Shaughnessy No.: 128974

Date Out of EFGWB: FEB 13 1990

TO: Robert Taylor
Product Manager # 25
Registration Division (H7505C)

FROM: Paul Mastradone, Chief
Environmental Chemistry Review Section #1
Environmental Fate and Groundwater Branch

THRU: Henry Jacoby, Chief
Environmental Fate and Groundwater Branch
Environmental Fate and Effects Division (H7507C)

Henry Jacoby 2/20/90

Attached please find the EFGWB review of:

Reg./File # : 7969-EUP-EP

Chemical Name : Quinclorac

Product Type : Herbicide

Product Name : Facet

Company Name : BASF Corporation

Purpose : Experimental Use Permit

Date Received : 1/29/90 Action Code: 700

Date Completed : 2/9/90 EFGWB No. : 90-0218

Total Reviewing Time (decimal days): 5.5

Deferrals to :
________ Ecological Effects Branch, EFED
________ Science integration & Policy Staff, EFED
________ Non-Dietary Exposure Branch, HED
________ Dietary Exposure Branch, HED
________ Toxicology Branch, HED

Use this form for individual studies & to submit pesticide applications.

EPA United States Environmental Protection Agency Office of Pesticide Programs Washington, DC 20460 **Data Review Record** *Confidential Business Information - Does not contain National Security Information (E.O. 12065)*	Pack Number 49911 EFED	Date Received 12-18-89
1. Product Name BAS 514 [illegible] cide	Chemical Name 3,7-dichloro-8-quinolinecarboxylic acid	

2. Identifying Number	3. Record Number	4. Action Code	5. MRID/ Accession Number	6. Study Guideline or Narrative
7969-EUP-[illegible]	252398	700	41247301	Aerobic Soil Met - Tenn. [illegible]

7. Reference No.	8. Date Rec'd (EPA)	9. Prod/Review Mgr/DCI	10. PM/RM Team No.	11. Date to HED/ EFED/RD/BEAD	12. Proj Return Date	13. Date Returned to RD/SRRD
1	11/21/89	Taylor/VK Walters	25	12/18/89	2/20/90	

Instructions

Aerobic Soil Metabolism study, in support of EUP on Turf

Chem Code 128974-3

This Section Applies to Review of Studies Only

14. Check Applicable Box

☐ Adverse 6(a)(2) Data (405)
☐ Special Review Data (870)
☐ Generic Data (Reregistration)(660)
☐ Product Specific Data (Reregistration)(655)

15. No. of Individual Studies Submitted

16. Have any of the above studies *(in whole or in part)* been previously submitted for review?

☐ Yes *(Please identify the study(ies))* ☐ No

17. Related Actions

18.	To	Type of Review	19. Reviews Also Sent to	
HED	☐	Science Analysis & Coordination	☐ SAC	☐ PC
	☐	Toxicology/HFA	☐ TOX/HFA	☐ PL
	☐	Toxicology/IR	☐ TOX/IR	
	☐	Dietary Exposure	☐ DEB	☐ EA
	☐	Nondietary Exposure	☐ NDE	☐ AC
EFED	☐	Ecological Effects		☐ BA
	✓	Environmental Fate & Groundwater	☐ EEB	
SRRD	☐	Special Review	☐ EFGWB	
	☐	Reregistration		
	☐	Generic Chemical Support	☐ SR	
RD	☐	Insecticide-Rodenticide	☐ RER	
	☐	Fungicide-Herbicide	☐ GSC	
	☐	Antimicrobial		
	☐	Product Chemistry	☐ IR	
	☐	Precautionary Labeling	☐ FH	
BEAD	☐	Economic Analysis	☐ AM	
	☐	Analytical Chemistry		
	☐	Biological Analysis		

20. Data Review Criteria

A. Policy Note No. 31

☐ 1 = data which meet 6(a)(2) or meet 3(c)(2)(B) flagging criteria
☐ 2 = data of particular concern from registration standard
☐ 3 = data necessary to determine tiered testing requirements

B. Section 18

☐ 1 = data in support of section 3 in lieu of section 18

C. Inert Ingredients

☐ 1 = data in support of continued use of List 1 inert

☐ Confidential Statement of Formula (EPA Form 8570-4) Attached *(Trade Secrets)*

☑ Label Attached

EPA Form 8570-17 (Rev. 11-88)
Previous editions are obsolete.

