

US EPA ARCHIVE DOCUMENT

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DATA EVALUATION RECORD

CHEM 080808

Propazine

§164-1

DRAFT

FORMULATION-00-ACTIVE INGREDIENT

STUDY ID 441848-08

Lightle, S. and P. N. Coody. 1996. The Mobility and Degradation of ¹⁴C-Propazine Utilizing Field Installed Lysimeters in a North Carolina Loamy Sand Soil. Unpublished study performed by PTRL East, Inc., Richmond, KY and submitted by Griffin Corporation, Valdosta, Ga.

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A. CONCLUSIONS / SUMMARY

(1) The study was submitted to support registration of an end use product, and to partially satisfy the requirements of FIFRA Subdivision N Guidelines (164-1: Field Dissipation for Terrestrial Use) and substitute for a Small Scale Prospective Ground Water Study. The study was found supplemental due to the following deficiencies discussed in the Reviewer's Discussion and Comments section: (a) mass balance of the applied radioactivity was poor towards the end of the study; and (b) experimental conditions with respect to rainfall and irrigation for the first 30-60 days after pesticide application are not favorable to leaching.

(2) Radiolabeled propazine and bromide tracer were applied to cylindrical lysimeters (length=36 in ; diameter=8 in) containing undisturbed Norfolk loamy sand in Clayton, NC. The application rate corresponded to 2.4 lb ai/acre based on lysimeter surface area. The soil is generally sandy and acidic with an organic carbon content of < 0.7%. The lysimeters received rainfall and supplemental irrigation water corresponding to 110% of 10-year average for the test location. Samples of soil, leachate, and overflow water were analyzed periodically for propazine and its metabolites during the 367-day study. Breakthrough of



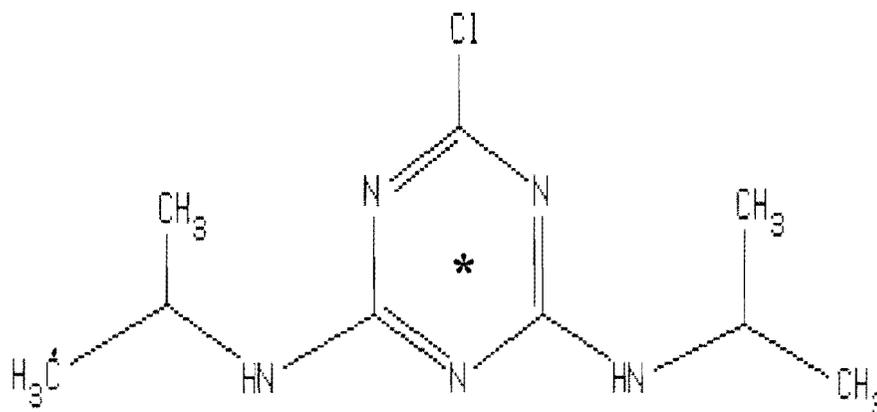
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bromide tracer below the lysimeters was observed after around 170 - 200 days after treatment (DAT). The dissipation kinetic analysis based on total radiocarbon residues in the upper 12 inches indicated a first-order half-life of 332 days and a rate constant of -0.0021/day. Propazine and its four metabolites (propazine-2-hydroxy, atrazine-desethyl, atrazine-desethyl-2-hydroxy, and atrazine-desethyl-deisopropyl) were detected in the soil layers and leachate samples. The maximum concentration of ^{14}C -propazine in all leachate samples was 32 $\mu\text{g/L}$, representing 0.04% of the applied radioactive carbon. The average recovery of applied radioactivity from all sources at all sampling times decreased from 82.1% at 1 DAT to 46.0% by 367 DAT.

(3) Under the experimental conditions used the study, propazine showed limited mobility in the Norfolk loamy sand.

B. TEST MATERIAL

The chemical structure of radiolabeled propazine used in the study is shown below:



* Denotes site of radiolabel

It has a radiochemical purity of 97.8% and a specific activity of 104.4 $\mu\text{Ci/mg}$. The solubility of propazine was reported to be 8.6 mg/L at 20 $^{\circ}\text{C}$.

