United States Environmental Protection Agency

Office of Prevention, Pesticides and Toxic Substances (7501C)

Pesticide Fact Sheet

Name of Chemical: Imazamox (Raptor Herbicide)
Reason for Issuance: Conditional Registration
Date Issued: May 22, 1997

1. DESCRIPTION OF CHEMICAL

Generic Name: 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-(methoxymethyl)-3-pyridinecarboxylic acid

Common Name: Imazamox

Trade Name: Raptor Herbicide

EPA Shaughnessy Code: 129171

Chemical Abstracts Service (CAS) Number: 114311-32-9

Year of Initial Registration: 1997

Pesticide Type: Herbicide

U.S. and Foreign Producers: American Cyanamid Company

2. USE PATTERNS AND FORMULATIONS

Application site: Soybeans

Method of application: Raptor may be applied early postemergence.

Application rates: Ground or aerial application rates are 0.040 lb acid equivalents per acre (lb ae/A). Ground applications are in 10 or more gallons of water per acre and aerial applications are in 5 or more gallons of water per acre.

Type of formulation: 95% technical grade, 12.1% active ingredient (ammonium salt of imazamox; equivalent to 11.4% of the acid) aqueous solution end-use product, and 70% active

ingredient (as the free acid) dispersible granule formulation.

Usual carrier: Water

3. SCIENCE FINDINGS

Summary science statement: Raptor has been found to be acceptable for the proposed use. Raptor end-use products are relatively non-toxic by the oral and inhalation routes and slightly toxic by the dermal route. These products are non-sensitizers and are non-to-slightly irritating to the skin. The aqueous solution formulation is non-to-slightly irritating to the eye and the dispersible granule formulation is slightly-to-moderately irritating to the eye. Hazard to nontarget organisms is considered to be minimal.

Chemical characteristics:

Physical state:	Powdered solid
Color:	Off-white; Munsell 5Y (9/1)
Odor:	Odorless
Melting point:	166.0 - 166.7
Solubility:	4413 ppm at 20 C
Octanol/water partition coefficient:	5.36 at pH 5 and 6 and 25 C
pH:	2.35; 1% aqueous suspension (w:v) at 24.5 C

Toxicology characteristics:

Acute effects: Imazamox is relatively non-toxic by oral and inhalation routes, slightly toxic by the dermal route, non-to-slightly irritating to the skin, and slightly-to-moderately irritating to the eye. Imazamox is not a dermal sensitizer. Acute test results indicate Toxicity Catergories III and IV[1] as follow:

Acute oral toxicity (rat):	Greater than 5000 mg/kg b.w. Toxicity Category IV
Acute inhalation (rat):	Greater than 6.3 mg/L Toxicity Category IV
Acute dermal (rabbit):	Greater than 4000 mg/kg b.w. Toxicity Category III

Acute dermal sensitization (Guinea pigs):	Not a sensitizer
Primary dermal irritation: (rabbit)	Non-to-slightly irritating Toxicity Category IV
Primary eye irritation: (rabbit)	Slightly-to-moderately irritating Toxicity Category III

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[1]Toxicity Category III = Harmful if absorbed through skin. Causes eye irritation. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Avoid breathing dust. Remove contaminated clothing and wash before reuse.

Toxicity Category IV = No precautions are required.

Subchronic effects: Tests indicate no systemic toxicity at the highest dose tested (HDT):

28-day dermal (rat):	No-observable adverse effect level (NOAEL) of 1000 mg/kg b.w./day (HDT)
13-week feeding study (rat):	NOAEL greater than 20,000 ppm (HDT) or 1661 mg/kg b.w./day
90-day feeding study (dog):	NOAEL of 40,000 ppm (HDT) or 1368 mg/kg b.w./day

Chronic effects: Tests indicate no oncogenic or teratogenic potential and no reproductive toxicity at HDT, and negative activity in four mutagenicity studies:

1-year dietary toxicity: (beagle dog)	NOAEL = 40,000 ppm (HDT) or 1165 mg/kg b.w./day
2-year oral dietary (rat):	NOAEL = 20,000 ppm (HDT) or 1167 mg/kg b.w./day
18-month oncogenicity: (mouse)	NOAEL = 7000 ppm (HDT) or 1201 mg/kg b.w./day
Two-generation repro-duction (rat):	NOAEL = 20,000 ppm (HDT) or 1639 mg/kg b.w./day
Teratology (rabbit):	Maternal NOAEL = 300 mg/kg b.w./day Developmental NOAEL = 900 mg/kg b.w./day (HDT)