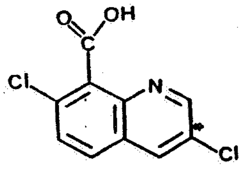
White - Data Coordinator
Yellow - Data Review Section
Pink - PM/RM/DCI
Green - Return with completed review

1.0 CHEMICAL:

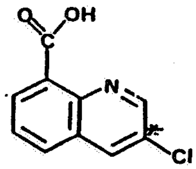
Common Name: Quinclorac, Facet

Chemical Name: 3,7-dichloro-8-quinlinecarboxylic acid

Chemical Structure:



BAS 514 H (quinclorac)



BH 514-1 (degradate)

2.0 TEST MATERIAL: See individual studies.

3.0 STUDY/ACTION TYPE: Experimental Use Permit Application.

4.0 STUDY IDENTIFICATION:

Ellenson, J. L. and V. W. Winkler. 1988. Soil Adsorption/Desorption of BAS 514 H. Performed by BASF Corporation Chemicals Division, Agricultural Chemicals Group. RTP, North Carolina. BASF Report Number 8804. MRID Number 410635-62.

Ellenson, J. L. 1988. Soil adsorption/desorption of 3-chloro-8-quinolincarboxylic acid. Performed by BASF Corporation Chemicals Division, Agricultural Chemicals Group. RTP, North Carolina. BASF Report Number 8808. MRID Number 410635-63.

Clark, James R. 1988. BAS 514-^{14}C Laboratory Aerobic Soil Metabolism Study using A Terrestrial System. Performed by BASF Corporation Chemicals Division, Agricultural Chemicals Group. RTP, North Carolina. BASF Report Number M8725. MRID Number 412473-01.

5.0 REVIEWED BY:

Richard J. Mahler
Hydrologist, Review
Section 1, EFGWB, EFED

Signature: Richard J. Mahler

Date: 2/12/90

6.0 APPROVED BY:

Paul J. Mastradone, Chief
Review Section 1, EFGWB, EFED

Signature: Paul J Mastradone

Date:

FEB 13 1990

7.0 CONCLUSION:

1. EFGWB concludes that these three studies are scientifically valid and satisfy the data requirements for leaching/adsorption/desorption of quinclorac (BAS 514 H) and it main degradate (BH 514-1) to soils and the aerobic soil metabolism study of quinclorac.

2. In the three reviewed studies, quinclorac was found to be persistent in the environment. The chemical was almost undegraded after 365 days of continuous aerobic metabolism in the soil. Based on the results of the adsorption/desorption studies, EFGWB concludes that quinclorac is mobile in the soil environment (K_d values <0.05 to 0.597). The main, and probably only degradate of quinclorac (other than CO_2), BH 514-1 (quinclorac minus one chlorine atom), appears to be mobile in soils that are low in clay and organic matter (K_d values ranging from 1.56 for a sand soil to 30.2 for a silty clay soil).

3. In previously reviewed studies (EFGWB review dated March 18, 1988, EUP application for rice), quinclorac was found to be persistent in the environment. It was stable to hydrolysis and persistent in the aerobic aquatic metabolism study (the main metabolite was BH 514-1). Residues accumulated in rotated crops planted one year after application. The bioconcentration factor in channel catfish was less than 1.

4. Based on the results of these studies, EFGWB concludes that quinclorac and it main degrade, BH 514-1, are persistent and mobile. They have a high potential to leach in all soil types into ground water or run-off into surface water.

8.0 RECOMMENDATIONS:

The studies submitted for this review are acceptable for this EUP.

