Product Safety Assessment

*Dithiopyr*


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**Names**

- CAS No. 97886-45-8
- Dithiopyr
- Dithiopyr technical
- CRAB-BUSTER® herbicide
- CRAB-BUSTER 2 FG herbicide
- DICTRAN® herbicide
- DICTRAN EC herbicide
- DICTRAN Tech herbicide
- DIMENSION® specialty herbicide
- DIMENSION technical
- DIMENSION turf herbicide
- DIMENSION EC herbicide
- DIMENSION 2EW
- DIMENSION 2 FG herbicide
- DIMENSION 0.25G herbicide
- DIMENSION T&O herbicide
- DIMENSION 40 SC herbicide
- DIMENSION 40 Ultra WSP herbicide
- DIMENSION 40 Ultra WP herbicide
- DIMENSION 40W
- GAMBARUCHI® herbicide
- S,S′-dimethyl 2-difluoromethyl-4-isobutyl-6-trifluoromethyl-3,5-pyridinedicarbothioate
- S,S′-dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-3,5-pyridinedicarbothioate

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

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**Product Overview**

- Dithiopyr is the common name for the active ingredient in several pre-emergent herbicide products registered to Dow AgroSciences LLC, a wholly owned subsidiary of The Dow Chemical Company. Its mode of action is inhibition of mitosis (cell development and growth) in susceptible weeds.¹² For further details, see the relevant Product Label and Product Description.
- Dithiopyr technical is a tan solid with a sulfur-like odor that is formulated into liquid, powder, and granular herbicide formulations.³⁴ For further details, see the relevant Product Label and Product Description.
- Dithiopyr is a pre-emergent herbicide for control of grasses and small-seeded broad leaf weeds. Its primary use in DIMENSION® herbicide formulations is to control crabgrass in turf, ornamentals, and flowerbeds.⁵ For further details, see the relevant Product Label and Product Uses.

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Those working in manufacturing and formulation of herbicides, or who apply herbicides or re-enter treated areas could be exposed to dithiopyr. Workers can minimize the potential for exposure by carefully following workplace procedures, label directions, and wearing the proper protective equipment. For further details, see the relevant Product Label and Exposure Potential.

Dithiopyr is essentially nonirritating to eyes and skin. Prolonged skin contact is unlikely to result in absorption of harmful amounts. No adverse effects are anticipated from inhalation or ingesting small amounts of dithiopyr. For further details, see Health Information or the Safety Data Sheet.

Dithiopyr is practically nontoxic to birds on an acute or dietary basis, but is highly toxic to aquatic organisms on an acute basis (EC50 between 0.1 and 1 mg/L). Dithiopyr has low solubility in water and binds tightly to soil, so it has a low potential for leaching into ground water. In soil and water, microbial degradation is the primary route of dissipation. Dithiopyr is not persistent in the environment and will be removed in wastewater-treatment facilities. For further details, see the relevant Product Label and Environmental Information.

Dithiopyr-containing formulations are stable at typical storage and use conditions. Avoid exposure to elevated temperatures, which can cause the product to decompose. Decomposition can generate gas and cause pressure build-up in closed systems. Consult the Product Label for specific use and storage information. For further details, see the relevant Product Label and Physical Hazard Information.

Manufacture of Product

- **Manufacture** – Dithiopyr is manufactured in the United States and is formulated into end-use herbicide products in the U.S., Canada, Australia, South Korea, and Japan.
- **Process** – Dithiopyr is manufactured using a complex and proprietary process involving a series of reaction and purification steps. The chemical structure of dithiopyr is shown below:

![Chemical Structure of Dithiopyr](image)

Product Description

Dithiopyr is the common name for S,S'-dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-3,5-pyridinedicarbothioate, the active ingredient in several herbicide products registered to Dow AgroSciences LLC, a wholly owned subsidiary of The Dow Chemical Company. Dithiopyr formulations are primarily marketed in the United States, Canada, Australia, and Japan under the trade names including DIMENSION® herbicide, CRAB-BUSTER® herbicide, and DICTRAN® herbicide.

