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Date Out EFB:

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Through: Dr. Gunter Zweig, Chief
Environmental Fate Branch

From: Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 100-ANN

Chemical: N-(2,6-dimethylphenyl)-N-(methoxyacetyl) alanine methyl ester

Type Product: fungicide

Product Name: Subdue

Company Name: CIBA-GEIGY

Submission Purpose: non-bearing citrus and ornamental and turf

ZBB Code: Sec. 3

Date in: 4/27/79

Date Completed: 5/1/79

Deferrals To:

- Ecological Effects Branch
- Residue Chemistry Branch
- Toxicology Branch

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1. INTRODUCTION

1.1 This resubmission of Subdue 5W fungicide is for registration on ornamentals, non-bearing citrus (Florida only) and turf. Use directions for turf were not included with the first submission.

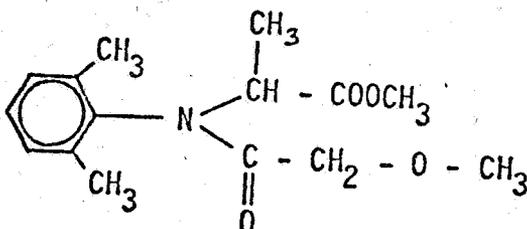
1.2 Data has been submitted with accession numbers 238231 and 238232. Some of it has been previously reviewed.

1.3 Other reviews are:

100-EUP-1, potatoes, Nov. 1, 1978

100-ANN, non bearing citrus (FA). and ornamentals, Feb. 26, 1979.

1.4 Structure



2. DIRECTIONS FOR USE

2.1 The use directions are the same as in the previous review of ~~100-ANN~~ dated Feb. 26, 1979 except for the following:

Citrus - change the application rate of 1.0-3.75 oz ai/1000 ft row to 1.0 -1.5 oz ai/1000 ft row

Turf - (this use has been added with this submission).

Established turf (preventive treatment) - Apply 0.25 - 0.5 oz ai /1000 ft² and repeat at 10-21 day intervals. Newly seeded areas - apply 0.25 - 0.5 oz ai/1000 ft² immediately after seeding and irrigate with 1/4 - 1/2 inch of water. Repeat at 7-14 day intervals.

2.2 All the proposed uses have more specific narrow recommended rates depending on soil depth and penetration needed. See the label.

2.3 See the Feb. 26, 1979 review of 100-ANN for disposal information and cautions.

2) Photolysis of CGA-48988 in Distilled Water plus 1% Acetone

<u>Exposure minutes</u>	<u>Parent compound found (ppm)</u>
0	10.0
20	9.5
40	7.3
60	4.5
80	2.5
100	1.6

- 3) After 7 days of photolysis, 8% of the initial activity was lost due to volatilization. The remaining 92% consisted of 52% parent, 5% CGA-62826, 17% polar compounds (at least 4), 12% unidentified volatiles with the remaining material lost or unidentified.

Conclusions

- 1) CGA will degrade in water under artificial sunlight with a half-life of 6 1/2 days. This degradation will be greatly accelerated in the presence of photosensitizers since the half-life in 1% acetone was found to be 57 minutes.
 - 2) CGA-62826 will be found in small amounts (5%) after 7 days photolysis plus smaller amounts of at least 4 polar products. Some 8% unidentified material is lost during photolysis due to volatilization.
- 3.2 The Effects of N-(2,6-Dimethylphenyl)-N-(Methoxyacetyl)-Alanine Methyl Ester on Soil Microorganisms, Ercegovich, C.D., Penn. State, acc #238231, page 218.

Procedure and methods

The effects of CGA-48988 on various soil microbes in nutrient cultures was tested. Fungal growth was correlated to the mean radius of mycelial extension, actinomycetes and bacterial growth was determined by scoring inoculated plates for number of colonies and algal growth was monitored by turbidometric measurement.

The following organisms were tested:

3. DISCUSSION OF DATA

- 3.1 Photolysis of CGA-48988 (Ridomil) in Aqueous Solution under Artificial Sunlight Conditions, project report 12/79, N. Burkhard, Basle, Switzerland, March 27, 1979, acc.# 238231, page 98.

Procedure

Aqueous 10 ppm solutions of ^{14}C ring-labeled CGA-48988 with and without 1% acetone were irradiated via a mercury vapor lamp (with radiation 290 nm filtered out). The initial solution registered a pH of 8.3 and was maintained at 25°C during the 7 day experiment.

