038901

Date Out EAB: APR 19 1985

APR 19 1985

To: G. Werdig
Product Manager 50
Registration Division (TS-767)

From: Samuel Creeger, Chief
Environmental Chemistry Review Section 1
Exposure Assessment Branch
Hazard Evaluation Division (TS-769)

Attached please find the environmental fate review of:

Reg./File No.: _____

Chemical: Endothall

Type Product: Herbicide

Product Name _____

Company Name: Penwalt

Submission Purpose: Response to Ground Water Data Call In: Review Protocol.

ZBB Code: other

ACTION CODE: 495

Date In: 12/11/84

EAB # 5192

Date Completed: APR 19 1985

TAIS (level II)	Days
51	2

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

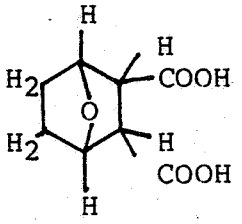
_____ Toxicology Branch

1. CHEMICAL:

Common name: Endothall

Chemical name: 3,6-Endoxohexahydrophthalic Acid

Structure:



2. TEST MATERIAL:

The test material was not specified for any of the studies submitted.

3. STUDY/ACTION TYPE:

Ground-water-data-call-in (GWDCI) package submission.

4. STUDY IDENTIFICATION:

Progress reports on the Soil Behaviour of Endothall. Oregon State Univ.

1) Effect of UV light on Endothall.
2) Effect of sunlight on Endothall.
3) Adsorption of Endothall by different soils.
4) The breakdown of Endothall by soil as measured by $^{14}CO_2$ evolution.
5) Effects of chemical additive (pentachlorophenol) on the breakdown of Endothall.
6) Study on the degradation products of Endothall in soil.
7) Movement and persistence of Endothall.

5. REVIEWED BY:

Catherine Eiden
Section # 1
Exposure Assessment Branch

April 15,1985

6. APRROVED BY:

Sam Creeger
Section Chief # 1
Exposure Assessment Branch

April 15,1985

7. CONCLUSIONS:

The studies submitted are progress reports. They do not follow Guideline procedures, and therefore, do not satisfy the require-

ments for any of the environmental fate studies necessary for the GWDCI package. Because no half-lives were calculated from the reports presented, little information on the environmental fate of Endothall could be assessed. However, three conclusions can be drawn from these preliminary reports:

1. The mobility study did conclude that Endothall is mobile in soils. Endothall was leached 3 inches by 2 inches of surface applied water in three soil types, a sandy loam, and two clay loam soils.

2. Endothall was found to be persistent in water. Unfortunately, no half-life was calculated for Endothall in water, and no hydrolysis study has been performed.

3. Endothall is broken down in soil under aerobic conditions, apparently rapidly. However, before this judgment can be made, a metabolic half-life should be determined.

As regards the individual progress reports submitted, the following conclusions have been drawn:

1. The report (See 10.0) on the effect of UV light on Endothall is inappropriate for GWDCI, and need not have been submitted.

2. The report (See 10.1) on the effect of sunlight on Endothall is inadequate. The effect of sunlight on the compound on soil and in water is required, not the effect of sunlight on the chemical after it has been evaporated onto glass plates. Studies 161-2 and 161-3 as per the Guidelines should be done.

3. The reports (See 10.2) submitted on the breakdown of Endothall on soil did not report the half-life for Endothall metabolism in soil, nor did it clearly describe the test materials used for the study. Though Endothall appears to degrade rapidly, the study was not carried out long enough to establish a half-life for Endothall in soil. At present the half-life is shown as greater than 17 days.

4. The adsorption/desorption report (See 10.3) considered the percent of adsorption of Endothall from aqueous solution onto soil, but stopped there, and did not calculate soil-water partition coefficients (Kd). Based on the conclusion that Endothall is mobile, as seen from the report on soil column leaching, the Kd should be determined from Freundlich isotherms.

5. The report (See 10.4) on the effects of pentachlorophenol on the breakdown of Endothall is inappropriate for the GWDCI, and need not have been submitted.

6. The report (See 10.5) on the soil column leaching of Endothall indicated that Endothall is mobile in soils, as mentioned above. A complete leaching study as per the Guidelines should be done to determine the potential for Endothall to leach.

8. RECOMMENDATION:

New studies, more in depth, need to be done as per the Guidelines for the following required studies for the GWDCI:

Hydrolysis	161-1
Photolysis in Water	161-2
Photolysis on Soil	161-3
Soil Aerobic Metabolism	162-1
Soil Anaerobic Metabolism	162-2
Anaerobic Aquatic Metabolism	161-3
Adsorption/Desorption--Leaching Mobility Study	163-1
Field Dissipation Study	164-1

The purity of the radio-labeled test compound used for each study should be included.

9. BACKGROUND:

Endothall was conditionally registered for aquatic weed control in lakes, ponds, and ditches. Apply at a rate of 20-40 lbs per acre foot of water. Acid equivalent to 2.68-5.36 lbs per acre foot.

On rice, 2-3 lbs a.i./acre, 25-60 days after sowing and after the rice emerges from the surface of the water, but before heading. Apply by air or ground once yearly.

