

Isocycloseram

CAS 2061933-85-3; EPA PC CODE 129220

New Active Ingredient Review

January 2026

Overview

Isocycloseram (Plinazolin® technology) is a broad-spectrum insecticide that was first registered by the U.S. Environmental Protection Agency (EPA) in November 2025.

The Minnesota Department of Agriculture (MDA) routinely conducts reviews of new pesticide active ingredients (a.i.) prior to registration in Minnesota. **The MDA completed its review of isocycloseram in January 2026 and did not identify any risks of concern specific to Minnesota.** To evaluate the potential impacts of isocycloseram on groundwater and surface water, the MDA may add this a.i. to its [water quality monitoring program](#). Isocycloseram is a per-/polyfluoroalkyl substance (PFAS) based on Minnesota's PFAS definition ([MINN. STAT. 18B.01, subd. 15c](#)); therefore, products containing isocycloseram will be subject to additional regulations under the Pesticide Control law.

Pesticide Type	Insecticide
Chemical Class	Isoxazoline
Mode of Action Insecticide Resistance Action Committee	Group 30 - Gaba-gated chloride channel allosteric modulator
Basic Manufacturer	Syngenta Crop Protection, LLC

The following is a summary of the MDA's review of the EPA's isocycloseram risk assessments and product labels ([EPA Docket EPA-HQ-OPP-2021-0641](#)). The EPA uses high-end, conservative exposure estimates to evaluate risk based on various use scenarios; therefore, exposure estimates may not reflect future use and impacts in Minnesota.

Use Profile



Use Sites

Isocycloseram is registered for a variety of agricultural, residential, commercial, and industrial uses. It can be used as a foliar or in-furrow treatment for multiple field crops, including corn and soybean, and also is registered for use as a seed treatment for select crops. Non-agricultural uses include use on turf and ornamentals, use as a gel bait, and application as crack and crevice treatment in and around structures.



Target Pests

Isocycloseram products are labeled to control a variety of mites and chewing and sucking insect pest species. Target pests for agricultural products include grubs and wireworms, while gel baits and crack and crevice products target pests such as cockroaches, ants, and bed bugs.



Application Rates & Methods

Ground, aerial, seed treatment, chemigation, and other application methods are approved for isocycloseram. Maximum single and maximum annual application rates vary by use site.

Table 1. Maximum application rates for select use sites

Use Site	Max Single Rate (lb a.i./acre)	Max Annual Rate (lb a.i./acre/year)
Corn	0.133 (at planting)	0.186
Soybean	0.0535	0.107
Turf	0.107	0.32



Products

The EPA registered nine end-use products and one technical product containing isocycloseram. Product trade names include Incipio, Vertento, Equento, Atexzo, and Vanecto. Select end-use products are Restricted Use Pesticides. A full list of isocycloseram products registered for use in Minnesota is available through the [Kelly Solutions registered pesticide product database](#).




Projected Use in Minnesota

According to University of Minnesota Extension, isocycloseram may be a valuable insecticide for a variety of Minnesota crops and aid in resistance management. For example, isocycloseram could be a resistant management option for Colorado potato beetle. Soybean growers may be interested in isocycloseram for management of pests such as bean leaf beetle.

Human Health

Toxicity Profile



Signal Word	CAUTION 
Toxicity Category <i>Based on acute exposure</i>	Category IV (low toxicity) via oral, dermal, and inhalation routes; Category IV (low toxicity) for eye and skin irritation
Population-Adjusted Dose (PAD) for Dietary Exposure	Acute PAD not calculated – No acute dietary endpoint attributable to a single dose identified Chronic PAD = 0.02 mg/kg/day
Cancer Classification	“Not likely to be carcinogenic to humans”

Drinking Water

The EPA identified the parent compound, isocycloseram, and 11 degradates as residues of concern for drinking water. The estimated drinking water concentrations (EDWCs) in surface water were 16.1 µg/L and 9.9 µg/L for acute and chronic exposure, respectively. The cancer simulation average EDWC in surface water was 6.5 µg/L. Based on the EDWC, the chronic dietary risk estimate was below the EPA’s level of concern. An acute dietary assessment was not conducted because no appropriate acute endpoints were observed.

Occupational & Residential Exposure

Occupational handling and post-application exposures as well as residential post-application exposures are possible; however, the EPA did not identify any risk estimates of concern. Products are intended for use by professional applicators in residential areas.

