

109901
SHAUGHNESSEY NO.

15
REVIEW NO.

EEB BRANCH REVIEW

DATE: IN 10-28-80 OUT 12-22-80

FILE OR REG. NO. 3125 - 320
PETITION OR EXP. PERMIT NO. _____
DATE DIV. RECEIVED 10-27-80
DATE OF SUBMISSION 9-80
DATE SUBMISSION ACCEPTED _____
TYPE PRODUCT(S): I, D, H, (F), N, R, S Fungicide - Pine Rust
DATA ACCESSION NO(S). Referenced -- 231311 and 232489
PRODUCT MANAGER NO. E. Wilson (21)
PRODUCT NAME(S) Bayleton 50% Wettable Powder
COMPANY NAME Mobay Chemical Corporation
SUBMISSION PURPOSE Conditional Registration -- Pine Seedlings

SHAUGHNESSEY NO.	CHEMICAL, & FORMULATION	% A.I.
<u>109901</u>	<u>Triadimefon 1-(4-Chlorophenoxy)-3,3-dimethyl</u>	
	<u>-1-(1H-1,2,4-triazol-1-yl)-2-butanone</u>	<u>50.0 %</u>

100 Pesticide Label Information

100.1 Pesticide Use

Add use on pine seedlings for pine rust (Fusiform rust) to previously registered labeling.

100.2 Formulation Information

Triadimefon (Bayleton®) -- 50.0 % wettable powder

100.3 Application Methods, Directions, Rates

Apply specified dosage (0.25-1.0 lbs a. i. per acre) in a uniform spray with a minimum of 20 gallons of water per acre by ground or 5 gallons of water by air. Begin application prior to infection period, repeat as necessary at 2 to 3 week intervals depending upon disease pressure. Use lower rates in areas of low disease incidence and higher rates in areas of severe disease incidence. A maximum of 4 applications of 16 ozs. BAYLETON 50% W.P. per acre may be made per season. A spreader-sticker is needed to help adhere spray solution to the pine trees.

100.4 Target Organism(s)

Pine rust (Fusiform rust)

100.5 Precautionary Labeling

Precautions were not provided with the registration request. The original labeling precautions reported in Leitzke's 2-7-80 review are as follows:

Environmental Hazards

Do not use on other crops grown for food or forage. Keep out of lakes, streams, ponds. Do not contaminate water by cleaning of equipment or disposal of wastes. Apply this product only as specified on this label. Do not make applications when weather conditions favor drift from target area.

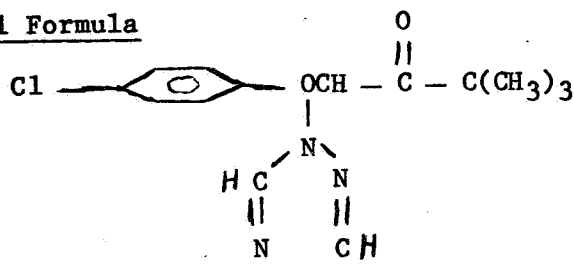
101 Chemical and Physical Properties (from Leitzke's review 2/7/80)

101.1 Chemical Name:

1-(4-Chlorophenoxy)-3,3-dimethyl-1-(1H-1,2,4-triazol-1-yl)-2-butanone

101.2 Common Name: Triadimefon (BAY 8364, MEB 6447)

101.3 Structural Formula



Molecular Weight: 293.7

101.5 Physical State

White to tan crystals; odorless to mild aromatic.

101.6 Solubility

Water - 260 ppm at 20°C
Cyclohexanone - 35 %
Toluene - 25 %
Isopropanol - 17 %
Methylene Chloride >50 %
Ligroin - 25 %

102 Behavior in the Environment (from Leitzke's review 2/7/80)

(Reference: Expanded from L. Turner's (1/12/79) citation of K. Sampson/R. E. Ney - Environmental Fate Review, 8/8/78).

102.1 Soil

In laboratory studies, the half-life of triadimefon was six days in aerobic soil and 15 days in anaerobic soil. Since there was no degradation in sterile soils, microbial action on triadimefon seems a likely route of degradation. In field studies the average half-life was five days, but the half-life of triadimefon plus its primary degrade (KWG-0519) was 225 days. KWG-0519 is considered persistent.

"Aged" soil residues of triadimefon were substantially mobile in sandy clay loam and silty clay soils in column leaching and soil TLC experiments. In the column part, 73% of the original ¹⁴C activity was found below 5 cm. However, relatively low leaching ability of "fresh" triadimefon was noted in a different soil TLC study. Lack of experimental procedures prevented ascribing different results to aging or use of differently labeled parent compounds.

