Methiozolin

DEPARTMENT OF AGRICULTURE

CAS 403640-27-7; EPA PC CODE 090088 | NEW ACTIVE INGREDIENT REVIEW | APRIL 2020

PESTICIDE TYPE	FUNGICIDE
Chemical Class	Isoxazoline
Common Trade Names	PoaCure
Major Degradates	Met-3, Met-6, Met-7, DFBA, and DFBA acid
Application Rate (lb a.i/A/year)	Max Single: 0.46 - 0.92 Max Annual: 2.3 - 5.52
Registration Status	EPA: Registered unconditionally in December 2019 Minnesota: 2020
Toxicity Profile for Applicators	Signal word: CAUTION Category III (oral, dermal, inhalation exposure)
Basic Manufacturer	Moghu Research Center Ltd.
MDA Laboratory Capabilities	In discussion
HUMAN HEALTH	
Non–Cancer	Acute RfD = no value* Chronic RfD = 0.43 mg/kg/day
Cancer	Classification not determined
Acute and chronic reference doses (RfD) are doses that include all relevant uncertainty and safety factors	
ENVIRONMENTAL AQUATIC TOXICITY	
Fish	Acute: 650 ppb Chronic: 140 ppb
Invertebrate	Acute: 1,015 ppb Chronic: 117 ppb
Aquatic Plants	Vascular: 7 ppb Non-vascular: 1,010 ppb
POLLINATOR TOXICITY	
Honey Bee	Acute Contact: >40 µg ai/bee Acute Oral: >40 µg ai/bee
Level of Concern (LOC) has been applied to all values. ** An acute endpoint was not selected.*	

INTRODUCTION

Methiozolin is a new selective, systemic herbicide for pre- and post-emergence weed control in golf course turf. It belongs to the Weed Science Society of America (WSSA) Group 30 and is classified as a tyrosine aminotransferase herbicide. Methiozolin is considered to be a "very slow acting" herbicide and is intended to inhibit plant cell wall biosynthesis via inhibition of the tyrosine aminotransferase enzyme. The herbicidal activity is mainly based on root uptake and is enhanced by irrigation or rainfall following application. According to product labels, activity is also optimized when the product is applied in repeated applications (2-week intervals).

The U.S. Environmental Protection Agency (EPA) has registered methiozolin for use on golf courses to control annual bluegrass (Poa annua var. annua), perennial annual bluegrass (Poa annua var. reptans), and rough stalk bluegrass (Poa trivialis) in various established cool and warm season turfgrasses (e.g., creeping bentgrass, Kentucky bluegrass). Methiozolin can also provide control of crabgrass (Digitaria spp.), goose grass (Eleusine indica), and certain broadleaf weeds.

The Minnesota Department of Agriculture's (MDA) extensive review of the EPA methiozolin labels and risk assessments for issues relevant to Minnesota is summarized below.

PROJECTED USE IN MINNESOTA

Methiozolin is registered for use on golf course turf in Minnesota including golf course tees, fairways, and putting greens. According to the University of Minnesota, there is interest in products containing methiozolin for use on golf courses in Minnesota, particularly to remove Poa annua from creeping bentgrass.

Broadcast foliar ground applications of methiozolin can be made via groundboom and/or handheld equipment. The maximum single application rates are 0.46 lb a.i./A for putting greens, and 0.92 lb a.i./A for permanently established green collars, approaches, fairways, or tees. In northern states, including Minnesota, maximum annual application rates are 2.3 lb ai/A/yr for putting greens and 5.52 lb ai/A/yr for green collars, approaches, fairways, or tees.

Two soluble concentrate end-use products containing methiozolin are currently registered in Minnesota:

- **PoaCure** (EPA Reg. No. 89933-4) – This product contains 25% methiozolin.
- **PoaCure SC** (EPA Reg. No.89933-5) – This product contains 25% methiozolin.

