

PESTICIDE TYPE	Fungicide
CHEMICAL CLASS	Quinone outside Inhibitors
COMMON TRADE NAMES	Pinpoint™
MAJOR DEGRADATE	Multiple
APPLICATION RATE (lbs a.i./A)	Max Annual: 1.68
REGISTRATION STATUS	EPA: Registered conditionally in August 2016 Minnesota: October 2016
TOXICITY PROFILE FOR APPLICATORS	Signal word: Caution III (eye, oral, dermal) IV (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= 0.92 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: 465 ppb Chronic: 150 ppb
INVERTEBRATE	Acute: 600 ppb Chronic: 560 ppb
AQUATIC PLANTS	Vascular (IC ₅₀): 2,100 ppb Non-vascular (IC ₅₀): 65 ppb

POLLINATOR TOXICITY

HONEY BEE	Acute Contact (LD ₅₀): 40 µg/bee Acute Oral (LD ₅₀): 44 µg/bee
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Level of Concern (LOC) has been applied to all values.



Introduction

Mandestrobin is a systemic and translaminar non-restricted fungicide registered conditionally for controlling *Botrytis cinerea* (Botrytis gray mold) on grapes and strawberries and *Sclerotinia homoeocarpa* (Dollar spot) on turf. According to the Fungicide Resistance Action Committee (FRAC) mandestrobin belongs to the strobilurin Group 11 fungicides which inhibits mitochondrial respiration in fungi. Mandestrobin is a racemic mixture of R-isomer and the S-isomer; the R-isomer is the toxic moiety. In addition to foliar applications on turf, mandestrobin is approved for seed treatment on corn, legume vegetables, and field pea. However, mandestrobin use is not approved by aerial application. Mandestrobin is not a restricted used pesticides. The U.S. Environmental Protection Agency (USEPA) expects that mandestrobin can serve as a new resistance management fungicide for dollar spot and would provide a slightly higher efficacious activity than strobilurin fungicides. Minnesota Department of Agriculture (MDA) extensive review of the EPA mandestrobin product labels and risk assessments for issues relevant to Minnesota is summarized below.

Projected Use in Minnesota

The USEPA approved mandestrobin product under the trade name Pinpoint. In Minnesota, mandestrobin is proposed for use as a PRE and POST infection fungicide for the control of turf diseases in golf courses, lawns, and landscape areas around residential, institutional, public, commercial and industrial buildings, parks, recreational areas, athletic fields and sod farms. The approved maximum annual application rate for Pinpoint on turf is 1.68 lbs a.i./A. Pinpoint can be applied four times in a year at a maximum application rate of 0.42 lbs a.i./A. According to the University of Minnesota extension mandestrobin was not evaluated on corn in Minnesota specific conditions.

- Pinpoint™ Fungicide (EPA Reg. No. 59639-199) - The product carries 43.4% of mandestrobin. Pinpoint is approved for controlling certain diseases of turf including dollar spot, fairy ring, take all patch and rust diseases. The product label restricts aerial application and through any type of irrigation. The product label also carries restrictions on grazing animals on treated areas for one year after application and feeding clippings from treated areas to livestock or poultry.

Label Environmental Hazards

Water Quality:

- Mandestrobin based product label carry 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. The product label carries an advisory to include a vegetative strip between the treated area and the edge of the water body.

Other:

- Do not apply this product in a way that will contact workers or other persons, either directly or through drift.
- Do not apply this product by aerial application or through any type of irrigation system.
- Do not graze animals on treated areas for one year after application.
- Do not feed clippings from treated areas to livestock or poultry.

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 mandestrobin and its degradates are classified as "not likely to be carcinogenic to humans".
- **Drinking Water Guidance**- The estimated chronic dietary (food and drinking water) exposure to mandestrobin is below EPA's level of concern (i.e., the estimated exposure is below 100% of the cPAD) for the general U.S. population and all population subgroups. Although mandestrobin may slowly leach to ground water, residues were not detected in field dissipation studies beyond 30 cm soil depth.
- **Occupational Exposure**- Short- and intermediate-term dermal and inhalation exposures are expected from mandestrobin handler activities associated with the proposed agricultural, and turf uses. Restricted entry interval of 12 h is considered to be adequate to protect workers for all activities and crops. Because mandestrobin is not a restricted-use pesticide, there is also a potential for exposure to residential handlers.

Environment- Non-target Species

- **Stressor of concern**-In aquatic assessments, the potential for effects of the mandestrobin alone, rather than transformation products, is considered to be the primary stressor. All degradates are considered to be less toxic than the parent, and, therefore, present lower ecological risks than the parent.
- **Aquatic & Terrestrial Life Exposure**- Mandestrobin is characterized as persistent and is considered moderately to highly toxic to aquatic organisms. However, aquatic exposures are not expected to be sufficiently high to trigger risk concerns for aquatic organisms based on the current label directions and use sites.

Environmental Fate

Mandestrobin is a relatively nonvolatile, moderately mobile in soil and persistent fungicide. The fungicide may move to ground water slowly via leaching and may move to surface water bodies via spray drift and runoff of dissolved or sorbed residues.

Soil

- **Half-life** - Aerobic: 46 days to >1yr (up to 635 days).
Anaerobic: >1 yr (up to 12,772 days).
- **Mobility** - K_{oc} is 287 to 1,104 L/kg.
- **Photolysis**: 193 to 278 days.
- **Persistence**- DT₅₀ value 108 to 606 days.

Aquatic

- **Half-Life**- Aerobic: 161 days to >1 yr (up to 870 days).
Anaerobic: > 1yr (up to 8,800 days).
- **Surface water**- Mandestrobin may contaminate surface water due to runoff or drift.
- **Groundwater**- Mandestrobin may slowly leach to the groundwater.
- **Half-life via hydrolysis**: stable.
- **Photolysis in water**: 4.4 to 4.6 days.

Air

- **Volatilization**- nonvolatile; Vapor pressure = 6.88 X 10⁻⁸ torr; Henry's Law Constant 6.6 X 10⁻¹² atm m³ mole⁻¹.

Degradates

Mandestrobin breaks down into multiple degradate chemicals. However, all degradates were found to be less toxic than the parent compound.