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Date Out: EFB: APR 28 1981

To: Product Manager 21 Jacoby
TS-767

From: Dr. Willa Garner III
Chief, Review Section No. 1
EnvironmentalFate Branch

Attached please find the environmental fate review of:

Reg./File No: 618-75

Chemical: Thiabendazole

Type Product: Fungicide

Product Name: Mertect 340-F

Company Name: Merck

Submission Purpose: Review of anaerobic aquatic metabolism study (preharvest use on rice)

ZBB Code: Other

ACTION CODE: 570

Date Completed: 3/3 /81

EFB # 777

Date Completed: APR 28 1981

TAIS (level II) 64

Days 2

Deferrals To:

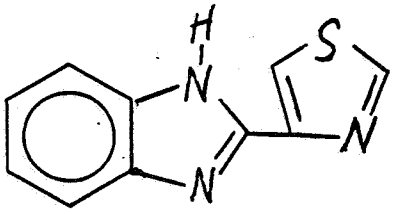
_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

1.0 INTRODUCTION

Merck and Co. has submitted data on the anaerobic aquatic metabolism of thiabendazole = 2-(4-thiazolyl)-IH- benzimidazole



2.0 DISCUSSION OF DATA

2.1 "Thiabendazole Anaerobic Aquatic Metabolism," Report (final), Jan. 14, 1981, by Raltech Scientic Services for Merck and Co., Rathway, NJ, Accession No. 244423.

Experimental Procedures

The experimental protocol was described in EFB review of 3/31/80.

Results

The results of this study are summarized in Table 1. The amount of original ^{14}C and thiabendazole decreased in both the sterile and nonsterile chambers to <5% in 14 days, most likely due to adsorption to the soil. HPLC analysis confirmed that 80 to 104% of the ^{14}C present at levels of 30 ppb or more was thiabendazole (original theoretical concentration was 1.4 mg/1.7 l water = 0.823 ppm). No metabolites were detected at these low levels. A similar range of ^{14}C and thiabendazole was found in sterile water. In the non-sterile soil, the amount of extractable ^{14}C gradually increased to a fairly constant 62-69% (compared to 66-86% in sterile controls). Of the extracted ^{14}C, an average of 94% was thiabendazole by HPLC in non-sterile soil versus 91% in sterile soil. No metabolites were noted. Data fluctuations were attributed to the nonhomogenous nature of samples necessitated by the design of the experiment (most of the adsorption probably occurred on the surface layer of the soil). No extractable metabolites were noted in any sample. Only negligible quantities of volatile ^{14}C were trapped. The data fluctuations prevent an accurate material balance from being demonstrated, but the results of ^{14}C analysis of soil prior to extraction demonstrate that the vast bulk of the ^{14}C partitions into the soil where somewhat less than half becomes bound to the soil (non-extractable).

Conclusions

Thiabendazole added to an anaerobic aquatic system rapidly partitions into soil, leaving minimal residues in the water. Somewhat less than half of the soil ^{14}C residue become bound to the soil such that it could not be extracted with basic methanol. No evidence of biodegradation or non-biological degradation were seen.

3.0 SUMMARY AND CONCLUSIONS

3.1 This study satisfies EFB requirements for anaerobic aquatic metabolism and demonstrates that, while thiobendazole appears resistant to biodegradation in this system; it rapidly dissipates from water by partition into soil where slightly less than half of the residues become extremely tightly bound (maybe irreversibly) to the soil. This confirms the findings of the field dissipation studies submitted for rice paddy use (3/31/80, Nawar).

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TABLE 1

Summary - Aquatic Anaerobic Metabolism of ^{14}C-Thiabendazole[a]

Time	Soil		Water		Volatiles
	Carbon-14 (% of Soil Total)[b]	Thiabendazole (% of Carbon-14)	Carbon-14 (% of Flask Total)[c]	Thiabendazole (% of Carbon-14)	Carbon-14 (% of Flask Total)[c]
Sterile					
2 days	86	77	25	104	0.0012
7 days	74	91	7.6	106	0.0038
14 days	68	83	3.8	78	0
1 month	70	99	1.8	94	0
2 months	73	92	1.0	86	0
3 months	80	92	0.7	72	0
4 months	76	94	0.5	92	0.0012
6 months	70	97	0.4	117	0.0022
9 months	66	92	<0.3	-	0.0012
12 months	68	94	<0.3	-	0.0006
Nonsterile					
2 days	44	88	41	88	0.0029
7 days	44	97	15	99	0.0028
14 days	44	101	4.1	93	0.0027
1 month	47	93	1.6	60	0.0062
2 months	62	90	0.8	107	0.0068
3 months	62	92	0.6	92	0.0036
4 months	68	98	0.4	120	0.0048
6 months	64	94	<0.3	-	0.0094
9 months	65	94	<0.3	-	0.0065
12 months	69	90	<0.3	-	0.0034

a Values are averages of duplicate analyses from each of duplicate chambers.

b Total carbon-14 in the soil was determined for each soil sample at each sampling period. Dried soil was oxidized and counted for total carbon-14.

c Total carbon-14 was the ^{14}C-Thiabendazole (9.33×10^6 dpm) added to each flask.