Methods of analysis

Aliquots were extracted with methylene chloride, evaporated, re-dissolved in acetone and analyzed for parent by GC with a PN detector. Other aliquots were made basic with NaOH and extracted with isopropylether (IPE). The IPE extract was analyzed by GLC and TLC and the aqueous fraction was acidified with 1N HCl followed by extraction with IPE. The IPE extract ~~with~~ methylated or ethylated to regenerate known compounds, was analyzed by GLC, TLC and MS and the aqueous portion was evaporated, dissolved in n-hexane/ethanol (1:1), methylated and analyzed by GLC and TLC.

Results

- 1) Photolysis of CGA-48988 in Distilled Water

<u>Exposure hours</u>	<u>Parent compound found (ppm)</u>	
	<u>exposed</u>	<u>control</u>
0	10.0	10.0
24	9.2	-
48	8.9	-
72	8.0	-
96	7.2	-
168	4.5	9.4

MICROORGANISM AND SPECIAL FUNCTION

Actinomycetes

Actinomycetes streptomycini (antibiotic producer)
Norcardia corrallina (attacks phenols & naphtolenes;N-fixer)

Bacteria

Achromobacter metaloaligenes (utilized pentoses)
Arthrobacter tumescens (heterotrophic nitrification)
Bacillus pasteurii (urease producer)
Bacillus subtilis (amylase and protease producer)
Cellulomonas sp (cellulose decomposer)
Cytophaga sp (sea water)
Escherichia coli (decarboxylase producer)
Flavobacterium dehydrogenans (dehydrogenase producer)
Pseudomonas fluorescens (nitrogen fixation)
Pseudomonas saccharophila (marine organism; many enzymes)
Rhizobium japonicum (nitrogen fixation)
Thiobacillus thiooxidans (sulfure metabolism)

Algae

Chlamydomonas reinhardi
Chlorella vulgaris
Nostoc muscorum

FUNGUS AND SPECIAL FUNCTION

Aspergillus fumigatus (extracellular proteases)
Aspergillus flaschentraegeri (inhibition of Trichoderma sp)
Aspergillus oryzae (amylolytic enzymes)
Chaetomium globosum (cellulose decomposer)
Fusarium equiseti (antibiotic producer)
Fusarium solani (hydrolytic enzyme producer)
Gliomastix convoluta (cellulose decomposer)
Humicola grisea (cellulose, lignin and pectin decomposer)
Mortierella alpina (pectin decomposer)
Mucor hiemalis (sludge digester)
Mucor hiemalis (phosphate removal from sewage)
Myrothecium roridum (cellulose decomposer; polyphenoloxidases)
Myrothecium verrucaria (cellulose decomposer; polyphenoloxidases)
Penicillium chrysogenum (antibiotic producer)
Penicillium notatum (antibiotic producer)
Scopulariopsis brevicaulis (arsenic metabolism)
Scopulariopsis koningii (cellulose, lignin and xylane decomposer)
Stachybotrys chartarum (cellulose, lignin and xylane decomposer)
Trichoderma viride (cellulose decomposer; fungal antagonist)

Results

At rates of 0, 5, 25 and 125 ppm CGA-48988 in nutrient media, no effect was noted on the growth of the microorganisms tested.

Conclusions

At use rates, CGA-48988 will not affect soil microorganisms.

- 3.3 Effects of N-(2,6-dimethylphenyl)-N(methoxyacetyl)-alanine methyl ester (CGA-48988) on the Degradation of ^{14}C -Cellulose, ^{14}C -Protein and ^{14}C Starch in Soil, C.D. Ercegovich and E.R. Bogus, Penn State, acc #238231, page 228.

Procedure

Two soils, a Morrison sandy loam (72% sand, 17% silt, 11% clay, 1.2% OM, pH=5.2, moisture at 1/3 atm = 11.3%) and on Hagerstown silt loam (18% sand, 66% silt, 16% clay, 2.7% OM, pH=6.2, moisture at 1/3 atm = 32.2%) were sieved and fortified to 1% of either ^{14}C -cellulose, ^{14}C -protein or ^{14}C -starch. Aliquots of 50 grams from each of the ^{14}C fortified soils were then amended with CGA-48988 to 5, 25 and 125 ppm by adding 0.5 ml from the appropriate ethanol stock solutions. All samples, including the controls, received 0.5 ml ethanol and were adjusted to 75% moisture capacity. The incubation bottles were closed and had CO_2 - free moist air drawn through them and then through NaOH solution to capture evolved $^{14}\text{CO}_2$.

