

US EPA ARCHIVE DOCUMENT



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

28 APR 1993

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Chemical: Thidiazuron  
PC Code: 120301  
Case no: 4092  
DP Barcode: 184066, 184064,  
170798, 167595, 166723  
EFGWB nos: 93-0134, 93-0136  
92-0185, 91-0791, 91-0185

MEMORANDUM

Subject: Thidiazuron - List D Phase 4 Review

From: Arnet W. Jones, Agronomist  
Environmental Fate and Ground Water Branch  
Environmental Fate and Effects Division (H7507C)

Through: Henry Jacoby, Chief  
Environmental Fate and Ground Water Branch  
Environmental Fate and Effects Division (H7507C)

Paul J. Mastradone, Ph.D., Chief, Review Section #1  
Environmental Fate and Ground Water Branch  
Environmental Fate and Effects Division (H7507C)

To: Kathy Davis, Product Manager #52  
Special Review and Reregistration Division (H7508W)

Enclosed is the Phase 4 review package for List D chemical Thidiazuron. The package includes DERs for nine studies and Table A which provides details concerning all applicable environmental fate data requirements.

1. Use Pattern

According to the LUIS report (09/02/92), Thidiazuron (N-phenyl-N'-(1,2,3-thiadiazyl) urea) is a cotton defoliant (ground or aerial application) used to remove cotton leaves prior to harvest. The only product (Dropp 50 WP) is formulated as a wettable powder and is contained in water soluble bags. It can be applied by ground or air at a maximum rate of 0.2 lb a.i./A, with two applications not to exceed a total of 0.3 lb a.i./A. There are restrictions against feeding gin trash and treated foliage to animals. Also, there are restrictions against planting rotational crops of 2 weeks (small grains, sorghum, corn, and root crops) to 2 months (legumes, alfalfa, or leafy vegetables) following application. The usage category is Terrestrial Food.

## 2. Status of Environmental Fate Data Requirements

The status of the environmental fate data requirements for thidiazuron for terrestrial food crop use is summarized below:

<u>Environmental Fate Data Requirements</u>	<u>Status</u>	<u>MRID Number</u>
<u>Degradation</u>		
161-1 Hydrolysis	Fulfilled (AWJ 04/28/93)	42069203
161-2 Photodegradation in water	Not Fulfilled (JAH 12/06/89; AWJ 04/28/93)	41188201 41364910
161-3 Photodegradation on soil	Not Fulfilled (AWJ 04/28/93)	41364902
161-4 Photodegradation in air	Not Submitted <sup>1</sup>	00156241
<u>Metabolism</u>		
162-1 Aerobic soil	Partially Fulfilled (AWJ 04/28/93)	41950101
162-2 Anaerobic soil	Fulfilled (AWJ 04/28/93)	41945201
<u>Mobility</u>		
163-1 Leaching, Adsorption/ Desorption	Partially Fulfilled (AWJ 04/28/93)	41364909
163-2 Volatility-lab	Not Submitted <sup>1</sup>	
163-3 Volatility-field	Not Submitted <sup>1</sup>	
<u>Dissipation</u>		
164-1 Soil	Not Fulfilled (AWJ 04/28/93)	41761105
164-5 Soil, long-term	Reserved <sup>2</sup>	
<u>Accumulation</u>		
165-1 Confined rotational crops	Not Fulfilled (AWJ 04/28/93)	00030793 41364907 41364908
165-4 Fish	Waived <sup>3</sup>	
<u>Spray Drift</u>		
201-1 Droplet size spectrum	Not submitted <sup>4</sup>	
202-1 Drift field evaluation	Not submitted <sup>4</sup>	

### Footnotes:

<sup>1</sup> Based on the vapor pressure reported in EFGWB 's One-Liner Database ( $3 \times 10^{-11}$  mm Hg), volatility does not appear to be an important route of dissipation. Therefore, this study is not required at this time.

<sup>2</sup> The long-term soil dissipation study (164-5) is reserved until evaluation of an acceptable soil dissipation study (164-1).

<sup>3</sup> See Waiver Request below.

<sup>4</sup> This study is required when aerial applications (rotary and fixed wing) and mist blower or other methods of ground application are proposed and it is estimated that the detrimental effect level of those nontarget organisms expected to be present would be exceeded. These data are required for all herbicides which are applied aerially.

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### 3. Environmental Fate Summary

There are insufficient data for a comprehensive environmental fate assessment for thidiazuron at this time. Preliminary data indicate that mineralization to  $\text{CO}_2$  and adsorption to soil may be major routes of dissipation. These data, however, were derived from European soils which are not representative of the compound's typical use sites (i.e. U.S. cotton soils). Additional data from U.S. cotton soils are needed to assess fully the environmental fate of thidiazuron. The following assessment is based on all available information.

