

PESTICIDE TYPE	<b>Herbicide</b>
CHEMICAL CLASS	Picolinic acid
COMMON TRADE NAMES	Quelex™
MAJOR DEGRADATE	XDE-729 acid (halauxifen)
APPLICATION RATE (lbs a.i./A)	Max Annual: 0.0182
REGISTRATION STATUS	EPA: Registered conditionally in August 2016 Minnesota: October 2016
TOXICITY PROFILE FOR APPLICATORS	Signal word: Caution Acute toxicity (Category IV); Eye irritants (Category III)
BASIC MANUFACTURER	Dow AgroSciences
MDA LABORATORY CAPABILITIES	In discussion

## HUMAN HEALTH

NON-CANCER	Acute PAD= No hazard from single exposure Chronic PAD= 0.0010 mg/kg/day
CANCER	Not likely to be carcinogenic to humans

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

## ENVIRONMENTAL AQUATIC TOXICITY

FISH	Acute: 1,005 ppb Chronic: 259 ppb
INVERTEBRATE	Acute: >1,060 ppb Chronic: >144ppb
AQUATIC PLANTS	Vascular (IC <sub>50</sub> ): 0.008 ppb Non-vascular (IC <sub>50</sub> ): 1280 ppb

## POLLINATOR TOXICITY

HONEY BEE	Acute Contact (LD <sub>50</sub> ): >39.24 µg/bee Acute Oral (LD <sub>50</sub> ): 43.2 µg/bee
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Level of Concern (LOC) has been applied to all values.

## Introduction

Halauxifen-methyl is a new herbicide registered conditionally for post-emergent control of annual broadleaf weeds such as lambsquarters, redroot pigweed, cleavers, henbit, wild buckwheat, and mustards in barley, triticale, and wheat. Halauxifen-methyl is a synthetic auxin of picolinic acid class of herbicides (HRAC group O). The specific mechanism of action of this chemical is not known. However, based on the studies of non picolinic acids auxins (e.g. 2,4-D, 2,4,5-T), halauxifen-methyl is considered to mimic the plant growth hormone auxin, resulting in the disruption of growth processes in susceptible plants. Cellular effects include alterations in cell wall elasticity and gene expression. Additionally, non-productive tissue growth is often induced, resulting in epinasty and phloem disruption, preventing the movement of photosynthates and causing death in days to weeks. Halauxifen-methyl applications are limited to two times per crop per year. Single or split applications can be made per crop provided there is a 14-day interval between treatments.

## Projected Use in Minnesota

The EPA approved halauxifen-methyl for controlling post-emergent broadleaf weeds in barley, triticale, and wheat. Halauxifen-methyl is expected to control weeds that have become resistant to Group 2 (imidazolinones, sulfonylureas, triazolones, etc.) and glyphosate herbicides. Halauxifen-methyl was not evaluated in Minnesota specific conditions; however, the new active ingredient has the potential to help Minnesota farmers in controlling broadleaf weeds in wheat. Halauxifen-methyl is registered as a product named Quelex™.

- Quelex™ (EPA Reg. No. 62719-661) - The product carries 10.4% halauxifen-methyl and 10.0% sulfonamide.

## Label Environmental Hazards

### Water Quality:

- The product labels containing halauxifen-methyl carry advisories that the chemical has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.
- The product has a potential for reaching surface water via run-off after application. A level, well-maintained vegetative buffer strip between areas to which the product is applied and surface water features such as ponds, streams, and springs, will reduce the potential loading the halauxifen from runoff water. Runoff of this product will be reduced by avoiding when rainfall or irrigation is expected to occur within 48 hrs.

### Other:

- Do not apply this product through any type of irrigation system.
- Do not apply this product directly or permit it to drift to susceptible crops or desirable plants including alfalfa, edible beans, canola, soybeans, sugar beets, sunflowers, tomatoes.
- Apply Quelex with a nozzle class that ensures a coarse or coarser spray.
- Do not apply with hollow cone-type insecticide nozzles or other nozzles that produce a fine droplet spray.
- Do not apply more than 0.75 ounces (0.0468 lbs) of Quelex per acre per growing season.



