the position of the European Union.