LABEL ENVIRONMENTAL HAZARDS

Water Quality

- **Groundwater** – This chemical and a degradate of concern have properties and characteristics associated with chemicals detected in groundwater. The chemical and a degradate of concern may leach into groundwater if used in areas where soils are permeable, particularly where the water table is shallow.
- **Surface water** – This product may impact surface water quality due to runoff of rainwater. This is especially true for poorly draining soils and soils with shallow groundwater. This product is classified as having a medium potential for reaching both surface water and aquatic sediment via runoff for several months or more after application.

TOXICOLOGY AND EXPOSURE

EPA's screening models generate high-end, conservative exposure estimates for active ingredients and toxicologically significant degradates. Model inputs include annual usage at maximum use rates, maximum treated acres, maximum food residues, peak runoff and drift scenarios, etc. Some proposed products, application rates, and use scenarios are not relevant to Minnesota. EPA's estimates, therefore, may not reflect future use and impacts in Minnesota.

Human Health

- **Carcinogenic Effects** – A cancer classification was not determined by EPA because carcinogenicity studies were not required for non-food use registration.
- **Drinking Water Guidance** – Methiozolin has the potential to reach ground and surface water sources of drinking water; however, EPA acute and chronic dietary exposure estimates were below the level of concern for all populations. The EPA dietary risk assessment for methiozolin is based on drinking water exposure (no food uses) and includes only the parent. Estimated Drinking Water Concentrations (EDWCs) of 152 and 132 µg/L in groundwater were used in acute and chronic dietary risk assessments, respectively.
- **Occupational and Residential Exposure** – All exposure scenarios assessed by the EPA resulted in risk estimates not of concern. No restricted entry interval (REI) is required.

Non–target Species

- **Aquatic Life Exposure** – Methiozolin is moderately toxic to freshwater fish and invertebrates on an acute basis. Vascular aquatic plants are more sensitive than non-vascular plants, and predicted exposures from all proposed uses of methiozolin exceeded the EPA's levels of concern for vascular aquatic plants.
- **Terrestrial Life Exposure** – Methiozolin is practically non-toxic to birds and mammals on an acute basis. In the EPA risk assessment, however, there were exceedances of the chronic level of concern for all sizes of mammals for several food sources. Methiozolin may adversely affect terrestrial plants; however, according to EPA, risk is expected to be low.
- **Pollinators** – Methiozolin is practically non-toxic to adult bees on an acute oral and contact basis; however, the estimated exposure is two orders of magnitude higher than the highest concentration tested for adult toxicity.

ENVIRONMENTAL FATE

Methiozolin is moderately persistent to persistent in the environment and is slightly mobile in soil. It is expected to dissipate primarily through photodegradation and aerobic metabolism. Methiozolin may enter surface water via spray drift and runoff or groundwater via leaching.

Soil

- **Half–life** (20°C) – Aerobic: 47.1 to 185 days
  Anaerobic: 79.6 to 236 days
- **Mobility** – K_{oc} values range from 1,499 to 2,781 mL/g_{oc}
  Solubility in water (20°C) is 1.6 mg/L
- **Photolysis** (half–life) – 19.6 to 20.8 days
- **Persistence** – DT_{50} values range from 2.2 to 128 days

Aquatic

- **Half–Life** (20°C) – Aerobic: 38.7 to 50.7 days
  Anaerobic: 71.5 to 116 days
- **Photolysis** (half–life) – 5.2 days
- **Hydrolysis** (half–life) – 2,650 days (pH 4), 4,534 days (pH 7), stable at pH 9

Air

- **Volatilization** – Not a major route of dissipation. Vapor pressure (20°C) = 3.28×10^{-10} torr; Henry's law constant 9×10^{-11} atm m^3 $mole^{-1}$

Degradates

Methiozolin has five major environmental degradates, not counting carbon dioxide: Met-3, Met-6, Met-7, DFBA, and DFBA acid. Only Met-3 was found to have similar toxicity to the parent, methiozoline; therefore, Met-3 was the only degradate considered a residue of concern by the EPA in its ecological risk assessment. None of the degradates were considered residues of concern in the EPA human health risk assessment.

All active ingredient technical information, risk assessment values, fate and transport data, and label hazards have been summarized from final registration documents available at www.regulations.gov Docket ID: EPA-HQ- OPP-2018-0193.