

Pyridate

CAS 55512-33-9; EPA PC CODE 128834

New Use Review

March 2026

Overview

The herbicide pyridate was first registered for use by the Environmental Protection Agency (EPA) in 1996; however, in 2004, all product registrations were cancelled after the registrant failed to pay the required annual maintenance fee. In 2020, the EPA reregistered pyridate for use on select crops, and in 2022, Belchim Crop Protection applied to register the new uses of pyridate on soybeans, dry peas, turf, and fallow land. The EPA approved these new uses in March 2025.

Pesticide Type	Herbicide
Chemical Class	Phenyl-pyridazines
Mode of Action Herbicide Resistance Action Committee	Group 6 – photosystem II inhibitors (D1 Histidine 215 binders)
Basic Manufacturer	Belchim Crop Protection

The Minnesota Department of Agriculture (MDA) routinely conducts reviews of significant new uses of pesticide active ingredients (a.i.). **The MDA completed its review of pyridate in March 2026 and did not identify any risks of concern specific to Minnesota.** To evaluate the potential impacts of pyridate on groundwater and surface water, the MDA added pyridafol, pyridate's primary degradate, to its [water quality monitoring program](#) in 2021.

The following is a summary of the MDA's review of the EPA's pyridate risk assessments and product labels associated with its new uses on soybeans and peas ([EPA-HQ-OPP-2022-0257](#)) as well as turf and fallow land ([EPA-HQ-OPP-2022-0324](#)). 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

Pyridate is registered for a variety of agricultural crops including corn, canola, *Brassica* head and stem vegetables, soybean, and dry peas. It can be used as a post-emergent foliar treatment for annual broadleaf weeds or as a pre-plant burndown in crops or fallow fields. Pyridate is also registered for use on turfgrass and residential lawns.



Target Pests

Pyridate products are labeled to control a variety of actively growing weed species up to the 4-leaf stage or under 3-5 inches in height (depending on product and target weed species). Target weeds in agricultural crops include common lambsquarters and species of amaranth, nightshade, pigweed, and waterhemp, as well as actively growing annual broadleaf weeds in turf and fallow lands.



Application Rates & Methods

Only ground applications are approved for pyridate. Maximum single and annual application rates vary by crop. Products labeled for turfgrass/lawn are not intended for homeowner use.

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)
Soybean	0.47	0.94
Dry peas	0.78	0.78
Turf	0.94	1.88



Products

The EPA has registered five end-use products and one technical product containing pyridate. At the time of this review, one product is approved for use on soybeans and dry peas (Tough 5EC HERBICIDE), and one product is approved for use on turf and fallow land (BCP258H_4). A current list of pyridate products registered for use in Minnesota is available through the [Kelly Solutions registered pesticide product database](#).



Projected Use in Minnesota


Pyridate products may be a valuable tool for Minnesota farmers growing chickpeas, pulses, or mint where there have been no or limited post-emergence herbicides registered. Pyridate registrations for soybeans, dry peas, turf and fallow fields are expected to offer an additional tool to aid in resistance management. Pyridate has been shown to have minimal to no phytotoxicity to registered crops or turfgrass with over-the-top applications.

In accordance with the Americans with Disabilities Act, this information is available in alternative forms of communication upon request by calling 651-201-6000. TTY users can call the Minnesota Relay Service at 711. The MDA is an equal opportunity employer and provider.

Human Health

Toxicity Profile



Signal Word	CAUTION 
Toxicity Category <i>Based on acute exposure</i>	Category III (low toxicity) via oral, dermal routes Category IV (low toxicity) for inhalation routes and eye irritation
Population-Adjusted Dose (PAD) for Dietary Exposure	Acute PAD = 0.2 mg/kg/day Chronic PAD = 0.11 mg/kg/day
Cancer Classification	"Not likely to be carcinogenic to humans"

Drinking Water

The EPA identified the parent compound, pyridate, and two degradates (CL-9673 and CL 9673-O-methyl) as residues of concern for drinking water. The estimated drinking water concentrations (EDWCs) were 580 µg/L and 454 µg/L for acute and chronic exposure, respectively (based on turf use). No dietary cancer simulation was assessed due to pyridate's classification as not likely to be carcinogenic to humans. Based on the EDWCs, the acute and chronic dietary risk estimate was below the EPA's level of concern for all registered uses.