C. SOIL DESCRIPTION

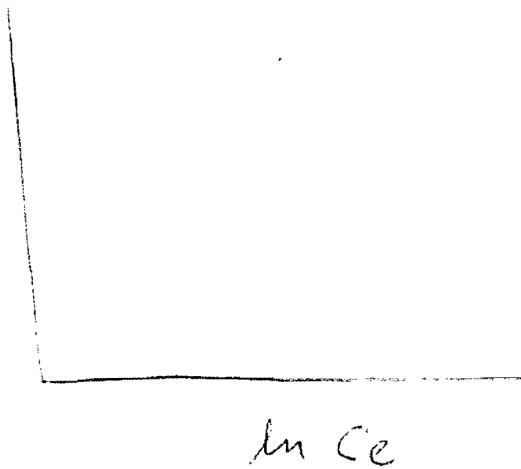
The soil used in the study is Norfolk loamy sand from Clayton, NC. The soil has the following average physicochemical characteristics as summarized in Table 1: pH 4.9, 0.17% organic carbon, bulk density 1.28 g/cc , Cation Exchange Capacity 6.92 meq/100g , water holding capacity (at 0.33 Bar) 15.91%, particle size percentage: 62.8% sand, 8.0% silt, and 29.2% clay. In the different lysimeters, the soil properties tend to vary with depth. For instance, the organic carbon content and pH generally decreased with increase in soil layers depth from 0 to 36 inches. The bulk density and % sand were generally lower in the

24 - 30" and 30 - 36" soil layers than those in the upper layers.

D. TEST METHODOLOGY

(1) Lysimeter Experiments:

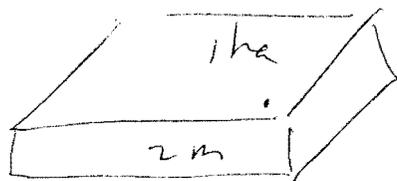
$$\ln \frac{x}{m}$$



$$\ln \frac{x}{m} = K_F + n \ln C_e$$

↑ ↑
intercept slope

20 6.30



$$A = 10 \times 10^8$$

$$V = 2 \times 10^8$$

$$A : V = 0.5 \times 10^8$$

$$1 \text{ ha} \times 2.47 = 1 \text{ acre}$$

$$2.47 \text{ ha} = 1 \text{ acre}$$

$$1 \text{ m}^2 \times 2.47 \times 10^4 = 1 \text{ acre}$$

$$2.47 \times 10^4 \text{ m}^2 = 1 \text{ acre}$$

$$1 \text{ ha} \times \frac{1 \text{ acre}}{2.47 \text{ ha}} \times \frac{4.05 \times 10^3 \text{ m}^2}{1 \text{ m}^2}$$

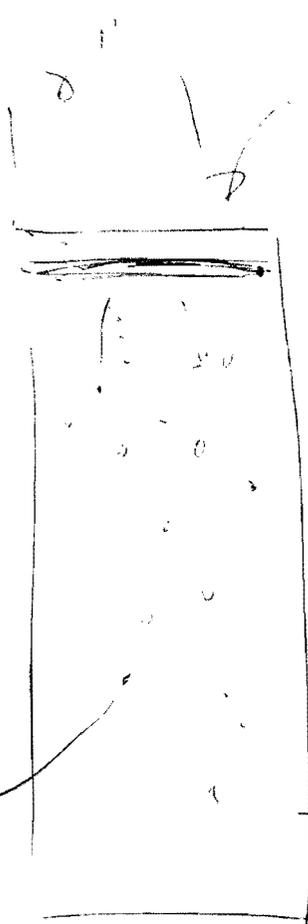
$$1 \text{ ha} \times 2.47 = \text{acre}$$

$$247 \text{ km}^2 \text{ acre}$$

$$247 \times 10^6 \text{ m}^2 = 1 \text{ acre}$$

$$1 \text{ ha} \times 2.47 = 247 \times 10^6 \text{ m}^2$$

$$1 \text{ ha} = \frac{247 \times 10^6 \text{ m}^2}{2.47} = \boxed{10^8 \text{ m}^2}$$



$$2 \times 10^8 \text{ m}^3 \times 10^3 \text{ m}^3$$

$$2 \times 10^8 \text{ m}^3 \times \frac{10^3 \text{ L}}{\text{m}^3}$$

$$\frac{247 \times 10^6 \times 10^6}{2.47}$$

$$(10^3) \text{ m} = (1 \text{ km})$$

$$10^6 \text{ m}^2 = 1 \text{ km}^2$$

Page _____ is not included in this copy.

Pages 5 through 6 are not included in this copy.