On sugar beets, for pre-emergence of weeds, apply 4.23-9.31 lbs a.i./acre by broadcast. Apply 1.56-4.18 lbs a.i./acre by band treatment. For post-emergence, apply only after the weeds have emerged (4-6 leaf stage) 0.73-1.46 lbs a.i./acre by broadcast.

On sugar cane, in Hawaii, use 2 gal./acre applied by air in 7 gal. of water.

On potatoes, apply to vines 10-14 days prior to harvest, spray application in water of 0.78-1.04 lbs a.i./acre, up to two applications.

On cotton, tank mix chlorate with 0.065-0.0975 lbs a.i./acre in water. Apply when 50% or more of the bolls are open (about 5-7 days) before harvest.

10. DISCUSSION OF INDIVIDUAL STUDIES:

Because none of the studies submitted follow Guideline procedures, and because they are inadequate, each study will be discussed only with respect to the Reviewer's Discussion (Part E.). The studies will not be described in detail as they are incomplete and only progress reports. All of the studies should be redone according to Guideline procedures.

10.0

A. STUDY DENTIFICATION:

Effect of UV light on Endothall. Oregon State University.

E. REVIEWER'S DISCUSSION:

The progress report submitted on the effects of UV light on Endothall is not a required study.

10.1

A. STUDY IDENTIFICATION:

Effect of Sunlight on Endothall. Oregon State University.

E. REVIEWER'S DISCUSSION:

In this study, Endothall was evaporated from acetone onto glass plates and was then exposed to sunlight for 7 days. At the end of the 7 days, 13-20 % of the Endothall was reported as degraded. No mention was made of the identity of the degradation products. The study should be carried out in soil and water media as described in the Guidelines for study 161-2

and 161-3. Only then can the effects of sunlight on Endothall in soil and water be assessed. A calculation of the half-life of Endothall under these conditions is necessary.

10.2

A. STUDY IDENTIFICATION:

The breakdown of Endothall by soil as measured by $^{14}CO_2$ evolution. Oregon State University.

E. REVIEWER'S DISCUSSION:

The progress report submitted for the breakdown of radio-labeled C^{14} Endothall in soil did not present a calculated half-life value for Endothall in soil. Nor did the report discuss the identity of the breakdown products formed by degradation. Mention was made that the breakdown products rapidly degrade. It was stated that most of the Endothall degraded in 2 weeks, but no half-life was determined. It was also stated that most of the Endothall evolves as $^{14}CO_2$.

In another part of this study, the soil slurry used for the breakdown study was centrifuged and the supernatant was incubated with the Endothall. No breakdown of Endothall was indicated in the slurry. This led the authors to conclude that " Endothall is more persistent in water solutions than in solutions containing such materials as dirt or organic debris".

5

The required hydrolysis study is obviously lacking, and should be completed to substantiate this conclusion and to fulfill the environmental fate profile requirements.

A second report on the metabolic breakdown of Endothall indicated that 33% of the compound applied to the soil degrades. The final breakdown product being $^{14}CO_2$. No mention was made as to the remaining 67% of the initially applied compound. No intermediate breakdown products were identified. Data were presented comparing the initial amount of radio-carbon activity of the labeled Endothall versus that present from 3-17 days. No half-life was determined.

10.3

A. STUDY IDENTIFICATION:

Adsorption of Endothall by different soils. Oregon State University.

E. REVIEWER'S DISCUSSION:

This study, submitted as a mobility study, consisted of preliminary work on adsorption. The study did not include soil-water partition coefficients (Kd values) for the soils used. The study considered the percent adsorption of Endothall from solution at two temperatures.

The main purpose of the sorption studies is to generate a soil-water partition coefficient for those soils studied. The registrant should use the Freundlich isotherm method and should calculate the soil-water partition coefficient for several soils.

10.4

A. STUDY IDENTIFICATION:

The effects of chemical additives (pentachlorophenol) on the breakdown of Endothall. Oregon State University.

E. REVIEWER'S DISCUSSION:

This study will not be discussed as it is inappropriate, and need not have been submitted.

10.5

A. STUDY IDENTIFICATION:

Movement and persistence of Endothall. Oregon State University.

E. REVIEWER'S DISCUSSION:

A soil column study was submitted. Eight inch columns, packed with 3 types of soils were studied. The columns were leached with 2 inches of water. No leachate was collected. The Endothall moved to the 1-4 inch depth. Surface and sub-irrigation were used.

The authors conclude that Endothall was very mobile, moving either

upward or downward depending on the method of irrigation used. The authors conclude that "excessive sprinkler irrigation or precipitation on sandy soils may leach the bulk of the chemical below the germinating zone of most annual weeds". Soil moisture, dry or wetted to field capacity, made little difference on the movement of Endothall. Endothall was leached readily in dry and wet soils. Endothall was leached to a depth of 3 inches with 2 inches of water.

The column length is inadequate as is the amount of water used for leaching the Endothall. The Guidelines call for 30 cm columns and 20 acre-inches of water for leaching.

11. COMPLETION OF ONE-LINER:

No one-liner was completed at this time.

12. CBI:

No CBI was included in the GWDCI package.