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TO: J. Miller/S. Robbins
Product Manager #23
Registration Division (H7505C)

FROM: Paul Mastradone, Ph.D., Chief
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Environmental Fate and Ground Water Branch

17 FEB 1993

THRU: Hank Jacoby, Chief
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

Attached, please find the EFGWB review of ...

Reg./File #: 000100-TET

Chemical Name: 4-(Cyclopropyl-hydroxy-methylene)-3,5-dioxocyclohexane carboxylic acid ethylester

Type Product: Plant growth regulator

Common Name: Cimectacarb

Company Name: Ciba-Geigy Corporation

Purpose: To review photodegradation in water and photodegradation on soil studies submitted in support of registration.

Action Code: 116 EFGWB #(s): 92- Total Review Time: 4.0 days

EFGWB Guideline/MRID Summary Table : The review in this package contains							
161-1		162-1		163-3		165-1	166-1
161-2	42081403 accept'b	162-2		164-1		165-2	166-2
161-3	42081406 accept'b	162-3		164-2		165-3	166-3
161-4		162-4		164-3		165-4	167-1
201-1		163-1		164-4		165-5	167-2
202-1		163-2		164-5			

1. CHEMICAL:

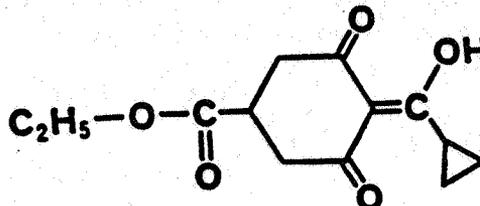
Chemical name: 4-(Cyclopropyl-hydroxy-methylene)-3,5-dioxocyclohexane carboxylic acid ethylester

CAS no.: 95266-40-3

Common name: Cimectacarb

Trade name: CGA163935, PRIMO, VISION

Chemical structure:



Physical/Chemical properties of active ingredient:

Physical characteristics:	Liquid
Molecular formula:	C ₁₃ H ₁₆ O ₅
Molecular weight:	252.26
Melting point:	N/A
Vapor Pressure:	1.62 x 10 ⁻⁵ mm/Hg at 25°C
Solubility:	10.2 g/L in water at pH 5.5 21.1 g/L in water at pH 8.2
Octanol/water partition coefficient:	275

2. TEST MATERIAL:

See individual DER's.

3. STUDY/ACTION TYPE:

Review of photodegradation in water and photodegradation on soil studies.

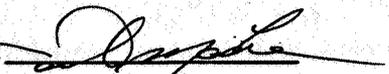
4. STUDY IDENTIFICATION:

Merritt, Andrew PHOTODEGRADATION OF ¹⁴C-CGA-163935 IN pH 7 BUFFERED SOLUTION UNDER ARTIFICIAL SUNLIGHT. Sponsored and Performed by Ciba-Geigy Corporation, Greensboro, NC under Lab. Project ID ABR-91026; Study completed on 10 October 1991; Received by EPA 5 November 1991; MRID 42081403.

Merritt, Andrew PHOTODEGRADATION OF ¹⁴C-CGA-163935 IN SOIL UNDER ARTIFICIAL SUNLIGHT. Sponsored and Performed by Ciba-Geigy Corporation, Greensboro, NC under Lab. Project ID ABR-91027; Study completed on 24 October 1991; Received by EPA 5 November 1991; MRID 42081406.

5. REVIEWED BY:

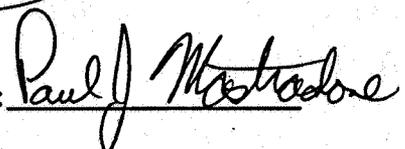
Gail Maske
Chemist, Review section #1
OPP/EFED/EFGWB

Signature: 

Date: _____

6. APPROVED BY:

Paul Mastradone
Chief
Review section #1
OPP/EFED/EFGWB

Signature: 

Date: _____

7. CONCLUSIONS:

The registrant, Ciba-Geigy Corporation, has submitted the following environmental fate studies for review to fulfill the respective data requirements for registration of cimectacarb:

a. Photodegradation in water (161-2)

This photodegradation in water study is scientifically sound and is acceptable to fulfill the data requirement. No further photodegradation in water data for cimectacarb (CGA-163935) is needed at this time.

When exposed to a continuous light source (xenon arc lamp) for 372 hours, cimectacarb in pH 7 buffer solution degraded with a reported pseudo-first order kinetic half-life of 63.5 hours (equivalent to 5.3 days using intermittent light). The dark control samples did not degrade significantly (<2% of applied). Peak 1 (ethyl ester of tricarballylic acid) was the major degradate (maximum concentration of 55.69% at 372 hours) for the light exposed samples. Five other minor (<10% of applied) degradates (Peaks 1A (comprised of several components), 1B (not present in sufficient quantity to be identified), 2A & 2B (cis and trans isomers of CGA-163935, and 2 (CGA-179500) See Figure 1) were discernible in the light exposed samples reaching maximum concentrations of 2.67% of applied at 372 hours, 2.14% of applied at 372 hours, 6.26% of applied at 276 hours, 5.58% of applied at 276 hours and 5.41% of applied at 240 hours, respectively.

The data indicate that photodegradation plays an important role in the degradation of cimectacarb. The opening of the cyclohexane ring forming the ethyl ester of tricarballylic acid appears to be the major photolytic pathway.

b. Photodegradation on soil (161-3)

This photodegradation in soil study is scientifically sound and is acceptable to fulfill the data requirement. No further photodegradation in soil data for cimectacarb (CGA-163935) is needed at this time.

