

Disciplinary Review: Ecological Effects Profile

Technical DCNA

DCNA Technical appears to be moderately toxic to warm water fish (Bluegill 96-h LC₅₀ = 1.08 ppm; ID: 00096058) and very highly toxic to coldwater fish (Rainbow Trout LC₅₀ = .56 ppm; ID: 00096064). Studies on oyster shell growth indicate that DCNA significantly effects shell deposition at the 2.3 ppm level (ID: 00087031).

Formulated Product

Formulation No. 1: 4 - 50% dust

Botran 50W was tested on bluegill and rainbow trout producing LC₅₀ values of 7.0 ppm and 4.1 ppm, respectively. This suggests moderate toxicity (ID:00096062; 00096063).

Formulation No. 2: 75% WP:

Botran 75 WP appeared to be slightly - practically non-toxic to birds. the dietary LC₅₀ values for mallard duck and bobwhite quail were 11,800 ppm and 3,250 ppm, respectively ID:00087027; 00087020).

Formulation, No. 3: 9% FLC.

Toxicity data not present

Formulation No 4: 0.5%, 3.0% RTU

Toxicity data not present

Ecological Effects Branch Hazard Assessment

Manufacturing Products containing DCNA

The Ecological Effects Branch (EEB) does not conduct a hazard assessment on the manufacturing use product.

Formulated Product

DCNA is a fungicide that is used against Botrytis, Monilinia, Rhizopus, Sclerotinia and Sclerotium species. The registered fruit and vegetable crop sites include: apricots, blackberries, boysenberries, carrots, celery, cherries, cucumbers, garlic, grapes, kiwi, nectarines, onions, peaches, peanut seed, plums and prunes, potatoes, raspberries, rhubarb, snap beans, sweet potatoes and tomatoes.

The maximum foliar application rate of DCNA is 5.0 lb a.i./A (nectrines, three times prior to harvest). Soil application of DCNA as a dust or spray can amount to 24 lb a.i./A and 30 lb a.i./A (onions garlic), respectively. This soil application is mixed into the top 1.5" of soil prior to seeding.

Appendix 1. Calculations for Estimating Environmental Concentration (EEC)

General equation for calculating EEC in a body of water, eg., lake or pond:

$$\text{EEC (ppm)} = \frac{A \text{ (pesticide loading to the body of water)}}{B \text{ (weight of the water)}}$$

A = maximum application rate (lbs a.i./A) x size of drainage basin (acres) x percent runoff

B = surface area of body of water (acres) x average depth (ft) x 43560 ft²/A x 62.36 lb/ft³

therefore: - application rate = 30.0 lbs a.i./A
- drainage basin = 30¹ - 40² acres
- percent runoff = 1.0%² - 3.0%¹
- surface area = 1¹ - 2.5² acres
- average depth = 2.5² - 6¹ ft.

$$\text{EEC (ppm)} = \frac{(30) (30) (.03)}{(1) (6) (43560) (62.36)} = 1.6 \text{ ppm}$$

$$\frac{(30) (40) (.01)}{(2.5) (2.5) (43560) (62.36)} = 0.71 \text{ ppm}$$

- 1) USDA information regarding minimum watershed required to support a particular pond volume. USDA Farm Bulletin # 2256 (1973). USDA Handbook #387 (1971).
- 2) Data from similar compound (Propochlor) Wauchop, 1978.

DCNA appears to be moderately toxic to warm-water fish (bluegill LC₅₀ = 1.08 ppm) and highly toxic to cold-water fish (rainbow trout LC₅₀ = .56 ppm). Oyster shell growth appears to be effected at levels of 2.3 ppm, suggesting moderate toxicity.

The maximum rate of application of DCNA is 30lb a.i./A (onions, garlic). Although this fungicide is to be incorporated in the top 1.5" of soil, runoff is still a possibility. Two Estimated Environmental Concentrations (EEC) were calculated using a typical drainage basin in Indiana (see Appendix 1) and data from field studies on a compound similar to DCNA. The calculated values ranged from 0.71 ppm - 1.6 ppm, suggesting possible hazard to fish. Pending the receipt of environmental fate data, embryo-larvae testing and/or aquatic field studies may be required.