Methods of analysis

Initial and final ^{14}C soil activity levels were determined by combustion of soil aliquots and $^{14}\text{CO}_2$ content in the traps were determined by direct LSC of the trapping solution.

Results

During the 28 day soil incubation period no significant differences in $^{14}\text{CO}_2$ evolution were found in any soil at any of the CGA-48988 testing levels (0-125 ppm).

Conclusions

CGA-48988, applied at use rates will not adversely affect cellulose, protein or starch metabolism in soil.

- 3.4 The Effects of 5, 25 and 125 ppm of CGA-48988 N-(2,6-dimethylphenyl)-N-(methoxyacetyl)-alanine methyl ester on Soil Nitrification, C.D. Ercegovich, et. al., Penn State, acc. #238231, page 235.

Procedure

A Hagerstown silt loam and a Morrison sand loam (see section 3.3 above for soil profiles), amended with ammonium sulfate, were treated with CGA-48988 resulting in concentrations of 5, 25 and 125 ppm of the pesticide. During 8 weeks of incubation at 28 °C, 80% relative humidity and 75% soil moisture capacity, soil samples were taken for nitrate analysis.

Method of analysis

Phenylmercuric acetate (0.4% solution to inhibit microbial activity during analysis) and water were added to the soil samples. The mixture was then centrifuged, the supernatant was removed and treated with KF solution to bring the ion strength to a constant background. A nitrate specific ion electrode was used to determine nitrate.

Results

There were no significant differences between the CGA-48988 treated and untreated soils with regard to nitrification except for the 125 ppm treated Hagerstown silt loam. In that soil some inhibition (42-85%) was seen for the first 3-4 weeks, but recovery was full by 4 weeks.

Conclusions

CGA-48988, used at the recommended label rates, is not expected to effect soil nitrification.

- 3.5 Effects of Pesticides on Soil Microorganisms, D.A. Laskowski, Dow Chemical, Midland Michigan, Jan. 24, 1979, acc #238232, page 209.

This is a very general report not dealing with CGA-48988 specifically but with pesticides in general.

When reviewed for 6a2 data, it was found not to contain information regarding unreasonable adverse effects of CGA-48988 on the environment

- 3.6 Accumulation and Elimination of ¹⁴C - Residues by Bluegill Sunfish (Lepomis macrochirus) Exposed to \emptyset -14C-CGA-48988; report #BW-78-10-328, Bionomics, April 1979, acc #238232, page 63.

Procedure

Bluegill (5.6 ± 2.5 gm, 7.3 ± 0.9 cm, N=150) were exposed to ^{14}C - CGA-48988 at a level of 1 ppm in the water via continuous flow for 29 days. During the study, the pH was 7.0-7.2, the dissolved oxygen concentration was maintained above 60% saturation by aeration and the mean temperature was kept at 17.0 ± 0.5 °C. After exposure, the remaining fish were placed in depuration aquaria.

Methods of analysis

Water samples taken during exposure and depuration were analyzed directly by LSC and also by extraction with methylene chloride and LSC of the extract. The methylene chloride extract was then evaporated and diluted with hexane followed by GC analysis. The % recoveries were 77 and 75 % for LSC and GC respectively, with a detectable minimum of 0.01 ug/ml per 500 ml water sample.

Residues in the edible and non-edible fish tissues were determined by combustion/LSC and also by extraction with methanol/water (4:1), evaporation of the methanol and extraction of the aqueous phase with methylene chloride. The organic and aqueous phases were analyzed by LSC. If adequate residues (≥ 0.5 ppm in organic fractions) are found in the fish tissues, characterization by TLC will be done.

