E X T O X N E T

EXTENSION TOXICOLOGY NETWORK

A Pesticide Information Project of Cooperative Extension Offices of Cornell University, Michigan State University, Oregon State University, and University of California at Davis. Major support and funding was provided by the USDA/Extension Service/National Agricultural Pesticide Impact Assessment Program.

Pesticide Information Profile

TRICLOPYR

TRADE OR OTHER NAMES

The trade names for herbicides containing this product are Garlon, Turflon, Access, Redeem, Crossbow, Grazon and ET. The herbicide may be mixed with picloram or with 2,4-D to extend its utility range (8).

INTRODUCTION

Triclopyr, a pyridine, is a selective systemic herbicide used for control of woody and broadleaf plants along rights-of-way, in forests, on industrial lands and on grasslands (7). Unlike a similar product 2,4,5-T, which has been banned in the United States, there is no possibility of dioxin impurities occurring in triclopyr.

Some or all applications of the product Access may be classified as Restricted Use Pesticides (**RUP**). Restricted Use Pesticides may be purchased and used only by certified applicators.

(**NOTE:** Unless otherwise specified, triclopyr will be assumed to be the technical material for this document.)

TOXICOLOGICAL EFFECTS

ACUTE TOXICITY

The product will either have a **DANGER** or **CAUTION** signal word on the label depending on the specific formulation. Products marked **DANGER** include Garlon 3A, Redeem, Turflon Amine.

The oral **LD_{50}** of triclopyr in rats ranges from 630 to 729 mg/kg and from 2,000 to 3,000 mg/kg for various formulated products. Similar differences were noted for skin toxicity in the rabbit The LD_{50} for the technical material was greater than 2,000 mg/kg and greater than 4,000 mg/kg for the formulations. Inhalation of triclopyr (technical) did not affect rats but inhalation of some of the formulations did cause nasal irritations. A similar result was seen when rabbit eyes were exposed. The technical material had only a slight effect on rabbit eyes and the undiluted formulated material caused significant eye irritation. Other oral LD_{50} values for triclopyr are 550 mg/kg in the rabbit and 310 mg/kg in the guinea pig.

CHRONIC TOXICITY

Rats fed diets containing between 3 and 30 mg/kg/day of triclopyr experienced no ill effects. Males fed much higher doses (100 mg/kg) had decreased liver and body weight and increased kidney weight. The male mice were also sensitive at moderate doses. They had reduced liver weight at 60 mg/kg/day (4). Monkeys fed small amounts of triclopyr (30 mg/kg/day) had no adverse effects.

Reproductive Effects

Triclopyr fed to rabbits daily at low to moderate doses (25 to 100 mg/kg) caused some maternal toxicity and death but not fetal toxicity

or birth defects. The maternal mortality was inconsistent with other studies. There is not enough date to draw any conclusion about the reproductive hazards of triclopyr due to chronic exposure in humans.

Teratogenic Effects

Pregnant rats given moderate doses (up to 200 mg/kg/day) on days 6-15 of gestation had offspring with mild fetotoxicity, but no birth defects (9). There were no teratogenic effects in rabbits treated in a similar manner at 10 or 20 mg/kg/day. The evidence suggests that the human risk of birth defects is fairly low due to chronic exposure to triclopyr.

Mutagenic Effects

Both bacteria and isolated cells did not mutate in response to the presence of triclopyr. Another mutagen study using rats was weakly positive, but negative in mice, the more sensitive species. There were no chromosome changes noted in rat bone marrow. Triclopyr is not considered to be mutagenic.

Carcinogenic Effects

Rats and mice fed low levels (3 to 30 mg/kg/day) of triclopyr for two years showed no carcinogenic response. Even though the mice did have a high incidence of lymph cancer, this incidence were apparently characteristic of the particular strain of mice and did not represent a dose-related effect (1).

