Fluxapyroxad

CAS 907204-31-3; EPA PC CODE 138009

New Active Ingredient Review
July 2012

PESTICIDE TYPE	**FUNGICIDE**
CHEMICAL CLASS	Succinate-dehydrogenase inhibitor (SDHI) Frac Code: 7
COMMON TRADE NAMES	Imbrex™, Sercadis™ and 2 seed treatments (e.g., Acceleron) Pre-Mix Combinations (a.i.) Priaxor™ & Merivon™ (pyraclostrobin)
APPLICATION RATE (lbs a.i./A)	Single: 0.09 – 0.18 Max Annual: 0.18 – 0.36
REGISTRATION STATUS	EPA: Registered 5/2/ 2012 Minnesota: 6/12
TOXICITY PROFILE FOR APPLICATORS	Signal word- Caution Toxicity III or IV
BASIC MANUFACTURER	BASF Corporation
MDA LABORATORY CAPABILITIES	In discussion; LC-MS/MS parent, reversed-phase HPLC, gradient elution, 2 ion transitions

HUMAN HEALTH	
NON-CANCER	Acute PAD = 1.25 mg/kg/day Chronic PAD = 0.021 mg/kg/day
CANCER	Not Likely to be Carcinogenic

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

ENVIRONMENTAL AQUATIC TOXICITY	
FISH	Acute: 145 ppb Chronic: 22 ppb
INVERTEBRATE	Acute: 2,550 ppb Chronic: 460 ppb
AQUATIC PLANTS	Vascular: 2,400 ppb Non-vascular: 370 ppb

Level of Concern (LOCs) have been applied to all values

Introduction

Fluxapyroxad is a broad-spectrum, pyrazole carboxamide fungicide registered for uses on a wide range of crops (cereal grains, legume vegetables, oil seed crops, peanuts, pome fruit, stone fruit, root and tuber vegetables, fruiting vegetables, and cotton). Fluxapyroxad is formulated as an emulsifiable concentrate (EC) or suspension concentrate (SC) and is foliar applied or used as a seed treatment. Crop applications may begin at emergence, but typical applications begin as plants touch across rows, using groundboom, airblast, or aerial techniques. Seed treatments are applied in a standard slurry or mist-type seed treatment. Its mode of action is inhibition of succinate dehydrogenase in complex II of the mitochondrial respiratory chain, which results in inhibition of spore germination, germ tubes, and mycelial growth within the fungus target species. Minnesota Department of Agriculture (MDA) extensive review of the U.S. Environmental Protection Agency (EPA) fluxapyroxad labels and risk assessments for issues relevant to Minnesota is summarized below.

Projected Use in Minnesota

Fluxapyroxad is labeled for use on the following major crops in Minnesota: corn (all types), soybeans, sugar beets, peas, and cereal grains. Most fluxapyroxad products are 'Xemium' "branded" and all are unconditionally registered. Two of the products are co-formulated with pyraclostrobin. There are no products proposed for homeowner use or application to residential areas. The following products most likely will be registered in Minnesota:

- **Priaxor** *(EPA Reg. No. 7969-311; Registered in MN)* - Co-formulation with pyraclostrobin for disease control on a variety of Minnesota crops including corn, soybeans, sugar beet, and wheat.
- **Merivon** *(EPA Reg. No. 7969-310; Registered in MN)* – Co-formulation with pyraclostrobin for use on pome and stone fruits such as apples, and corm vegetables including potato.
- **Sercadis** *(EPA Reg. No. 7969-309)* – Suspension concentrate for disease control in a variety of crops: corn, soybean, wheat, sugar beet, and potato.
- **Imbrex** *(EPA Reg. No. 7969-306)* – Emulsifiable concentrate for disease control on a variety of crops, notably: corn, soybean, wheat, sugar beet, and potato.
- **Xemium 2.72, Xemium 2.78, Acceleron** *(EPA Reg. No. 7969-308; Registered in MN)* – Seed treatments on a variety of crops including: corn, soybean, and wheat.