9.0 BACKGROUND:

This is an experimental use permit application for use of BAS 514 00 H (Quinclorac, Facet) herbicide 50% wettable powder postemergence use in turf. A maximum of 4.00 lb/A of product (2.00 lb a.i./A) would be used on a total of 267.5 acres of established turf for a total of 1070 lb of product (535 lb a.i.). The size of each quinclorac treated test area will be between 2 and 10 acres located in 15 states (NY, PA, NJ, MD, DE, VA, CA, OR, MS, GA, OH, IN, IL, MI, MO).

10.0 DISCUSSION OF INDIVIDUAL STUDIES: See individual Data Evaluation Reports.

11.0 COMPLETION OF ONE-LINER: One-liner is being updated.

12.0 CBI APPENDIX: No claim of confidentiality is made for any information contained in these studies on the basis of its falling within the scope of FIFRA Section 10 (d)(1)(A), (B), or (C).

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Ellenson, J. L. and V. W. Winkler. 1988. Soil Adsorption/Desorption of BAS 514 H. Performed by BASF Corporation Chemicals Division, Agricultural Chemicals Group. RTP, North Carolina. BASF Report Number 8804. MRID Number 410635-62

Ellenson, J. L. 1988. Soil adsorption/desorption of 3-chloro-8-quinolincarboxylic acid. Performed by BASF Corporation Chemicals Division, Agricultural Chemicals Group. RTP, North Carolina. BASF Report Number 8808. MRID Number 410635-63

REVIEWED BY:

Richard J. Mahler, Hydrologist
Review Section I, EFGWB

Signature: Richard J. Mahler
Date: 2/12/90

APPROVED BY:

Paul J. Mastradone, Chief
Review Section I, EFGWB

Signature: Paul J Mastradone
Date: FEB 13 1990

TYPE OF STUDY: 163-1--Leaching/adsorption/desorption

CONCLUSIONS:

1. EFGWB concludes that these two studies are scientifically valid and satisfy the data requirements for leaching/adsorption/desorption of BAS 514 H and BH 514-1 to soils.

2. BAS 514 H has low K_d soil adsorption values ranging from <0.05 for a sand soil to 0.597 for a clay soil. Based on the results of this study, EFGWB concludes that BAS 514 H is mobile in the soil environment and appears to have the potential to leach into groundwater.

3. BH 514-1 has K_d values ranging from 1.56 for a sand soil to 30.2 for a silty clay soil. EFGWB concludes that BH 514-1 has the potential to leach to the groundwater in soils containing low amounts of clay or organic matter. The data supports this conclusion since K_d values were correlated with soil organic matter ($r = 0.95$), clay content ($r = 0.88$), cation exchange capacity ($r = 0.89$) and sand content ($r = -0.91$).

MATERIALS AND METHODS:

BAS 514 H

Solutions of unlabelled and radiolabelled BAS 514 H were added to five soils (See Table I for soil characteristics) in sufficient quantities fo yield 0.26, 0.87, 2.3 and 10.4 ppm. Duplicate samples of each of the five soils with the four concentrations of BAS 514 H and duplicate controls samples with no soil were prepared and agitated for 20 hours on a Burrell Model 75 wrist action shaker. After agitation, the samples were centrifuged and the supernatant was sampled for radioassay.

For desorption, the centrifuged soil (minus the supernatant) was extracted two times with sufficient 0.01 M $CaCl_2$, centrifuged and the combined supernatants were assayed for radioactivity.

Prior to the adsorption/desorption test, adsorption equilibrium tests were conducted using a 20.69 ppm concentration of BAS 514 H added to the test soils placed in centrifuge tubes. After agitation for 1, 3, 6, or 24 hours, the tubes were removed from the shaker and centrifuged. Duplicate 100 uL aliquots of supernatant were taken from each tube and mixed with 10 mL Aquasol for radioassay.

All experiments were conducted in an environmental chamber maintained at 25° ± 1 °C.

