acetamiprid

Review Date: 06/13/2014

CAS #: 135410-20-7

Type	Insecticide
Controls	Ants, roaches, spiders, etc.
Mode of Action	Interupts the function of the insect nervous system (Reference 5).

Thurston County Review Summary:

Acetamiprid is a neonicotinoid insecticide that is also known as ethanimidamide. Products containing acetamiprid fail Thurston County's pesticide review criteria. Acetamiprid fails the review criteria because of its potential to cause adverse effects to birds and bees at labelled use rates. Additionally, risk to humans from potential post-application exposures to acetamiprid ranges from low hazard to high hazard. Risk to non-target birds that eat treated bait products that are applied to the ground surface are rated high in hazard, however there are many non-bait products available that do not represent this level of risk to birds or other animals. Risk to non-target beneficial insects (including bees) can be high in hazard for lethal and sub-lethal effects- especially when used on flowering plants. In 2013, Thurston County Commissioners sent a letter to the Washington State Department of Agriculture (WSDA) requesting that they restrict the distribution, sale, purchase and application of the neonicotinoid class of insecticides, for ornamental use, to persons or entities with a valid WSDA pesticide applicator license.

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	2950	1	High
Soil Sorption (Kd=mL/g)	0.39 to 4.1	5	High
Organic Sorption (Koc=mL/g)	132-267	4	High

Mobility Summary:

Acetamiprid is soluble in water and is expected to adhere poorly to all soil types. The hazard for acetamiprid to move off the site of application with rain or irrigation water is rated high.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.000044	4	Moderate
Biotic or Aerobic Half-life (days)	<1 to 8	4	Low
Photolysis Half-life (days)	About 5 hours	4	Low
Terrestrial Field Test Half-life (days)	<18	4	Moderate
Hydrolysis Half-life (days)	Stable	5	High
Anaerobic Half-life (days)	365 (aquatic)	5	High
Aquatic Field Test Half-life (days)	45	5	Moderate

Persistence Summary:

In surface soil, acetamiprid can take a week to a few weeks to degrade to half of the applied concentration, however, it can take months to degrade when it leeches deeply into soil or gets into water or sediment. The overall hazard for persistence is rated moderate (likely to take between 2 weeks and 2 months to degrade to half of the applied concentration).

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	2	4	Low
Octanol/Water Partition Coefficient	log Kow = 0.8	1	Low

Bioaccumulation Summary:

In oral dosing studies with rats, acetamiprid was quickly absorbed and metabolized with an estimated elimination half-life of less than one day. Other, non-oral, metabolism studies also observed rapid elimination with very little accumulation (Reference 4). The octanol/water partition coefficient (logKow = 0.8) indicates that acetamiprid does not bind strongly to organic material and therefore has little potential to bioaccumulate. The hazard for bioaccumulation is rated low.

ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Toxicity Rating
Mammalian (LD50)	146 mg/kg	2	Moderate
Avian (LD50)	98 mg ai/kg bw	6	Moderate
Honey bee or insect (LD50)	~8 ug/bee	6	Moderate
Annelida -worms (LC50)	9 mg/kg	6	High
Fish (LC50)	>100 mg/L	6	Low
Crustacean (LC50)	0.08 mg ai/L	5	Very high
Mollusk (LC50)	40.7 mg ai/L	5	Moderate
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that acetamiprid is low in toxicity to fish, moderately toxic to animals, honeybees, and mollusks, but highly toxic to earthworms and some aquatic invertebrates. Toxicity to birds ranges from moderately toxic to very highly toxic depending on test species (References 2, 5, 6 and 7). It should be noted that neonicotinoid insecticides have been implicated with the effects associated with colony collapse in bee communities, although these effects have not been specifically identified with acetamiprid use.

Risk of toxicity to non-target birds is rated high in hazard for treated bait products used on the soil surface (Reference 7).

ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Risk Rating
Adult applicator	Dermal + inhalation	Value not provided	Value not provided	<2	1	High
Adult hand harvesting and pruning	Dermal + inhalation	0.1 mg/kg/day	0.0526 mg/kg/day	<2	1	High
Child exposure to crack and crevice treatment	Dermal	0.1 mg/kg/day	0.033 mg/kg	3	2	Moderate
Child's exposure to treated vegetation	Dermal + inhalation	0.07 mg/kg/day	0.0003 mg/kg/day	230	8	Low

Acute Toxicity Risk Assessment Summary:

In 2002, the EPA's fact sheet for acetamiprid used a safety factor of 300 for residential risk assessment evaluation due to evidence of increased susceptibility to developing fetuses that was later reduced to 100. The safety factor was reduced because the dose of concern was based on the toxic effect to developing fetuses and the EPA believes that this will be adequately protective (References 1 and 3). The uncertainty factor used by the EPA for potential inhalation exposure risk assessment changed from 100 in 2011 to 1,000 in 2012. The change in uncertainty factors makes evaluating the risk very confusing because the margin of safety changes when different uncertainty factors are used and because dermal and inhalation exposures were combined in the risk assessment. The risk evaluated and rated represents the data as it was preseted in the referenced document.