Results

1) ¹⁴C - Residues (as parent CGS-48988) in Water and Fish

Day		Water	Edible	BF	Non-Edible	Whole Fish*		
		ppm	ppm		ppm	BF	ppm	BF
exposure	0	0.99						
	1	0.96	0.94	.98	5.04	3.25	2.64	2.75
	3	1.14	0.72	.63	9.01	7.90	3.99	3.50
	7	0.90	0.79	.88	8.02	8.91	3.78	4.20
	10	0.96	0.58	.60	6.65	6.93	3.02	3.16
	14	0.94	0.66	.70	13.77	14.65	5.83	6.20
	21	0.94	0.62	.66	7.99	8.50	3.64	3.87
	29	0.95	0.66	.69	4.62	4.86	2.23	2.35
	depuration	1	<0.01	0.45		5.13		2.30
3		<0.01	0.24		1.38		0.70	
7		<0.01	<0.25		0.43		<0.32	
9		<0.01	0.23		0.31		0.26	
14		<0.01	0.25		0.70		0.43	

* based on radiometric analysis of individual tissue portions

2) Identification or characterization of the activity in the fish was not done due to the low levels found.

Conclusions

1) When exposed to CGA-48988 at 1 ppm in the water, bioaccumulation levels in the whole fish are not expected to exceed 7X. Residues prefer to concentrate in the non-edible portions over the edible portions in a ratio range of 4:1 to 15:1.

2) More than half of the accumulated residues are discharged after 3 days of depuration and continue to be discharged as the depuration period continues.

3) The low levels of accumulation did not permit identification of the fish residues.

4) Previously reviewed hydrolysis data, which shows the parent to be stable under conditions of this experiment allow the conclusion that the fish were exposed to unchanged CGA-48988 during the exposure period.

3.7 Kinetics of ϕ - ^{14}C -CGA-48988 in a Model Aquatic Ecosystem, report #BW-79-2-401, Bionomics, Feb. 1979, acc #238232, page 122.

Procedure

A sandy loam soil (68% sand, 26% silt, 6% clay, 2.6% OM, pH=6.4, (EC=8.5) fortified to 3.3 ppm (oven dry weight) with ϕ - ^{14}C -CGA-48988 and adjusted and maintained to 70% field moisture capacity was aerobically aged for 30 days outdoors (temperature range was -3 to 15 °C). After aging, the soil was flooded with well water (pH=7.1) to a depth of 51 cm and allowed to equilibrate for 3 days. The system was maintained at 18 ± 2 °C and at 78-87% of dissolved oxygen saturation. After equilibration, catfish (5.1 ± 1.4 gm, 82.1 ± 7.8 mm, N=300) were added to the system for 28 days of exposure. This was followed by a 14-day depuration period. Water, soil and fish were analyzed for residues.

Method of analysis

The soil was analyzed by direct combustion. It was also extracted with methanol/water followed by analysis of the combusted soil via combustion. The extract was heated gently, evaporating the methanol and the remaining aqueous portion was analyzed by LSC and was also extracted with methylene chloride. The aqueous fraction was analyzed by LSC and the organic fraction by LSC and TLC.

Water samples were centrifuged followed by direct counting of the supernatant. The water was also extracted with methylene chloride with an aliquot of the organic fraction counted directly and an aliquot concentrated, mixed with hexane and analyzed by GC and TLC.

Edible and non-edible fish tissue portions were combusted directly. If results are 0.05 ppm, then additional characterization and identification will be done.

Results

1) Distribution of ¹⁴C During Catfish Residue Uptake Study

Day	Soil ppm	Water ppm	Edible ppm	Non-Edible ppm	Whole Fish ppm
Aging 0	2.27				
7	2.03				
14	2.27				
21	1.80				
30*	2.47				
33	--	0.016			
Exposure 0		0.020			
1	1.43	0.049	0.052	0.009	0.025
3	0.77	0.068	0.011	0.019	0.016
8	0.54	0.100	0.016	0.029	0.024
10	0.66	0.095	0.019	0.023	0.021
15	0.93	0.110	0.019	0.030	0.026
21	0.62	0.117	0.018	0.029	0.025
28	0.67	0.137	0.018	0.029	0.025
Depuration					
1	-	ND**	0.002	0.007	0.005
3	-	ND	0.004	0.007	0.006
7	-	ND	0.002	0.004	0.003
10	-	ND	<0.005	0.005	<0.005
14	-	ND	<0.003	0.003	<0.003

* soil flooded - begin 3 day equilibration period

** ND = ¹⁴C level below detectable limits

- 2) Bioaccumulation factors were 1X or below in the edible, non-edible and whole fish portions at all exposure sampling time.
- 3) Due to the low residues in fish and water, characterization and identification was not done.

