

US EPA ARCHIVE DOCUMENT

10-17-89

59101

Shaughnessy No.: ~~059191~~

Date Out of EFGWB: OCT 13 1989

To: Dennis Edwards
Product Manager #12
Insecticide-Rodenticide Branch
Registration Division (H7505C)

From: Emil Regelman, Supervisory Chemist
Chemistry Review Section #2
Environmental Fate and Ground Water Branch (H75070)

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

R
Henry Jacoby 10/17/89

Attached, please find the EFGWB review of

Reg./File # : 464-552
Common Name : Chlorpyrifos
Type Product : Insecticide
Product Name : Lorsban
Company Name : Dow Chemical USA
Purpose : Review application for amended registration of Lorsban 50W to add use on blueberries.

Date Received : 9/12/89 EFGWB # (s) : 90758

Action Code : 310

Total Reviewing time: 2.1 days

- Deferrals to:
- Ecological Effects Branch, EFED
 - Science Integration and Policy Staff, EFED
 - Non-Dietary Exposure Branch, HED
 - Dietary Exposure Branch, HED
 - Toxicology Branch I, HED
 - Toxicology Branch II, HED

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1. CHEMICAL: Common name:

Chlorpyrifos.

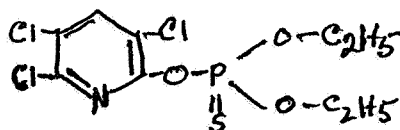
Chemical name:

O,O-Diethyl O-(3,5,6-trichloro-2-pyridyl)phosphorothioate.

Trade name(s):

Pyrinex, Dursban, Lorsban, Brodan, Dowco, Eradex.

Structure:



Formulations:

Ø.1-25% D; Ø.Ø75-15% G; 1% P/T; 2.32-5Ø% WP; 1Ø% Mcap;
Ø.5-1Ø% Impr; Ø.156-4 lb/gal and Ø.51-41.2% EC; 6 lb/gal SC/L;
Ø.Ø73-3.8 lb/gal and Ø.Ø5-Ø.86% RTU; Ø.Ø9-Ø.5% PrL.

Physical/Chemical properties:

Molecular formula: C₉H₁₁Cl₃NO₃PS
Molecular weight: 35Ø.57
Physical state: White granular crystal
Solubility: 2 ppm in water at 25^ØC ; readily soluble
in organic solvents.

2. TEST MATERIAL:

N/A.

3. STUDY/ACTION TYPE:

Review application for amended registration of lorsban 5ØW to add use on blueberries.

4. STUDY IDENTIFICATION:

N/A.

5. REVIEWED BY:

P. Datta, Ph.D.
Chemist
Review Section #2
EFGWB/EFED/OPP

Signature: _____

P. Datta

Date: _____

10/11/89

6. APPROVED BY:

Emil Regelman
Supervisory Chemist
Review Section #2
EFGWB/EFED/OPP

Signature: _____



OCT 13 1989

Date: _____

7. CONCLUSIONS:

EFGWB has the following concerns re adding use of chlorpyrifos on blueberries:

- (1) Since the 1984 Registration Standard, Dow Chemical has fulfilled the following six studies out of sixteen studies required for current use patterns to support continued registration of pesticide products containing chlorpyrifos as active ingredient:

- 161-1 - Hydrolysis,
- 161-4 - Photodegradation in air,
- * 162-1 - Aerobic soil metabolism,
- * 162-2 - Anaerobic soil metabolism,
- ** 162-3 - Anaerobic aquatic metabolism, and,
- 165-4 - fish accumulation.

* Accepted study in the 1984 Registration Standard

** Not required because aquatic use pattern was withdrawn by Dow (1984).

Therefore, there are insufficient data requirements studies accepted by EFGWB to determine the fate of chlorpyrifos in environmental media (soil, water, and air).

- (2) Inadequate data exist to demonstrate that chlorpyrifos and/or its major metabolite 3,5,6-trichloropyridin-ol (TCP) is not likely to leach to ground water in measurable quantities. TCP appears to be mobile and moderately persistent in soil.
- (3) A tolerance of 2 ppm in/on blueberries has been established by the Agency [Interregional Research project NO 4 (IR-4), petition] to avoid a significant economic impact on a substantial number of small growers. This action was not meant to waive data requirements to support continued registration and label amendments registration of chlorpyrifos.

