

PESTICIDE TYPE	FUNGICIDE
Chemical Class	pyrazolecarboxamide
Common Trade Names	Excalia & Zeltera
Major Degradate	3'-OH-S-2840 1'-COOH-S-2840
Application Rate (lb a.i./A/year)	Max Annual: 0.044-0.178 foliar/ soil 0.002-0.103 lb. ai/100lb seed only
Registration Status	EPA: Registered unconditionally In June 2020 Minnesota: September 2020
Toxicity Profile for Applicators	Signal word: Caution Category II (oral) Category III, IV (dermal, inhalation)
Basic Manufacturer	Valent USA, LLC
MDA Laboratory Capabilities	In discussion
HUMAN HEALTH	
Non-Cancer	Acute PAD= 0.3 mg/kg/day Chronic PAD= 0.3 mg/kg/day
Cancer	Not likely to be carcinogenic to humans
<i>Acute and chronic PADs are doses that include all relevant uncertainty and safety factors</i>	
ENVIRONMENTAL AQUATIC TOXICITY	
Fish	Acute: 15.5 µg/L Chronic: 7.5 µg/L
Invertebrate	Acute: 550 µg/L Chronic: 140 µg/L
Aquatic Plants	Vascular (EC50): >23,000 µg/L Non-vascular (EC50): 730 µg/L
TERRESTRIAL TOXICITY	
Honey Bee	Acute Contact (LD50): >40 µg/ bee Oral (LD50): >40 µg/bee
<i>Level of Concern (LOC) has been applied to all values.</i>	

INTRODUCTION

Inpyrfluxam is a new fungicide active ingredient which belongs to the Fungicide Resistance Action Committee (FRAC) group 7. Inpyrfluxam is a pyrazolecarboxamide that provides protection against plant pathogens, specifically Rhizoctonia. The USEPA unconditionally registered inpyrfluxam for use as a seed treatment on cereal grains, legume vegetables, rapeseed, field corn, pop corn, sweet corn, soybean, and sugar beet. Inpyrfluxam can also be used as a foliar application for apple, peanut, soybean, and sugar beet, or as an in-furrow application at the time of planting for field corn, sweet corn, or pop corn. Inpyrfluxam can be applied by aerial, ground boom, airblast, chemigation, handheld, and seed treatment methods. The EPA also evaluated inpyrfluxam seed treatment use in combination with multiple active ingredients including metalaxyl and ethaboxam.

According to the EPA, inpyrfluxam is effective in managing pathogens on multiple crops and can play a key role in resistance management and integrated pest management (IPM).

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

PROJECTED USE IN MINNESOTA

The active ingredient inpyrfluxam is approved by the USEPA for use on crops grown in Minnesota, including soybeans, field corn, sweet corn, sugar beets, and apples. The greatest benefit of use is predicted to be for soybeans with blight disease and sugar beets with root and crown rot for which limited fungicides are available. According to the University of Minnesota Extension, inpyrfluxam may be a useful addition to products used to control Rhizoctonia diseases. Field trials evaluating inpyrfluxam are taking place as of 2020 to evaluate the efficacy in Minnesota.

The USEPA approved three inpyrfluxam end use products. The end-use products are formulated as a flowable concentrate for seed treatment and a suspension concentrate for soil and foliar application. As of 2020

- **Excalia Fungicide®** (EPA Reg. No 59639-230) - The product contains 31.25 % active ingredient and is approved for use on apple, soybean, and sugar beet.
- **Zeltera Fungicide®** (EPA Reg. No. 59639-231) – The product contains 34.05 % active ingredient and is a seed treatment approved for use on corn, soybean, small grains, and sugar beet.

LABEL ENVIRONMENTAL HAZARDS

Water Quality

This pesticide is toxic to fish and aquatic invertebrates. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high water mark. Drift and runoff from treated areas may be hazardous to aquatic organisms in water adjacent to treated areas. Do not contaminate water by disposing of equipment wash waters or rinsate.

Products with multiple active ingredients (metalaxyl and ethaboxam) carries additional language: Metalaxyl has properties and characteristics associated with chemicals detected in ground water. This chemical may leach into ground water if used in areas where soils are permeable, particularly where the water table is shallow.

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** – Inpyrfluxam is not likely to be carcinogenic to humans
- **Drinking Water Guidance** – Residues of concern in drinking water included the parent inpyrfluxam and its metabolites: 3-OH-S-2840, 1-COOH-S-2840, and 1-Keto-S-2840. The estimated drinking water concentration (EDWC) for surface water are not expected to exceed 46.1 µg/L and concentrations in groundwater are not expected to exceed 104.5 µg/L.
- **Occupational and Residential Exposure** – Occupational exposure is expected but is not of concern with baseline PPE for soil, foliar, aerial, and seed treatment uses. A restricted-entry interval (REI) of 12 hours is required for products with inpyrfluxam as the sole active ingredient. There are no proposed residential uses for Inpyrfluxam.

Non-target Species

- **Aquatic Life Exposure** – Inpyrfluxam is classified as “very highly toxic” to freshwater fish, “moderately toxic” to freshwater invertebrates on an acute basis.
- **Terrestrial Life Exposure** – Inpyrfluxam is “practically non-toxic” to the mallard and quail birds but is classified as “highly toxic” to the passerine based on two separate accepted studies.
- **Pollinators** – Inpyrfluxam is “practically non-toxic” to honey bees on an acute contact and oral basis.

ENVIRONMENTAL FATE

Inpyrfluxam is moderately mobile and moderately persistent to persistent in soil, stable in hydrolysis, and not volatile.

Soil

- **Half-life (20°C)** – Aerobic: 121-1,720 days
Anaerobic: 1,212 days
- **Mobility** – Koc is 691 L/kgoc
Solubility in water is 16.4 mg/L
- **Photolysis** – 627 days (half-life)
- **Persistence** – Persistent

Aquatic

- **Half-Life** – Aerobic: 319 days
Anaerobic: 3,537 days
- **Half-life via hydrolysis** – Stable
- **Photolysis in water** – Stable

Air

- **Volatilization** – Not volatile, vapor pressure = 9×10^{-10} mm Hg at 25C;

Degradates

Inpyrfluxam breaks down into several degradates which are moderately mobile but not considered toxic: 3-OH-S-2840, 1-COOH-S-2840, and 1-Keto-S-2840.