102.2 Water

Triadimefon is stable to hydrolysis at pH 3, 6, and 9 and temperatures of 25°C, 35°C, and 45°C. It will photolyze in water with a half-life of 10-12 hours. Addition of 2% acetone accelerated the half-life to 5.5 hours. 1,2,4-Triazole and CO₂ were the major photoproducts from triazole- and benzene ring-labeled studies.

In a simulated pond environment, triadimefon has a half-life of 6-8 days in the water and 18-20 days in the silt. The major degradate was again KWG-0519.

102.3 Soil Microorganisms

There is little inhibition of several soil microbes by triadimefon. However, when nitrogen-fixing symbionts in soybean nodules were

exposed to 0.5 ppm triadimefon for four weeks, the plants showed a 60% decrease in shoot length, 21% decrease in plant flesh weight and 29% decrease in nodule fresh weight as compared to controls. On the other hand, actual nitrogen-fixation (as measured by acetylene reduction on LC) was not affected.

102.4 Plant

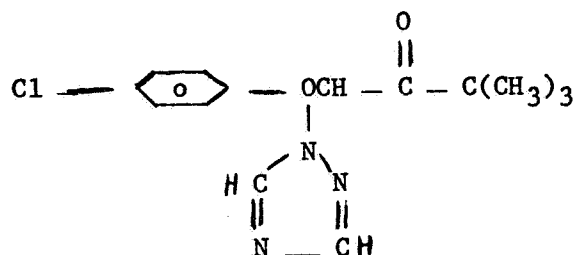
In barley plants and seeds, KWG-0519 is again the primary metabolite.

102.5 Animal

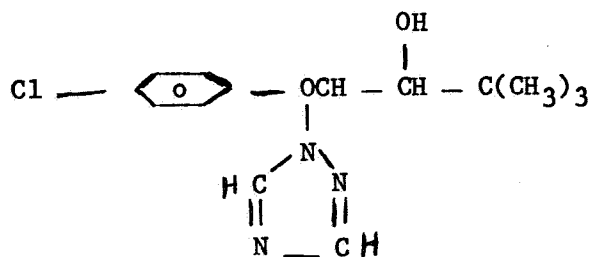
Triadimefon accumulated in 28 days in catfish to levels of 6.5-7.6X in two flow-through tests at 10 and 100 ppb. Approximately 96% of activity was eliminated in the first seven to ten days of withdrawal.

102.6 Comparative Structural Formulas

Parent: Triadimefon



Primary Degradate: KWG-0519



103 Toxicological Properties (from Leitzke's review 2/7/80)103.1 Mammal

(Reference: Toxicology Branch memo by J. D. Doherty, 2/15/78).

Acute Oral LD50

<u>Species</u>	<u>Formulation</u>	<u>LD50 (mg/kg)</u>
Rat (male)	92 % Technical	568 mg/kg
Rat (female)	92 % Technical	363 mg/kg
Mouse (male)	92 % Technical	987 mg/kg
Mouse (female)	92 % Technical	1071 mg/kg
Rabbit	Technical	500 mg/kg
Dog	Technical	500 mg/kg
Rat (male)	50 % WP	812 mg/kg
Rat (female)	50 % WP	1470 mg/kg
Rat (male)	25 % WP	2828 mg/kg
Rat (female)	25 % WP	3668 mg/kg

Teratology

Three studies (oral in rats, inhalation in rats, and oral in rabbits) showed no indication of embryo toxicity or teratogenesis at 50 mg/kg.

103.2 Fish and Wildlife (Combined from previous EEB reviews)

<u>Species</u>	<u>Test Type</u>	<u>Formulation</u>	<u>Toxicity</u>	<u>Status</u>
Mallard	Acute Oral LD50	Technical	>4,000 mg/kg	Core
Mallard	Dietary LC50	Technical	>10,000 ppm	Core
Bobwhite	Dietary LC50	Technical	>4,640 ppm	Core
Bluegill	96-Hour LC50	Technical	11 ppm	Core
Rainbow	96-Hour LC50	Technical	14 ppm	
Channel Catfish	96- Hour LC50	Technical	15 ppm	Core
<u>Daphnia magna</u>	48-Hour EC50	Technical	1.6 ppm	Core

103.3 Beneficial InvertebratesHoney Bees (Apis mellifera)

Contact and oral LD50 --- both greater than 25 ug/bee.
Stevenson. 1978. Plant Pathol. 27(1):38-40.

Reviewed by: A. Vaughan, 11/5/79

Reviewer's conclusions: This study is scientifically sound.