Due to many data gaps and deficiencies in the reviewed studies cited above, EFGWB cannot support, at this time, an amended registration to use of chlorpyrifos on blueberries.

8. RECOMMENDATIONS:

RD should inform Dow Chemical the requested label amendment registration for chlorpyrifos on blueberries is not acceptable because EFGWB cannot evaluate environmental fate of chlorpyrifos and its major degradates TCP due to insufficient data base.

9. BACKGROUND:

In the 1984 Registration Standard only 2 of the 21 required studies were judge acceptable to support reregistration. Since the 1984 Registration Standard, four other of the sixteen studies (minus 5 aquatic use pattern studies) required under 40 CFR 158.290 for the current use patterns submitted by Dow have been found acceptable, namely:

- ***161-1 - Hydrolysis,
- ***161-4 - Photodegradation in air,
- **162-1 - Aerobic soil metabolism,
- **162-2 - Anaerobic soil metabolism,
- ***162-3 - Anaerobic aquatic metabolism*, and,
- ***165-4 - Fish accumulation.

* study is not required because aquatic use pattern was withdrawn by Dow.

** study accepted in the 1984 Registration Standard (RS).

*** study accepted in the 1989 RS (Second Round Review).

Since chlorpyrifos degraded with a mean half-life of 63 days in seven soils incubated under aerobic conditions, the long-term dissipation studies (164-5) were not required.

Since Dow Chemical withdrew the aquatic (mosquito larvicide) label (in 1984) the following five studies are no longer required (but 16 studies out of the total 21 environmental fate studies are still required):

- 162-4 - Aerobic aquatic metabolism ,
- 164-2 - Aquatic (sediment) field dissipation,
- 164-3 - Forestry dissipation,
- 165-3 - Accumulation studies on irrigated crops, and,
- 165-5 - Accumulation studies in aquatic non-target organisms.

In 1989 Registration Standard (Second Round Review) the following five studies submitted in response to the 1984 registration Standard was reviewed and found them to be unacceptable . EFGWB believes that the submission of additional and/or clarification of original data may not be adequate to make these studies acceptable.

- 161-2 - Photodegradation in water,
- 161-3 - Photodegradation on soil,
- 163-2 - Laboratory volatility studies,
- 164-1 - Terrestrial field dissipation, and,
- * 165-1 - Confined accumulation studies on rotational crops.

* Study is not required for blueberries patch.

The data requirement for two studies are being held in reserve pending first tier laboratory studies, namely: 163-3 - field volatility, and 165-2 - field rotational crops (this study is not required for blueberries patch)

Two spray drift studies (201-1 and 202-1) under 40 CFR 158.440 are required on current use patterns because chlorpyrifos is aerially applied.

At present, insufficient ground water data exist for chlorpyrifos and its major degradate TCP.

The data requirement studies cited above are required to support continued registration of pesticide products containing chlorpyrifos as active ingredient. (For details, refer to EFGWB's Science Chapter of chlorpyrifos-Second Round Review (SRR), 12/19/88 and the Registration Standard (SRR) issued by the Agency for public comments 8/16/89).

Ecological Effects Branch (EEB) stated that it has not been able to complete risk assessments on fish and wildlife for the present use patterns due to inadequate data base. At present, a special fish and wildlife testing using granular chlorpyrifos and its degradate TCP is required because of their persistence in the environment. Therefore, the allowing use of chlorpyrifos on blueberries (a total of ca 40,000 acres for both cultivated and wild varieties) may produce incremental risk to non-target flora and fauna. Chlorpyrifos is known to be moderately to very toxic to birds and very highly toxic to fresh water fish, aquatic invertebrates and estuarine and marine organisms. (For details, refer to the Ecological Effects Branch's Science Chapter of Chlorpyrifos Second Round Review, 12/20/88).

Dietary Exposure Branch stated that the IR-4 tolerance for chlorpyrifos re in/on blueberries was established with the label restriction " Do not apply within 28 days before harvest or apply the treatments closer than 14 days apart." The petitioner has not responded to the deficiency re lb a.i./100 gallons sprayed to run-off. (For details see RCB [now DEB] review #2454, 7/16/87).

On 5/18/89, Dow Chemical requested revision of currently registered Lorsban 50W label (EPA REG. NO. 464-552) to add use on blueberries. Dow's request was based on the Agency's issuance of a tolerance of 2 ppm on blueberries. (F.R. Notice 52 , No. 236, pp. 46598, 12/9/87).