Occupational & Residential Exposure

Occupational handling and post-application exposures are possible; however, the EPA did not identify any risk estimates of concern. A restricted entry interval of 12 hours is considered protective of post-application exposure.

Environmental Fate

The movement and breakdown of pyridate in the environment can vary depending on numerous factors including application methods, soil type, and weather. Pyridate may move offsite via spray drift, runoff, or erosion; however, it is unlikely to enter groundwater in high concentrations due to its limited mobility in soil. It is non-persistent in the environment and readily breaks down, primarily into pyridafol. Pyridate has the potential to bioaccumulate in aquatic food chains.



Table 2. Pyridate properties

Pesticide Property	Value
<u>Solubility in Water</u> (20°C)	0.32 to 1.67 mg/L Low solubility
<u>Vapor Pressure</u> (25°C)	7.49 x 10 ⁻⁹ torr Non-volatile under field conditions
Henry's Law Constant (25°C)	2.24 x 10 ⁻⁹ to 1.17 x 10 ⁻⁸ atm-m ³ /mol
<u>Binding Affinity/Sorption</u>	K _{oc} = 223,807 L/kg _{oc} (estimated) Immobile in soil
Octanol-Water Partition Coefficient	log K _{ow} = 4.01 ± 0.16

Table 3. Pyridate degradation and field dissipation

Degradation Study Type	Half-life
Abiotic Hydrolysis	pH 4: 4.9; pH 5: 3.7; pH 7: 2.4; pH 9: 0.26 days
Aqueous Photolysis	7.2 days
Soil Photolysis	1.62 days
Aerobic Soil Metabolism	5.77 days
Anaerobic Soil Metabolism	<1.0 days
Aerobic Aquatic Metabolism	0.33 and 0.54 days
Anaerobic Aquatic Metabolism	0.81 and 0.82 days
Terrestrial/Field Dissipation	<3.0 to 8.99 days

Degradates

Pyridate has one major degradate, pyridafol (CL-9673). Pyridafol, which is also herbicidally active, is more mobile (estimated K_{oc} of 18 to 140 L/kg_{oc}) and more persistent (aerobic soil metabolism half-life = 163 days) than its parent, pyridate.

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 assessments include pyridate and its pyridafol degradate. Pyridafol is generally less toxic to aquatic animals but has a similar toxicity to non-vascular aquatic plants compared to its parent compound.

Aquatic Ecotoxicology & Risk

Table 1. Pyridate aquatic toxicity

Taxa	Toxicity Value ¹	Acute Risk Category
Freshwater Fish (Surrogates for Vertebrates)	<u>Acute</u> : 96-hr LC ₅₀ >380 µg a.i./L <u>Chronic</u> : NOAEC = 192 µg a.i./L ²	May be highly toxic
Freshwater Invertebrates (Water-Column Exposure)	<u>Acute</u> : 48-hr EC ₅₀ = 21 µg a.i./L ² <u>Chronic</u> : NOAEC = 28 µg a.i./L	Very Highly Toxic
Aquatic Non-Vascular Plants	IC ₅₀ = 26.8 µg a.i./L	
Aquatic Vascular Plants	IC ₅₀ >1,500 µg a.i./L	



¹LC₅₀ = Lethal Concentration 50%; NOAEC = No Observable Adverse Effect Concentration; IC₅₀ = Inhibition Concentration 50%; Values based on studies using the technical grade active ingredient unless otherwise noted.

² Based on data from a formulated product that is not registered for use in the United States.

With respect to aquatic toxicity, quantification of acute endpoints may be impacted by the solubility limits of pyridate. It is worth noting that select toxicity data used in the EPA's risk assessment is based on formulated products not registered in the United States; however, the inert/adjuvant effects on toxicity values were largely inconclusive.

