DATA EVALUATION RECORD

CHEM 080808 Propazine §162-1

FORMULATION--00--ACTIVE INGREDIENT

MRID 441848-07

Perdue, D. 1995. Aerobic Soil Metabolism of [^{14}C]Propazine in Sandy Loam. Laboratory Project Identification: PTRL Project No.:865. Unpublished study performed by PTRL East, Inc., Richmond, KY, and submitted by Griffin Corporation, Valdosta, GA

REVIEWED BY:

Rodolfo A. Pisigan, Jr., Ph.D.
Chemist
OPPTS/OPP/EFED
ERB-IV

Signature:_____

Date:_____

APPROVED BY:

Mah T. Shamim, Ph.D.
Branch Chief
OPPTS/OPP/EFED
ERB-IV

Signature:_____

Date:_____

A. CONCLUSIONS/SUMMARY

(1) The study was submitted to support registration of an end use product and to provide data that may be used toward fulfillment of Subdivision N (162-1) environmental fate requirements on aerobic soil metabolism of propazine. The study was found to be acceptable.

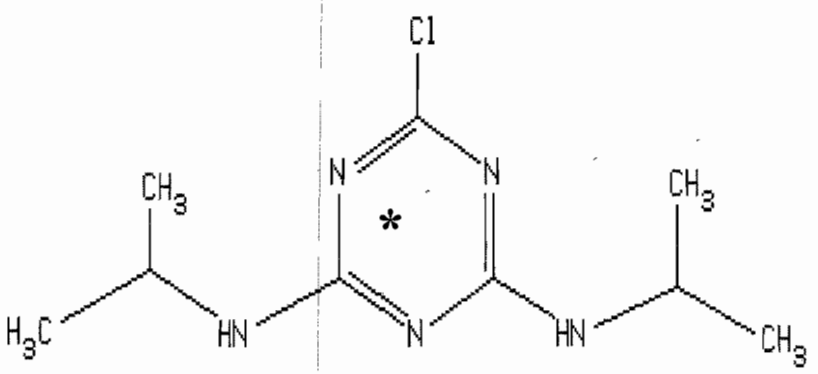
(2) Radiolabeled propazine was applied to a sandy loam (sand 67%, silt 23%, clay 10%; organic carbon 1.0%; pH 6.8) at a concentration of 4.3 ppm. Duplicate soil incubation flasks under dark conditions maintained at 25.0±0.1 ^{0}C were sampled at 0, 21, 53, 117, and 179 days. The half-life was estimated at 289 days. The major degradation product was 2-hydroxypropazine that represented 12.2% of the applied dose. Other degradates detected in trace quantities include atrazine-desethyl and atrazine-desethy-2-hydroxy. Volatile degradation products were less than 0.1% of the applied radiocarbon and considered to be practically absent. No mineralization based on negligible carbon dioxide production was observed. The mean material balance throughout the study was

97.8±2.4%.

(3) Aerobic soil metabolism would be expected to contribute to the dissipation of propazine in subsurface environments. Other studies indicated that propazine is both hydrolytically and photolytically stable in aqueous environments.

B. TEST MATERIAL

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



* Denotes site of radiolabel

It has a radiopurity of 100.0% (HPLC/RAM) and a specific activity of 49.42 mCi/mM.Thesolubility of propazine was reported to be 8.6 mg/L at 20 ^{0}C.

C. SOIL DESCRIPTION

Sandy loam was collected from Huntington Silt Loam Series (horizon A) in Fayette County, Kentucky. The soil has the following characteristics: pH 6.8, 1.0% organic carbon, bulk density (undisturbed) 1.2 g/cc, Cation Exchange Capacity 5.5 meq/100g, particle size percentage: 67.0% sand, 23.0% silt, and 10.0% clay. The soil was sieved through a 2-mm screen and air-dried before tranfering it to the soil incubation flask. Soil viability was evaluated at the start of the study by determining the total colony forming units (CFU) of the microbes present. The microbial population density was reported in CFU/g of soil as follows: aerobic bacteria=3.9E+06, actinomycetes=2.1E+06, and fungi=2.0E+03.