An acceptable study indicates that thidiazuron is stable to hydrolysis at pH 5, 7, and 9. Supplemental studies indicate that it photodegrades rapidly in water and on soil ( $t_{1/2} = <1$  hr). The principal soil photodegradation product was the isomer 1-phenyl-3-(1,2,5-thiadiazol-3-yl)urea. In an aerobic soil metabolism study conducted in a German sandy loam which partially fulfilled the data requirement, thidiazuron metabolized with a half-life of 111 days. At the end of the 1-year study,  $^{14}\text{CO}_2$  and bound residues comprised 21.2% and 44.7% of the applied radioactivity, respectively, indicating that mineralization to  $\text{CO}_2$  and adsorption to soil may be routes of dissipation. Data regarding the formation and decline of degradation products containing the thiadiazol moiety are needed to understand more completely the aerobic soil metabolism of the compound. Thidiazuron was stable in an acceptable anaerobic soil metabolism ( $t_{1/2} = \gg 90$  days). It was slightly mobile to relatively immobile in acceptable batch equilibrium studies ( $K_{oc}$  were 4.36, 16.2, 7.33, and 18.78 on sand, loamy sand, sandy loam, and clay loam soils, respectively); adsorption was related to soil organic matter content and cation exchange capacity. Aged leaching data are needed to assess the mobility of degradation products. In a supplemental study conducted for 9 months, thidiazuron did not dissipate from the upper 8 cm of a Florida sand and did not leach significantly (low concentrations of parent were detected at 15-30 cm; it was not detected deeper than 30 cm). In two supplemental studies, small amounts of thidiazuron accumulated in confined rotational crops.

4. Accumulation in Fish (165-4) - Waiver Request

The registrant (NOR-AM) has requested a waiver of this data requirement based on the low octanol/water partition coefficient and because the estimated environmental concentration (<4 ppb) is low in comparison to the aquatic LC<sub>50</sub> value for daphnia (10 ppb).

The octanol/water partition coefficient ( $K_{ow}$ ) reported by NOR-AM to the Product Manager (but not validated by HED/Product Chemistry), 58.3 ( $\log K_{ow} = 1.77$ ), indicates that thidiazuron has low potential to bioaccumulate in fish. Accordingly, EFGWB agrees to waive the accumulation in fish data requirement (165-4) at this time provided that the  $K_{ow}$  is valid and that Ecological Effects Branch does not need this information.

Chemical Code: 120301

Date Out: \_\_\_\_\_

**ENVIRONMENTAL FATE AND GROUND WATER BRANCH**

**Review Action**

To: Kathy Davis, PM 52  
Special Review and Reregistration Division (H7508W)

From: Paul J. Mastradone, Ph.D. Chief  
Environmental Chemistry Review Section 1  
Environmental Fate & Ground Water Branch/EFED (H7507C)

Thru: Henry M. Jacoby, Chief  
Environmental Fate & Ground Water Branch/EFED (H7507C)

*Handwritten:* 4/30/93  
*Signature:* Henry M. Jacoby

Attached, please find the EFGWB review of...

<b>DP Barcode:</b>	D184066, 184064, 170798, 167595, & 166723		
<b>Common Name:</b>	Thidiazuron	<b>Trade name:</b>	Dropp 50 WP
<b>Company Name:</b>	NOR-AM		
<b>ID #:</b>	120301		
<b>Purpose:</b>	Phase IV review of environmental fate data.		

<b>Type Product:</b>	<b>Action Code:</b>	<b>EFGWB #(s):</b>	<b>Review Time:</b>
Cotton defoliant	602	93-0136, 93-0134, 92-0185, 91-0878, & 91-0791	20.0 days

**STATUS OF STUDIES IN THIS PACKAGE:**

Guideline #	MRID	Status <sup>1</sup>
161-1	42069203	A
161-2	41188201 41384910	C
161-3	41384902 00156241	I
162-1	41950101	A
162-2	41945201	A
163-1	41384909	A
164-1	41761105	C
165-1	00030793 41384907 41384908	C C C
165-4		

**STATUS OF DATA REQUIREMENTS:**

Status <sup>2</sup>
S
N
N
P
S
P
N
N
Waived

<sup>1</sup>Study Status Codes:

A=Acceptable U=Upgradeable C=Ancillary I=Invalid.

<sup>2</sup>Data Requirement Status Codes: S=Satisfied P=Partially satisfied N=Not satisfied R=Reserved.

