Product Safety Assessment

Picloram

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Names
- CAS No. 2545-60-0
- Picloram
- Picloram (potassium salt)
- Picloram (trisopropanolamine salt)
- TORDON™ RTU herbicide
- TORDON 22K herbicide
- CAS No. 6753-47-5
- 4-Amino-3,5,6-trichloropicolinic acid
- 4-Amino-3,5,6-trichloropicolinic acid, potassium salt
- 4-Amino-3,5,6-trichloropicolinic acid, TIPA salt
- PATHWAY™ herbicide
- TORDON 101 herbicide

Much of the information in this document relates to the registration and sale of picloram in the United States of America. For details applicable to other geographies, consult the relevant Product Label, Safety Data Sheet, or Contact Us.

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Product Overview

- Picloram is the active ingredient in a family of herbicides manufactured by Dow AgroSciences, a subsidiary of The Dow Chemical Company. Picloram formulations are sold under the trade names TORDON™ herbicide and PATHWAY™ herbicide. These formulations are blue-green or amber to dark brown liquids with an alcohol-like odor.\(^1,2,3\) For further details, see Product Description. There are many additional trade names for other products that contain picloram alone or as mixtures with other active ingredients, including 2,4-D, fluroxypyr, triclopyr, clopyralid, or combinations of these.
- Picloram is a systemic herbicide used to control deeply rooted herbaceous weeds and woody plants in rights-of-way, forestry, rangelands, pastures, oil seed rape, corn, and small grain (cereal) crops. In the U.S., some picloram formulations are classified as Restricted Use pesticides by the U.S. Environmental Protection Agency (EPA) based on their hazard to non-target plants. As a consequence, only certified personnel or those under the direction of certified personnel may apply these products in the United States.\(^4\) TORDON and PATHWAY RTU products are not restricted use products in the United States. For further details, see the relevant Product Label and Product Uses.
- Eye contact with concentrated picloram formulations may cause moderate to severe irritation with slight corneal injury, depending on the product. Prolonged or repeated skin contact may cause irritation or a burn, but is unlikely to result in absorption of harmful amounts. Based on

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animal tests, inhalation of picloram is not likely to cause adverse effects.\textsuperscript{5,6} For further details, see Health Information or the relevant Safety Data Sheet.

- Picloram is not registered for home use. The public may be exposed to residues of picloram through the diet. The EPA has assessed dietary risks considering chronic dietary exposure and risk to picloram. The exposure/risk estimates are extremely low. Worker exposure during manufacturing or field application is possible.\textsuperscript{7} For further details, see Exposure Potential.

- Some picloram formulations are combustible. Keep them away from heat, open flames, and sparks. Hydrogen chloride and nitrogen oxides may be formed if the material is burned.\textsuperscript{8} Consult the Product Label for specific use and storage information. For further details, see Physical Hazard Information or the relevant Safety Data Sheet.

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Manufacture of Product\textsuperscript{9,10}

- **Manufacture** – Dow AgroSciences manufactures picloram formulations at facilities in Midland, Michigan and Freeport, Texas in the U.S.

- **Process** – Picloram is manufactured as 4-amino-3,5,6-trichloropicolinic acid. The acid is often converted to a salt or ester for formulating purposes. Potassium picloram (K-salt), picloram triisopropanolamine (TIPA) salt, or the ester isoctyl picloram (IOE), are blended into commercial herbicides. Once absorbed by the target weed, picloram is converted back to the acid, which is the chemical form that ultimately kills the plant. The chemical structures of picloram acid and its derivatives are shown below:

  - Picloram acid
  - Picloram triisopropanolamine salt
  - Picloram isoctyl ester
  - Picloram potassium salt

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Product Description\textsuperscript{11,12,13}

Picloram is the active ingredient in a family of herbicides manufactured by Dow AgroSciences and sold under various trade names including TORDON\textsuperscript{™} herbicide and PATHWAY\textsuperscript{™} herbicide. Picloram formulations are blue-green or amber to dark brown liquids with an alcohol-like odor. Picloram is a systemic herbicide that interrupts the internal growth processes of established weeds resulting in death three to five weeks after application.

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Product Uses\textsuperscript{14,15,16,17}

Picloram products are used to control woody plants and broadleaf weeds. Some formulations of picloram are labeled for restricted use in the U.S. in order to prevent damage to non-target plants. Only certified personnel or those under the direction of certified personnel may apply these products.