Environmental Fate

The movement and breakdown of isocycloseram in the environment can vary depending on numerous factors including application site and methods, soil type, and weather. Isocycloseram may move offsite via spray drift, runoff, or erosion; however, it is unlikely to enter groundwater in high concentrations. It is moderately persistent to persistent in soil and has the potential to bioaccumulate in aquatic food chains.



Table 2. Isocycloseram properties

Pesticide Property	Value
Solubility in Water (20°C)	1.2 mg/L Moderately soluble
Vapor Pressure (25°C)	<4.65 x 10 ⁻⁸ torr Non-volatile under field conditions
Henry’s Law Constant (25°C)	4.8 x 10 ⁻¹⁵ atm-m ³ mol ⁻¹
Binding Affinity/Sorption	K _{oc} = 5,618 to 14,444 L/kg _{oc} Slightly to hardly mobile
Octanol-Water Partition Coefficient	log K _{ow} = 4.9

Table 3. Isocycloseram dissipation rates

Degradation Study Type	Dissipation Rate [DT ₅₀]
Abiotic Hydrolysis	pH 4: Stable; pH 7: 262 days; pH 9: 1.36 days
Aqueous Photolysis	70.3 to 234 days
Soil Photolysis	81.5 to 109 days
Aerobic Soil Metabolism	56.3 to 293 days
Anaerobic Soil Metabolism	36.6 to 132 days
Aerobic Aquatic Metabolism	9.93 to 37.1 days
Anaerobic Aquatic Metabolism	2.29 to 5.94 days
Terrestrial/Field Dissipation	3.86 to 382 days

Degradates

Isocycloseram has 24 major degradates. Mobility data for select degradates show that SYN549107 is more mobile than the parent compound (isocycloseram), while SYN550738 is less mobile than the parent.

Ecotoxicology

Risk Assessment & Residues of Concern

The EPA uses the [Risk Quotient \(RQ\) Method](#) to evaluate potential ecological risks from pesticides. The RQ is calculated by dividing the estimated environmental exposure concentration of a chemical by its toxicity endpoint. RQ values are then compared to established Levels of Concern (LOCs). RQ values above the LOC indicate a potential risk and need for further assessment or mitigation measures.

Residues of concern for EPA's ecological risk assessment include isocycloseram and its SYN549431, SYN549107, SYN550738, SYN551203, SYN550737, and SYN55103 degradates. For degradates with available toxicity data, many are less toxic than the parent; however, SYN550738 is more toxic than the parent to freshwater aquatic invertebrates.

Aquatic Ecotoxicology & Risk

Table 1. Isocycloseram aquatic toxicity

Taxa	Toxicity Value ¹	Acute Risk Category
Freshwater Fish (Surrogates for Aquatic-Phase Amphibians)	<u>Acute</u> : 96-hr LC ₅₀ = 120 µg a.i./L <u>Chronic</u> : NOAEC = 40 µg a.i./L (based on acute-to-chronic ratio)	Highly Toxic
Freshwater Invertebrates (Water-Column Exposure)	<u>Acute</u> : 48-hr LC ₅₀ = 0.014 µg a.i./L <u>Chronic</u> : NOAEC = 0.0013 µg a.i./L pore water (sediment study)	Very Highly Toxic
Aquatic Non-Vascular Plants	IC ₅₀ = 395 µg a.i./L	
Aquatic Vascular Plants	IC ₅₀ > 1,100 µg a.i./L	



¹LC₅₀ = Lethal Concentration 50%; NOAEC = No Observable Adverse Effect Concentration; IC₅₀ = Inhibition Concentration 50%

In its ecological risk assessment, the EPA did not identify any RQ exceedances for freshwater fish, aquatic non-vascular plants, or aquatic vascular plants; however, risks for freshwater invertebrates were noted for many proposed uses of isocycloseram. To mitigate risks to freshwater invertebrates, the EPA reduced the proposed application rates and prohibited aerial applications for some uses. Spray drift management language and required buffer zones were also added to product labels to address risks to aquatic invertebrates.