Annelids

A previous EEB review by J. Tice (4/19/78) cited a study on manure worms (Eisenia foetida) by Hermann, 1973. Members of the genus Eisenia are commonly called manure worms because they require manure to live in. Members of this genus are the worms that are usually sold by commercial operators because they reproduce faster and year-round as opposed to Lumbricus terrestris. Manure worms, e. g., E. foetida, are also very resistant to a number of pesticides that are quite toxic to L. terrestris, and thus the use of manure worms "is quite unwise if the results are to be applied to other earthworms" (Stickel, W. H., in Foreword to Davey, S.P. 1963. Effects of chemicals on earthworms: A review of the literature. Bur. Sport Fish. Wildl., Spec. Sci. Rep. Wildl. No. 74; see also Gilman, A. P. and A. Vardanis. 1974. Carbofuran. Comparativ toxicity and metabolism in the worms Lumbricus terrestris L. and Eisenia foetida S. J. Agric. Food Chem. 22(4):625-628.

104 Hazard Assessment

104.1 Discussion

Since the recommended application rate for pine rust on pine seedlings is equivalent to 0.25 to 1.0 lbs of active ingredient per acre per application with a maximum of four applications per season repeated as necessary at 2 to 3 week intervals, the maximum amount permitted per season would be 4.0 lbs/A per season. And since the halflife of triadimefon is 6 to 15 days in soil, 6 to 8 days in water, and 18 to 20 days in silt, additional applications at intervals of 2 to 3 weeks will result in the accumulation of triadimefon residues. While these higher residue levels (Table 1) would not appear to be acutely lethal to any fish or wildlife species, except aquatic invertebrates, as indicated by the available acute studies, little is known about triadimefon's chronic effects and the toxicity and effects of its primary degradate, KWG-0519, which has a half-life of 225 days in soil (no data were available on its persistence in water). The frequency of application and the persistence of triadimefon and its primary degradate, KWG-0519, indicate the probability that fish and wildlife will be exposed to chronic residues of these two chemicals.

104.2 Likelihood of Adverse Effects to Non-target Organisms

A guide on wildlife food habits by Martin et al (1951) indicates that pines are used for food by 82 different species of birds and mammals. While pine seeds are eaten by most species and for a few species they are a major portion of the diet, pine needles and bark are also eaten by a few birds and mammals. Pines are also an important cover area for many avian and mammal species, some of which feed there on insects and other vegetation. The extent to which these wildlife would use pine seedling areas treated with triadimefon would depend largely on whether the seedlings were tall enough to provide cover and whether the seedlings were in the proximity of larger trees which might provide seeds, and shelter where treated pine seedlings themselves are too small to give cover.

Table 1. Triadimefon Residue Levels Resulting From Multiple Applications

	Residues on Short Grass		Residues in water 6 inches deep	
	6 Day Half-life (ppm)	15 Day Half-life (ppm)		
Low Application Rate	ACCUMULATED RESIDUES		ACCUMULATED RESIDUES	
	60. 4. 14. 6.	RES APP INT T1/2	60. 4. 14. 15.	RES APP INT T1/2
	0.46875		8.615237662	
	2.831101969		25.06761236	
	14.73660986		56.48643604	
	74.73660986	TOT	116.486436	TOT
				0048351544
				.0210986104
				.0758021376
				.2598021376
				TOT
				0.184
				4.
				14.
				8.
				T1/2
				RES
				APP
				INT
				T1/2
				TOT
				0.734
				4.
				14.
				8.
				T1/2
				RES
				APP
				INT
				T1/2
				TOT
				.0192880615
				.0841651087
				.3023846143
				1.036384614
				TOT
				0.734
				4.
				14.
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				TOT
				0.734
				4.
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				T1/2
				RES
				APP
				INT
				T1/2
				TOT
				0.734
				4.
				14.
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				T1/2
				RES
				APP
				INT
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				TOT
				0.734
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				8.
				T1/2
				RES
				APP
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				TOT
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				TOT
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				0.734
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				APP
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				RES
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				INT
				T1/2
				TOT
				0.734
				4.
				14.
				8.
				T1/2

Table 2. Primary Degradate, KWG-0519, Residue Concentrations Resulting From Multiple Applications

	Residues in Soil		Residues in water 6 inches deep	
	0.1 inch Soil Depth	1.0 inch Soil Depth		
Low Application Rate	ACCUMULATED RESIDUES	ACCUMULATED RESIDUES	ACCUMULATED RESIDUES	ACCUMULATED RESIDUES
	5.5 RES	0.55 RES	0.184 RES	0.184 RES
	4. APP	4. APP	4. APP	4. APP
	14. INT	14. INT	14. INT	14. INT
	225. T1/2	225. T1/2	225. T1/2	225. T1/2
High Application Rate	4.832483987	.4832483987	.1616685552	.1616685552
	9.877948767	.9877948767	0.330462286	0.330462286
	15.14578099	1.514578099	.5066952185	.5066952185
	20.64578099	2.064578099	.6906952185	.6906952185
	TOT	TOT	TOT	TOT
	ACCUMULATED RESIDUES	ACCUMULATED RESIDUES	ACCUMULATED RESIDUES	ACCUMULATED RESIDUES
	22. RES	0.734 RES	0.734 RES	0.734 RES
	4. APP	4. APP	4. APP	4. APP
	14. INT	14. INT	14. INT	14. INT
	225. T1/2	225. T1/2	225. T1/2	225. T1/2
	19.32993595	.6449169539	.6449169539	.6449169539
	39.51179507	1.318257163	1.318257163	1.318257163
	60.58312395	2.021273317	2.021273317	2.021273317
	82.58312395	2.755273317	2.755273317	2.755273317
	TOT	TOT	TOT	TOT