On 8/16/89, the agency issued Second Round Review (SRR) Registration Standard of chlorpyrifos. Dow Chemical has not had enough time to respond to the comments on data gaps cited in this SRR.

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

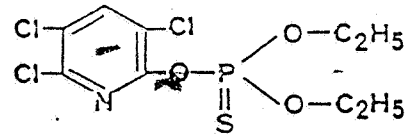
N/A.

11. COMPLETION OF ONE-LINER:

See attached one-liner.

12. CBI APPENDIX:

All data reviewed here are considered "company confidential" by the registrant and must be treated as such.



ENVIRONMENTAL FATE & GROUND WATER BRANCH
 PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY

Common Name: **CHLORPYRIFOS** Date: 06/28/89
 Chem. Name : O,O-DIETHYL-O-(3,5,6-TRICHLORO-2-PYRIDYL) PHOSPHOROTHIOATE
 :
 Synonym : BRODAN; DURSBAN
 Shaugh. # : 59101 CAS Number: 2921-88-2
 Type Pest. : Insecticide
 Formulation: 4E;15G; DUSTS; WP; BAITs;
 Uses : 57% OF CHLORPYRIFOS MFD. IN U.S. IS USED ON CORN, 22% USED
 : FOR PEST CONTROL AND LAWN AND GARDEN SERVICES
 :

Empir. Form: C₉H₁₁SPO₂Cl₃N VP (Torr): 1.87E-5
 Mol. Weight: 350.6 Log Kow : 4.70
 Solub.(ppm): 2 @ 20 C Henry's : 4.21E-6

Hydrolysis (161-1)	Photolysis (161-2, -3, -4)
pH 5:[*] 72 DAYS	Air :[*] 2.6 DAYS
pH 7:[*] 72 DAYS	Soil :[] 32 DAYS (ARTIFICIAL LT.)
pH 9:[*] 16 DAYS	Water:[] 6-24 HR
pH :[]	:[#] 31 DAYS, STERILE, pH 5,
pH :[]	:[] UNDER ARTIFICIAL LIGHT
pH :[]	:[]

MOBILITY STUDIES (163-1)

Soil Partition (Kd)	Rf Factors
1.[#] 49.9 IN LOAM (ORG. C = 0.68%)	1.[*] IMMOBILE IN LmSd AND SdLm.
2.[#] 99.7 IN SiLm (ORG. C = 2.01%)	2.[]
3.[]	3.[]
4.[]	4.[]
5.[]	5.[]
6.[]	6.[]

METABOLISM STUDIES (162-1,2,3,4)

Aerobic Soil (162-1)	Anaerobic Soil (162-2)
1.[*] SdLm <1 WEEK (AT 10 PPM)	1.[*] LOAM 15 DAYS
2.[*] ORGANIC SOIL 2.5 WEEKS (AT 10	2.[*] CLAY 58 DAYS (BOTH AFTER
3.[] PPM). IN STERILIZED SOIL =	3.[] AEROBIC AGING)
4.[] >17 WEEKS.	4.[*] LOAM 39 DAYS
5.[]	5.[] CLAY 51 DAYS (BOTH AFTER
6.[]	6.[] TREATMENT AND ANAEROBIC INCU-
7.[]	7.[] BATION)

Aerobic Aquatic (162-4)	Anaerobic Aquatic (162-3)
1.[]	1.[]
2.[]	2.[]
3.[]	3.[]
4.[]	4.[]

[*] - Acceptable Study. [#] = Supplemental Study

Common Name: **CHLORPYRIFOS**

Date: 06/28/89

VOLATILITY STUDIES (163-2,3)

Laboratory:

Field:

DISSIPATION STUDIES (164-1,2,3,5)

Terrestrial Field (164-1)

1. 18-53 DAYS FINE SANDY LOAM
2. [#] 7-21 DAYS LOAM
3. [#] 14 DAYS SAND
4. [#] 56 DAYS ORGANIC MUCK
5. [#] < 14 DAYS TURF
6.

Aquatic (164-2)

1.
2.
3.
4.
5.
6.

Forestry (164-3)

1.
2.

Other (164-5)

1.
2.

ACCUMULATION STUDIES (165-1,2,3,4,5)

Confined Rotational Crops (165-1)

1. [*] RESIDUES ACCUMULATE IN WHEAT, SOYBEANS, AND BEETS.
2.

