IDRODIDA.LTR
7/92

DP Barcode: D165904
Shaughnessy No.: 109801
Date Out of EFGWB:

DEC 24 1991

TO: Barbara Briscoe/Kathryn Davis
Product Manager #51
Registration Division (H7505C)

FROM: Emil Regelman
Supervisory Chemist, Review Section #2
OPP/EFED/EFGWB (H7507C)

THROUGH: Henry Jacoby, Chief
OPP/EFED/EFGWB (H7507C)

Henry Jacoby

Attached, please find the EFGWB review of . . .

Reg./File # : 109801-000264

Common Name : Iprodione

Chemical Name : 3-(3,5-Dichlorophenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide or 3-(3,5-dichlorophenyl)-N-isopropyl-2,4-dioxoimidazolidine-1-carboxamide

Product Type : Fungicide

Product Name : Rovral, RP 26019, Glycophene, Chipco 26019, LFA 2043, NCR 910, ROP 500 F.

Company Name : Rhône-Poulenc Ag Company

Purpose : Review of a Photodegradation on Soil (161-3) study.

Date Received: 5/20/91 Action Code: 627

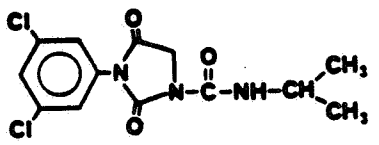
EFGWB # (s): 91-0719

Deferrals to:

_____ Ecological Effects Branch/EFED
_____ Science Integration & Policy Staff/EFED
_____ Non-Dietary Exposure Branch/HED
_____ Dietary Exposure Branch/HED
_____ Toxicology Branch I, II/HED

1. **CHEMICAL:**

Chemical Name: 3-(3,5-Dichlorophenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide or 3-(3,5-dichlorophenyl)-N-isopropyl-2,4-dioxoimidazolidine-1-carboxamide
CAS No.: 36734-19-7
Common Name: Iprodione
Trade Names: Rovral, RP 26019, Glycophene, Chipco 26019, LFA 2043, NCR 910, ROP 500 F.
Chemical Structure:



Molecular Formula: $C_{13}H_{13}Cl_2N_3O_3$
Molecular weight: 330.15 g/mol
Physical/Chemical Properties of Active Ingredient:

Physical state: Non-hygroscopic crystals
Color: White
Odor: Odorless
Solubility at 20 °C: 13 mg/L water; 300 mg/L acetone, acetophenone, anisole; 500 g/L methylene chloride, dimethylformamide, 1-methyl-2-pyrrolidone; 25 g/l ethanol, methanol; 200 mg/L benzene.
Vapor pressure (at 20 °C): $< 1.0 \times 10^{-5}$ mm Hg (< 0.133 mPa)
Melting point: ca. 136 °C
Formulations: 50% WP or FC
Active ingredient..... 50%
Inert ingredients..... 50%

2. **TEST MATERIAL:**

Active ingredient.

3. **STUDY/ACTION TYPE:**

Review of a Photodegradation on Soil (161-3) study.

2

4. **STUDY IDENTIFICATION**:

Ayliffe, J.M., Outram, J.R. and Reeves, G.L. 1991. *Iprodione-^{14}C: Soil Photolysis Study*. Laboratory Project ID: P91/048. Performed by Rhône-Poulenc Agriculture Ltd., Essex, England, and submitted by Rhône-Poulenc Ag Company, Research Triangle Park, NC. (MRID #419121-01)

5. **REVIEWED BY**:

María Isabel Rodríguez
Chemist, Review Section #2
OPP/EFED/EFGWB

Signature: María Isabel Rodríguez
Date: December 18, 1991.

6. **APPROVED BY**:

Emil Regelman
Supervisory Chemist
Review Section #2
OPP/EFED/EFGWB

Signature: E Reg
Date: DEC 24 1991

7. **CONCLUSIONS**:

The submitted study is not acceptable and cannot be used to fulfill the Photodegradation on Soil (161-3) data requirement.

Dark controls were not incubated under similar conditions as those of the irradiated samples, therefore, the data are considered to be of uncertain value. As a result, the photodegradation of iprodione on soil cannot be adequately assessed.

8. **RECOMMENDATIONS**:

The registrant, Rhône-Poulenc Agricultural Company, should be informed that the submitted Photodegradation on Soil (161-3) study was not acceptable. Therefore, the requirement remains a data gap and a new study has to be submitted for review.

