

US EPA ARCHIVE DOCUMENT

102001
SHAUGHNESSEY NUMBER

EEB CHEMICAL PROFILE

Pesticide Name: Thiophanate - Methyl

100 Toxicological Properties

100.1 Minimum Requirements

100.1.1 Avian Acute Oral LD50

<u>Species</u>	<u>Test Material</u>	<u>Results</u>	<u>Category</u>	<u>Ref.</u>
Bobwhite quail	94% a.i.	>4640 mg/kg	CORE	
Mallard duck	94% a.i.	>4640 mg/kg	CORE	

100.1.2 Avian Dietary LC50

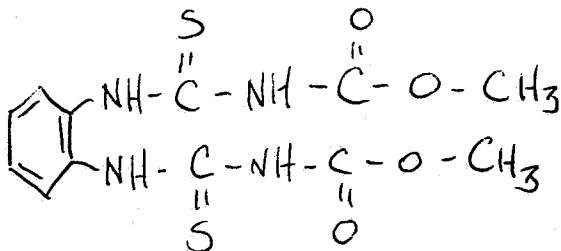
<u>Species</u>	<u>Test Material</u>	<u>Results</u>	<u>Category</u>	<u>Ref.</u>
Bobwhite quail	94% Technical	>10,000 ppm	CORE	
Mallard duck	94% Technical	>10 000 ppm	CORE	

100 1.3 Fish Acute LC50

<u>Species</u>	<u>Test Material</u>	<u>Results</u>	<u>Category</u>	<u>Ref.</u>
Rainbow Trout	70% W.P.	>25.2 ppm (corrected to 17.1 ppm)	CORE	
Bluegill Sunfish	70% W.P.	>15.8 ppm (corrected to 11.1 ppm)	CORE	
Channel Catfish	70% W.P.	30 ppb (corrected to 21 ppb)	CORE	
Rainbow Trout	99% MBC	370 ppb		Johnson & Finley, 1980
Channel Catfish	99% MBC	16 ppb		Johnson & Finley, 1980

100.1.4 Aquatic Invertebrate LC50

<u>Species</u>	<u>Test Material</u>	<u>Results</u>	<u>Category</u>	<u>Ref.</u>
Daphnia	94% Technical	24 ppm	CORE	
Red Crayfish	70% W.P.	>4 ppm	SUPPL.	

101.2 Structural Formula101.3 Common Name

Thiophanate-methyl

101.4 Trade Name

Topsin-M

101.5 Molecular Weight

354.4

101.6 Physical State

Color: White to light tan

Odor: Faint sulfur odor

Physical State: Crystalline powder

Melting Point: 177°C to 178°C (Decomposes)

101.7 Properties101.7.1 SolubilityW/WICompound

Acetone	5.9
Acetonitrile	2.5
Chloroform	1.7
Cyclohexane	4.4
Methanol	1.3
Water	Insoluble

101.7.2 Octanol/Water Partition Coefficient (Kow)

<u>Compound</u>	<u>P-value</u>
Thiophanate - methyl	12.8
Thiophanate	54.2
Benomyl	133.0
MBC	29.8

101.7.3 Soil Adsorption Coefficient (Kd)

1.95	Sandy Loam	.9% om
3.47	Clay Loam	2.1% om
14.5	Muck	7.8% om

102 Behavior in the Environment102.1 Soil

Thiophanate-methyl degrades rapidly in soil (half-life of 7 days) to methyl 2-benzimidazole carbamate (MBC). The rate of degradation is faster in alkaline soils and silty loam soil than in sandy loam soils. The parent compound and MBC are not considered to be particularly persistent, have little effect on soil bacteria and do not appear to be transported in water but bind to soil. Both compounds have a very low water transport potential and are retained in the upper 2 inches (thiophanate-methyl) 3 inches (MBC) of soil after a simulated rainfall of 2.5 inches.

102.2 Water

Thiophanate-methyl has a half-life in water of 5 days at pH values of 5, 7 and 10 if exposed to sunlight. The half-life of MBC is 19 days at the middle range of pH values.

102.4 Animals

After 2 weeks whole fish residues in cutthroat trout and rainbow trout were 1X and 4X, respectively. After 4 weeks, the residue levels were 0.3X and 2X, respectively.