Product Uses & Regulatory Information

Dithiopyr is a pre-emergent herbicide for control of grasses and small-seeded broadleaf weeds. It is primarily used to control crabgrass in residential and commercials lawns, ornamental turf areas, golf

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courses, flowerbeds, and various ornamental garden applications. It is readily absorbed by the roots of susceptible weeds, inhibiting mitosis (plant-cell development and growth), thereby causing roots to swell and stop growing.

Dithiopyr products are registered and authorized for use in all countries in which they're sold. Examples include, but are not limited to, registrations for use in the United States by the U.S. Environmental Protection Agency (U.S. EPA), in Canada by the Health Canada Pest Management Regulatory Agency (PMRA), in Australia by the Australian Pesticides and Veterinary Medicines Authority (APVMA), and in Japan by the Ministry of Agriculture, Forestry and Fisheries (MAFF) and the Ministry of the Environment (MOE).

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of products containing dithiopyr. 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.

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**Exposure Potential**

Dithiopyr is used in the production of commercial and consumer herbicide products. Based on the uses for dithiopyr, the public could be exposed through:

- **Workplace exposure** – Exposure could occur in facilities that manufacture or formulate products containing dithiopyr. Those working with dithiopyr 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 exposure. Applicators could be exposed while applying this product to turf, golf courses, and other commercial lawn and gardening applications. Applicators are expected to follow all label precautions, including wearing personal protective equipment that is appropriate to the application method. See Health Information and Product Label.

- **Consumer exposure to products containing dithiopyr** – Herbicides containing dithiopyr are available in residential lawn-care markets. Consumers could be exposed when applying these herbicides. Consumers could also be exposed by contact with treated surfaces after application. Consumer and commercial applicators should always read and follow all label instructions and product information before using herbicides containing dithiopyr. See Health Information and Product Label.

- **Environmental releases** – In the event of a release or spill, contain all spilled material if possible. Prevent the material from entering soil, ditches, sewers, waterways, and groundwater. Sweep up small spills and collect the spilled material in suitable and properly labeled containers. Consult the relevant Safety Data Sheet or Product Label for more 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 keep the material contained and out of waterways. Personnel engaged in cleaning up spills must wear appropriate protective equipment. Contact Dow AgroSciences for clean-up assistance. Consult the relevant Safety Data Sheet or Product Label for more detailed information about protective equipment and procedures. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Keep people away. Isolate the fire and deny unnecessary entry. Soak thoroughly with water to cool and prevent re-ignition. If material is molten, do not apply direct water stream. Use fine water spray or foam. Use water spray to cool fire-exposed containers and fire-affected zone until the fire is out and danger of re-ignition has passed. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Consult the Product Label and Safety Data Sheet for more detailed
Emergency response information – In case of an emergency such as poisoning, product spillage, or fire associated with a Dow AgroSciences product in the United States, call us at 800-992-5994. More information is available at www.dowagro.com/rc/response/na.htm.
  - In Canada, call CANUTEC at 613-996-6666.
  - In Japan, call Dow AgroSciences at 0120-565767. In case of medical emergency, call the Japan Poison Information Center at 072-726-9923 or 029-851-9999.
  - For emergencies in countries not already listed, use the phone number listed on the Safety Data Sheet for the respective country. In some countries, an Emergency Response number is also provided on the artwork of the commercial product package.

Health Information

Laboratory Testing – Dithiopyr has been comprehensively evaluated under regulatory frameworks used for registration and approval of pesticide products in the United States, Canada, Australia, South Korea, Japan, and other countries. These legal frameworks require laboratory testing for potential acute, short-term, and long-term health effects. These tests help scientists and regulators determine how chemicals might affect humans, domestic animals, or wildlife in cases of exposure. Herbicide products used according to label directions are unlikely to cause toxic effects. The amount of herbicide that people and pets may be exposed to is very low compared to that used in laboratory testing.