9. **BACKGROUND**:

Iprodione is a contact fungicide active against a broad spectrum of diseases including Botrytis, Sclerotinia, Monilinia, Alternaria, Helminthosporium, Fusarium, and Rhizoctonia. According to the label it is registered for use on vegetables (lettuce, broccoli, carrots, onions, garlic, beans, peanuts, potatoes, caneberries, and ginseng), orchard (apricots, cherries, nectarines, peaches, plums, prunes, almonds, and grapes) crops. The maximum application rates are 4.0 lb ai/A on field and vegetable crops and 2.0 lb ai/A on orchard crops.

The registrant is submitting a Photodegradation on Soil (161-3) study as part of the re-registration process for iprodione.

An environmental-fate summary table for iprodione is attached to this review.

10. **DISCUSSION OF INDIVIDUAL STUDIES**:

Refer to attached Data Evaluation Record (DER).

11. **COMPLETION OF ONE-LINER**:

The EFGWB One-liner database for iprodione was updated with this review.

12. **CBI APPENDIX**:

All data reviewed here are considered "confidential business information" by the registrant and must be treated as such.

ENVIRONMENTAL-FATE SUMMARY TABLE FOR IPRODIONE:

Data Requirements and Guidelines Reference #	Submitted Studies/ Addendums	DER[1]/Addendum Review/Summary Identification	DER/Addendum Review/Summary Review Conclusions	Additional Data Required?
1. DEGRADATION -- LAB:				
161-1: Hydrolysis	418854-01	EFGWB #91-0712 (12/8/91)	Acceptable	No
161-2: Photodegradation in Water	418619-01	EFGWB #91-0712 (12/8/91)	Not acceptable	Yes
161-3: Photodegradation on Soil	419121-01	This review (EFGWB #91-0719)	Not acceptable	Yes
161-4: Photodegradation in Air	N/A	N/A	N/A	Yes
2. METABOLISM -- LAB:				
162-1: Aerobic Soil	000682-85	No DER Sum[2] (92083-022)	N/A Not Reviewable	Yes[3]
162-2: Anaerobic Soil	N/A	N/A	N/A	Waived[4]
162-3: Anaerobic Aquatic	417558-01	SIR[5] (EFGWB #91-0399)	SIR	SIR[6]
162-4: Aerobic Aquatic	419276-01	EFGWB #91-0725/0726 (12/8/91)	Not acceptable	Yes[6]

...Continues...

Data Requirements and Guidelines Reference #	Submitted Studies/ Addendums	DER[1]/Addendum Review/Summary Identification	DER/Addendum Review/Summary Review Conclusions	Additional Data Required?
3. **MOBILITY**:				
163-1: Leaching and adsorption/desorption	N/A	N/A	N/A	Yes
163-2: Laboratory Volatility	N/A	N/A	N/A	Yes
163-3: Field Volatility	N/A	N/A	N/A	Yes
3. **DISSIPATION -- FIELD**:				
164-1: Soil	N/A	N/A	N/A	Yes
164-2: Aquatic (sediment)	001622-18	DER (SIR) Sum (92083-023)	SIR Reviewable	SIR[6]
4. **ACCUMULATION**:				
165-1: Confined Rotational Crops	N/A	N/A	N/A	Yes
165-3: Irrigated Crops	001622-18	DER (SIR) Sum (92083-023)	SIR Reviewable	SIR
165-4: In Fish	001622-21	No DER Sum (92083-024)	N/A Not Reviewable[7]	Yes
	001622-22	No Sum (92083-024)	N/A Not Reviewable[7]	
5. **GROUND WATER MONITORING**:				
166-1: Small Scale Prospective	N/A	N/A	N/A	Reserved[8]

...Continues...

Data Requirements and Guidelines Reference #	Submitted Studies/ Addendums	DER[1]/Addendum Review/Summary Identification	DER/Addendum Review/Summary Review Conclusions	Additional Data Required?
166-2: Small Scale Retrospective	N/A	N/A	N/A	Reserved[8]
166-3: Large Scale Retrospective	N/A	N/A	N/A	Reserved[8]
6. SURFACE WATER:				
167-1: Field Runoff	N/A	N/A	N/A	Reserved[8]
167-2: Surface Water Monitoring	N/A	N/A	N/A	Reserved[8]
7. SPRAY DRIFT:				
201-1: Droplet Size Spectrum	N/A	N/A	N/A	Yes
202-1: Drift Field Evaluation	N/A	N/A	N/A	Yes

1 DER = Data Evaluation Record
2 Sum = Summary
3 The study, dated 8/8/1977, was conducted following the 1975 EPA Proposed Guidelines. The study was conducted using foreign soils not compared to United States soils, was not conducted at 25 °C, and experiments were not conducted with each labelled ring. Therefore, a new study following the new Guidelines should be submitted.
4 Waiver was granted because Anaerobic Aquatic Metabolism (162-3)study was conducted and might be used to substitute it (currently undergoing review).
5 SIR = Study in Review
6 Study being repeated as per terms of conditional registration on rice.
7 The experiments should be conducted with each respectively labelled ring.
8 The requirement is to be held in reserve pending results of the Field Dissipation (164-1) study.