Potential exposures to children following crack and crevice treatments are rated moderate in hazard (exposure is calculated to be about one third of the EPA's dose of concern). Potential dermal and inhalation exposures to adults and children following an application to ornamental plants and flowers is rated low in hazard using a safety factor of 100 or 1,000.

Potential short-term post-application occupational exposures were calculated for high activity work in treated vegetation (hand harvesting and pruning) and were at the EPA's level of concern for the day of treatment and the day following the application. These potential exposures are rated high in hazard.

CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Not likely to be carcinogenic in humans	- -	1	Low
Mutagenicity	Testing values not found	"No clear evidence" of mutagenicity	2	Moderate
Neurotoxicity - (NOAEL)	Value not found	"No evidence" of neurotoxicity	1	Low
Endocrine Disruption	Value not found	"No evidence" of endocrine disruption	1	Low
Developmental Toxicity (NOAEL)	15 mg/kg/day	Increased incidence of shortening of the 13th rib	1	Moderate
Reproductive Toxicity (NOAEL)	280 ppm	Survival of F2 pups	2	Moderate
Chronic Toxicity (NOAEL)	7.1 mg/kg/day	Reduced body weights	3	Check risk

Chronic Toxicity Hazard Summary:

In two-generation reproductive testing, acetamiprid showed evidence of increased susceptibility to developing fetuses. The observed toxicity to the pups in the reproductive toxicity study occurred at the same concentration as maternal toxicity but the toxicity to the pups was much greater than the toxicity to the dams (Refrerence 3 and 4). Developmental toxicity was observed at the same doses that caused maternal toxicity. There was no toxicological evidence that acetamiprid causes neurotoxicity or endocrine disruption. In an in vitro mutagenicity study there was evidence that acetamiprid caused breaks in chromosomes (clastogenic) although it did not cause breakage with in vivo studies. The EPA concluded that acetamiprid did not show clear evidence of mutagenicity. Mixed results for mutagenicity potential is rated moderate in hazard.

CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Risk Rating
Adult applicator	Dermal + inhalation	Value not provided	Value not provided	4.6	1	Moderate
Adult hand harvesting and pruning	Dermal + inhalation	Value not provided	Value not provided	None	1	High
Other occupational exposures were not evaluated						
Long-term residential exposures are not expected						

Chronic Toxicity Risk Assessment Summary:

The EPA determined that residential uses of acetamiprid products will not create long-term exposures (so, long -term exposure risk assessments were not performed). Potential occupational exposures were evaluated using a safety factor of 100. Potential long-term post-application occupational exposures were calculated for high activity work in treated vegetation (hand harvesting and pruning). These potential exposures were calculated to be at the EPA's level of concern for the day of treatment and for the day following the application. These potential exposures are rated high in hazard. Worst-case occupational applicator exposures were calculated to be nearly five times less than the calculated dose of concern and are rated moderate in hazard.

Metabolites and Degradation Products:

Acetamiprid metabolites include; N-dealkylated metabolite (IM-2-1), 6-chloronicotinic acid (IC-0), and the IC-0-glycine conjugate (Reference 4). Acetamiprid's major environmental degradate is methyl(6-chloro-3-pyridyl)methylamine (Reference 4).

Comments:

Acetamiprid is not considered an eye irritant (EPA Toxicity Category IV), it is not considered a skin irritant (EPA Toxicity Category IV) or a skin sensitizer (Reference 1).

References

1. USEPA. Office of Prevention, Pesticides and Toxic Substances. Pesticide Fact Sheet: Acetamiprid. Conditional Registration. March 15, 2002.
2. USEPA. Office of Prevention, Pesticides and Toxic Substances. Acetamiprid: Occupational and Residential Exposure Assessment for the New Uses in Food/Feed Handling Establishments and on Soybeans. November 16, 2011.
3. USEPA. Office of Prevention, Pesticides and Toxic Substances. Acetamiprid Acute and Chronic Dietary (Food and Drinking Water) Exposure and Risk Assessment. Uses in Food Handling Establishments and on Soybean. November 22, 2011.
4. National Center for Biotechnology Information, U.S. National Library of Medicine. Acetamiprid - Compound Summary. http://pubchem.ncbi.nlm.nih.gov/ Accessed 10/22/2012.
5. USEPA. Office of Prevention, Pesticides and Toxic Substances. Ecological Risk Assessment for Proposed Use of Acetamiprid on Cucurbit, Stone Fruit and Tree Nut Crops. 7/27/2004.
6. International Union of Pure & Applied Chemistry. Pesticide Properties Database. Acetamiprid (Ref: NI 35). Accesed 10/22/2012.
7. USEPA. Office of Prevention, Pesticides and Toxic Substances. Ecological Risk Assessment for the Proposed Section 3 New Use of Acetamiprid on a Variety of Agricultural Crops and as Bait near Animal Areas and Enclosed Dumpsters. November 29, 2011.
8. USEPA. Office of Prevention, Pesticides and Toxic Substances. [OPP-2005-0029; FRL-7705-7]. Acetamiprid; Pesticide Tolerance. April 13, 2005