104.3 Endangered Species Considerations

The distribution of pine trees and their reforestation is so extensive that many endangered species could be exposed to triadimefon residues applied to pine seedlings. Although there does not appear to be an acute toxicity problem, multiple applications and the persistence of triadimefon and its primary degradate, KWG-0519, pose the potential for chronic exposure.

104.4 Adequacy of Toxicity Data

The six basic fish and wildlife studies have been submitted and have been found to be adequate to support registration.

104.5 Additional Data Required

As indicated above, the acute studies indicate no acutely lethal effect from the triadimefon residues to any fish or wildlife species, except possibly to aquatic invertebrates as indicated by the daphnia 48-hour LC50 study. But since there may be multiple applications and triadimefon and its primary degradate residues will accumulate, there is concern about the chronic effects that use on pine seedlings may have on wildlife species which use the treated and/or adjacent areas for feeding, nesting, and brood-rearing and on fish and aquatic invertebrates in adjacent aquatic areas which may be exposed to chronic residues from spray drift and/or runoff. As in the previous reviews by J. Lieitzke (2/7/80), A. Yamhure (3/31/80), and M. Gessner (6/6/80), EEB feels that it is necessary that an avian reproduction and two invertebrate life-cycle studies be conducted. Given the potential for transport to aquatic areas from either spray drift or runoff from reforested areas, it is also necessary to conduct a fish embryo-larvae study, preferably on rainbow trout.

107 Conclusions

107.3 Environmental Hazards Labeling

Do not use on crops grown for food or forage. Keep out of lakes, streams, and ponds. Do not contaminate water by cleaning of equipment or disposal of wastes. Do not apply when weather conditions favor drift. Apply this product only as specified on this label.

107.4 Data Adequacy Conclusions

The six basic fish and wildlife requirements have been submitted and found adequate to support registration.

107.5 Data Requests

Prior to consideration of registration, the following data are required:

- 1) Two Daphnia life-cycle studies; one study with technical triadimefon and the other with triadimefon aged long enough to insure a high concentration of KWG-0519.

- 2) An avian reproduction study of the technical material on an upland game species, preferably bobwhite quail.
- 3) A fish embryo-larvae study, preferably on rainbow trout.

107.7

Recommendations

The Ecological Effects Branch objects to the conditional registration of Bayleton® 25% W.P. for use on pine seedlings. Multiple applications and the persistence of both triadimefon and its primary degradate, KWG-0519, will produce the potential for chronic exposure of these chemicals to terrestrial and aquatic species. Until the studies outlined in 107.5 are submitted and reviewed by EEB, no determination of chronic environmental hazard can be made on reproduction and/or population effects.

William S. Rabert

William S. Rabert, Biologist
Section 2, Ecological Effects Branch

Norman Cook 1-5-81

Norman Cook, Section Head
Section 2, Ecological Effects Branch

Clayton Bushong 1/5/81

Clayton Bushong, Branch Chief
Ecological Effects Branch, HED

U.S. LABEL

Reason to Issue: To propose use on
pine seedlings.

Date of Draft: 9/3/80 (Pre-Reg.) (T)

EPA Reg. No. 3125-320

(R)

BAYLETON

50% Wettable Powder

FUNGICIDE

ACTIVE INGREDIENT:

1-(4-Chlorophenoxy)-3,3-dimethyl-1-(1H
-1,2,4-triazol-1-yl)-2-butanone 50%

AMENDMENT

To Previously Registered Labeling

ADD THE FOLLOWING

RECOMMENDED APPLICATIONS

CROP	DISEASE	Ounces BAYLETON 50% WP	REMARKS
Pine (Seed- lings)	Pine Rust (Fusiform rust)	4 to 16	Apply specified dosage per acre in a uniform spray with a minimum of 20 gallons of water per acre by ground or 5 gallons of water per acre by air. Begin application prior to infection period, repeat as necessary at 2 to 3 week intervals depending upon disease pressure. Use lower rates in areas of low disease incidence and higher rates in areas of severe disease incidence. A maximum of 4 applications of 16 ozs. BAYLETON 50% W.P. per acre may be made per season. A spreader-sticker is needed to help adhere spray solution to the pine trees.