...Continues...

→ Enclosures →

Environmental Fate & Effects Division PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY **IPRODIONE** Last Update on December 18, 1991 [V] = Validated Study [S] = Supplemental Study [U] = USDA Data			
LOGOUT	Reviewer:	Section Head:	Date:

Common Name: IPRODIONE
PC Code # : 109801 CAS #: 36734-19-7 Caswell #:

Chem. Name : 3-(3,5-Dichlorophenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide
Action Type: FUNGICIDE

Trade Names: GLYCOPHENE; ROVRAL 4F; RP 26019; CHIPCO 26019; others.
(Formul'tn): 50% WP or FC; Granular
Physical State: Non-hygroscopic crystals

Use Patterns (% Usage): Terrestrial food/feed/non-food, outdoor residential, aquatic food, and greenhouse non-food. Vegetables (lettuce, broccoli, carrots, onions, & others), orchard (apricots, almonds, peaches, & others).

Empirical Form: $C_{13}H_{13}Cl_2N_3O_3$
Molecular Wgt.: 330.15 Vapor Pressure: 1.00E -7 Torr
Melting Point : ca. 136 oC°C Boiling Point: °C
Log Kow : 3.1 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured) 3.34E -9 (calc'd)

Solubility in ...					Comments
Water	13.00E		ppm	@20.0 °C	
Acetone	3.00E	2	ppm	@20.0 °C	
Acetonitrile	E		ppm	@ °C	
Benzene	2.00E	2	ppm	@20.0 °C	
Chloroform	E		ppm	@ °C	
Ethanol	2.50E	4	ppm	@20.0 °C	
Methanol	2.50E	4	ppm	@20.0 °C	
Toluene	E		ppm	@ °C	
Xylene	E		ppm	@ °C	
Methylene chloride	5.00E	5	ppm	@20.0 °C	
Dimethylformamide	5.00E	5	ppm	@20.0 °C	

Hydrolysis (161-1)
[V] pH 5.0:131 DAYS
[V] pH 7.0:4.7 DAYS
[V] pH 9.0:1 DAY (For 1991 study: 27 MINUTES)
[V] pH 3.0:STABLE
[V] pH 6.0:20 DAYS
[ ] pH :

8

Photolysis (161-2, -3, -4)
[V] Water:3-7 DAYS
[ ] :
[ ] :For 1991 study: 67 DAYS, pH 5/22 days
[ ] : (2 % acetone sensitized)

[V] Soil :7-14 DAYS ON ClLm ([ ] 1991 study: 182 DAYS on Sandy loam)
[ ] Air :

Aerobic Soil Metabolism (162-1)
[V] 20-70 DAYS, ClLm AND SiLm
[V] 50-70 DAYS ClLm
[V] 30-50 DAYS SlClLm
[ ]
[ ]
[ ]
[ ]

Anaerobic Soil Metabolism (162-2)
[V] 20-50 DAYS ClLm
[V] 50 DAYS SlClLm
[ ]
[ ]
[ ]
[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
[S] 6.4 DAYS IN WATER AND 126 DAYS IN SiLm SEDIMENT.
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Aerobic Aquatic Metabolism (162-4)
[S] DEGRADATE RP-30228 COMPRISED UP TO 50% OF THE TOTAL RESIDUE
[ ] IMMEDIATELY POST-TREATMENT.
[ ]
[ ] For 1991 study: 3-7 DAYS in flooded SiLm SEDIMENT system.
[ ]
[ ]
[ ]

Soil Partition Coefficient (Kd) (163-1)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Soil Rf Factors (163-1)
[V] IN SOIL COLUMN STUDIES, WITH Lm MUD, SdLm, ClLm, AND SiClLm, MOST
[ ] OF THE ACTIVITY WAS IN THE UPPER 10 CM; IN LEACHATE, 2% FROM
[ ] SiClLm, LESS THAN 1% FROM OTHERS.
[ ]
[ ]
[ ]

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[V] 20-40 DAYS SAND, LOAM, SyClLm
[V] 20-40 DAYS SyLmClLm
[V] WITH SAMPLING AT 0-2, 2-4, AND 4-6". T1/2 VALUES WERE:
[ ] - NORTHEASTERN 15-45 DAYS; SOUTHEASTERN 8-30 DAYS;
[ ] - SOUTHWEST 15-90 DAYS; MIDWEST 40-50 DAYS
[ ]
[ ]
[ ]
[ ]
[ ]

Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[ ]
[ ]

Accumulation in Rotational Crops, Field (165-2)
[S] AFTER MAX. USE RATE APPL., DETECTABLE RESIDUES FOUND IN SORGHUM,
[ ] CORN, SOYBEANS, WHEAT, AND PEAS.