The material not included contains the following type of information:

_____ Identity of product inert ingredients.

_____ Identity of product impurities.

_____ Description of the product manufacturing process.

_____ Description of quality control procedures.

_____ Identity of the source of product ingredients.

_____ Sales or other commercial/financial information.

_____ A draft product label.

_____ The product confidential statement of formula.

_____ Information about a pending registration action.

X_____ FIFRA registration data.

_____ The document is a duplicate of page(s) _____.

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_____ Internal deliberative information.

_____ Attorney-client communication.

_____ Claimed confidential by submitter upon submission to the Agency.

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The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

Propagazine / Lyzimeter (1)

ρ_B ($g\ cm^{-3}$)

0	1.75	} 1.75 = $\bar{\rho}_B$
3	1.74	
6	1.78	
9	1.79	
12	1.82	
18	1.63	} 1.32 = $\bar{\rho}_B$
24	1.36	
30	1.28	
36		

$$\text{Ave } \bar{\rho} = (1.75) \cdot \frac{6}{8} + (1.32) \cdot \frac{2}{8} = \boxed{1.64}$$

$$\begin{aligned} \text{Total porosity } \bar{n} &\approx 1 - \frac{\bar{\rho}_B}{\rho_d} \rightarrow 2.65\ g\ cm^{-3} \\ &= 1 - \frac{1.64}{2.65} \\ &= 0.38 \end{aligned}$$

$$\eta_T = \frac{\text{void vol}}{\text{soil vol.}}$$

$$\text{void vol.} = (\eta_T) (\text{soil vol.})$$

$$= (0.38) (29,630)$$

$$= 11,258$$

$$= \boxed{12,260\ cm^3}$$

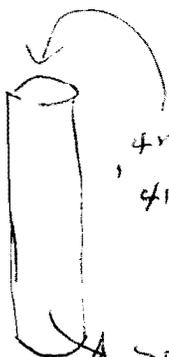
$$A \times 36\ in = 324\ cm^2 \times (36) (2.54) = 29,630\ cm^3$$

$$L = \frac{\text{Vol}}{A} = \frac{416\ cm^3}{324\ cm^2}$$

$$L \times A = \text{Vol} = 1284\ cm^3$$

$$L = \frac{\text{Vol}}{A} = 0.51\ in$$

$$= \frac{29630\ cm^3}{324\ cm^2}$$



4 mL acetone w/ 87 mg propagazine (ai)
 412 mL H₂O w/ 914 mg KBr
 (= 0.5 inch H₂O added to 1 gram soil)

soil - Norfolk loamy sand
 in Clay soil, NC

Table V, p. 64.

Sampling DAI	Total water Input (liters)
1	0.41
7	1.00
14	2.30
28	3.58
86	13.14
183	21.33
272	34.43
367	54.93

$$M_1 = 0.38 \times 12,260 \text{ cm}^3 = 12.26 \text{ liters}$$

Leachate would be expected by ≤ 86 days after treatment.

Note: For almost 28 DAI, no significant leachate collected
 \rightarrow for about a month, first chemical is in the soil as adsorbed and/or ~~in~~ a dissolved phase
 \rightarrow may be somewhat equivalent to "aged residues" as opposed to freshly applied.

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Summary

application rate = 2.4 lb/c

lysimeter used
undisturbed Norfolk
sandy soil, in Clayton, NC
208 g a/c / ha (based on lysimeter surface area)
78 lysimeter

at = 14°C - propazine
tracer - ~~TEBT~~ Br⁻ from KBr

runoff at supplemented ~ 110% of 15-yr
ave. for
this location
soil - generally sandy
acidic pH
20.7% OC

lysimeter 38" = L; D = 8"

dispersion kinetic measurements
min total radiation received
in 1 hr by pm 12 m dia
t/2 = 331.8 days
k = -0.0021 / day

breakthrough of Br from
below lysimeter used 170-200 DAT

Propazine + 3 metabolites

Max conc
14C-propazine
in all reactions
sample = 37 mg/L

propazine - 2-hydroxy,
propazine desethyl,
1-propazine-desethyl... gly
propazine-desethyl-desethyl

Aerobic soil
metabolism
CO = 4.3 ppm
179-day period
t/2 = 287 d
H₂ mineralization
- respired CO₂
production

P.S.C. 2nd paragraph
Ave. 14C-prop concs
= 2.64 fold over
measured