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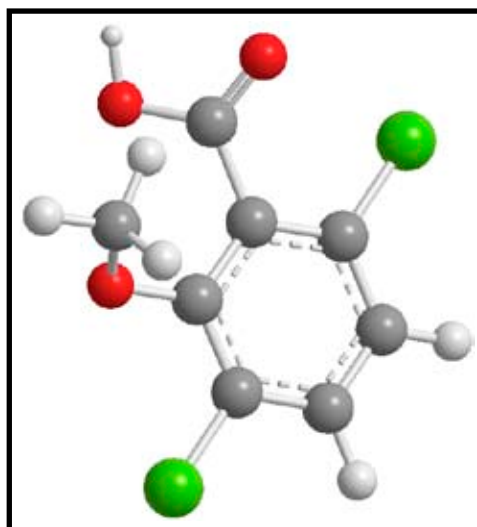
Some of the information in the following fact sheet (scroll down) is out-of-date. NPIC is planning to update this fact sheet in the future. In the meantime, updated information is available on the [US EPA's website](#).

Some of the information in the following fact sheet (scroll down) is out-of-date. NPIC has started a *NEW* set of fact sheets. If you would like to be notified when NPIC releases new publications, send an email to npicupdates@ace.orst.edu with "subscribe" in the subject line.

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Please call NPIC with any questions you have about pesticides at **1-800-858-PEST (7378)**.

Molecular Structure - Dicamba



NPIC General Fact Sheets are designed to answer questions that are commonly asked by the general public about pesticides that are regulated by the U.S. Environmental Protection Agency (U.S. EPA). This document is intended to be helpful to professionals and to the general public for making decisions about pesticide use.

National
Pesticide
Information
Center

Dicamba

(General Fact Sheet)

For less general information, please refer to the Technical Fact Sheet.

The Pesticide Label: Labels provide directions for the proper use of a pesticide product. *Be sure to read the entire label before using any product.* A signal word on each product label indicates the product's potential hazard.

CAUTION - low toxicity

WARNING - moderate toxicity

DANGER - high toxicity

What is dicamba?

- Dicamba is an herbicide (kills or controls weeds) first registered in the United States in 1967 (1).
- Dicamba is selective and is applied before or after weeds appear (1, 2). See the **Herbicide Selectivity** box.
- Different forms of dicamba (acid and salt) are used in products (3). Use of the term “dicamba” in this fact sheet refers to the acid and/or salts.
- Dicamba is a solid that ranges in color from white to brown (2). It dissolves in water (6.5 g/L @ 25 °C) and is stable in air and water under normal conditions (4). Dicamba has a low potential to leave soil or water and become airborne (2).
- Signal words for products containing dicamba range from Caution to Danger (3). The signal word reflects the combined toxicity of dicamba and other ingredients in each product. See the **Pesticide Label** box above.
- Dicamba products are used to treat food and non-food crops, pastures, rangeland, forests, right of ways, and lawns (1). Products containing dicamba come in various forms including granules, wettable powders, aerosols, liquids, and dusts (3).
- Dicamba products often contain multiple active ingredients such as 2,4-D, mecoprop (MCP), and/or MCPA (3). All of these active ingredients affect plants in a similar manner.

Herbicide Selectivity: Selective herbicides kill some plant species and not others. Resistant plants can survive by detoxifying the herbicide or not absorbing it. Often, a crop plant will be more tolerant of an herbicide than the weeds around it. This is the case for dicamba where the grass crop (bermudagrass, wheat, etc.) survives and broadleaf plants (dandelion, thistles, etc.) die.

How does dicamba work?

- Dicamba mimics naturally-occurring plant growth hormones called auxins. It kills plants by destroying tissue through uncontrolled cell division and growth (2).
- Dicamba causes plant cells to swell and increases production of some plant compounds. At high levels, dicamba inhibits plant growth (2).
- Plant symptoms from dicamba exposure include leaf cupping and stem curling, swelling, and lengthening. These symptoms are followed by yellowing or bleaching of plant tissues, wilting, slowed growth, and death (2).
- Dicamba penetrates roots, leaves, and stems (2, 5). The chemical moves to all plant tissues but builds up in growing tissues (2, 5). Plants tolerant to dicamba typically move the chemical slowly relative to susceptible plants (2).