D. TEST METHODOLOGY

(1) Aerobic Metabolism: Radiolabeled propazine was evenly applied using a Hamilton syringe to 50 g of soil to give an initial concentration of 4.3 ppm in the test system in 500-ml Erlenmeyer flask. The flask was equipped with a ground-glass stopper and glass stopcock inlet and outlet tubes which were used to remove any volatile metabolites and carbon dioxide while providing for replacement of headspace gas with ambient air on a periodic basis. HPLC-grade water was added to moisten the soil to 75% of field capacity at 0.33 bar and was maintained by adding appropriate amount of water approximately every 14 days. Duplicate soil incubation test flasks and two control flasks without propazine under total darkeness were used. The temperature was maintained at 25 ^{0}C and manually checked during the study.

(2) Sampling: Two types of samples were collected: soil samples from the incubation test flasks and gaseous samples from the trapping solutions.The duplicate test flasks were sampled for soil at different time intervals: 0, 7, 21, 53, 117, and 179 days. The control flasks were not needed and were frozen at day 179. Approximately once every two weeks, the flasks were flushed with air to allow sampling of the polyurethane foam plug, and two glass dispersion tubes with ethylene glycol and 10% sodium hydroxide.

(3) Extraction: Soil samples at day 0 were initially extracted with acetonitrile:water (ACN:H_2O) and then subjected to reflux extraction using ACN:H_2O(9:1,v:v). The extracts were then centrifuged for about 10 minutes at approximately 10,000 rpm. For soil samples for days 7 - 179, the ACN:H_2O extracts were reflux extracted using methanol:ammonium hydroxide (1:1,v:v). The extracts were also centrifuged. The foam plugs were extracted wtih acetonitrile. Propazine was stable throughout the methanol:ammonium hydroxide extraction (97.54% recovery).

(4) Analysis: Air-dried extracted soil was combusted and subsequently radioassayed by Liquid Scintillation Counting (LSC). Aliquots of ethylene glycol, NaOH, and foam plug extracts were radioassayed directly by LSC. Extracts of soil samples were also radioassayed and analyzed, after storage at approximately -20 ^{0}C, by High Performance Liquid Chromatography (HPLC) and Tin Layer Chromatography (TLC). Prior to sample analysis, [^{14}C]propazine fortified with a nonradiolabeled reference mixture of degradates was injected to HPLC (modular liquid chromatograph) equipped with a reverse phase column. Two dimensional TLC was used with two solvent systems to confirm the characterization of [^{14}C]propazine and its degradates.

E. REPORTED RESULTS

The material balance ranged from 94.8 to 103.0%, with a mean of 97.8 ± 2.5% (± std. deviation). The half-life of propazine, derived from the linear regression of ln % of applied radiocarbon vs time with a correlation coefficient of 0.96, was 289 days. The

major degradation product detected was propazine-2-hydroxy, which was about 12% of the applied dose. Other degradation products detected in the soil extracts in trace quantities by TLC were atrazine-desethyl and atrazine-desethyl-2-hydroxy. No significant formation of volatile degradation products was observed and mineralization was practically absent.

F. REVIEWER'S DISCUSSION AND COMMENTS

(1) The study was conducted up to 179 days that corresponded to 40% degradation. The sampling and analysis could have been extended to more than 200 days until at least more than 50% degradation had been achieved. It is possible that the half-life could be experimentally reached by doing additional sampling for another 30 days or more.

(2) The formation and decline of the major the major product was not addressed. No graph nor simple kinetic analysis was provided for propazine-2-hydroxy.

(3) Although approximately once every two weeks the soil incubation flasks were flushed with air to alow sampling of the trapping solutions, aerobicity measurement (Eh or other appropriate/valid parameter) could have been done to check and ensure that aerobic conditions were maintained throughout the study period.

(4) The half-life of propazine determined from the current study (289 days) was about three times longer than the soil aerobic metabolism half-life of 105 days reported in a previous study by Ciba Geigy (MRID # 001537-12).

STUDY AUTHOR'S RESULTS AND CONCLUSIONS

INCLUDING PERTINENT TABLES AND FIGURES

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