Field Rotational Crops (165-2)

1.
2.

Irrigated Crops (165-3)

1.
2.

Fish (165-4)

1. [*] RAINBOW TROUT BCF : FILLETS 725 X, WHOLE FISH 1374
2. [*] RAINBOW TROUT BCF:EDIBLE 1280 X, NON-ED. 3903 X, WHOLE 2729 X

Non-Target Organisms (165-5)

1.
2.

ENVIRONMENTAL FATE & GROUND WATER BRANCH
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY

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Common Name: **CHLORPYRIFOS**

Date: 06/28/89

GROUND WATER STUDIES (158.75)

1. []
2. []
3. []

DEGRADATION PRODUCTS

1. 3,5,6-TRICHLORO-2-PYRIDINOL (MAJOR DEGRADATE WITH T1/2 OF ABOUT
2. 25 DAYS, YIELDING 3,5,6-TRICHLORO-2-METHOXYPYRIDINE)
3. AFTER 1 YEAR INCUBATION MOST OF RING-LABELLED CHLORPYRIFOS IS
4. EVOLVED AS CO₂.
5. 2-METHOXY-3,5,6-TRICHLOROPYRIDINE (MINOR DEGRADATE IN SOIL
6. PHOTOLYSIS).
7. O-ETHYL-O-(3,5,6-TRICHLORO-2-PYRIDYL)-PHOSPHOROTHIOATE
- 8.
- 9.
- 10.

COMMENTS

BREAKDOWN IN SOIL IS MOSTLY BY MICROBIAL METABOLISM.
ACUTE TOXICITY TO TROUT AND BLUEGILL RANGED FROM 3 TO 14 PPB; AL
VERY HIGHLY TOXIC TO FRESHWATER AQUATIC INVERTEBRATES.

IN LEACHING EXPERIMENTS, MOST OF THE CHLORPYRIFOS WILL REMAIN I
THE UPPER 2" OF SOIL HAVING ORG. CARBON CONTENT ABOVE 1%.

CHLORPYRIFOS RESIDUES VOLATILIZED FROM THE SURFACE OF CORN LEAV
WITH T1/2 OF <12 HOURS.

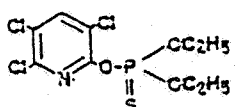
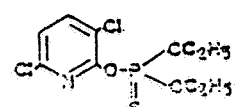
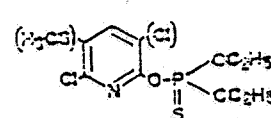
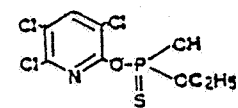
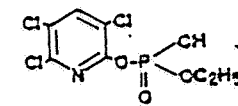
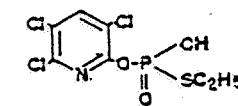
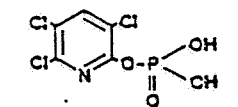
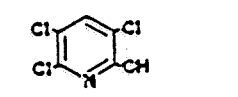
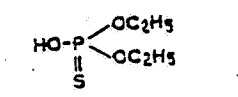
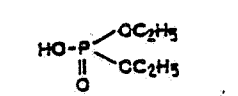
T1/2 FOR PHOTOLYSIS, 1 METER DEPTH OF WATER, IN MIDSUMMER=43 DA

References:

Writer : RWH J. HANNAN

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Table 1. Chlorpyrifos and its metabolites.

Code	Structure	Chemical Name
I		0,0-diethyl 0-(3,5,6-trichloro-2-pyridyl)phosphorothioate (chlorpyrifos)
II		0,0-diethyl 0-(3,6-dichloro-2-pyridyl)phosphorothioate
III ^a		0,0-diethyl 0-(dichloro, methylthio, 2-pyridyl)phosphorothioate
IV		0-ethyl 0-(3,5,6-trichloro-2-pyridyl)phosphorothioate
V		0-ethyl 0-(3,5,6-trichloro-2-pyridyl)phosphate
VI		S-ethyl 0-(3,5,6-trichloro-2-pyridyl)phosphorothioate
VII		3,5,6-Trichloro-2-pyridyl phosphate
VIII		3,5,6-Trichloro-2-pyridinol
IX		Diethyl thiophosphate
X		Diethyl phosphate

^aThe exact position of the thiomethyl group was not determined; however, it was determined that the group is located at either position 2 or 5 on the ring.

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