Health information for products containing dithiopyr is summarized on the relevant Safety Data Sheets. It is important to note that health risks associated with individual products may vary based on their formulation or intended use. Formulated products may contain solvents, minor components, or additives that have additional health risks. The Safety Data Sheet is the preferred source for specific health information. An overview of health information for dithiopyr technical (the unformulated active ingredient) is provided below.

Eye contact – Contact is essentially nonirritating.

Skin contact – Contact is essentially nonirritating. Prolonged contact is unlikely to result in absorption of harmful amounts.

Inhalation – No adverse effects are anticipated from inhalation of dithiopyr.

Ingestion – Dithiopyr has very low toxicity if swallowed. Harmful effects are not anticipated from swallowing small amounts.

Repeated exposure – In laboratory testing on animals, effects have been reported on the liver, kidney, adrenal gland, thyroid, gall bladder, and blood.

Cancer information – Dithiopyr did not cause cancer in laboratory animals.

Developmental, reproductive, and genetic information – In laboratory testing, dithiopyr did not cause birth defects or other effects, even at doses that caused toxic effects in the mother. In animal studies, dithiopyr did not interfere with reproduction. In-vitro genetic toxicity studies were negative.

For more information, see the relevant Product Label or Safety Data Sheet.
Environmental Information\textsuperscript{19,20}

There is low potential for groundwater contamination because dithiopyr exhibits low solubility in water and has a strong tendency to bind to soil. If released to the environment, it is broken down in soil and water by microbial degradation and exposure to sunlight. The rate of biodegradation depends on temperature, air supply, and the presence of other materials. Therefore, dithiopyr is not persistent in the environment and will be removed by biological action in wastewater treatment facilities.

Dithiopyr is highly toxic to certain aquatic organisms on an acute basis (EC\textsubscript{50} between 0.1 and 1 mg/L). It is practically non-toxic to birds on an acute or dietary basis.

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

Physical Hazard Information\textsuperscript{21,22}

Dithiopyr formulations are stable under normal use and storage conditions. Avoid contact with strong oxidizers. Avoid exposure to elevated temperatures which can cause these products to decompose. Generation of gas during decomposition can cause pressure build-up in closed systems.

Store products containing dithiopyr in a cool, well-ventilated area, away from excessive heat sources and out of direct sunlight. Some products should not be stored at temperatures below 4.4°C (39°F). Keep containers tightly closed. Consult the Product Label for specific use and storage information.

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

Additional Information

- Safety Data Sheets and Product Labels (www.dowagro.com/products/label/index.htm)
- Contact Us (www.dowagro.com/company/contact/index.htm)
- Everything You Always Wanted to Know About DIMENSION\textsuperscript{®} Crabgrass Control, Dow AgroSciences LLC, Form No. DOW-033, Revised September 17, 2002 (http://www.mgshort.com/images/dimension_qa.pdf)
- DIMENSION\textsuperscript{®} Specialty Herbicide Technical Info Sheet, Dow AgroSciences LLC, Form No. T01-337-005, August 2011 (http://msdssearch.dow.com/PublishedLiteratureDAS/dh_0830/0901b80380830e91.pdf?filepath=turf/pdfs/noreg/010-60450.pdf&fromPage=GetDoc)
- There are some things in life you can count on: DIMENSION\textsuperscript{®} Specialty Herbicide, Dow AgroSciences, Form No. T01-813-007 (12/04) BR, December 2004 (http://msdssearch.dow.com/PublishedLiteratureDAS/dh_0050/0901b803800503da.pdf?filepath=turf/pdfs/noreg/010-60297.pdf&fromPage=GetDoc)

For more business information about dithiopyr, visit the Dow AgroSciences LLC website at www.dowagro.com/.
References


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