Shaugh. No. 079401

EAB Log Out Date: JUL 09 1985

Init.:

To: George LaRocca
Product Manager 15
Registration Division (TS-767)

From: John Jordan, Ph.D.
Acting Chief, Review Section #3
Exposure Assessment Branch, HED (TS-769)

Attached, please find the protocol review of:

Reg./File No.: 8340-13

Chemical: Endosulfan

Type Product: Insecticide

Product Name: THIODAN

Company Name: American Hoechst

Submission Purposes: Response to Registration Standard requesting a full field dissipation study. This is review of the protocol for that study.

Date In: 2 May 1985

Action Code: 177

Date Completed: JUL 09 1985

EFB#: 5584

TAIS (Level II)	Days
01	2

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

THIODAN

I. Chemical

Common Name: Endosulfan
Trade Name: THIODAN
Chemical Name: 6,7,8,9,10,10-hexachloro-1,5,5a,6,9,9a-hexahydro-6,90methano-2,4,3-benzodioxathiepin-3-oxide

II. Study Action

Review of terrrestrial field dissipation protocol

III. Citation

American Hoechst Co. 1985. Field Trial Program EI 85 USA 07R for Thiodan 3EC and Thiodan 50WP (dated April 25, 1985).

IV. Reviewer

Patricia Ott
Chemist
Exposure Assessment Branch/HED/OPP

P. Ott JUL 8 1985

Robert W. Holst, Ph.D.
Plant Physiologist
Exposure Assessment Branch/HED/OPP

JUL 8 1985

V. Approval

John Jordan, Ph.D.
Chief (Acting), Review Section #3
Exposure Assessment Branch/HED/OPP

CHG John Jordan

VI. Conclusion

The terrestrial field dissipation study protocol has been reviewed. There are several areas of deficiency with respect to location of the test, the measurement of runoff, the analytical methodology, and the reporting of the endosulfan degradates in addition to the parent compound, endosulfan. Also, noted was disagreement with the crop use pattern to be monitored. Because fish kills have been noted in South Carolina and California where tomatoes, cotton, and lettuce have been grown, these use patterns must be seriously considered over that of wheat which was proposed.

VII. Recommendation

It is recommended that American Hoechst prepare another protocol and resubmit it for approval. Consultation with the Exposure Assessment Branch and Ecological Effects Branch scientists during preparation of this protocol is strongly encouraged.

VIII. Background

The purpose of this action is to review a terrestrial field dissipation study protocol submitted by American Hoechst. This protocol was submitted in response to a reregistration action requesting information on terrestrial field dissipation of endosulfan i.e., movement of endosulfan in runoff from rains and irrigation waters to nearby aquatic systems because of the reported fish kills near crops where endosulfan had been used.

American Hoechst has not fulfilled the requirements for a field dissipation study to assess the degradation and leachability of endosulfan (Subdivision N, § 164-1).

A discussion of the use pattern and pesticide use directions is not applicable to this protocol review.

IX. Discussion

Upon review of the protocol the following areas were found to be deficient:

a. The protocol proposes to identify, in a simple fashion, pesticide movement downslope and leaching through the soil. The toxicological concerns, however, justify a more extensive runoff study. A study of this nature requires a more intensive data gathering effort than proposed and should include those data indicated in Appendix A in order to quantify the pesticide movement. Subdivision N, § 164-1 shall also be used as a basis for the study reporting requirements.

b. Upon review of the use patterns of endosulfan and the location of fish kills, the Agency has concluded that wheat is not the best use pattern to be tested. According to the Ecological Effects Branch fish and wildlife scientists, most fish kills have occurred where endosulfan had been applied to tomatoes (South Carolina and California), cotton and lettuce (California), and, thirdly, wheat (presumably Minnesota). (See Registration Standard for Endosulfan.) The California incidents may have occurred where tomatoes, cotton, and lettuce are furrow irrigated and the tailwaters were released too soon into the area rivers. Also cotton represents a more extensive use pattern than wheat and possesses a greater potential to allow agricultural chemicals to enter aquatic bodies, thereby, causing aquatic organism deaths. Therefore, a field dissipation (runoff) study performed in two of the following locations would be more appropriate:

1. South Carolina tomato fields,
2. Mississippi delta cotton fields
3. Southern California cotton fields

c. Overhead irrigation as would be applied to wheat is normally applied to allow for infiltration of the water and any pesticides present but usually not to the extent of causing

runoff. Small plot (ca. 1/4 acre) overhead irrigation may be used to simulate rainfall volume and intensity to cause sufficient runoff, thereby simulating runoff.