Conclusions

Accumulation of aged residues of CGA-48988 above 1X in catfish is not expected. Also, during depuration, 80% and greater of the residues accumulated are discharged after 14 days.

3.8 Residue Report AG-A 4604 I, II, III, IV, V, VI-A, project number 409004, acc #238232, page 266.

Procedure

A 135 ft. X 60 ft portion of a tobacco field in Rockingham, N.C. consisting of sandy loam soil (76% sand, 14% silt, 10% clay, 0.9% OM, pH= 5.7; CEC = 5.9) was treated with CGA-48988 SOW on May 16, 1977 at 0.75, 3 and 6 lb ai/A. (The plot was treated 3 weeks previously with Mocap, Dyfonate and Tillam). Half of the applied ai/A was applied PPI broadcast to the plot and half was applied with transplant water when planting tobacco. Both applications were made the same day.

Soil samples were taken to 12 inches in 6 inch increments.

Method of analysis

Method AG-323 was used to analyze the soil for CGA-48988 and the degradation product CGA-62826. See the previous review of 100-ANN dated Feb. 26, 1979, sections 3.1 and 3.2.

Recoveries were 80 - 122% from 0.05 - 5.0 ppm fortification levels

Results

1) CGA-48988 (ppm) Found after Application to a Field Plot

Rate lb ai/A	Soil Depth inches	Day					
		0	31	63	92	121	228
0.75	0-6	6.85	5.32	1.58	0.27	0.08	<0.05
0.75	6-12		0.42	0.71	0.22	0.62	<0.05
3.0	0-6	3.05	0.53	0.90	1.04	0.96	0.20
3.0	6-12		<0.05	0.08	1.13	0.38	0.06
6.0	0-6	4.55	1.21	0.64	0.90	1.61	0.16
6.0	6-12		<0.05	<0.05	0.80	0.22	0.31

2) CGA 62826 (ppm) Found After Application of CGA-48988 to a Field Plot

Rate lb./A.	Soil Depth inches	Day					
		0	31	63	92	121	228
0.75	0-6	0.10	0.17	0.07	0.14	<0.05	<0.05
0.75	6-12		<0.05	0.07	0.35	<0.05	<0.05
3.0	0-6	<0.05		<0.05	<0.05	<0.05	<0.05
3.0	6-12		<0.05	<0.05	0.13	0.05	<0.05
6.0	0-6	0.06	<0.05	<0.05	<0.05	0.06	<0.05
6.0	6-12		<0.05	<0.05	<0.05	<0.05	0.09

Conclusions

1) The CGA-48988 was applied unevenly to the soil (half as broadcast and half as transplant water when planting tobacco). It cannot be determined from this study if soil sampling was done close to the plants where the soil received both treatments or between the rows where the soil received only the broadcast treatment.

The results cannot be interpreted without this clarification.

2) In any case, information will not be gained from this study that would add to or alter what is currently known about the dissipation of CGA-48988 under field conditions. (See the previous review of 100-ANN dated Feb. 26, 1979 for field dissipation data).

3.9 Residue REport 4604 VII, project number 409007, acc #238232, page 281.

Procedure

See procedure of field study in section 3.8 above.

Soil samples were taken to 18 inches in 6 inch increments.

Method of Analysis

Method AG-323 was used. See field study in section 3.8 above for further information.

Recoveries were 71-97% from 0.05-0.5 ppm fortification levels.

Results

Residues (ppm) Found 326 Days Post Application

<u>Rate</u> <u>(lb ai/A)</u>	<u>Soil Depth</u> <u>(inches)</u>	<u>CGA-48988</u>	<u>CGA-62826</u>
3	0-6	0.06	< 0.05
	6-12	0.16	< 0.05
	12-18	0.07	0.07
6	0-6	0.15	< 0.05
	6-12	0.12	< 0.05
	12-18	0.07	0.06

Conclusions

The conclusions are the same as those for the field dissipation study reviewed in section 3.8, above.

Procedure

A 9 ft. X 30 ft portion of a potato field in Columbia County, NY, consisting of Hoosic Gravelly loam (66% sand, 28% silt, 6% clay, 2.1% OM, pH = 6.9 and CEC = 8.1) was treated with CGA-48988 50W (1.75 lb ai/A) with and without each of the following: captafol 4F (10.5 lb ai/A) mancozeb 80W (11.2 lb ai/A) and chlorothalonil (7.88 lb ai/A). The date of application was June 20, 1977.