Cimectacarb degraded with a calculated pseudo-first order kinetic half-life of 3.87 hours when exposed to an artificial light source (xenon arc lamp). The dark control samples had a reported half-life of 8.31 hours. The light exposed dry sterile samples and sterile dry dark control samples appeared to degrade significantly slower with reported half-lives of 79.1 and 122.8 days, respectively. The parent material appeared to comprise 71.8% of the applied material at 0 hour posttreatment for the supplemental study. However, by Day 30 posttreatment the parent material was reported to be only 2.4% of applied in light exposed samples. In addition, two major degradates (CGA-179500 (Peak 2) and open-chain (cyclohexane ring) cimectacarb (Peak 1A)) and two minor degradates (Peak 1, comprised of several components, and the ethyl ester of the tricarballylic acid (Peak 1B)) were reportedly discernible during the testing period. The two minor degradates appeared to not increase significantly (<4% of applied) during the testing period and were not identified. However, the open-chain cimectacarb increased from 2.0% of applied at 0 hour to 11.5% by Day 7 posttreatment. CGA 179500 increased from 17.0% of applied at 0 hour to 52.2% by Day 7 posttreatment.

If microbial counts are taken into account, the data indicates that microbial activity plays a major role in the degradation of cimectacarb on soil. Photodegradation also plays a role in the degradation of cimectacarb. The opening of the cyclohexane ring appears to be the major microbial/photolytic pathway. Furthermore, these results parallel those in aerobic soil metabolism data (MRID 41563933) and confirms previously reviewed supplemental photodegradation on soil data (MRID 41563932).

ENVIRONMENTAL FATE AND GROUNDWATER ASSESSMENT

Based upon acceptable and supplemental data, cimectacarb appears to degrade and dissipate rapidly (aerobic conditions ($t_{1/2}$ =8 hours), $t_{1/2}$ <2 days for most soils, hydrolyzes ($t_{1/2}$ at pH 9-8.1 days), and photodegrades ($t_{1/2}$ =0.037 to 63.5 hours) under most environmental conditions. The reported data indicates that cimectacarb has a potential to be extremely mobile (K_{ads} =1.56, 0.11, and 0.76 when applied to sand, loam, and sandy loam soils, respectively), as well. Therefore, these data suggests cimectacarb may dissipate rapidly with microbial activity playing a major role in its degradation. In addition, abiotic degradation (e.g. photodegradation and hydrolysis (basic)) appear to have a minor role in the degradation process. Soil metabolism data also shows eventual mineralization of the compound to CO₂. Furthermore, the field dissipation data indicates that under typical use

much of the compound and metabolites bind to turf and thatch before dissipating. However, there are some conditions which cimectacarb was reported to degrade considerably slower (hydrolytic conditions/acidic and neutral ($t_{1/2}$ at pH 5 = 228 days; $t_{1/2}$ at pH 7 = 455 days) and anaerobic conditions ($t_{1/2}$ for anaerobic conditions = 25 days)). In addition, it was reported to be relatively immobile ($k_{ads} = 60.2$) when applied to clay soils.

8. RECOMMENDATIONS:

The registrant should be informed of the following:

- a. The photodegradation in water and photodegradation on soil studies are acceptable to fulfill the data requirement.
- b. The status of the Environmental Fate Data Requirements for registration of cimectacarb for terrestrial non-food use pattern is as follows:

<u>Environmental Fate Data Requirements</u>	<u>Status of data Requirement</u>	<u>MRID No.</u>
Degradation Studies-Lab		
161-1 Hydrolysis	Fulfilled (EBC;04/24/91)	41563930
162-1 Photodegradation in water	Fulfilled (EBC;04/24/91) (WGM;01/ /93)	41563931 42081403
162-3 Photodegradation on soil	Fulfilled (EBC;04/24/91) (WGM;01/ /93)	41563932 42081406
Metabolism Studies-Lab		
162-1 Aerobic (Soil)	Fulfilled (EBC;04/24/91)	41563933
162-2 Anaerobic (Soil)	Fulfilled (EBC;04/24/91)	41563933
Mobility Studies		
163-1 Leaching, Adsorption/ Desorption	Fulfilled (EBC;04/24/91)	41563934 41563935 41563936 41563937
163-2 Volatility-lab	Fulfilled (EBC;04/24/91) (WGM;09/17/92)	41563938 41869541
Dissipation Studies-Field		
164-1 Soil	Not Fulfilled (WGM;09/17/92)	41869539 41869540

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Con't--	<u>Environmental Fate Data Requirements</u>	<u>Status of data Requirement</u>	<u>MRID No.</u>
	Accumulation Studies		
	165-4 in Fish	Not Fulfilled ¹ (EBC;04/24/91) (WGM;09/17/92)	41604207 41869542 41869543

¹ Based on the low octanol/water coefficient (275) and supplemental data which has been reviewed, cimectacarb does not meet the trigger values for requiring a fish accumulation study. Therefore, no further fish accumulation data is needed at this time.

9. BACKGROUND:

Cimectacarb is a plant growth regulator which inhibits gibberellic acid biosynthesis at a specific site. It blocks the synthesis of GA₁ to GA₂₀. Gibberellic acid is necessary for cellular elongation in leaves and stolons during a plant's growth period. However, the compound has not been shown to decrease a plant's root system which is explained by the majority of the compound not being translocated to the root tip and the absorption is through the foliage as opposed to through the root system. Therefore, cimectacarb reduces frequency of mowing and clippings disposal for the use sites.

10. DISCUSSION:

See attached DERs.

11: COMPLETION OF ONE-LINER:

See attached one-liner.

12: CBI APPENDIX:

N/A