



Karmex[®] DF

PRODUCT INFORMATION BULLETIN

KARMEX DF is a dispersible granule (80% diuron) to be mixed in water and applied as a spray for selective control of weeds in certain crops and for control of annual and perennial grasses and broadleaf weeds on non-cropland areas where bare-ground control is desired. KARMEX DF is an ideal preemergence herbicide for residual bare-ground control.

Biology

Biological Activity

KARMEX DF inhibits photosynthesis, the process by which plants manufacture food. Plants treated with it exhibit veinal chlorosis and become necrotic: brown in broadleaves, white in grasses. Plants are weakened, the leaves drop, and the plant ultimately dies.

Moisture is required to activate the chemical. Best results occur if rainfall occurs within two weeks after application.

Physical & Chemical Properties

Solubility

KARMEX DF is dispersible in water. It must be kept in suspension by hydraulic or mechanical agitation. The aqueous solubility of diuron is very low (42 mg/litre at 25°C or 77°F).

Compatibility

KARMEX DF is compatible in tank mixtures with most other non-crop herbicides. Check the product label for mixtures that have been approved by Agriculture Canada.

Stability

The dry flowable formulation of KARMEX DF is stable in its original, unopened container at normal temperatures and storage conditions.

Volatility

KARMEX DF is nonvolatile. It does not evaporate readily at normal atmospheric pressures and temperatures.

Environmental Fate

Soil Dissipation and Biodegradability

KARMEX DF is adsorbed on soils with organic matter and clay. The active ingredient, diuron, breaks down in soil as the result of microbial action. It breaks down to a lesser extent in aquatic sediments. It does not readily degrade in natural waters (pH 5–9), unless exposed to sunlight.

KARMEX DF is biodegradable and does not accumulate in the environment. The primary means of degradation is metabolism by soil microbes.

Hydrolysis Half-Life

The hydrolysis half-life of diuron in a naturally occurring aquatic environment is about 45 days. Scientific studies show its half-life in sterile water is greater than 500 days (at pH of 5, 7 and 9, at 25°C in the dark).

Metabolism and Bioaccumulation

Non-susceptible plants readily degrade KARMEX DF to inactive compounds. Susceptible plants most readily absorb it through the root system, and to a lesser extent, through foliage and stems. The chemical accumulates in plant leaves as a result of translocation.

As shown in the toxicology charts below, diuron is relatively low in toxicity to humans, animals, and the environment when used according to label directions. It shows no significant bioaccumulation in animals or fish and is broken down by oxidation into lower molecular weight materials.

Water Quality

KARMEX DF is not leached readily, due to its low water solubility. As with all products, follow label instructions and best management practices to avoid contamination of water.

Signal Words

Agriculture Canada requires the KARMEX DF label to bear the signal word “Warning – Eye Irritant.” It may also irritate the nose, throat and skin.

Toxicology (Mammalian)

Study	Results	Comments
Acute Oral (Rat)	LD50 ¹ 2,900 mg/kg	Compared to other commonly used compounds KARMEX DF in its concentrated form is considered to be only slightly toxic by ingestion.
Acute Dermal (Rabbit)	LD50 ¹ > 2,000 mg/kg	Dermal application of concentrated KARMEX DF was nonlethal at the highest practical dose tested.
Acute Inhalation (Rat)	4-hour LC50 ¹ > 5 mg/l ²	Based on a 4-hour test with active ingredient, the inhalation toxicity of concentrated KARMEX DF was estimated to be very low.
Skin Irritation	Slight irritation	Slight but reversible irritation was produced after 4 hours direct contact with KARMEX DF.
Skin Sensitization	Nonsensitizer	KARMEX DF did not produce an allergic/sensitization response.
Eye Irritation	Mild to moderate irritation	Direct contact with concentrated KARMEX DF produced irritation that was completely reversible within 14 days.

Toxicology (Avian and Aquatic)²

Study	Results
Acute Oral (LD50 ¹) Mallard Duck	> 2,000 mg/kg
8-day Dietary (LC50 ¹) Mallard Duck	> 5,000 ppm
8-day Dietary (LC50 ¹) Bobwhite Quail	1,730 ppm
Bluegill Sunfish (96-hour LC50 ¹)	25 ppm
Rainbow Trout (96-hour LC50 ¹)	20 ppm
<i>Daphnia Magna</i> (48-hour LC50 ¹) (Water Flea)	8 ppm

¹ LD50 and LC50 – dose or concentration that is lethal to 50% of the test population. Doses are commonly defined in milligrams per kilogram of body weight (mg/kg). The smaller the numerical value of LD50 and LC50, the greater the acute toxicity of the substance.

² Studies were conducted with the active ingredient.

Effects of Repeated Exposure

KARMEX DF contains the active ingredient diuron. Diuron has been evaluated in a number of studies to determine the potential effects of multiple exposures. These studies have been conducted in several species and have included short-term and chronic exposures. Daily and excessive dietary exposures to this compound has produced reduced body weights, increased liver weights, and slight to minimal microscopic changes in the spleens, thyroids, and bladders of one or more of the test species. Lifetime exposures resulted in tumors in the bladders of rats and an equivocal tumor response was reported in mice at excessive dietary doses of diuron. Tumor responses were not observed in an additional rat study at the same excessive doses.

Moderate to low exposures of laboratory species to diuron did not result in tumors and produced only minimal to no effects. The laboratory data reflected exposures that were much greater than those likely encountered by workers, consumers, or wildlife. Therefore, when used in accordance with labeled directions, the margins-of-safety for KARMEX DF are considered protective of the health of those exposed to this product.

Diuron also has been extensively evaluated for its potential to produce malformations in the fetus. Each of these tests or battery of tests produced a negative response.

Inerts

The inert ingredients contained in this product formulation are not classified by authorities as inert ingredients of toxicological concern to humans or the environment.

The inert ingredients in this product formulation are required by law to have been approved by Federal regulatory authorities.

Worker Safety

KARMEX DF should not be applied in such a manner as to directly or through drift expose workers or other persons. Workers performing hand labour operations should not enter treated areas without protective clothing until sprays have dried.

Other Information

Off-Site Movement

Prevent drift of dry powder or spray to desirable plants, as injury to or loss of plants may result. Do not apply KARMEX DF in locations where it may be washed or moved into contact with desirable vegetation. Carefully follow all label instructions and precautions.

References

For further information about Du Pont products, contact your local Du Pont representative, or call 1-800-667-3925 in Western Canada or 1-800-387-2169 in Eastern Canada.

For medical emergencies involving this product, contact the Du Pont Haskell Laboratory for Toxicology and Industrial Medicine, 1-800-441-3637.

For transportation emergencies, contact (613) 348-3616.

For more information on pesticides, feel free to contact any of the following:

Agriculture Canada Regional Office
Crop Protection Institute – (416) 622-9771

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