In its ecological risk assessments, the EPA did not identify any risks exceeding levels of concern for freshwater fish, aquatic invertebrates, or aquatic vascular plants; however, risks for aquatic non-vascular plants were noted for some uses of pyridate. The EPA concluded that because pyridate quickly breaks down and risks are associated with only the most conservative assumptions, the potential risk to non-vascular plants is likely low; therefore, no additional mitigation actions were taken.

Terrestrial Ecotoxicology & Risk

Table 2. Pyridate terrestrial toxicity



Taxa	Toxicity Value ¹	Acute Risk Category
Mammals	Acute: LD ₅₀ = 1,060 mg a.i./kg bw (TEP) Chronic: NOAEC = 400 mg/kg bw	Practically Non-toxic
Birds	Acute: LD ₅₀ = 1,270 mg a.i./kg bw Chronic: NOAEC = 595 mg a.i./kg diet	Slightly Toxic
Terrestrial Invertebrates - Bees	Acute: Oral (adult) LD ₅₀ >75.6 µg a.i./bee (TEP) ² Oral (larval) LD ₅₀ >1.44 µg a.i./larva/day Contact (adult) LD ₅₀ >100.0 µg a.i./bee Chronic: Oral (adult) NOAEL = 21.2 µg a.i./bee/day Oral (larval) NOAEL = 0.18 µg a.i./larva/day	Practically Non-toxic (adult)
Terrestrial Plants	Seedling emergence: NOAEC = 0.39 lb a.i./acre (TEP) ² Vegetative vigor: NOAEC = 0.0057 lb a.i./acre (TEP) ²	

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; values based on studies using the technical grade active ingredient unless otherwise noted.

²The typical end-use products used for these studies were not formulations proposed for use in the United States.

The EPA identified RQ exceedances for chronic exposure in mammals, invertebrates (larval and adult stages of honey bees) and non-target dicot plants in semi-aquatic areas. While the chronic LOC was exceeded for all size classes of mammals, the EPA does not believe there will be a realistic risk to mammals given that risk estimates were based on very conservative assumptions (i.e., mammals would exclusively forage for plant-based food in pyridate treated fields). Because pyridate is not systemic and does not have residual activity, the EPA does not think it is likely for invertebrates (i.e., bees) to be exposed to active pyridate in pollen and nectar, despite larval bee studies showing pyridate was high toxic during testing. Furthermore, EPA states that several crops do not require bees for pollination, and it would be unlikely for pollinator attractive crops to be blooming at the time of pyridate application. For non-target dicot plants located in semi-aquatic areas, the EPA states that the LOC was only slightly exceeded when both pyridate runoff and drift occur. No label changes were made to address LOC exceedances identified in the EPA's 2020 Ecological Risk Assessment. EPA relied on 2020 Ecological Risk assessments to assess risk for the new uses on soybean, peas, turf, and fallow land did not identify any new risks to terrestrial species.

Listed Species

The EPA conducts biological evaluations to assess whether a pesticide may affect any federally listed threatened and endangered species or critical habitat. At the time of this review, the EPA has not yet published a biological evaluation for pyridate.

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](#).

Environmental Hazards



Surface Water Advisory – This product may impact surface water quality due to runoff of rain water. This is especially true for poorly draining soils and soils with shallow ground water. This product is classified as having high potential for reaching aquatic sediment via runoff for several days 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 pyridate from runoff water and sediment. Runoff of this product will be reduced by avoiding applications when rainfall or irrigation is expected to occur within 48 hours. Sound erosion control practices will reduce this product's potential to reach aquatic sediment via runoff.

Spray Drift Directions



Sensitive Areas – The pesticide must only be applied when the potential for drift to adjacent sensitive areas (e.g., bodies of water, known habitat for threatened or endangered species, non-target crops) is minimal (e.g., when wind is blowing away from the sensitive areas).