Soil samples were taken to 6 inches. Rainfall during the experiment was normal but the amount was not reported.

Method of analysis

Method AG-323 was used to analyze the soil for CGA-48988 and the degradation product CGA-62826. See the previous review of 100-ANN dated Feb. 26, 1979, sections 3.1 and 3.2

Recoveries were 79-98% at 0.05 - 2 ppm fortification levels.

Results

1)	Treatment	CGA 48988 (ppm) found (1.75 lb ai/A initial)				
		<u>0 day</u>	<u>30 day</u>	<u>60 day</u>	<u>120 day</u>	<u>283 day</u>
	CGA-48988	0.69	0.17	0.38	0.23	0.12
	CGA-48988 + captafol	0.49	0.16	0.30	0.28	0.21

2) Residues of the degradation product CGA-62826 were not reported.

3) The results of CGA-48988 when used with mancozeb or chlorothalonil were not reported.

Conclusions

1) Soil samples were not taken to 12 inches during this study. This would be necessary since other field studies (sections 3.8 and 3.9 above) show significant residues are found beyond 6 inches after 60 days of aging under field conditions. Previously reviewed data (see review of 100-ANN dated Feb. 26, 1979, sections 3.6 and 3.7) also shows CGA-48988 and its aged soil residues to leach.

2) In any case, information will not be gained from this study that would add to or alter what is known about the dissipation of CGA-48988 under field conditions. (See the previous review of 100-ANN dated Feb. 26, 1979 for field dissipation data).

3.11 Investigation of the Metabolism by Activated Sludge of the Compound CGA-48988, UCES Project No. 11506-96, acc no. 238231, page 114.

Since this study is not required for the proposed uses, it was not subjected to a review for registration, but was briefly reviewed for 6a2 information only. When a use of CGA 48988 requiring such a study is proposed, the data must be submitted for a complete registration review.

Review for 6a2 information - At ¹⁴C- CGA-48988 concentrations of 2 and 50 ppm and up to 96 hours incubation, 92-100% of the initial activity is in the effluent as 85% parent compound and 4 degradation products each less than 5%. Only 2% of the activity is associated with the solids. This indicates that CGA-48988 and degradation products formed will be discharged from the treatment plant with the effluent.

Effects on the microorganisms and the activated sludge process were not examined.

3.12 Effects of CGA-48988 on the Performance of the Activated Sludge Process, by Union Carbide Environmental Services, November, 1978, acc #238231, page 268.

Since this study is not required for the proposed uses, it was not subjected to a review for registration, but was briefly reviewed for 6a2 information only. When a use of CGA-48988 requiring such a study is proposed, the data must be submitted for a complete registration review.

Review for 6a2 information - Of the parameters monitored in this study:

- (1) Influent - total suspended solids (TSS), total organic carbon (TOC) and pH;
- (2) Effluent - TSS, TOC, turbidity and pH;
- (3) Mixed liquor - TSS, pH, dissolved oxygen (DO), oxygen uptake rate (OUR), initial settling rate (ISR), microscopic examination (floc size, ciliate presence, filament growth and plate counts;
only TOC in the effluent and plate counts showed effects.
At CGA-48988 levels of 50 and 100 mg/l, TOC values 4 and 8 times higher than the control were found, respectively. Plate counts taken at 0.1 mg CGA-48988 per liter showed decreased bacteria and fungal counts.

This indicates continuous treatment of an activated sludge unit with CGA-48988 at 50 mg/l and higher inhibits breakdown of organic carbon and allows TOC to build up and pass through the system in the effluent.

The fate of the CGA-48988 was not monitored in this study.

4. CONCLUSIONS

4.1 Environmental fate profile

Under conditions likely to be found in the environment, Ridomil will be stable to hydrolysis and soil surface photolysis. However it will photodegrade in water with a half-life of 1 week forming CGA-62826 in small (5%) amounts plus 4 unidentified polar compounds (totaling 17%) and production of some (12%) volatile compounds. Aqueous photolysis in the presence of photosensitizers greatly accelerates degradation of Ridomil to a half-life of 1 hour.

