

# *chemicalWATCH* Factsheet

## BENDIOCARB

Bendiocarb, known to most consumers as Ficam D™, is a widely used carbamate insecticide with high acute toxicity. Due to AgrEvo's, bendiocarb manufacturer, request for voluntary cancellation of all bendiocarb products on August 18, 1999, all products are being phased-out. End use products used in and around homes have been prohibited to be sold or distributed by the registrant since October 31, 2000 and all bendiocarb products will be cancelled as of December 31, 2001 (U.S. EPA 1999).

Data gaps exist for acute and subchronic neurotoxicity studies in rats. Occupational and residential exposure indicates risk of concern through dermal and inhalation routes of exposure, especially for children and workers.

### Usage

Consumers are most familiar with Ficam D™, a 1% dust, and Ficam W™, an 80% wettable powder, for use by professional applicators. Both formulations are used in structural pest control against cockroaches, ants, fleas and crickets. Ficam Plus™, used with synergized pyrethrins (NCAMP 1986). Dycarb™ is registered for use on plant insect pests like aphids, scale, whitefly, lace bugs and mealy bugs on horticultural crops. Turcam™ is registered for use on turf and ornamentals, and Turcam

ULV™, an ultra-low volume formulation, is registered for mosquito control (U.S. EPA 1985).

### Toxicity

Carbamate insecticides are nervous system poisons. They bind to the active site of the enzyme acetylcholine esterase (AChE), which is necessary for normal function of nerve impulses to other nerves and muscles. This causes an accumulation of acetylcholine, an excitatory neurotransmitter, at nerve muscle sites resulting in poisoning symptoms. Unlike their close relatives, the organophosphates, examples of which include Dursban™, parathion, and diazinon, carbamates do not bind permanently to the enzyme and can be "dislodged" from the active site, so that poisoning effects are readily reversible, upon administration of the antidote atropine. Carbamates, however, can be more acutely toxic. Bendiocarb has a particularly high acute toxicity. The oral rat LD<sub>50</sub> is 34-156mg/kg (lethal dose that will kill 50% of the test population); cats are eight times more sensitive.

It is suspected that carbamates can act at other sites in the nervous system as well. Symptoms of poisoning include diarrhea, nausea, vomiting, stomach cramps, sweating, blurred vision, muscle twitching or jerking, which last only a few hours if exposure is interrupted. Continued expo-

sure can result in malaise, weakness and symptoms that mimic the flu. Because carbamates dissociate so readily from AChE, blood tests for reduced activity of AChE are of limited use in documentation of a poisoning episode.

Bendiocarb has been classified as a 'Group E' carcinogen by the EPA, showing no evidence of carcinogenicity in laboratory animals or in humans (U.S. EPA 2000). Available information indicates that bendiocarb does not cause reproductive effects or birth defects in animals. It can cause skin rashes in rabbits, but is not a skin sensitizer. In one chronic study performed in mice, hyperactivity and lenticular opacities (eye problems) are noted in an interim report. There is no information on the outcome of this test. Another chronic study performed on rats fed 10mg/kg/day showed various changes in organ weights, blood, urine characteristics and increased incidence of stomach and eye lesions. A metabolism study indicates that bendiocarb clears within 3 hours in the urine of exposed men. Moderate toxicity has been seen in birds with an LD<sub>50</sub>=3.1 mg/kg in mallard ducks. Bendiocarb is also toxic to fish, earthworms and bees (U.S. EPA 1985).

### Environmental Fate

Other insecticides of the carbamate class, aldicarb and carbofuran, are of

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concern due to their demonstrated ability to contaminate groundwater. According to an EPA official, information submitted in response to a Data Call-In stated that bendiocarb is a potential leacher.

At pH 5, approximating that of rainwater, bendiocarb is fairly stable, showing no appreciable breakdown after 30 days. Bendiocarb breaks down more readily at more alkaline pHs, with a half-life of 10 days at pH

7, to 2,2-dimethyl-1,3-benzodioxyl-4-ol, a phenol, and carbon dioxide. Bendiocarb is metabolized by soil microorganisms in soils with organic content, but in low-oxygen, low-organic content soils, this process is retarded.

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## **Bendiocarb *chemicalWATCH* Factsheet Bibliography**

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U.S. EPA. 1999. *R.E.D. Facts: Bendiocarb*. Office of Pesticide Programs. Washington, DC.

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