Organ Toxicity

Garlon 3A, the triethylamine salt of triclopyr, can cause considerable eye and skin irritation. Prolonged skin contact will cause flaking but a different formulation, Garlon 4, is not as severe a skin and eye irritant (4).

Fate in Humans and Animals

When rats were intravenously dosed at 5 mg/kg, most of the dose was excreted in urine. At 100 mg/kg urinary excretion still predominated. At higher doses, an increasing amount was in the feces. In dogs, 0.5 mg/kg of triclopyr had a **half-life** of 14 hours for clearance from blood plasma, and a dose of 20 mg/kg had a half-life of 95 hours reflecting the unique capacity for excretion of organic acids by the dog. Excreted triclopyr is mostly the parent compound but small quantities of breakdown products are also present.

Triclopyr was found in greater quantities in the liver and fatty tissue of the rat when compared to the blood plasma. The dog had higher levels in the kidney than in the blood plasma, and in monkeys, residues in all tissues were the same as in blood plasma (4). The compound is not expected to concentrate to any significant degree in the tissues of animals.

ECOLOGICAL EFFECTS

Triclopyr is slightly toxic to mallard ducks. When fed the compound, the LD_{50} was 1698 mg/kg. Bobwhite quail and Japanese quail fed for eight days had **LC_{50}**'s of 2,935 ppm and 3,278 ppm, respectively.

The compound is practically non-toxic to fish. Triclopyr has a LC_{50} of 117 ppm for rainbow trout and a 96-hour LC_{50} of 148 ppm for bluegill sunfish. The compound is practically non-toxic to the aquatic invertebrate *Daphnia magna*, a water flea (LC_{50} for the triclopyr salt of 1170 ppm) (10). The compound is non-toxic to bees (7).

ENVIRONMENTAL FATE

In natural soil and in aquatic environments, the two of the formulations rapidly convert to the acid which in turn is neutralized to a salt. Triclopyr is not strongly adsorbed to soil particles, has the potential to be mobile, and is fairly rapidly degraded by soil microorganisms. Concentrations of 500 ppm had no apparent effects on the growth of common soil microorganisms. Triclopyr was tested but not found in a host of groundwater sites throughout the country (11).

The half-life in soil is from 30 to 90 days, depending on soil type and environmental conditions, with an average of about 46 days. The half-life of one of the breakdown products

(trichloro-pyridinol) in 15 soils ranged from 8-279 days with 12 of the tested soils having half-lives of less than 90 days. Longer half-lives occur in cold or arid conditions.

Breakdown by the action of sunlight is the major means of triclopyr degradation in water. The half-life is 10 hours at 25°C. The major metabolite is trichloropyridinol.

Triclopyr is readily translocated throughout a plant after being taken up by either roots or the foliage. Cowberries with residues of 2.4 ppm at six days had 0.7-1.1 ppm at 30-36 days, and 0.2-0.3 ppm in 92-98 days. The estimated half-life in aboveground drying foliage as in a forest overstory is two to three months.

Exposure Guidelines:

NOEL (dog): 2.5 mg/kg/day

RfD: 0.025 mg/kg/day (OPP)

Physical Properties:

CAS #: 55335-06-3

Chemical name: [(3,5,6-trichloro-2-pyridinyl) Oxy]acetic acid

Chemical class/use: triethylamino acid herbicide

Solubility in water - amine salt: 2,100,000 mg/l; ester: 23 mg/l

Solubility in other solvents: acetone 98.9 g/ 100 g; benzene 2.73 g/100 g; acetonitrile 12.6 g/100 g

Melting Point: 148-150°C

Vapor Pressure: 1.26 x 10^{-6} mm Hg at 25°C

BASIC MANUFACTURER

Dow Elanco
9002 Purdue Rd.
Indianapolis, Indiana
Telephone: 800-870-7290
Emergency: 517/636-4400

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This PIP is part of the EXTOXNET Pesticide Information Notebook. For more information, contact the Pesticide Management Education Program, Cornell University, 5123 Comstock Hall, Ithaca, N.Y. 14853-0901.