The introduction of the pesticide into the headwaters of furrow irrigated crops, or applying pesticides when the furrow irrigated fields are flooded, is a common practice in the desert Southwestern U.S. This will lead to introduction of pesticides into the tailwaters and adjacent rivers.

e. The significance of the downslope portions of the plot [100 x 50(?)] was not explained. If it is to identify any dissolved or sorbed pesticide runoff which is deposited on that portion of the plot, this should be explained. The size of this downslope portion of the plot is not entirely clear as the text identifies it as 100 x 50 feet but the graph indicates it will be 100 x 100 feet.

d. No analytical methodology was submitted or referenced for the parent or degradate compounds. We must know the limits of detection to see if they are low enough with respect to the effect levels for aquatic fauna species.

e. The degradates to be analyzed and their limits of detection were not identified. The Ecological Effects Branch has indicated that all degradates must be identified.

f. The half-life of the parent compound and, where possible, the degradates must be reported, as well as curves showing the decline of the parent and its degradates. Since endosulfan, and particularly the beta isomer, can persist for over 2 years, a study running only 18 months might not be adequate.

g. Soil samples must be taken to a depth sufficient to define the extent of leaching.

h. How is soil heterogeneity to be controlled? Statistical design and analysis of the data are indicated.

References:

U.S. EPA. April 1982. Hexachlorohexahydromethano-2,4,3-benzodioxathiepin-3-oxide (Endosulfan) Pesticide Registration Standard. U.S. EPA Office of Pesticides and Toxic Substances, Washington DC

U.S. EPA. October 1982. Pesticide Assessment Guidelines, Subdivision N, Chemistry: Environmental Fate. U.S. EPA, Office of Pesticides and Toxid Substances, Washington DC. EPA-540/9-82-021

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Appendix A.

The following information is normally required in performing a runoff or infiltration (leaching) study in order to quantitate the movement of the pesticide off the field or into the soil.

Geography
- Site Location
- Area of the Field

Meterological
- Precipitation depth and interval
- Evaporation
- Solar radiation
- Air temperature
- Relative humidity
- Wind speed/direction

Soil Characteristics (at various depths to the impermeable layer or ground water)
- Series identificaiton
- Hydrologic group
- Texture
- Organic carbon
- Bulk density
- pH
- Moisture content (wilting point and field capacity)
- Erodibility
- Temperature

Land/Crop Management (USLE factors)
- Slope of land
- Length of slope
- Crop management
- Supporting practice factor

Canopy
- Percent cover or Leaf area index
- Percent pesticide foliar washoff
- Crop yield
- Plant residue after harvest

Pesticide Application Rate and Method

Initial Pesticide Distribution Between Soil and Plant

Pesticide Sorption Partition Coefficients (K_d)

Runoff (for each event)
- Total volume (water + sediment)
- Sediment yield

Pesticide Content in Runoff (for each event)
  Dissolved in water column
  Sorbed to soil and organic matter

Pesticide Residue in Crop Cover (residue) at Application Time
  (conservation tillage)

Pesticide Degradation and Volatilization Rates
  Soil
  Foliar (if applied to foliage)

FIELD TRIAL PROGRAM EI 85 USA 07R April 25, 1985

OBJECTIVE: To determine the terrestrial dissipation rate of Thiodan 3EC and Thiodan 50WP. The study will be done in accordance with § 164.1 Field dissipation studies for terrestrial uses of the PESTICIDE ASSESMENT GUIDELINES - Subdivision N.

NUMBER OF TRIALS: Two locations to be determined after adequate site selection survey.

CROP TO BE TREATED: Two plots bare ground treatment; two plots planted to wheat.

INTERVAL OF APPLICATION: Seven (7) days between applications.

TREATMENT NUMBER	TREATMENT	DOSAGE RATE (lb ai/A)
01	Check	---
02	Thiodan 3EC	2.0+2.0+2.0+2.0+2.0 - bare ground
02A	Thiodan 3EC	2.0+2.0+2.0+2.0+2.0 - wheat
03	Thiodan 50WP	2.0+2.0+2.0+2.0+2.0 - bare ground
03A	Thiodan 50WP	2.0+2.0+2.0+2.0+2.0 - wheat

2 2/3 qts Thiodan 3EC = 4 lbs Thiodan 50WP = 2 lbs active ingredient.

EXPERIMENTAL PLOT DESIGN: (see attached diagram)
The treated plot size - 100 feet x 300 feet; slope of land is to be between 5 and 10°. Down slope portion of plot 100 feet x 50 feet divided into 25 feet strips. Two treated plots will be planted to wheat; two treated bare ground plot. The control plot will be bare ground.

