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Init.: *SM*

To: J. Ellenberger
Product Manager 12
Registration Division (TS-767)

From: Carolyn K. Offutt *(Carolyn K. Offutt)*
Chief, Environmental Processes and Guidelines Section
Exposure Assessment Branch, HED (TS-769)

Attached, please find the environmental fate review of:

Reg./File No.: 464-448 and -523

Chemical: Chlorpyrifos

Type Product: I

Product Name: LORSBAN 4E and 15G

Company Name: Dow

Submission Purposes: Evaluate runoff data for citrus

ZBB Code: _____

Action Code: 306

Date In: 4/26/85

EFB#: 5572 and 5573

Date Completed: 7/3/85

TAIS (Level II) Days

04

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Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

_____ Toxicology Branch

EVALUATION OF RUNOFF MODELLING

STUDY OF CHLORPYRIFOS

1. CHEMICAL:

Chemical name: Chlorpyrifos
Common name: LORSBAN

2. TEST MATERIAL:

LORSBAN® 4E and 15G

3. STUDY/ACTION TYPE:

Registrant submitted modeling study of chlorpyrifos applied to citrus in Florida. Their study was motivated by a PRZM study by Matt Lorber of EAB which showed that as much as 7.3% of application would run off. Their conclusion was that 0.1-0.3% would run off using PRZM and CREAMS models.

4. STUDY IDENTIFICATION:

Title: Evaluation of the Runoff Potential of Chlorpyrifos from Florida Citrus Groves
Author: George R. Oliver, Ag. Products Dept., Dow Chemical
Registration No: 464-448 and -523
Submitted by: Dow Chemical
Report Date: 4/4/85
Accession No: 257726

5. REVIEWED BY:

Matthew N. Lorber, Agricultural Engineer Matthew Lorber Date 7/3/85
Environmental Processes and Guidelines Section/EAB/HED

6. APPROVED BY:

Carolyn K. Offutt, Chief Carolyn K. Offutt Date 7/3/85
Environmental Processes and Guidelines Section/EAB/HED

7. CONCLUSIONS:

Their study represented an improvement over EAB's PRZM modeling study in that careful consideration was given to choosing an appropriate soil type for modeling purposes. On the other hand, they did not provide sufficient evidence that their assumption of a 15 day half-life represents a more realistic half-life than EAB's assumption of a 100 day half-life. In examining their study and EAB's, the conclusion is drawn that a realistic amount of chlorpyrifos runoff for a single event can be as high as 1% or applied, or 112 g/ha (see #10, discussion section).

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8. RECOMMENDATIONS:

Any decision to require field runoff monitoring studies or aquatic or avian toxicity studies with chlorpyrifos should be based on the assumption that 1% of applied (or 112 g/ha for an 11.2 kg/ha application rate) chlorpyrifos could possibly run off citrus groves during a single event. A prior recommendation to Dow to do these types of studies was based on the assumption of 7.3% runoff.

9. BACKGROUND:

A. Introduction

Matt Lorber's EAB PRZM assessment of runoff and leaching potential of chlorpyrifos dated 10/17/84 evaluating the proposed 11.2 kg/ha (10 lb/ac) application to citrus prompted a letter from Jay Ellenberger to Robert Bischoff of Dow dated 2/15/85 requiring that Dow perform runoff monitoring and avian and aquatic toxicity studies. Dow responded by redoing simulations with careful consideration of EAB's PRZM parameters. EAB's assessment concluded that between 0.2-7.3% of applied would run off, while Dow concluded that 0.1-0.3% would run off.

B. Directions for Use

The proposed amended registration was for the control of root weevils and various ant species on citrus. The maximum label rate for this use was 11.2 kg/ha (10 lb/ac).

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

The initial PRZM assessment assumed two soil types: a "sand" and a "loam", and showed the difference in fate and transport of chlorpyrifos as a function of soil type. Since chlorpyrifos is tightly bound to soil (EAB and Dow agree on this), the primary difference was a higher expected loss of chlorpyrifos adsorbed to eroded loam soil, as compared to eroded sand soil. PRZM predicted that as much as 7.3% of chlorpyrifos would run off a loam soil. Dow presented a strong case showing that between 90 and 98% of citrus in Florida can be found on sand to loamy sand soil types. Therefore, while 7.3% is not an incorrect estimate of runoff of chlorpyrifos from a loam soil, there will be very little loam soil use to be concerned about. Dow also showed that the appropriate PRZM parameter to change was the "erodibility" factor, k , of the soil loss equation. EAB assumed a k of 0.34, whereas Dow assumed a more appropriate k of 0.10 for sandy soils. All other things being equal, a substitute of 0.10 in earlier PRZM simulations would reduce maximum annual

runoff loads of chlorpyrifos from 7.3% to 2.1%. This reviewer concludes, therefore, that 2.1% of applied chlorpyrifos to citrus could run off annually in the "worst" case.

Dow also made the correct assertion that not all of the predicted annual loss would come off in one storm; i.e., a single event exposure level would not be 2.1% of applied. Based on this reviewer's experience, it is not unlikely that half of annual runoff losses of pesticide will come from one event. Therefore, the appropriate exposure input to aquatic environments is set at 1% of applied, or 112 g/ha from a 11.2 kg/ha application rate.

Dow asserted that the worst-case assumption of a half-life of 100 days was too long, saying that a half-life of 15 days was more reasonable. Close examination of their evidence and data presented in the Task 2: Environmental Fate and Exposure Assessment dated Feb. 22, 1984, prepared for the chlorpyrifos Registration Standard by Dynamac indicates that this may be true for a sand soil. However, degradation data which Dow has developed indicates a wide range of decay rates. A laboratory study (McCall, et al., 1984) quoted in this citrus package indicated a range of 12-61 days half-life. This study was reviewed by EAB on September 11, 1984, with the conclusion that the laboratory half-lives did have that range. The range quoted in the Task 2: EFEA is 11-141 days. Dow cites a field runoff study in Illinois conducted by the company (McCall, et al., 1984) which indicates a half-life of one to two weeks, although in this case, chlorpyrifos was applied to corn and soybean fields at a rate of 4.0 and 1.5 lb/ac (note: on September 11, 1984, EAB reviewed a McCall et al. study in Illinois titled, "Modeling the runoff potential and behavior of chlorpyrifos in a terrestrial-aquatic watershed". This is not the same study cited by Dow in this submission. The Dow study reviewed by EAB did not include half-life determinations.). In conclusion, this reviewer feels that a worst case assumption of 100 days is reasonable, and that an assumption of 1.0% of applied to possibly run off in Florida is also reasonable. If there is still concern with the resulting aquatic concentration resulting from a 1% runoff event, the next appropriate step would be to require a field runoff study for citrus in Florida.