What are some products that contain dicamba?

- BANVEL®
- COOL POWER®
- HORSEPOWER®
- MILLENNIUM ULTRA®
- TRIMEC®
- TRIPLET®
- TRI-POWER®
- WEED AWAY®

Exposure: Effects of dicamba on human health and the environment depend on how much dicamba is present and the length and frequency of exposure. Effects also depend on the health of a person and/or certain environmental factors.

How toxic is dicamba?

Animals

- Dicamba is low in toxicity when eaten (6). See boxes on **Laboratory Testing**, **LD50/LC50**, and **Toxicity Category**.
- Researchers fed dogs dicamba for 1 year, and the animals experienced no adverse health effects (6).
- Investigators fed male and female mice dicamba for 90 days. They noted altered liver cells and lower body weights and food consumption. No effects occurred at the lowest dose tested (6).
- Dicamba is low in toxicity when applied to the skin (6).
- Laboratory workers exposed the skin of rabbits to dicamba for 21 days. They noted skin irritation at the two highest doses. Workers did not detect effects to organ systems other than skin (6).
- In studies with guinea pigs, dicamba did not increase the sensitivity of the skin to chemical exposure (6).
- Dicamba caused low to moderate eye irritation in rabbits. The U.S. EPA categorizes dicamba as moderately toxic for eye irritation (6).
- Dicamba is very low in toxicity when inhaled (6).

Laboratory Testing: Before pesticides are registered by the U.S. EPA, they must undergo laboratory testing for short-term (acute) and long-term (chronic) health effects. Laboratory animals are purposely fed high enough doses to cause toxic effects. These tests help scientists judge how these chemicals might affect humans, domestic animals, and wildlife in cases of overexposure. When pesticide products are used according to the label directions, toxic effects are not likely to occur because the amount of pesticide that people and pets may be exposed to is low compared to the doses fed to laboratory animals.

Toxicity Category (Signal Word) (7)

	High Toxicity (<i>Danger</i>)	Moderate Toxicity (<i>Warning</i>)	Low Toxicity (<i>Caution</i>)	Very Low Toxicity (<i>Caution</i>)
Oral LD50	Less than 50 mg/kg	50 - 500 mg/kg	500 - 5000 mg/kg	Greater than 5000 mg/kg
Dermal LD50	Less than 200 mg/kg	200 - 2000 mg/kg	2000 - 5000 mg/kg	Greater than 5000 mg/kg
Inhalation LC50	Less than 0.05 mg/l	0.05 - 0.5 mg/l	0.5 - 2 mg/l	Greater than 2 mg/l
Eye Effects	Corrosive	Irritation persisting for 7 days	Irritation reversible within 7 days	Minimal effects, gone within 24 hrs
Skin Effects	Corrosive	Severe irritation at 72 hours	Moderate irritation at 72 hours	Mild or slight irritation

LD50/LC50: A common measure of acute toxicity is the lethal dose (LD50) or lethal concentration (LC50) that causes death (resulting from a single or limited exposure) in 50 percent of the treated animals. LD50 is generally expressed as the dose in milligrams (mg) of chemical per kilogram (kg) of body weight. LC50 is often expressed as mg of chemical per volume (e.g., liter (L)) of medium (i.e., air or water) the organism is exposed to. Chemicals are considered highly toxic when the LD50/LC50 is small and practically non-toxic when the value is large. However, the LD50/LC50 does not reflect any effects from long-term exposure (i.e., cancer, birth defects, or reproductive toxicity) that may occur at levels below those that cause death.

- Researchers evaluated the toxicity of dicamba to the nervous system by giving rats a single dose of the chemical by stomach tube. They detected nervous system effects at all levels tested. The majority of effects at the lower doses occurred only on the day of exposure and then disappeared (6).
- Scientists evaluated the toxicity of dicamba to the nervous system by feeding rats dicamba for 90 days. They noted rigid body tones and impaired walking and balance at the highest dose tested. No effects occurred at lower doses (6).

Humans

- Signs and symptoms reported from dicamba exposure include appetite loss, weight loss, vomiting, depression, and weakness (8).
- Dicamba can cause irritation to the skin and respiratory tract and may burn the skin and eyes (8, 9).