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[V] BLUEGILL EDIBLE: 102X, VISCERA 555X, WHOLE 180X.
[V] CATFISH EDIBLE: < 50X, VISCERA 500X, WHOLE < 50X.

Bioaccumulation in Non-Target Organisms (165-5)
[S] EC 50, 96 HR DATA: TROUT, 4.2 PPM, OYSTER, 2.3; DAPHNIA < 0.33,
[ ] BLUEGILL 8.6.

Ground Water Monitoring, Prospective (166-1)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[ ]
[ ]
[ ]

Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Field Evaluation (202-1)
[ ]
[ ]
[ ]
[ ]

Degradation Products

-Dichloroaniline (see enclosure for others)
-RP-30228 accounts for 71% of radioact. in sediment extracts in anaerobic aquatic study.
-pH and temperature have marked effect on persistence.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
IPRODIONE
Last Update on December 18, 1991
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

-List "B" chemical.
-Leaching-soil column study: Glycophene leached 10-15 cm in 30 cm column with 50 cm water in 30 hrs, using LmSd, SdLm,and ClLm. It leached 15-20 cm for SlClLm. Leaching is a potential problem only in soils of acidic pH and fine texture.
-Koc = 700.

References: REG STD and EFGWB Chemical File
Writer : PJH, MIR

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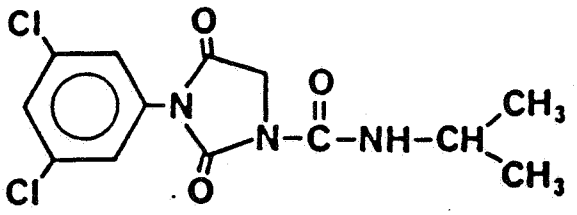
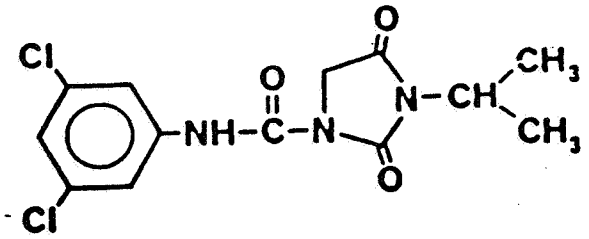
Metabolites
code vs. name

1. RP 30228 3-(1-methyehtyl)-N-(3,5-dichlorophenyl)-2,4-dioxo-1-imidazolidinecarboxamide
2. RP 32490 3-(3,5-dichlorophenyl)-2,4-dioxo-1-imidazolidinecarboxamide
3. RP 30181 3-isopropylhydantoin
4. RP 35606 1-(3,5-dichlorophenyl)carbamoyl-3-(1-methylethyl)-1-ureylene-acetic acid
5. RP 37176 3-)1-methyleth 1)-N-(3,5-dichlorophenyl)-1-ureylene acetamide
6. RP 32247 3-(3,5-dichlorophenyl)-1-ureyleneacetic acid
7. RP 32956 3,5-dichloroaniline
8. RP 36233 3-(3,5-dichlorophenyl)-N-(1-methyethyl)1-ureylene acetamide
9. MK 1 3-(3,4-dichlorophenyl-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide
10. MK 21 3-(3,5-dichlorophenyl)-N-(1-oxo-ethyl)-2,4-dioxo-1-imidazolidinecarboxamide
11. RP 37677 3-(3,5-dichloro-4-hyd oxyphenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide
12. MK 41 3-(3-chloro-5-hydroxyphenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide
13. MK 7060 3-(dihydroxyphenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidinecarboxamide
14. RP 36221 3-(1-methylethyl)-N-(3,5-dichlorophenyl)-1-ureylenecarboxamide
15. RP 35606 1-(3,5-dichlorophenyl)carbamoyl-3-(1-methylethyl)-1-ureylene-acetic acid



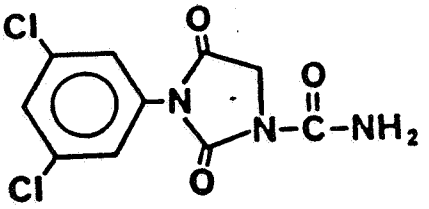
3-(3,5-Dichlorophenyl)-1-isopropyl-aminocarbonyl-2,4-dioxoimidazolidine

(Iprodione, RP-26019)