Environmental Fate & Effects Division  
 PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY  
 THIDIAZURON

Last Update on April 29, 1993

[V] = Validated Study    [S] = Supplemental Study    [U] = USDA Data

LOGOUT	Reviewer: <i>[Signature]</i>	Section Head:	Date: <i>04/29/93</i>
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Common Name: THIDIAZURON

Smiles Code: S(N=N1)C(=C1)NC(=O)N-c(ccc2)cc2

PC Code # : 120301

CAS #: 51707-55-2

Caswell #:

Chem. Name : N-PHENYL-N'-1,2,3-THIADIAZOL-5-YL UREA

Action Type: PLANT GROWTH REGULATOR; DEFOLIANT

Trade Names: DROPP; SN 49537

(Formul'tn): WP 50%

Physical State:

Use : FOR DEFOLIATION OF COTTON  
 Patterns :  
 (% Usage) :  
 :

Empirical Form: C9H8N4SO  
 Molecular Wgt.: 220.25      Vapor Pressure: 3.00E-11 Torr  
 Melting Point : °C      Boiling Point: °C  
 Log Kow :      pKa: @ °C  
 Henry's : E      Atm. M3/Mol (Measured)

Solubility in ...					Comments
Water	E 31	ppm	@	°C	
Acetone	E	ppm	@	°C	
Acetonitrile	E	ppm	@	°C	
Benzene	E	ppm	@	°C	
Chloroform	E	ppm	@	°C	
Ethanol	E	ppm	@	°C	
Methanol	E	ppm	@	°C	
Toluene	E	ppm	@	°C	
Xylene	E	ppm	@	°C	

**Hydrolysis (161-1)**

[V] pH 5.0: STABLE  
 [V] pH 7.0: STABLE  
 [V] pH 9.0: STABLE  
 [ ] pH :  
 [ ] pH :  
 [ ] pH :

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Photolysis (161-2, -3, -4)

[V] Water:0.4 HOUR

[ ] :  
[ ] :  
[ ] :

[V] Soil : 26 DAYS ON LmSd

[ ] Air :

Aerobic Soil Metabolism (162-1)

[V] 111 DAYS IN GERMAN SANDY LOAM; ADDL DATA NEEDED ON THIADIAZOL  
[ ] MOIETY

[ ]  
[ ]  
[ ]  
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Anaerobic Soil Metabolism (162-2)

[V] STABLE IN GERMAN SANDY LOAM

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Anaerobic Aquatic Metabolism (162-3)

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Aerobic Aquatic Metabolism (162-4)

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Soil Partition Coefficient (Kd) (163-1)

- [V] Kd = 4.36 (SAND, 0.83% OM; Koc = 908)
- [V] Kd = 16.2 (LOAMY SAND, 3.55% OM; Koc = 786)
- [V] Kd = 7.33 (SANDY LOAM, 1.62% OM; Koc = 780)
- [V] Kd = 18.78 (SANDY CLAY LOAM, 6.55% OM; Koc = 494)
- [ ] AGED LEACHING DATA STILL NEEDED TO FULFILL DATA REQUIREMENT.
- [ ]

Soil Rf Factors (163-1)

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

Laboratory Volatility (163-2)

- [ ]
- [ ]

Field Volatility (163-3)

- [ ]
- [ ]

Terrestrial Field Dissipation (164-1)

- [S] OF THREE SOILS, ONLY THE COMMERCE SILM SOIL IN MISSISSIPPI
- [ ] SHOWED A MOVEMENT ABOVE OR AT THE DETECTION LIMIT BELOW 6".
- [ ]
- [S] NO REPORTED DISSIP IN 0-8 CM IN 9 MONTH STUDY IN FL IN TIFTON
- [ ] SANDY LOAM. NO DEGRADATES AND NO LEACHING DETECTED (04/28/93).
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

Aquatic Dissipation (164-2)

- [ ]
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- [ ]

Forestry Dissipation (164-3)

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

[ ]  
[ ]

Accumulation in Rotational Crops, Confined (165-1)

[S] SMALL QUANTITIES ACCUMULATED IN ROTATIONAL CROPS AT VARIOUS  
[ ] PLANTING INTERVALS.

Accumulation in Rotational Crops, Field (165-2)

[S] LABEL RESTRICTIONS ON PLANTING UNTIL 2 WKS AFTER APPL.  
[ ] FOR SMALL GRAINS; 2 MOS FOR LEGUMES, LEAFY VEGS.

Accumulation in Irrigated Crops (165-3)

[ ]  
[ ]

Bioaccumulation in Fish (165-4)

[ ] WAIVED BASED ON LOW Kow (58.3). IN EARLIER STUDY, BCF FOR BLUE GILL  
[ ] WAS 54X; FOR CATFISH FILLET, BCF WAS 1X.

Bioaccumulation in Non-Target Organisms (165-5)

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Ground Water Monitoring, Prospective (166-1)

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

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

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Ground Water Monitoring, Miscellaneous Data (158.75)

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Field Runoff (167-1)

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Surface Water Monitoring (167-2)

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Spray Drift, Droplet Spectrum (201-1)

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Spray Drift, Field Evaluation (202-1)

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Degradation Products

1,2,3-thiadiazol-5-yl urea (=21% after a year in loamy sand)  
Under light, parent compd. partially isomerizes in aqueous  
solutions or on soil to give product #2 which resists photo-  
degradation and has water solubility of 41-46 ppm.  
At least 9 metabolites result from microbial action on the parent  
compound.

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Comments

Several studies were conducted in European soils, but compound is registered only for cotton. Additional information is required for U.S. cotton soils.

References:

Writer : RJH, A W Jones