SOIL SAMPLING PROCEDURE: Soil samples will be taken in 0-2, 2-4, 4-6 and 6-12" increments. A minimum of 10 cores per sample will be required. Cores are to be taken in a x-type pattern within the plot.

WHEAT SAMPLING PROCEDURE: Harvest wheat straw and grain samples will be taken for possible analysis.

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SOIL SAMPLING INTERVALS: Soil samples are to be taken from the treated area of the plot at the four depths at the following intervals (regardless of rainfall):

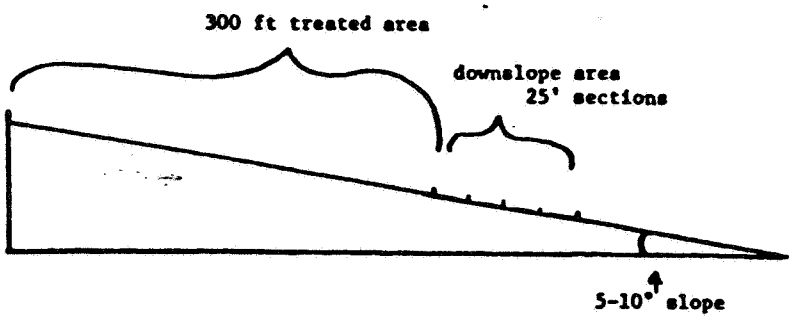
INTERVAL AFTER FIRST APPLICATION	
0 day	(immediately before and after 1st application)
7 days	(immediately before and after 2nd application)
14 days	(immediately before and after 3rd application)
21 days	(immediately before and after 4th application)
28 days	(immediately before and after 5th application)
2 months	after the first application
3 months	" " " "
4 months	" " " "
5 months	" " " "
6 months	" " " "
9 months	" " " "
12 months	" " " "
18 months	" " " "

Soil samples are to be taken from the down-slope area of the plot at the four depths, 1, 7, 14 days 1, 2, 3, 6, 9 and 12 months after the first rainfall as well as 1 day after each rainfall or irrigation event.

If significant rainfall (1-2" or 90% average rainfall for area) does not occur within 4 weeks after treatment, irrigation will have to be applied at 90% of the average rainfall.

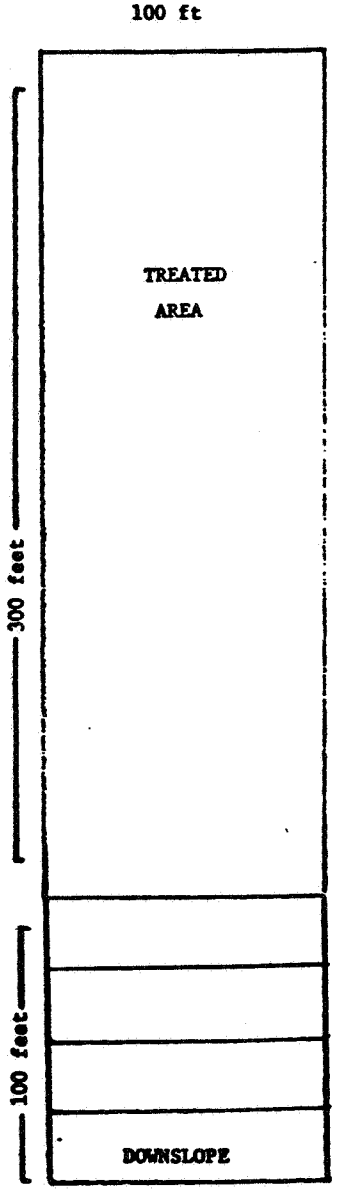
FIELD TEST DATA REQUIRED

- Amount of rainfall and/or irrigation water recorded on a daily basis.
- Soil and air temperature data, humidity on a daily basis.
- Experimental notes at each sampling period.
- Application method.
- Sampling techniques.
- Complete soil characterization.



SIDE VIEW

TOP VIEW



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Note to file

Meeting with American Hoechst

Endosulfan Field Dissipation and Runoff Studies

In a meeting on 29 January 1987 with representatives from American Hoechst it was agreed that:

1. The field dissipation and runoff studies in the eastern U.S. could be done in the Piedmont of GA SC or NC to get conditions more conducive to runoff
2. The field dissipation and runoff studies are to be separated in the eastern U.S. though they can be side by side.
3. The runoff from the field and from the buffer/barrier strip will both be measured for endosulfan.
4. The California - San Joaquin study will be a field dissipation study only measuring dissipation in a furrow irrigated field and the concentration of endosulfan in the tail waters after each irrigation episode. The EPA/USDA Imperial Valley study of similar nature was given as an example.

Bob Holst

cc: PM 15
John Bascietto/Doug Urban

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