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

Endothall

Publication Date: 9/95

TRADE OR OTHER NAMES

Endothall is endothal in Great Britain. Trade names for the acid form of endothall (technical endothall) include Aquathol, Hydrothal-47 and Hydrothal- 191. Trade names for the disodium salt of endothall (disodium endothall) include Accelerate, Des-I-Cate, Tri-endothal, Ripenthol, Hydrothol, and Niagrathol (4, 5, 6). The amine salt of endothall is also called Hydrothol (1).

REGULATORY STATUS

Endothall is a general use pesticide (GUP). When used as an aquatic herbicide, some water use restrictions may apply (2).

INTRODUCTION

Endothall is a member of the dicarboxylic acid chemical class (7, 8). It is a selective contact herbicide. The potassium and amine salts of endothall are used as aquatic herbicides to control a variety of plants including plankton, pondweed, niad, coontail, milfoil, elodea, and algaes in water bodies and rice fields. Endothall is also used to control annual grass and broadleaf weeds in sugar beets, spinach and turf. It reduces sucker branch growth in hops. Endothall is a desiccant to aid the harvest of alfalfa, potatoes, clover, and cotton (4). The EPA has classified endothall as Toxicity Class II - moderately toxic. Products containing endothall bear the SIGNAL WORD: WARNING (9). It is available as granules or as a soluble concentrate (4).

TOXICOLOGICAL EFFECTS

ACUTE TOXICITY

Endothall is moderately toxic. The LD50 is the dose which kills half of the test animals treated. The oral LD50 for disodium endothall is 51 mg/kg for rats and 250 mg/kg for guinea pigs (3, 5). The LD50 is 750 mg/kg for rats and 100 mg/kg for rabbits whose skin is exposed to disodium endothall (3, 10, 11). In humans, ingestion of 7 to 8g of disodium endothall causes repeated vomiting, hemorrhages, swelling in the lungs, and bleeding in the gastrointestinal tract (12).

The LD50 for the amine salt of endothall is 206 mg/kg for rats and 143 mg/kg for rabbits whose skin is exposed to it (3, 4). The oral LD50 for technical endothall is 38 mg/kg for rats. Endothall is very irritating to the eyes, skin, and mucous membranes (3, 4, 7).

CHRONIC TOXICITY

Reproductive Effects

A three generation study was conducted by feeding male and female rats disodium endothall until they were 100 days old and then mating them. Three successive generations were maintained on the test diet for 100 days and then bred to produce the next generation. When examined at 21 days, rat pups in all three generations whose parents were given 15 mg/kg/day of disodium endothall had decreased body weights. No adverse reproductive effects were observed (NOEL) at 5 mg/kg/day (12).There were no observable signs of developmental toxicity at dose levels that were fatal to the females (12).

Teratogenic Effects

Technical endothall was not teratogenic at the highest dose tested, 30 mg/kg/day (12).

Mutagenic Effects

Studies show that technical endothall is not mutagenic in Salmonella bacteria nor in mouse cells. Aquathol K, a formulation of dipotassium endothall, is not mutagenic in fruit flies, mold, or human white blood cells. However, "commercial endothall," with no further description, was mutagenic in fruit flies (12).

Carcinogenic Effects

No statistically significant numbers or types of tumors were observed in rats fed as much as 125 mg/kg/day of disodium endothall for two years. Thus, available evidence suggests that endothall does not cause cancer (12).

Organ Toxicity

In male dogs, high doses of 20 mg/kg/day of disodium endothall for 6 weeks caused vomiting, diarrhea, damaged intestinal walls, and hemorrhages in the stomach. In rats, very high doses of 50 mg/kg/day of disodium endothall for four weeks caused liver and kidney damage (12).

Fate in Humans and Animals

In rats dosed with technical endothall, over 95% of the dose was excreted within 48 hours. Within 72 hours after dosing, 99% of the dose was excreted. Approximately 90% of a dose of technical endothall is excreted in the feces and 7% in urine (12).

ECOLOGICAL EFFECTS

Effects on Birds

No information is currently available.

Effects on Aquatic Organisms

Endothall is toxic to some species of fish (4). Inorganic salts of endothall in aquatic formulations are safe to fish in 100-500 ppm concentrations. However, amine salts of endothall are more toxic to fish than the dipotassium endothall (17). Endothall has a low toxicity to crustaceans and a medium toxicity to aquatic insects (6). Long-term ingestion may cause severe damage to the digestive tract, liver and testes in fish (13).

Effects on Other Animals (Nontarget species)

Endothall is not toxic to bees (4).

ENVIRONMENTAL FATE

Breakdown of Chemical in Soil and Groundwater

Endothall is highly mobile in soil, however rapid degradation limits the extent of leaching. Endothall disappears from soil in 7-21 days (4). The half- life, the amount of time needed for the concentration to be reduced by half, of endothall in soil is 4-5 days in clay soils and 9 days in soils with high organic content (14).

Breakdown of Chemical in Surface Water

Endothall is rapidly degraded in water (4, 15). Its half-life is 4 to 7 days for dipotassium endothall and about 7 days for technical endothall in surface water (17). It biodegrades more slowly when air is not present (14).

Breakdown of Chemical in Vegetation

No information is currently available.

PHYSICAL PROPERTIES AND GUIDELINES

Technical endothall is a colorless or white crystal which is stable to light, weak acidic media and weak alkaline media. It is stable to temperatures up to about 90 degrees C. Above that temperature, it undergoes a slow conversion to anhydride. When heated to decomposition, endothall emits acrid smoke and fumes (3). Because it is a dibasic acid, it forms amine and alkali salts.

All properties are for technical endothall unless otherwise noted.

Physical Properties:

CAS #:	145-73-3 (technical endothall) 129-67-9 (disodium salt of endothall) 6385-60-0 (amine salt of endothall)
Chemical names:	3,6-endoxohexahydrophthalic acid (technical endothall) Disodium-3,6-endoxohexahydrophthalate (disodium endothall) 3,6-endoxohexahydrophthalic acid amine salt (amine salt of endothall)
Solubility in water:	100 g/kg at 20 degrees C (4, 14)
Sulubility in other solvents:	Soluble in benzene, isopropanol, acetone, dioxane, and methanol (disodium salt of endothall and technical endothall) (4)
Melting point:	144 degrees C (4)
Log octanol/water partition coefficient:	-0.87 (14)

Exposure Guidelines:

All guidelines are for technical endothall unless otherwise noted.

ADI: 0.02 mg/kg (12)

HA (lifetime): 0.8 mg/l (12)
NOAEL: 0.08 mg disodium endothall/kg/day (dog) (12)
RfD: 0.02 mg/kg/day (12)
DWEL: 0.7mg/l (12)
MCL: 0.1 mg/l (15)
MCLG: 0.1 mg/l (15)

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Review by Basic Manufacturer:

Comments solicited: October, 1994
Comments received:

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