## 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**- Both halauxifen-methyl and the major degradate XDE-729 acid are classified as "not likely to be carcinogenic to humans".
- **Drinking Water Guidance**- Rapid transformation of halauxifen-methyl in the environment reduces the likelihood of halauxifen-methyl to contaminate surface water or groundwater. However, groundwater or surface water may be contaminated with transformation products. Risk estimates for both halauxifen-methyl and XDE-279 acid in drinking water were found to be below USEPA's level of concern for the general population and all population subgroups.
- **Occupational Exposure**- Exposure and risk estimates suggest that occupational risks are not of concern for the proposed use. Label carries statement that the product is harmful if absorbed through skin.

### Environment- Non-target Species

- **Stressor of concern**- Because of high mobility in soil and water, halauxifen-methyl and XDE-729 acid may move from the treated field to surface water through run-off and/or erosion.
- **Aquatic & Terrestrial Life Exposure**-Risk to terrestrial, aquatic and semi-aquatic vascular plants is predicted. Risk to fish, birds reptiles, amphibians, mammals, aquatic non-vascular plants, and terrestrial and aquatic invertebrates is not expected from the proposed use. The EPA has required the registrant to submit data on pollinators for halauxifen-methyl by July 30, 2017.

### Environmental Fate

Halauxifen-methyl and its degradates has the potential for leaching, run-off, and/or spray drift and may contaminate surface water and/or groundwater.

### Soil

- **Half-life** - Aerobic: Halauxifen-methyl = (1.1-5.3 days); XDE-729 acid = 2-42 days days.  
Anaerobic: Halauxifen-methyl = 0.94-7.1 days; XDE-729 acid = 15-107 days.
- **Adsorption** (mL/g) - Both halauxifen-methyl and the major degradate XDE-729 acid are very mobile. Halauxifen-methyl  $K_{oc}=88 \text{ ml g}^{-1}$ ; XDE-729 acid  $K_{oc}=28-423 \text{ ml g}^{-1}$ .
- **Photolysis**: Halauxifen-methyl =Assumed to be stable; XDE-729 acid = Assumed to be stable.
- **Persistence**- Halauxifen-methyl  $DT_{50}$  value <1-7 days; XDE-729 acid  $DT_{50}$  value = 3-273 days.

### Aquatic

- **Half-Life**- Aerobic: Halauxifen-methyl = 1-5 days; XDE-729 acid = 3-12 days.  
Anaerobic (sediment+water): Halauxifen-methyl = 0.5-5.8 days; XDE-729 acid = ~4 days.
- **Surface water**- Halauxifen-methyl and degradates may contaminate surface water because of high mobility.
- **Groundwater**- Halauxifen-methyl and degradates may leach to the groundwater because of high mobility.
- **Half-life via hydrolysis**: Halauxifen-methyl = 155 days 7; XDE-729 acid = stable.
- **Photolysis in water**: halauxifen-methyl < 10 min XDE-729 acid = ~30 min= Photolysis is not likely to be a major route of dissipation for halauxifen-methyl or XDE-729 acid.

### Air

- **Volatilization**- Vapor pressure (25C) =  $1.1 \times 10^{-10}$  mmHg; Henry's Law=  $1.2 \times 10^{-11}$  atm  $\text{m}^3 \text{ mole}^{-1}$ .

### Degradates

XDE-729 acid (haluxafen) is a major transformation product in a soil or aquatic medium. Because of high mobility, degradate XDE-729 acid may contaminate groundwater. However, X11449757, X11406790, and other minor degradates may be present depending upon the source of the drinking water (surface or groundwater) and the amount of elapsed time since application of the product. Risk estimates for degradates in drinking water were found to be below USEPA's level of concern for the general population and all population subgroups,