

PESTICIDE TYPE	<b>Fungicide</b>
CHEMICAL CLASS	Thiazole carboxamide
COMMON TRADE NAMES	V-10208 4 SC
MAJOR DEGRADATE	Multiple
APPLICATION RATE (lbs a.i./A/year)	Max Annual: 0.5
REGISTRATION STATUS	EPA: Registered conditionally in May 2017 Minnesota: 2017
TOXICITY PROFILE FOR APPLICATORS	Signal word: Caution IV (eye, oral, dermal, inhalation)
BASIC MANUFACTURER	Valent U.S.A
MDA LABORATORY CAPABILITIES	In discussion

## HUMAN HEALTH

NON-CANCER	Acute PAD= No hazard from single exposure Chronic PAD= 0.055 mg/kg/day
CANCER	Suggestive evidence of carcinogenic potential

Acute and chronic PADs are doses that include all relevant uncertainty and safety factors

## ENVIRONMENTAL AQUATIC TOXICITY

FISH	Acute: 51 ppb Chronic: 880 ppb
INVERTEBRATE	Acute: 185 ppb Chronic: 50 ppb
AQUATIC PLANTS	Vascular (IC <sub>50</sub> ): 13000 ppb Non-vascular (IC <sub>50</sub> ): 3600 ppb

## POLLINATOR TOXICITY

HONEY BEE	Acute Contact (LD <sub>50</sub> ): 20.4 µg/bee Acute Oral (LD <sub>50</sub> ): 44.7 µg/bee
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Level of Concern (LOC) has been applied to all values.

## Introduction

Ethaboxam is a thiazole carboxamide fungicide that controls various diseases caused by oomycetes. According to Fungicide Resistance Action Committee (FRAC), ethaboxam belongs to Group 22 fungicides that affects  $\beta$ -tubulin assembly in mitosis. Ethaboxam is believed to have multiple sites of action as it inhibits migration of nuclei from the growing germ tube and mycelia, and appears to inhibit oxygen consumption by mitochondria. Ethaboxam was previously registered as seed treatment on variety of crops including rapeseed, cereal grains, and legume vegetables. The new foliar use of ethaboxam is approved to protect potato and other approved vegetable crops from *Phytophthora* and *Pythium* fungi. On potato, ethaboxam is approved for controlling pink rot (*Phytophthora erythroseptica*) and Pythium leak (*Pythium* spp.) diseases. Ethaboxam can be applied via aerial, chemigation, groundboom, and mechanically-pressurized handgun equipment. There are no registered or proposed residential uses for ethaboxam at this time. The Minnesota Department of Agriculture (MDA) extensive review of the EPA ethaboxam product labels and risk assessments for issues relevant to Minnesota is summarized below.

## Projected Use in Minnesota

Ethaboxam could be a critical tool for management of fungicide resistance when used as tank-mix with currently registered products on potato. The new use of ethaboxam on potato will allow its band or furrow application to potato seed or band side dressing between hilling and tuber initiation via groundboom. The maximum approved single application rate for ethaboxam on potato is 0.25 lb a.i./A while maximum approved annual application rate is 0.5 lbs a.i./A. The label recommends a minimum interval of 25 days between two applications on potato. The maximum number of applications are two/season and second application should be applied at least 25 day after first application. According to the University of Minnesota extension ethaboxam was not evaluated in Minnesota specific conditions.

- V-10208 4 SC (Elumin) Fungicide (EPA Reg. No. 59639-211) - This suspension concentrate product carries 42.5% of ethaboxam (4 lb a.i./gallon).

## Label Environmental Hazards

### Water Quality:

- Ethaboxam based product label carries statements that the product is toxic to aquatic organisms.
- Drift and runoff from treated areas may be hazardous to aquatic organisms in water adjacent to treated areas.
- Do not discharge effluent containing this product into lakes, streams, ponds, estuaries, oceans, or other waters unless in accordance with the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and the permitting authority has been notified in writing prior to discharge.

### Other:

- Do not allow spray from ground or aerial equipment to drift onto adjacent land or crops.
- Do not apply this product in a way that will contact workers either directly or through drift.

## Toxicology and Exposure

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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

According to the EPA no human health risk issues are expected from foliar use of ethaboxam when used at labeled rate on approved crops.

- **Carcinogenic Effects**- Ethaboxam is classified as "suggestive evidence of carcinogenic potential".
- **Drinking Water Guidance**- The EPA's estimated drinking water concentration from foliar use of ethaboxam for maximum application rate in Wisconsin sands suggested that drinking water exposure estimates were below levels of concern. Risk estimates were below HED's (Health Effects Division) level of concern for all population subgroups, including infants and children.
- **Occupational Exposure**- Because short-term (1-30 days) and intermediate-term (1-6 months) exposure to handlers and agricultural workers applying ethaboxam were identified from the proposed use, the label requires applicators and handlers to use personal protection equipment (PPE) while applying and handling ethaboxam. Restricted entry interval of 12 h is considered to be adequate to protect workers from post-application exposures. No long-term exposure risks were anticipated from the proposed use.

### Environment- Non-target Species

- **Aquatic & Terrestrial Life Exposure**- Ethaboxam is classified as highly toxic to aquatic invertebrates and moderately toxic to fish. However, aquatic exposures are expected to be sufficiently low so as to not trigger risk concerns for aquatic organisms based on the proposed foliar uses.

## Environmental Fate

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Ethaboxam is a relatively nonvolatile and moderately to slightly mobile in soil. Ethaboxam readily degrades in soil, however, total residues of ethaboxam and its degradates may persist in soil for several months. The fungicide may move to surface water bodies via spray drift or runoff and may persist longer in water. Ethaboxam does not bioaccumulate readily in fish and other aquatic organisms. Environmental fate characteristics are listed for parent chemical only because of similar toxicological profiles for ethaboxam and its degradates.

### Soil

- **Half-life** - Aerobic: 0.9 to 9.6 days.  
Anaerobic: 135 days.
- **Mobility** - K<sub>oc</sub> is 404 to 1,684 ml/g.
- **Photolysis**: Stable.
- **Persistence**- 2.3 to 11.6 days.

### Aquatic

- **Half-Life**- Aerobic: 29 to 52 days.  
Anaerobic: 151 days.
- **Surface water**- Ethaboxam may contaminate surface water due to runoff or spray drift.
- **Half-life via hydrolysis**: stable.
- **Photolysis in water**: 4.5 days.

### Air

- **Volatilization**- nonvolatile; Vapor pressure =  $6.1 \times 10^{-7}$  torr; Henry's Law Constant  $3.8 \times 10^{-8}$  atm m<sup>3</sup> mole<sup>-1</sup>.

### Degradates

LGC-32533, LGC-32525, and LGC-32799 are major degradates of ethaboxam in soil. These degradates are structurally similar to the parent ethaboxam. All degradates were found to be less toxic to aquatic organisms than the parent chemical, ethaboxam, except LGC-32799 which is potentially more toxic than the parent chemical. Other minor ethaboxam degradates include LGC-32524 and LGC-35525, and 2-thiophene carboxylic acid.