Does dicamba break down and leave the body?

Animals

- Dicamba injected into rats had a half-life of less than one hour (8). See box on **Half-life**.
- Rats fed dicamba excreted over 95% of the chemical in urine. The chemical did not break down or build up in the animals (6).
- Scientists fed dicamba to a cow for 5 days. The majority of dicamba was not broken down by the cow. Six hours after the final dose, about 89% of the chemical had left the cow in the urine. Only small amounts of the chemical left the animal in the feces (<2%) and milk (0.02%) (10).

Half-life is the time required for half of the compound to degrade.

1 half-life = 50% degraded
2 half-lives = 75% degraded
3 half-lives = 88% degraded
4 half-lives = 94% degraded
5 half-lives = 97% degraded

Remember that the amount of chemical remaining after a half-life will always depend on the amount of the chemical originally applied.

Humans

- Investigators evaluated a woman who intentionally drank a mixture of dicamba and 2,4-D. Investigators determined a half-life of approximately 15 hours for dicamba (11).

Does dicamba cause reproductive or birth defects?

Animals

- Laboratory workers fed rats dicamba for two generations and noted liver effects and signs of rigid body tone and impaired balance at the highest dose. At the two highest doses, they observed reproductive effects of decreased offspring growth and delayed sexual maturation in male offspring (high dose only). No effects occurred at the lowest dose tested (6).
- Researchers fed pregnant rats dicamba, and no developmental effects occurred. At the highest dose, they detected effects to the mothers that included increased mortality, nervous system effects, lower body weight gains, and decreased food consumption. No effects occurred at lower doses (6).
- Scientists fed pregnant rabbits dicamba, and at the two highest doses, mother rabbits had abortions and signs of decreased activity, lack of muscle coordination, and abnormal breathing sounds. No effects occurred at the lowest dose tested (6).

Humans

- Data are not available from work-related exposures, accidental poisonings, or other human studies regarding the reproductive and developmental toxicity of dicamba.

Does dicamba cause cancer?

Animals

- Laboratory workers fed rats diets containing dicamba for 2 years and noted no signs of toxicity or cancer (6).
- Researchers fed male and female mice dicamba for 2 years and noted no evidence of cancer. They did detect more deaths in males and decreased weight gains in females at the highest dose. No effects occurred at lower doses (6).
- Researchers often test chemicals for their ability to change the genetic material of an organism as an indication of the chemical's potential to cause cancer. Scientists report positive and negative results for the ability of dicamba to change genetic material depending on the test used (6, 12-14).

Humans

- The U.S. EPA currently classifies dicamba as a group D carcinogen (15). This means that dicamba is not classified in regards to its ability to cause cancer (15). See box on **Cancer**.

What happens to dicamba in the environment?

- Dicamba is stable in air and water under normal conditions (4). When it is in water, sunlight can break dicamba down but not when it is in soil (2, 8).
- The half-life of dicamba in soils ranges from 4-555 days with a typical half-life of 14-28 days (5, 16). It is broken down primarily by soil microorganisms (16).
- Dicamba binds poorly to soil and may leach into ground water (2, 5).
- Dicamba primarily breaks down in water by microorganisms (16). It is not likely to leave water to enter the air (5). In a

Cancer: The U.S. EPA has strict guidelines that require testing of pesticides for their potential to cause cancer. These studies involve feeding laboratory animals large *daily* doses of the pesticide over most of the lifetime of the animal. Based on these tests, and any other available information, EPA gives the pesticide a rating for its potential to cause cancer in humans. For example, if a pesticide does not cause cancer in animal tests at large doses, then the EPA considers it unlikely the pesticide will cause cancer in humans. Cancer tests are not conducted on human subjects.

field study, dicamba had a half-life of <7 days in surface water (5).

- Dicamba may adversely affect plants not intended to be exposed (5). In soil, it may remain active for 3 to 12 weeks and has a 9-day half-life on the surface of plants (2, 17).

What effects does dicamba have on wildlife?

- Dicamba is slightly to practically nontoxic to fish and practically nontoxic to other water organisms (1, 5). Dicamba is not likely to build up in wildlife (5, 16).
- Dicamba is practically nontoxic to birds (1, 18).
- Dicamba is low in toxicity when bees eat or touch it (19).

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