102.5 Estimated Environmental Concentrations

See Attached

Shaugh. No. 102001

EAB Log Out Date: 21 OCT 1983

Init.: 520M

To: Jacoby/Beavers
Product Manager 21
Registration Division (TS-767)

From: Carolyn K. Offutt *Carolyn K. Offutt*
Head, Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the estimated environmental concentration review of:

Reg./File No.: 4581-322

Chemical: Thiophanate-Methyl

Type Product: Fungicide

Product Name: Topsin M

Company Name: Pennwalt Corp.

Submission Purposes: EEC on wheat

ZBB Code: other

Action Code: 335

Date In: 8/11/83

EFB#: 3481

Date Completed: 21 OCT 1983

TAIS (Level II) Days

63 3.5

Deferrals To:

Ecological Effects Branch

Residue Chemistry Branch

Toxicology Branch

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1. Introduction

The purpose of this review is to provide estimated environmental concentrations (EECs) of thiophanate-methyl and its principal degradates in water bodies. This is in reply to EEB's request of 9 August 1983.

2. Chemical/Physical Characteristics

See attached data form.

3. Directions for use.

This is a use for wheat to control foot rot, strawbreaker, and eye spot. Apply 1 lb. ai/A by air or ground after wheat is tillered but before elongation has occurred. Use sufficient water to obtain thorough coverage. Not for use in California.

4. Discussion.

Both runoff and water quality analyses were performed.

Runoff analysis:

The Coshocton 118 watershed was chosen because it was the only one in which wheat had been grown. This watershed was used to determine the possible quantity of Topsin M in runoff as a function of meteorology and geography. The model river basin is part of the Simulator for Water Resources in Rural Basins (SWRRB). The chemistry and other input data are given in Table 1.

One application was made per year at the growth stage specified. This was approximately the end of April for this region.

The quantities of runoff were quite varied. The greatest runoff occurred with rains immediately following applications. The worst years for runoff were those with the heaviest rains. Some of the pesticide leached into the soil below the 1 cm active layer. A good portion of the pesticide was held by the soil as exemplified by the partition coefficient (Kd) of 3.0 for clay loam soils. Refer to Table 3 for the values of pesticide runoff and the associated water runoff from the fields.

Water Quality Analysis:

From the SWRRB model, the worst year (1956) for runoff from the wheat fields was used for the water quality analyses in the Exposure Analysis Modeling System (EXAMS) using the

Athens ERL pond scenerio. The chemistry data for thiophanate-methyl (Topsin M) used in the model is given in Table 2.


The first input quantity of 0.000001 kg is entered to provide a better graphic plot of the latter results. The other quantities are from the runoff quantities for the year noted. The quantities were adjusted for metric conversion and were adjusted to reflect the size of the watershed(s) needed to support a 1 ha. pond. For the Coshocton OH area, a watershed of approximately 10 ha. is needed. (The effect of large field runoff is being studied with respect to the quantity of material that is expected to enter an aquatic system. Pesticide entering the aquatic system may be only a portion of that applied. Also the water balance of the aquatic system must be maintained which will add to the dissipation of the pesticide.)

The maximum quantity found dissolved in the water column was approximately 10 ppb. The dissipation half-life was about two days. The sorbed quantities in the bottom sediments never exceeded 3.0 ppb.

From the experiences of this reviewer and from the information derived concerning the dissipation of the thiophanate-methyl from the pond, it is known that the quantity of material that would be found in the rivers would be considerably less than that found in the ponds. For these reasons, the river scenerio results are not provided.

Metabolites of Thiophanate-Methyl:

MBC, methyl-2-benzimidazolecarbamate, is the major metabolite of thiophanate-methyl. It degrades to less than 0.1 ppm in 1 to 12 months in the top 4 inches of soil. It is never found at concentrations greater than 0.3 ppm at the 12" depth when Topsin M was applied to loamy soils at 1.4 lb. ai./A. The reported half-life in soils is 6 to 12 months and 3 to 6 months on turf and other vegetation. The degradation rate in water has not been reported. Runoff and water quality modeling efforts were not undertaken for MBC due to the lack of certain chemical/physical data such as solubility.


Robert W. Holst, Ph.D.
Plant Physiologist
Exposure Assessment Branch (TS-769)