Terrestrial Ecotoxicology & Risk

Table 2. Isocycloseram terrestrial toxicity



Taxa	Toxicity Value ¹	Acute Risk Category
Mammals	Acute: LD ₅₀ > 5,000 mg a.i./kg bw (rat) Chronic: NOAEL = 12 mg a.i./kg bw (dog)	Practically Non-toxic
Birds	Acute: LD ₅₀ > 1,500 mg a.i./kg bw Chronic: NOAEC = 101 mg a.i./kg diet	Slightly Toxic
Terrestrial Invertebrates - Bees	Acute: Oral (adult) LD ₅₀ = 0.18 µg a.i./bee ² Oral (larval) LD ₅₀ = 0.08 µg a.i./larva Contact (adult) LD ₅₀ = 0.072 µg a.i./bee ² Chronic: Oral (adult) NOAEL = 0.0028 µg a.i./bee/day Oral (larval) NOAEL = 0.0040 µg a.i./larva/day	Highly Toxic
Terrestrial Plants	Seedling emergence: NOAEC = 0.081 lb a.i./A (TEP) Vegetative vigor: NOAEC = 0.67 lb a.i./A (TEP)	

¹ LD₅₀ = Lethal Dose 50%; LC₅₀ = Lethal Concentration 50%; NOAEL = No Observable Adverse Effect Level; NOAEC = No Observable Adverse Effect Concentration; TEP = Typical end-use product

² Value for degradate SYN549106

The EPA identified RQ exceedances for chronic exposures in birds and mammals from the proposed seed treatment use on rapeseed only. To mitigate risks to birds and mammals, the EPA added label language regarding spilled treated seed and management of excess treated seed. The EPA also identified RQ exceedances for terrestrial invertebrates for both chronic and acute exposure from all proposed uses. To mitigate risks to non-target terrestrial invertebrates, the EPA required measures to reduce spray drift and reduced select application rates. Label language restricting application during bloom was added to protect pollinators, along with best management practices to help reduce risk to pollinators.

Listed Species

The EPA conducts a Biological Evaluation to assess whether a pesticide may affect any federally listed threatened and endangered species or critical habitat. In its effects determination, the EPA concluded that isocycloseram is likely to adversely affect multiple listed species and critical habitats. The EPA has implemented mitigations to address the potential likelihood of future jeopardy or adverse modification identified for most listed species and developed Pesticide Use Limitation Areas (PULAs) for 7 species. PULAs for isocycloseram in Minnesota were established to address potential future jeopardy or adverse modifications for the Rusty Patched Bumble Bee.

A Biological Opinion by the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service has not yet been published for isocycloseram.

Product Labels

The following hazard warnings or use restrictions appear on at least one end-use product but may not appear on all products.

Always read and follow the label for the specific product you are applying. For additional information on product labeling criteria, see the [EPA's Label Review Manual](#).

Restricted Use Pesticide (RUP)

Select isocycloseram products are RUPs due to acute eye irritation. RUP products are for retail sale to and use only by certified applicators or persons under their supervision, and only for those uses covered by the certified applicator's certification.

Environmental Hazards



Surface Water Advisory – This product may impact surface water quality due to runoff of rainwater. This is especially true for poorly draining soils and soils with shallow groundwater. This product is classified as having a medium potential for reaching both surface water and aquatic sediment via runoff for several months or more after application. A level, well-maintained vegetative buffer strip between areas to which this product is applied and surface water features such as ponds, streams, and springs will reduce the potential loading of isocycloseram from runoff water and sediment.



Pollinator Precautions – This product is highly toxic to bees and other pollinating insects exposed to direct treatment, or to residues in/on blooming crops or weeds. Protect pollinating insects by following label directions intended to minimize drift and to reduce risk to these organisms. Best management practices are included on select product labels.



Non-target Organism Advisory – This pesticide is toxic to fish and highly toxic to aquatic invertebrates. Do not apply when weather conditions favor drift from target areas.

Mandatory Spray Drift Management

Applicators must comply with spray drift buffer requirements listed on the label. Users will be required to access the [EPA's Mitigation Menu website](#) to determine if buffers are required and how to implement options for buffer reduction. Additional buffer requirements may exist outside of this section for which reductions options may not apply. Follow label instructions for implementing other label listed buffers.

Mandatory Runoff/Erosion Mitigation

Do not apply when soils are saturated or above field capacity or during rain. The number of required mitigation points may vary by product. Users will be required to use the EPA's Mitigation Menu website to determine if mitigations are required and to select and implement measures to meet the point requirement.

Endangered and Threatened Species Protection Requirements

Applicators must access [Bulletins Live! Two \(BLT\)](#) within six months of the application to determine whether the application site falls within a Pesticide Use Limitation Area (PULA). If the application site is within a PULA, the applicator must obtain any applicable Bulletin and implement the requirements set forth in the bulletin.