

US EPA ARCHIVE DOCUMENT

# FILE COPY

Date Out EFB: MAR 25 1980

To: Product Manager Miller (16)  
TS-767

Through: Dr. Gunter Zweig, Chief  
Environmental Fate Branch

From: Review Section No. 1  
Environmental Fate Branch

*Gunter Zweig*  
*AW Cook*

Attached please find the environmental fate review of:

Reg./File No.: 100-LOO

Chemical: Curacron [0-(4-bromo-2-chlorophenyl)-0-ethyl-S-propyl  
phosphorothioate

Type Product: Insecticide, use on cotton

Product Name: Curacron 6E

Company Name: CIBA-GEIGY

Submission Purpose: data for review photo study to determine value for  
regulatory decision

ABB Code: unknown

Date in: 9/27/79

MAR 25 1980

Date Completed \_\_\_\_\_

EFB #262

Action Code 51

Referrals To:

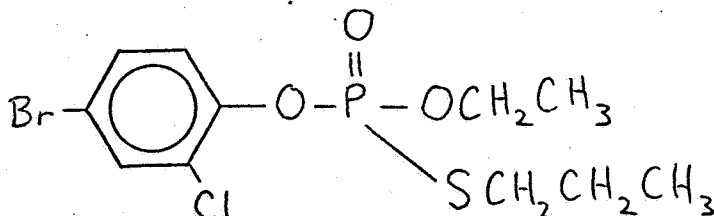
Ecological Effects Branch

Residue Chemistry Branch

Toxicology Branch

## 1. INTRODUCTION

- 1.1 In response to a request by EEB/HED, the registrant has submitted curacron photolysis data to satisfy, in part, EEB's concern over hazard to aquatic organisms resulting from use of curacron as proposed.
- 1.2 See previous EFB curacron reviews of 100-LOO dated May 26, 1978 and of 100-EUP-53 dated February 1, 1977 and July 19, 1977.
- 1.3 Structure



## 2. DIRECTIONS FOR USE

- 2.1 A label was not included with this submission. Therefore, the use directions as recorded in the May 26, 1978 review of 100-LOO are assumed to still apply.

## 3. DISCUSSION OF DATA

- 3.1 Characterization of Photosensitizers in Agricultural Water, Ronald Ross and Donald Crosby.

Several amino acids and humic acid which occur naturally in natural waters sensitize the photolysis of ETU to EU. Tyrosine and tryptophan are photooxidized to produce materials that thermally oxidize ETU in the absence of light.

- 3.2 Photosensitizers in Agricultural Water Samples, Ronald Ross, Donald Crosby, presented at the 166th ACS National Meeting in Los Angeles, 1974.

Photochemical sensitizers occur naturally in agricultural water used in taro and rice cultivation. Also, ferric and cupric ions were found to sensitize photolysis of ETU.

- 3.3 Photodegradation of Atrazine, Atraton and Ametryne in Aqueous Solution with Acetone as a Photosensitizer, N. Burkhard and J. Guth, Pesticide Science, 1976, 7, 65-71.

Acetone sensitized the photolysis of atrazine, atraton and ametryne. Mechanisms and photoproducts were reported.

3.4 Photolysis of Ethylenethiourea, Ronald Ross and Donald Crosby, J. Agr. Food Chem., Vol. 21, No. 3, 1973.

Ethylenethiourea (ETU) is stable in aqueous solution when exposed to sunlight but photodegrades in the presence of sensitizers and dissolved oxygen. ETU also photodegraded in agricultural drainage water due to naturally occurring photosensitizers.

3.5 Photolysis of CGA-15324 in Aqueous and Methanolic Solution under Artificial Sunlight Conditions, SPR 61/75, ref. AC 2.53, NB/rr, Dec. 15, 1975.

Procedure

Note: This study was previously reviewed under a different review process with 100-EUP-53 dated February 1, 1977. It is being re-reviewed here under current procedures.

Solutions of phenyl - <sup>14</sup>C - labeled CGA-15324 at 10 ppm were exposed to artificial sunlight (173 Langley's per hour with radiation <290 nm blocked out). The following solvents for CGA-15324 were used: water, 1% acetone/water and methanol. The photolysis of 4-bromo-2-chlorophenol (BCP), a photoproduct of CGA-15324, in water was also studied. Phenyl-<sup>14</sup>C-BCP was used.