Picloram products are registered for use in the following areas:

- Pastures
- Rangeland
Exposure Potential

Based on the uses for picloram, the public could potentially be exposed through:

- **Workplace exposure**\(^{16,19}\) – Exposure can occur in a picloram manufacturing facility or in facilities that formulate it into herbicides. Those working with picloram in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit unnecessary exposure. Agricultural workers, forest rangers, and roadside maintenance workers could be exposed while applying herbicide in the field. Picloram may only be used by certified personnel. Picloram is applied by ground, aerial, wiper applicator, backpack sprayer, handheld sprayer, tree injection, or paintbrush. Applicators are expected to follow label precautions, including wearing personal protective equipment appropriate to the application method. For further details, see Health Information or consult the relevant Product Label or Safety Data Sheet.

- **Consumer exposure to products containing picloram**\(^{20}\) – No herbicides containing picloram are registered for home use. People may be exposed to residues of picloram through their diet. The EPA has assessed dietary risks considering chronic dietary exposure and risk to picloram. The exposure/risk estimates for picloram are extremely low. See Health Information.

- **Environmental releases**\(^{21}\) – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, ditches, sewers, waterways, or groundwater. Small spills should be absorbed with an inert material such as clay, Zorball, or dry sand. Consult the relevant Product Label or Safety Data Sheet for more detailed information about protective equipment and procedures. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area to contain the spill. Personnel engaged in the cleanup of spills must wear the appropriate protective equipment. Consult the relevant Safety Data Sheet and Product Label for more detailed information about protective equipment and procedures.

- **In case of fire** – Wear positive-pressure, self-contained breathing apparatus (SCBA) and protective fire-fighting clothing. Use water fog, alcohol foam, carbon-dioxide, or dry-chemical fire extinguishers. Toxic, irritating vapors may be formed. Contain water from fire fighting to prevent entry into surface and ground water. Follow emergency procedures carefully. Consult the Product Label and Safety Data Sheet, See Environmental, Health, and Physical Hazard Information.

- **Emergency Response Information** - In the case of an emergency such as poisoning, product spillage or fire associated with a Dow AgroSciences product in the United States contact us at 800-992-5994 (additional information is available at http://www.dowagro.com/rc/response/na.htm). For emergencies outside the United States, access http://www.dowagro.com/rc/response/index.htm for a list of country sites or contact pages for relevant emergency response information.

For more information, see the relevant Product Label or Safety Data Sheet.
Health Information

**Eye and Skin Contact** – Eye contact with concentrated picloram formulations may cause moderate to severe irritation with slight corneal injury, depending on the product. Prolonged or repeated skin contact may cause irritation or a burn but is unlikely to result in absorption of harmful amounts. An allergic skin reaction may be possible with some products.

**Inhalation** – Prolonged inhalation of these products is unlikely to cause adverse effects.

**Ingestion** – Picloram has very low toxicity if swallowed. However, some components of these herbicide formulations, such as ethylene glycol or isopropanol, may be toxic if swallowed in large amounts.

**Systemic Effects** – In animal studies, effects have been noted on the gastrointestinal system, kidney, liver, and muscular system. Excessive exposure can cause irritation to the nose and throat.

**Cancer Information** – Picloram has not caused cancer in laboratory animals.

For more information, see the relevant [Product Label](#) or [Safety Data Sheet](#).

Environmental Information

In soil, picloram is degraded over time by microbial activity. The time required for soil degradation is dependent on the amount of herbicide used and the soil conditions. In general, breakdown of picloram is more rapid under warm, moist conditions that favor microbial activity. In surface water, picloram is degraded by sunlight.

Studies have shown that products containing picloram have low toxicity to livestock, pets, and all forms of wildlife, including large and small mammals. Picloram does not accumulate in the body and is excreted rapidly in the urine. Picloram is classified as slightly to moderately toxic to aquatic life and fish species.

For more information, see the relevant [Product Label](#) or [Safety Data Sheet](#).

Physical Hazard Information

Some picloram formulations are combustible. Store these materials in the original container with the lid tightly closed. Keep them away from heat, open flames, and sparks. Hydrogen chloride and nitrogen oxides may be formed if the material is burned. Consult the [Product Label](#) for specific use and storage information.

For more information, see the relevant [Product Label](#) or [Safety Data Sheet](#).

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of picloram. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Product Label](#), [Safety Data Sheet](#), or Contact Us.
Additional Information

- Safety Data Sheet (http://www.dowagro.com/label/index.htm).
- Contact Us (http://www.dowagro.com/contact/index.htm).

For more business information about picloram, visit the Dow AgroSciences website at: http://www.dowagro.com/homepage/.

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