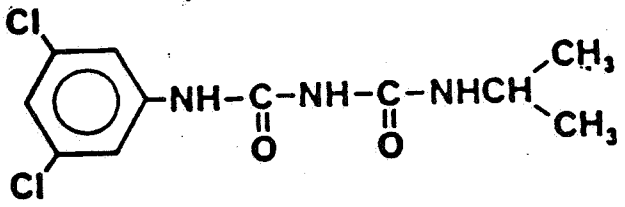


1-(3,5-Dichloroanilino)carbonyl-3-isopropylamino-2,4-dioxoimidazolidine

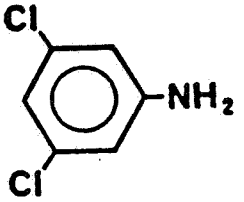
(RP-30228)



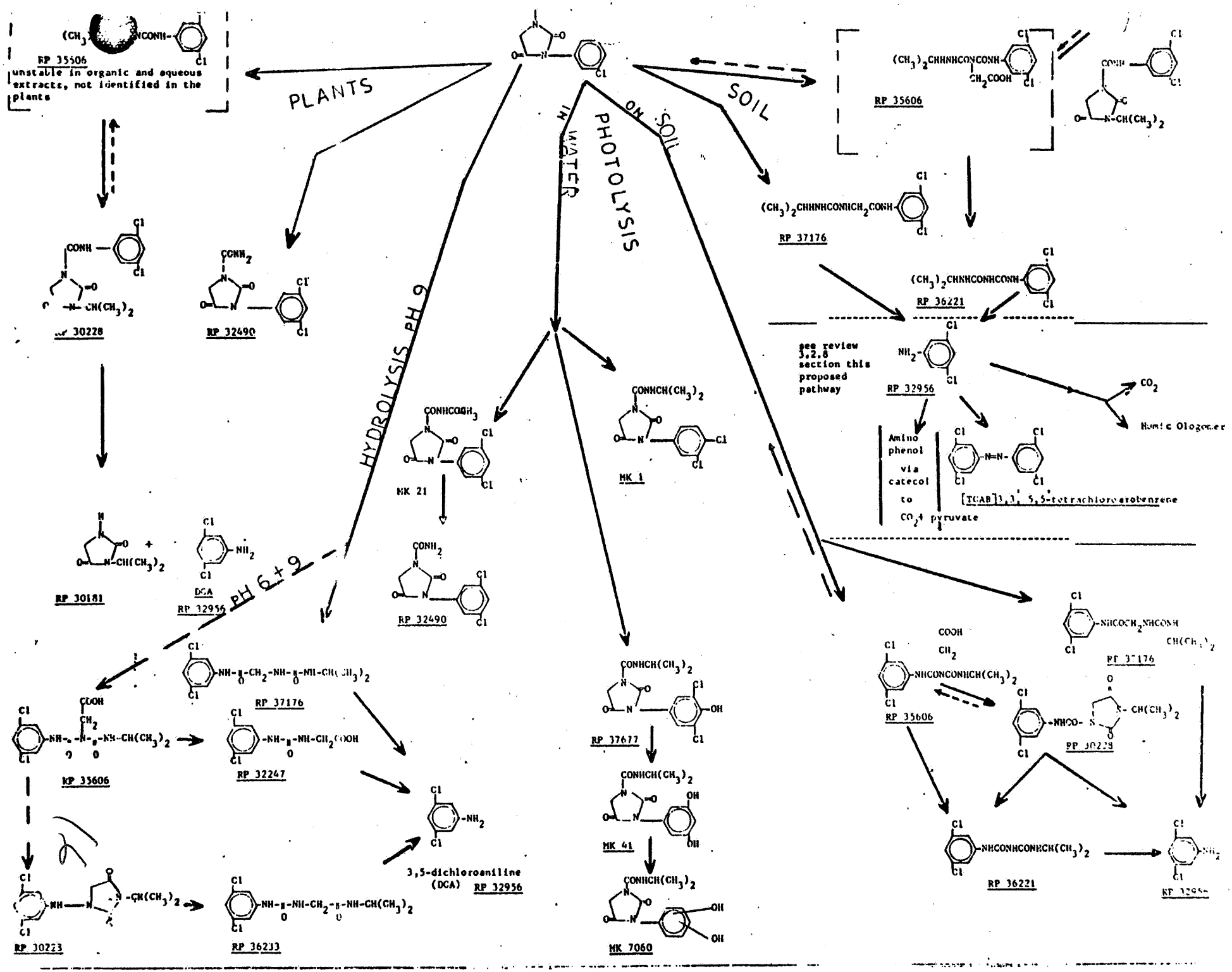
RP-32490



RP-36221



RP-32596


PLANTS
SOIL
IN WATER
PHOTOLYSIS
ON SOIL
HYDROLYSIS PH 9
PH 6+9
RP 35506
unstable in organic and aqueous extracts, not identified in the plants
RP 30228
RP 32490
RP 30181
DCA
RP 32956
RP 35606
RP 37176
RP 36221
see review 3.2.8 section this proposed pathway
RP 32956
Amino phenol via catecol to CO2 + pyruvate
[TCAB] 3,3',5,5'-tetrachloroazobenzene
Humic Oligomer
MK 21
MK 1
RP 32490
RP 35606
RP 32247
RP 37176
3,5-dichloroaniline (DCA) RP 32956
RP 30223
RP 36233
RP 37677
MK 41
MK 7060
RP 35606
RP 30229
RP 37176
RP 36221
RP 32956