In soil, under aerobic conditions, Ridomil can be expected to degrade with a half-life of about 7 weeks, with CGA-62826 being the principle product. The CGA-62826 then breaks down to non-extractable material and CO₂. Under anaerobic soil conditions, Ridomil degrades with a half-life of about 9 weeks with CGA-62826 being the major product but persisting longer than under aerobic conditions. Ridomil is stable in sterile soil, indicating soil microbes contribute to its breakdown under non-sterile conditions.

At use rates, Ridomil will not affect soil microbe growth, metabolism of cellulose, protein or starch or nitrification.

Ridomil and its aged soil residues are highly mobile via leaching in sandy soils low in organic matter but loss of Ridomil due to volatilization is not expected. Also, soil adsorption of Ridomil is minor, as supported by its high leachability.

Under field conditions, the fate of Ridomil in soil is similar to that under aerobic and anaerobic lab conditions, as described above, except for the shorter half-life of 2 weeks under field conditions.

Exposure of fish to the parent compound or soil aged residues will not result in accumulation values above 10X in the whole fish. Also, during 14 days of depuration, 80% and more of the accumulated residues will be discharged.

4.2 The additional field dissipation data submitted cannot be fully interpreted. See the reviewed studies in sections 3.8, 3.9 and 3.10 above, for the reasons. In any case, information will not be gained from these studies that would add to or alter what is currently known about the dissipation of CGA-48988 under field conditions. (See the previous review of 100-ANN dated Feb. 26, 1979 for field dissipation data).

4.3 Two activated sludge studies were submitted even though such data is not required to support the proposed uses. However, the studies were reviewed for 6a2 information and it was found in one study (reviewed in section 3.11 above) that CGA-48988 is essentially unchanged by the treatment process and it and the degradation products formed will be discharged from the treatment plant with the effluent. In the other study (reviewed in section 3.12 above), levels of 50 and 100 mg CGA-48988 per liter inhibited breakdown of organic carbon allowing the organic carbon to build up and pass through the system in the effluent.

Since these activated sludge studies were not subjected to a registration review, they will have to be resubmitted or referenced for review when a use of CGA-48988 requiring such studies is proposed.

4.4 The data requirements for effects on soil microbes, fish accumulation and photolysis in water have been satisfactorily met.

4.5 The degradation product CGA-62826 forms in water when the parent is subjected to artificial sunlight. This information is to be added to section 3.17 of the previous review of 100-ANN dated Feb. 26, 1979.

4.6 Potential for groundwater contamination

Ridomil and its soil aged residues leach very strongly in loamy and silty soils low in organic matter and especially strongly in sandy soils posing possible groundwater contamination. Hydrolysis in groundwater would have little effect on the degradation of Ridomil but microbes would degrade it. In soil, under the influence of soil microbes, parent material will decline steadily while amounts of product CGA-62826 and non-extractable material will increase.

<u>Time</u>	<u>%parent(Ridomil)</u>	<u>%CGA-62826</u>	<u>%non-extractable</u>
1 mo.	60	30	6
3 mo.	19	48	20
6 mo.	5	33	37
12 mo.	< 2	23	38

Therefore, several factors, such as how fast leaching occurs, rainfall, soil microbes present and the depth of the water table will determine the relative amounts of Ridomil and its degradation reaching groundwater. Also, Ridomil contaminated groundwater reaching the surface would be subject to photolysis. Ridomil does photodegrade in water forming small amounts of CGA-62826 and unidentified products.

Ridomil or its degradation products in groundwater are not expected to accumulate in fish since lab studies show low (10X) whole fish accumulation levels. However, residue amounts that would be present for human consumption via drinking and whether residues would be taken up by crops irrigated with contaminated groundwater is not known.

Attention is drawn to the proposed citrus use - an agricultural area incorporating sandy soil - and the high leachability of Ridomil and its soil aged residues. Use of Ridomil as proposed may result in residues reaching groundwater. We defer to EEB on the need for additional environmental fate data.