Solutions were extracted and analyzed for photoproducts using standard TLC, GC, GC/MS and LSC techniques.

Results

1. Rate of Photolysis of CGA-15324

<u>Time (hr.)</u>	<u>Water</u>	<u>1% Acetone</u>
0	100	100
1		75
2		45
3		31
4		20
5		14
6		10
8	78	
24	50	
48	28	
72	16	

$$k [s^{-1}] = 7.0 \times 10^{-6} \text{ (95\% conf. limits)}$$
$$t_{0.5} [\text{hr.}] = 27 \pm 2 \text{ (95\% conf. limits)}$$

2. Photolysis of CGA-15324 in Methanol and Amount of Photoproduct Formed

<u>Time (hr.)</u>	<u>% CGA-15324</u>	<u>% Compound II *</u>
0	100	<1
8	91	12
24	68	33
32	56	35
48	46	49
56	40	50
72	28	57

$$k [s^{-1}] = 4.9 \times 10^{-6} \text{ (95\% conf. limits)}$$

$$t_{0.5} \text{ [hr.]} = 40 \pm 3 \text{ (95\% conf. limits)}$$

\* compound II is 0-ethyl-0-(2-chlorophenyl)-S-n-propylthiophosphate

3. Photolysis of 4-Bromo-2-Chlorophenol

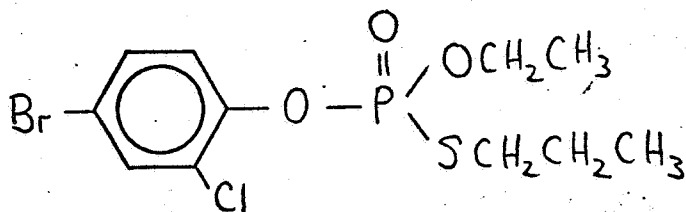
<u>Time (min.)</u>	<u>% <sup>14</sup>C in organic phase</u>	<u>% <sup>14</sup>C in aqueous phase</u>
0	91	2
10	83	13
20	76	22
30	66	28
60	40	46
90	32	60

$$k [s^{-1}] = 1.9 \times 10^{-4}$$

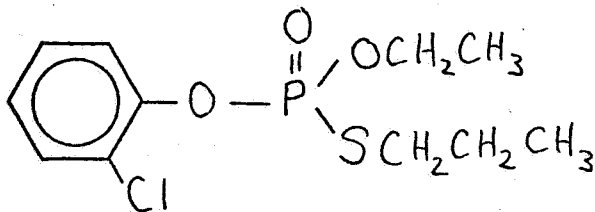
$$t_{0.5} \text{ [hr.]} = 1.0 \pm 0.2$$

4. - The photolysis solutions dropped 2-3 pH units during photolysis.

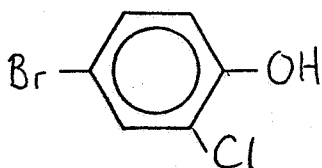
3.6 Structures



CGA-15324, parent compound  
0-ethyl-0-(2-chloro-4-bromophenyl)-S-n-propyl-thiophosphate



compound II  
O-ethyl-O-(2-chlorophenyl)-S-n-propyl-thiophosphate



BCP, compound III  
4-bromo-2-chlorophenol

CONCLUSIONS/RECOMMENDATIONS

1. CGA-15324 will photodegrade in pure water with a halflife of 27 hours, but the rate of degradation will be accelerated in the presence of photosensitizers.
2. Photolysis in 1% acetone and in methanol showed compound II to be the dominate photoproduct with 3 unidentified minor products. Formation of compound II occurs through debromination of the parent compound resulting in the formation of bromic acids and a drop in pH of the photolysis solutions. Compound II was not detected in the pure water photolysis solution most probably due to a low water solubility in pure water, *resulting in volatilization.*
3. BCP, the major hydrolysis product of CGA-15324, also photodegrades in pure water with a halflife of 1 hour. The photolysis mechanism is postulated as dehalogenation, followed by formation by hydroxybenzenes and subsequent oxidation.
4. For additional information on the environmental fate of CGA-15324, refer to the previous reviews of 100-LOO.

Samuel M. Creeger  
February 22, 1980  
Review Section #1  
EPB/HED

*Samuel M. Creeger*  
Feb 28, 1980