Label Environmental Hazards

Water quality:

- Labels carry enforceable language related to direct application to surface waters and equipment cleaning.
- Labels for crop applications carry advisories for surface water and groundwater impacts, runoff reduction potential from vegetative buffers, and avoiding applications before rainfall.
- Unique mention is made of crop application products having high potential for reaching aquatic sediment via runoff for several months or more after application. Sound erosion control practices reduce this potential.

Other:

- Both crop application and seed treatment labels note that fluxapyroxad is toxic to fish. Drift and runoff may be hazardous to aquatic organisms in water adjacent to treated areas.
- The fluxapyroxad label carries treated seed disposal recommendations (including use restrictions in ethanol production) and EPA-enforceable language related to the Federal Seed Act regarding dyes and colorants, and use of treated seed for feed, food or oil purposes.

MINNESOTA DEPARTMENT OF AGRICULTURE

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- Classified as "Not Likely to be Carcinogenic to Humans"
- Drinking Water Guidance- High-end, screening exposure estimates for drinking water suggest that applications of fluxapyroxad may result in surface water and groundwater detections; however, EPA concludes that conservative exposure estimates are below levels of concern for the general population and all population subgroups.
- Occupational Exposure- Low acute toxicity. Exposure and risk estimates indicate occupational risks are not of concern for the proposed uses.

Environment- Non-target Species

- Aquatic Life Exposure - High-end, screening exposure estimates for risks to fish and invertebrates generated some concern and fluxapyroxad is classified and highly to very highly toxic to fish and slightly to highly toxic to invertebrates; however, EPA concludes the likelihood of actual chronic risk is expected to be low or is further mitigated by labeling requirements.
- Terrestrial Life Exposure – High-end, screening exposure estimates for risks to seed-eating birds and mammals, and non-target plants generated some concern as a result of seed treatment use of fluxapyroxad. For seed treatment uses, seed incorporation would reduce the likelihood of runoff to non-target plants and surface water and would further reduce the potential for exposure and risk to seed-eating birds.
- Listed Terrestrial Plants - Potential risks to listed terrestrial plants are mitigated by the spray drift precautions on the product labels. Minnesota has 4 listed terrestrial plant species: Prairie Bush Clover, Leedy's Roseroot, Minnesota Trout Lily, and Western Prairie Fringed Orchid.
- Co-formulation Toxicity Data - Based on aquatic toxicity studies, formulations that contain pyraclostrobin are more toxic than fluxapyroxad parent. The greater toxicity to fish and invertebrates, when compared to fluxapyroxad, appears to be driven by pyraclostrobin. Exposure via spray drift to dual-a.i. formulations results in risk of acute mortality that exceeds the level of concern for acute risk to fish and invertebrates, and is mitigated by the spray drift precautions on the product labels.

Environmental Fate

Soil

- Half-life- Aerobic = 387 days (slowly; WI, loamy sand); Anaerobic = 591 days (slowly; NJ, loam)
- Adsorption- K_{oc}: 931 mg/L
- Persistence- Exceptionally long environmental persistence and stable to most environmental degradation, though unlikely to bioaccumulate. Degrades slowly in soil and aquatic systems; may persist in soil, water, and benthic sediment for several months or more.

Water

- Half-life via hydrolysis- stable, no evidence of degradation
- Surface water- Moderate to slightly mobile. There is a high potential to reach surface water for several months or more following foliar applications and seed treatments. Can move to surface water through spray drift, runoff, and erosion.
- Groundwater- Has the potential to leach to groundwater, particularly where high water tables are present, high rainfall/irrigation occurs, and where sandy soils with low organic matter exist.

Air

- Volatilization- Not expected to volatilize (vapor pressure of 6.1×10^{-11} mm Hg at 25°C)

Degradates

Fluxapyroxad (parent) is the only residue of concern in drinking water. One major degradate was identified: M700F001 (3-(difluoro-methyl)-1-methyl-1H-pyrazole-4-carboxylic acid). M700F001 has a lower toxicity than the parent and will be present in low concentrations relative to parent in drinking water.