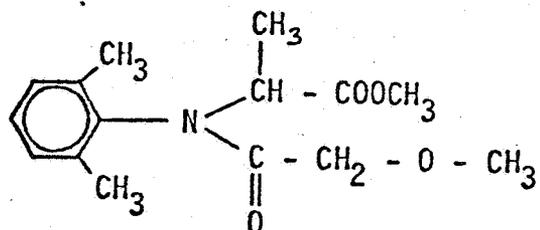
4.7 Executive summary

Ridomil is stable to hydrolysis and soil surface photolysis but does photodegrade in water with a halflife of 1 week. Photosensitizers accelerate degradation. Aerobic and anaerobic soil halflives are 7 and 9 weeks, respectively with CGA-62826 forming which in turn breaks down. Soil microbes metabolize Ridomil by soil microbe functions are not affected at use rates. Ridomil and its soil residues leach strongly in soil and especially strongly in sandy soils low in organic matter. Groundwater contamination is a strong possibility considering the proposed citrus use. Ridomil dissipates under field conditions with a halflife of 2 weeks and accumulation in whole fish is not expected to exceed 10X.

4.8 Parent, degradation products and where they occur

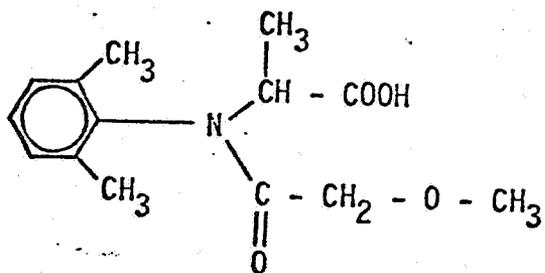
Structure

where occurs



parent

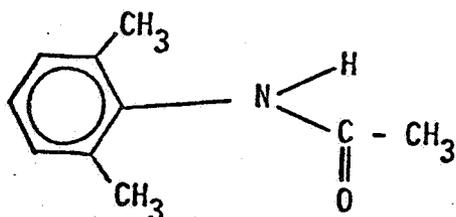
N-(2,6-dimethylphenyl)-N-
(methoxyacetyl)-alanine methyl ester



soil (aer. & anaer.)
rats (urine and feces)
hydrolysis at pH 1, 9,
10 at > 50°C
potato stalks
tobacco

CGA-62826

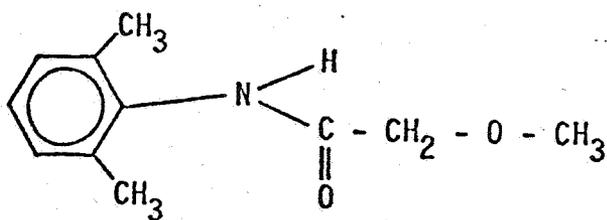
N-(2,6-dimethylphenyl)-N-
methoxyacetyl)-alanine



soil (aer) - minor

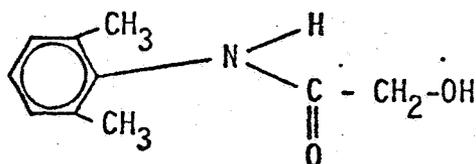
CGA-42447

2,6-dimethylacetanilide



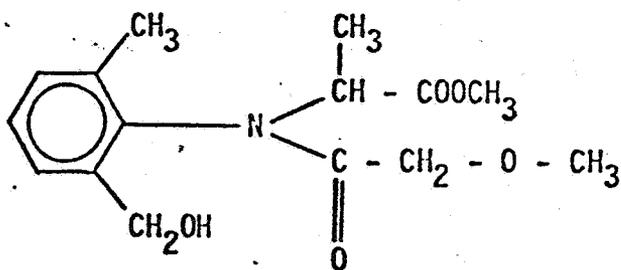
rats (urine)

CGA-67868
N-(2,6-dimethylphenyl)-N-
 (methoxyacetyl)-alanine



rats (urine)

CGA-37734
N-(2,6-dimethylphenyl)- N-
 (hydroxyacetyl) alanine



rats (urine)

N-(2-methyl-6-hydroxymethylphenyl)-
N-(methoxyacetyl)-alanine

5. RECOMMENDATIONS

5.1 The fate of CGA-48988 (Ridomil) in the environment has been satisfactorily described and has been found to have the potential to leach into groundwater supply. Attention is drawn to the proposed citrus use - an agricultural area incorporating sandy soil - and the high leachability of Ridomil and its soil aged residues. Use of Ridomil as proposed may result in residues reaching groundwater. This will also apply to all uses in areas of sandy soil such as turf, etc.

Samuel M. Creeger Oct 24, 1979

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August 24, 1979
Review Section #1
Environmental Fate Branch