Teratology (rat):	Maternal NOAEL = 500 mg/kg b.w./day; Lowest Observable Effect Level (LOEL) = 1000 mg/kg b.w./day Developmental NOAEL = 1000 mg/kg b.w./day (HDT) LOEL = Not achieved
Metabolism (rat):	Rapidly excreted primarily in the urine following intravenous administration, and in the urine and feces following oral administration, mainly as unchanged parent.
Mutagenicity - Ames test:	Negative
In vivo micronucleus aberration:	Negative
In vitro cytogenetics (CHO):	Negative
CHO/HGPRT point mutation:	Negative
Major route of exposure:	Dermal, inhalation

Physiological and biochemical behavioral characteristics:

Plant absorption: Absorption occurs through both the foliage and roots.

Mechanism of pesticidal action: Following postemergence application, weed growth stops and the weeds either die or are not competitive with the crop.

Metabolism in plants and animals: The nature of the residue in plants and animals is adequately understood for the use of imazamox on soybeans. The parent compound is the residue compound of concern. The residue analytical method is adequate for the determination of residues in soybeans and for enforcement purposes.

Environmental characteristics: Imazamox is only moderately persistent, and it degrades aerobically in the soil to a non-herbicidal metabolite which is immobile or moderately mobile. Imazamox also degrades by aqueous photolysis.

Adsorption and leaching: Imazamox is mobile however the terminal soil metabolite is moderately mobile to immobile. Leaching of imazamox in the field studies was very limited.

Microbial breakdown: Imazamox is metabolized under aerobic soil conditions. The degradation products are not herbicidal.

Loss from hydrolysis, photo decomposition, and/or volatilization: Imazamox is hydrolytically stable at pH 5, 7, and 9. Photodegradation is rapid in water (half-life of 6.8 hours) but slow on soil. Volatilization is not significant.

Resultant average persistence: The range of dissipation half-lives is 15 to 130 days with the more representative half-lives appearing to be 35 and 50 days. The limited persistence will restrict much of imazamox from reaching ground water.

Ecological characteristics: The following test results indicate that imazamox is practically non-toxic to avian species, finfish, aquatic invertebrates, and honeybees following acute exposure:

Avian acute oral toxicity (mallard duck and bobwhite quail):	Greater than 1950 mg/kg
Avian subacute dietary toxicity (mallard duck and bobwhite quail):	Greater than 5572 ppm
Avian reproductive toxicity (mallard duck and bobwhite quail):	No observable effect concentration (NOEC) and Lowest observable effect concentration (LOEC) of greater than 2000 ppm
Fish acute toxicity	
rainbow trout:	Greater than 122 mg/L
bluegill sunfish:	Greater than 119 mg/L
Aquatic invertebrate toxicity (*Daphnia magna*):	Greater than 122 ppm
Honeybee:	Greater than 25 µg/bee

Tolerance Assessment

List of crops and tolerances (40 CFR 180.XXX)

Commodity	Parts per million
Soybeans	0.10

Results of tolerance assessment: The acceptable daily intake (ADI), based on the 1-year dog feeding study (NOAEL of 40,000 ppm or 1165 mg/kg b.w./day) and using a 100-fold safety factor, is calculated to be 11.65 mg/kg b.w./day. The Theoretical Maximum Residue Contribution (TMRC) for use on soybeans is calculated to be 0.000023 mg/kg b.w./day, which

accounts for 0.0002% of the ADI.

4. SUMMARY OF REGULATORY POSITION AND RATIONALE

Position: The Agency has conditionally accepted the use of this chemical on soybeans.

Rationale: The Agency has reviewed the data submitted and, with the exception of acute estuarine/marine animal toxicity testing, found these data to be adequate for the proposed use of this chemical. The proposed use of this chemical, prior to completion of the acute estuarine/marine animal toxicity studies, is not expected to result in any adverse effects to humans or the environment and will fill a need for a herbicide to control weeds in soybeans.

Use Restrictions: None

Unique label statements: None

5. SUMMARY OF MAJOR DATA GAPS

72-3(a) Estuarine/marine fish
72-3(c) Estuarine/marine shrimp or mysid
72-3(b) Estuarine/marine mollusk (reserved)

6. CONTACT PERSON AT EPA

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