Avian studies on technical DCNA (92% a.i.) were not available. However, EEB will use the test results for Botran 75W (80.2% a.i.) for assessing the potential for avian hazard. These results suggest that Botran appears to be slightly-practically non-toxic to birds (mallard duck LC₅₀ = 11,800 ppm; bobwhite quail LC₅₀ = 3900 ppm or 9500 ppm and 2,120 ppm, respectively, when converted to technical). The foliar application of DCNA appears to be the most likely mode for avian contamination. Expected residue levels, for the maximum rate of 5.0 lb a.i./A are listed in Table 1.

Table 1. Maximum Expected Residues of DCNA on Vegetation ppm.

Rate (a.i.)	Short range-grass	long grass	leafy crops	Insects small seeds	Fruit cherries peaches
5.0 lb/A	1400	550	630	290	35

Comparison of these expected values and the calculated LC₅₀ values suggest that DCNA is not hazardous to birds. However, environmental fate data pertaining to persistence, solubility, bioaccumulation, etc., is necessary for a more conclusive evaluation of hazards to wildlife.

Ecological Effects "Generic" Data Gaps Technical DCNA

The following toxicity tests are required on technical DCNA in order to complete a hazard evaluation.

1. Single-dose oral LD₅₀ testing performed on one avian species (preferably mallard duck or bobwhite quail). 163.71-1.
2. Acute 48-hour toxicity study on a freshwater invertebrate (preferably Daphnia magna). 163.72-2.
3. Fish embryo-larvae and/or aquatic field studies may be required depending upon environmental fate data.

End Use Products

- This pesticide is toxic to fish
- Do not apply directly to water or wetlands.
- Drift or runoff may be hazardous to aquatic organisms

in neighboring aquatic sites

- cover spills
- Do not contaminate water by cleaning of equipment or disposal of wastes.

Manufacturing Use Products

- This pesticide is toxic to fish (NPDES)
- Do not apply directly to water or wetlands
- Do not contaminate water by cleaning of equipment or disposal of wastes.

4

The following studies were sent to EEB, but received only an abbreviated review. These studies are not cited in the Topical summaries.

00038312
00086879
00087032
00086931
00096061

Effects on Freshwater Fish

Table 1 contains seven studies which were received and evaluated under this topic. Five of the studies are acceptable for use in the hazard assessment for fish.

Table 1. Studies that were evaluated.

<u>Author</u>	<u>ID</u>
McCann	00096062
McCann	00096063
Beliles	00087030
Beliles	00087029
Pitcher	00096058
Beliles	00087028
Pitcher	00096064

In order to establish the acute toxicity of DCNA to fish, two 96-hour acute aquatic studies are required on the technical material. These studies should be conducted on one coldwater species (preferably rainbow trout) and one warmwater species (preferably bluegill).

Based on the available data, the following is known about the toxicity of DCNA to freshwater fish.

Table 2. Acute Toxicity Values

Species	Formulation	Effects (ppm)	Author	Fiche ID	Fulfills Guideline Requirements
Bluegill	Tech.	LC ₅₀ = 37.0	Beliles	00087030	Partial
Goldfish	Tech.	LC ₅₀ > 32.0	Beliles	00087029	Partial
Bluegill	Tech.	LC ₅₀ = 1.08	Pitcher	00096064	Yes
Trout	Tech.	LC ₅₀ = 1.6	Beliles	00087028	Yes
Trout	Tech.	LC ₅₀ = 0.56	Pitcher	00096064	Yes

According to the above data, technical DCNA is moderately toxic to warmwater fish and highly toxic to coldwater fish.

Two studies (McCann; ID: 00096062; 00096063) were conducted on the formulation, Botran 50W. These studies appear to be scientifically sound and would fulfill Guideline requirements for this formulation if necessary. The calculated 96-hour LC₅₀ for rainbow trout and bluegill sunfish was 7.0 and 4.1 ppm, respectively. These values suggest that Botran 50W is moderately toxic to trout and bluegill.

Precautionary Labeling

Current toxicity data demonstrates the need for fish toxicity statements. "This pesticide is toxic to fish."

Effects on Estuarine and Marine Organisms

One study was evaluated under this topic and is acceptable for use in a hazard assessment.

<u>Author</u>	<u>ID</u>
Beliles	00087031

Estuarine and marine organism toxicity tests on technical and formulated pesticides are required to support registration if there is an intended direct application to to an estuarine or marine environment, or if the pesticide may be expected to enter the environment in significant concentration because of mobility pattern. These studies include LC₅₀ testing on shrimp, oysters and estuarine fish.