IPRODIONE

TASK 1: REVIEW AND EVALUATION OF INDIVIDUAL STUDIES

CONTRACT No. 68D90058

Submitted to:
Environmental Protection Agency
Arlington, VA 22202

Submitted by:
Dynamac Corporation
The Dynamac Building
2275 Research Boulevard
Rockville, MD 20850-3262

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1. Photodegradation on Soil (Ayliffe et al., MRID #419121-01)	1.1
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INTRODUCTION:

Iprodione is a contact fungicide active against a broad spectrum of diseases including Botrytis, Sclerotinia, Monilinia, Alternaria, Helminthosporium, Fusarium, and Rhizoctonia. According to the label it is registered for use on vegetables (lettuce, broccoli, carrots, onions, garlic, beans, peanuts, potatoes, caneberries, and ginseng), orchard (apricots, cherries, nectarines, peaches, plums, prunes, almonds, and grapes) crops. The maximum application rates are 4.0 lb ai/A on field and vegetable crops and 2.0 lb ai/A on orchard crops.

DATA EVALUATION RECORD

PHOTODEGRADATION ON SOIL

CHEM 109801 §161-2

IPRODIONE

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 419121-01
Ayliffe, J.M., Outram, J.R. and Reeves, G.L. 1991. *Iprodione-^{14}C: Soil Photolysis Study*. Laboratory Project ID: P91/048. Performed by Rhône-Poulenc Agriculture Ltd., Essex, England, and submitted by Rhône-Poulenc Ag Company, Research Triangle Park, NC.

DIRECT REVIEW TIME = 7

REVIEWED BY:	L. Binari	TITLE:	Staff Scientist
EDITED BY:	W. Martin OL. Mickley	TITLE:	Staff Scientist Staff Scientist
APPROVED BY:	W. Spangler	TITLE:	Project Manager
ORG:	Dynamac Corporation Rockville, MD		
TEL:	301-417-9800		

APPROVED BY: María Isabel Rodríguez
TITLE: Chemist
ORG: OPP/EFED/EFGWB

SIGNATURE: María Isabel Rodríguez

DATE: December 18, 1991.

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CONCLUSIONS:

Degradation - Photodegradation on Soil (161-3):

1. This study cannot be used to fulfill data requirements.

2. These data are considered to be of uncertain value and should not be used to predict the environmental behavior of iprodione.

3. This study is unacceptable for the following reason:

> the photodegradation of iprodione on soil could not be adequately assessed because the dark controls were not incubated under conditions similar to those of the irradiated samples.

4. Since the dark controls and irradiated samples were not incubated under similar conditions, the problems with this study cannot be resolved with the submission of additional data. A new study must be submitted.

METHODOLOGY:

Twelve samples (50 g dry weight equivalent) of partially air-dried, sieved (2 mm) sandy loam soil (72% sand, 13% silt, 15% clay, 1.2% organic matter, pH 7.1, CEC 8.72 meq/100 g) were placed in metal trays (6.15 x 7.3 cm) to a depth of 1 cm and adjusted to 75% of 0.33 bar moisture. Uniformly phenyl ring-labeled [^{14}C]iprodione (radiochemical purity 98.7%, specific activity 18.89 mCi/mMol, Rhône-Poulenc) plus unlabeled iprodione (purity 99.9%, Rhône-Poulenc), dissolved in acetonitrile, was applied to the soil surface at approximately 2.3 mg/tray (equivalent to 5 kg ai/ha). Six trays of treated soil were placed in a photolysis chamber. The chamber was covered with a quartz glass plate and sealed; the floor of the chamber consisted of an aluminum water jacket connected to a circulating cooling system to maintain the soil samples at 25 °C. Within the photolysis chamber, humidified air was drawn (flow rate unspecified) over the soil samples, then sequentially through a polyurethane foam plug and 2 M potassium hydroxide trapping solution. The soil samples were irradiated on a 9-hour daylight photoperiod using a xenon arc lamp (Heraeus Suntest) equipped with UV filters to eliminate radiation below 290 nm and reduce light intensity above 800 nm (Figure AIV.1). The average intensity of the light source at sample distance (26 cm) was 453 W/m^2, and it was reported that 9 hours of irradiation with the xenon lamp was equivalent to 12 hours of natural sunlight (midday at Ongar, England; latitude 50°N). The remaining six trays of treated soil were placed in a glass desiccator and incubated in darkness at 25 °C to serve as dark controls; the desiccator was attached to a gas collection system as described above. Irradiated and dark control soil samples were weighed daily and water was added as necessary to maintain the moisture content. Individual irradiated and dark control soil samples were collected at 1, 3, 7, 14, 21, and 30 days posttreatment; the foam plugs and trapping solution were replaced at the sampling intervals. For time 0 samples, two additional soil samples contained in glass petri dishes were treated with [^{14}C]iprodione as described above.

The soil samples were Soxhlet extracted for 3 hours with acetonitrile. Aliquots of each extract were analyzed for total radioactivity using LSC, and the remaining extract was evaporated to dryness. The residue was redissolved in acetonitrile and aliquots were analyzed using one-dimensional TLC on silica gel plates developed in methylene chloride:acetone (95:5, v:v) or methylene chloride:ethyl acetate:acetic acid (85:10:5, v:v:v). Radioactive areas were detected and quantified using a TLC linear analyzer; identification was made by comparison with unlabeled reference standards cochromatographed with the samples and visualized by UV absorbance (254 nm). Additional aliquots were analyzed using reverse HPLC on an RP-10-8 column with a mobile phase of acetonitrile:0.05 M ammonium acetate (1:1, v:v) with UV (240 nm) and radioactivity detection. Aliquots of the 30-day soil extracts were analyzed using HPLC/MS to confirm degradate identifications. Unextracted [^{14}C]residues remaining in the soil were quantified using LSC following combustion.

The polyurethane foam plugs were extracted for 3 hours with acetone. Aliquots of the acetone extracts and potassium hydroxide trapping solutions were analyzed for total radioactivity using LSC.

DATA SUMMARY:

Uniformly phenyl-ring labeled [^{14}C]iprodione (radiochemical purity 98.7%), at 5 kg ai/ha, photodegraded with a registrant-calculated half-life of 182 days on sandy loam soil that was irradiated under a 9-hour daylight photoperiod with a UV-filtered xenon arc lamp (average intensity 453 W/m^2) at 17-25 °C for 30 days. The 9 hours of irradiation was reported to be equivalent to 12 hours of summer sunlight at 50° N latitude (United Kingdom). In contrast, [^{14}C]iprodione degraded with a half-life of 10 days on sandy loam soil incubated at 25 °C in the dark. Degradates detected in both the irradiated and dark control soil samples were tentatively identified as

1-(3,5-dichlorophenyl)carbamoyl-3-isopropylhydantoin (RP-30228),

RP-25040 (chemical name not provided), and

3,4-dichloroaniline (RP-32596).

In irradiated soil extracts, at 30 days post-treatment, iprodione comprised 86.6% of the applied radioactivity (Table 8); the degradates RP-30228 (Metabolites E and 7), RP-25040 (Metabolite 2), RP-32596 (Metabolite 1), and two unidentified [^{14}C]compounds (Metabolites 5 and 6) each comprised ≤2.0% of the recovered radioactivity at any sampling interval (Tables 5 and 6). Evolved $^{14}CO_2$ totaled <0.1% of the applied radioactivity and unextractable [^{14}C]residues comprised 5.4% of the applied at 30 days (Table 3). In dark control soil extracts at 30 days posttreatment, iprodione comprised 4.9% of the applied radioactivity, 3,5-dichlorophenol (Metabolite 4) comprised 28.3% of the recovered radioactivity, RP-32596 (Metabolites D and 1) comprised 18.6-26.5% of the recovered, and RP-25040 (Metabolite 2) comprised 26.2% of the recovered (maximum 58.6% at 21 days; Tables 5, 6, and 7). Unidentified degradates (Metabolite I, Metabolite III, Metabolite V, Metabolite A and Metabolite B) were present at up to 48.7% of the recovered. During the study, material balances ranged from 76.3 to 101.2% of the applied (Tables 2 and 3).

COMMENTS:

1. Iprodione only slowly degraded (registrant-calculated half-life 182 days) in the irradiated soil samples, but rapidly degraded (calculated half-life 10 days) in the dark control soil samples. The study authors theorized that differing incubation conditions for the irradiated and dark control soil samples possibly caused the unexpected results. It was reported that monitoring of soil weights during the study determined that the irradiated samples lost moisture more than the control samples, consequently reducing soil microbial activity and hydrolytic degradation. In addition, the incubation temperature of the irradiated samples dropped to approximately 17 °C during the dark phase of the photoperiod, possibly also reducing soil microbial activity; dark control samples were maintained at a constant 25 °C. As a result, the photodegradation of iprodione on soil could not be adequately assessed because the dark controls were not incubated under conditions similar to those of the irradiated samples.