The current uses of DCNA are unlikely to effect the estuarine environments. One study (Beliles ID: 00087031) was evaluated on oyster shell growth. The calculated EC₅₀ was found to be 2.3 ppm, suggesting moderate toxicity. This study would only partially fulfill the data requirements, if such data was requested.

Precautionary Labeling

No toxicity statement would be required based upon available data.

Effects on freshwater Aquatic Invertebrates

The Ecological Effects Branch (EEB) has not received any freshwater aquatic invertebrate studies on this topic. In order to establish the acute toxicity of DCNA to aquatic freshwater invertebrates, a 48-hour acute aquatic study is required on the technical material. Test organisms should be the first instar Daphnia magna, or early instar amphipods, stoneflies, or mayflies.

Effects on Birds

Two studies were reviewed under this topic. Both studies can be used in a hazard assessment.

<u>Author</u>	<u>ID</u>
Beliles	00087027
Beliles	00087020

In order to establish the acute toxicity of DCNA to birds, the following tests are required on the Technical: Two subacute dietary studies on one species of waterfowl (preferably mallard duck) and one species of upland game bird (preferably bobwhite quail or ring-necked pheasant); one avian single-dose oral study on one avian species (preferably mallard duck or bobwhite quail).

Two studies (Beliles, 00087027; 00087020) were conducted on the formulation, Botran 75W. These studies are acceptable for use in a hazard assessment and will fulfill Guideline requirements for technical LC₅₀ testing. The calculated LC₅₀ values for bobwhite quail and mallard duck were 3,250 and 11,800 ppm, respectively. Both values suggest that Botran 75W is practically non-toxic to birds.

7

Generic Data Requirements: DCNA

Must Additional Data be Submitted Under FIFRA 3(c) (B)? If So, Month Allowed For Submission From Published Date Of Standard

Does EPA Have Data To Partially Or Totally Satisfy This Requirement?

Guidelines Citation	Data Requirements	Composition Use Pattern	Does EPA Have Data To Partially Or Totally Satisfy This Requirement?	Bibliographic Citation	Published Date Of Standard
71-1	Avian Single-Dose Oral LD50	Technical A,B,E,	No		yes, 6 months
71-2	Avian Dietary LC50	Technical A,B,E	Partial	ID: 00087027 00087027	yes, 6 months
71-3	Wild Mammal	Technical A	No		No ³
71-4	Avian Reproduction	Technical A, B	No		No
71-5	Simulated and Actual Field Testing for Mammals and Birds	T.E.P A, B	No		No
72-1	Fish Acute LC50	Technical A,E	Yes	ID: 00096064 00087028 00096058	No
72-2	Acute LC50 Aquatic Invertebrates	Unique formulation	Partial ²	ID: 00087029 00087030	No
72-3	Acute Toxicity to Estuarine and Marine Organisms	Technical A,E	no		yes 6 months

1) The use patterns are coded as follows: A-Terrestrial, Food Crop; B-Terrestrial, Non-Food; C-Aquatic, Food Crop; D-Aquatic, Non-Food; E-Greenhouse, Food Crop; F-Greenhouse, Non-Food; G-Forestry; H-Domestic Outdoor; I-Indoor.

2) Botran 50W

3) Not normally required

Must Additional
Data be Submitted
Under FIFRA 3(c)
(B)? If So, Month
Allowed For Sub-
mission From
Published Date Of
Standard

Does EPA Have
Data To Partially
Or Totally Satisfy
This Requirement?

Bibliographic
Citation

Guideline
Citation

Guideline Citation	Data Requirements	Composition Use Pattern	Does EPA Have Data To Partially Or Totally Satisfy This Requirement?	Bibliographic Citation	Must Additional Data be Submitted Under FIFRA 3(c) (B)? If So, Month Allowed For Sub- mission From Published Date Of Standard
72-4	Fish Early Life-Stage aquatic invertebrate Life cycle.	Technical A, B	no		reserved
72-5	Fish Life-Cycle	Technical A, B	no		
72-6	Aquatic Organism Accumulation	Technical A, B	no		
72-7	Simulated or Actual field testing for aquatic Organisms	TEP	no		

4) Reserved pending environmental fate data (to support onions and garlic use).

9