2. It was difficult to interpret the degradate profile data (Tables 5 and 6), because the TLC and HPLC systems used did not isolate the same compounds and the study authors did not attempt to integrate the information. For example, TLC with methylene chloride:ethyl acetate:acetic acid isolated iprodione, RP-36221, RP-32596, RP-30228, and unidentified Metabolites A and B; HPLC isolated iprodione, RP-32596, RP-25040, RP-30228, 3,5-dichlorophenol, plus unidentified Metabolites 3, 5, and 6. In addition, the data were reported in terms of percent of radioactivity recovered after TLC or HPLC rather than in terms of percent of radioactivity applied to the soil. The data presented in Table 4 could not be adequately reviewed since the various isolated compounds (Metabolites I through V) were not identified; Metabolite 0 was apparently parent iprodione. As a result, it is impossible to determine if all degradates present at ≥10% of the applied radioactivity were identified.

3. The incubation temperature was not maintained at the recommended 25 ± 1 °C. It was reported that soil temperatures were measured in the photolysis chamber; however, a calculated mean temperature with standard deviation was not reported and the raw data were not provided. It was reported that the irradiated soil samples were maintained at approximately 25 °C; however, the temperature of the samples dropped to approximately 17 °C during the dark phase of the photoperiod.

4. It was reported that each irradiated and dark control soil sample was weighed daily to determine any moisture loss. It is unclear how the dark control samples were not exposed to light during the daily weighing process.

5. The study authors reported degradation half-lives of approximately 26 weeks for iprodione in the irradiated samples and approximately 1 week (after a 7-day lag period) for iprodione in the dark controls. The statistical estimation of the photodegradation half-life of iprodione reported in this study is of limited value because the calculations involve extrapolation considerably beyond the experimental time limits of the study. Data are often incapable of accurately predicting trends outside of their range because small

differences are magnified and reactions which appear to be linear may, in fact, be curvilinear.

6. The material balance for the 30-day dark control soil was incomplete (76.3% of the applied was recovered); however, this did not affect the results of this study.

7. The study authors calculated that the intensity of the summer sunlight measured June 20, 1990 at Ongar, United Kingdom (latitude 50° N) was similar to summer sunlight in Florida (latitude 30° N) (Appendix IV).

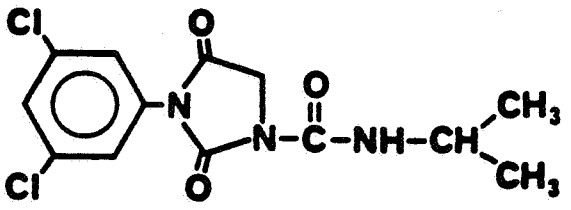
REFERENCES:

The following study was reviewed:

Ayliffe, J.M., Outram, J.R. and Reeves, G.L. 1991. *Iprodione-^{14}C: Soil Photolysis Study*. Laboratory Project ID: P91/048. Performed by Rhône-Poulenc Agriculture Ltd., Essex, England, and submitted by Rhône-Poulenc Ag Company, Research Triangle Park, NC. (MRID #419121-01)

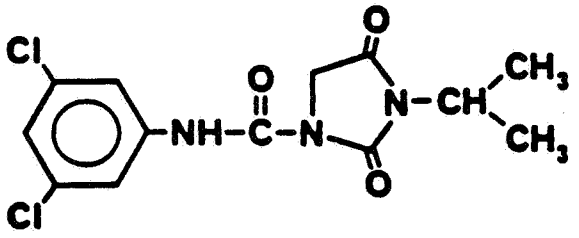
APPENDIX

IPRODIONE AND ITS DEGRADATES



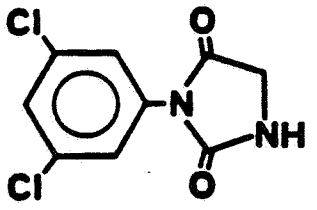
3-(3,5-Dichlorophenyl)-N-(1-methylethyl)-2,4-dioxo-1-imidazolidecarboxamide

(Iprodione)

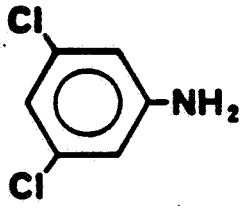


1-(3,5-Dichlorophenyl)carbamoyl-3-isopropylhydantoin

(RP-30228)



RP-25040 (Chemical name not provided)



3,4-Dichloroaniline (RP-32596)

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