Mass balance as a percent recovery of initial starting DPM was calculated for each of the soils tested by summing the DPM determined at each step of the procedure and dividing by initial starting DPM's.

BH 514-1

Solutions of unlabelled and radiolabelled BH 514-1 were added to five soils (See Table I for soil characteristics) at 0.04, 0.11, 0.38 and 1.70 ppm. Duplicate samples of each of the five soils with the four concentrations of BH 514-1 and duplicate control samples with no soil were prepared and agitated for 48 hours on a Burrell Model 75 wrist action shaker. After agitation, the samples were centrifuged and the supernatant was sampled for radioassay.

For desorption, the centrifuged soils (minus the supernatant) were extracted by shaking for 24 hours two times with sufficient 0.01 M $CaCl_2$, centrifuging, and combining the supernatants for radioassay.

Prior to the adsorption/desorption test, adsorption equilibrium tests were conducted using a 35 ppm concentration of BH 514-1 added to the test soils placed in centrifuge tubes. After agitation for 1, 3, 6, 24, 30 or 48 hours, the tubes were removed from the shaker and centrifuged. Duplicate 50 uL aliquots of supernatant were taken from each tube and mixed with 10 mL Aquasol for radioassay.

All experiments were conducted in an environmental chamber maintained at 25° ± 1 °C.

Mass balance as a percent recovery of initial starting DPM was calculated for each of the soils tested by summing the DPM determined at each step of the procedure and dividing by initial starting DPM.

REPORTED RESULTS:

BAS 514 H

The authors reported that material balance (Table IV) ranged from 94 to 106% of the applied radioactivity. The calculated adsorption coefficients (K_d) were:

SOIL TYPE	K_d
Sand	<0.05
Sand-loam	0.067
Loam	0.258
Silty-clay	0.516
Clay	0.597

Based on the results of the study, the authors concluded that BAS 514 H has low affinity for the soil types tested.

BH 514-1

The authors reported that material balance (Table IV) ranged from 91 to 109% of the applied radioactivity. The calculated adsorption coefficients (Kd) were:

SOIL TYPE	K_d
Sand	1.56
Sand-loam	1.97
Loam	11.4
Clay	13.3
Silty-clay	30.2

Based on the results of the study, the authors concluded that soils that have high CEC, and/or clay content or organic matter would have a relatively large capacity for adsorbing BS 514-1. They concluded this from the data that showed K_d values were correlated with soil organic matter (r = 0.95), clay content (r = 0.88), cation exchange complex (r = 0.89) and sand content (r = -0.91).

DISCUSSION:

1. EFGWB concludes that these studies are scientifically valid and satisfy the data requirement for a leaching/adsorption/ desorption study.

2. Based on the results of the studies, EFGWB concludes that BAS 514 H has the potential to leach in the soil environment and into groundwater.

3. BH 514-1, on the other hand, has the potential to leach to the groundwater in soils containing low amounts of clay or organic matter. The study supports this conclusion since the data shows that soils containing high amounts of organic matter or clay (i.e., high CEC) adsorbed the greatest amount of BH 514-1.

4. The authors did not report what size sieve the soils were passed through prior to the start of the experiment.

5. The authors did not report whether or not the soils were sterilized prior to their use.

6. The % field moisture at 1/3 bar was reported in Table I as 0.86. This number seems to be lower than is normally found in sand soil and is probably the result of a typographical error and may be 8.6.

7. The soil referred to in the original documents as a clay is actually a clay loam soil, according to the USDA Textural Classification System.

RIN 0633-94 QUINCLORAC Review
(128974)

Page_____ is not included in this copy.

Pages 10 through 18 are not included.

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.

✓ FIFRA registration data.

____ The document is a duplicate of page(s) __________.

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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.

DATA EVALUATION RECORD

STUDY IDENTIFICATION:

Clark, James R. 1988. BAS 514-^{14}C Laboratory Aerobic Soil Metabolism Study using A Terrestrial System. Performed by BASF Corporation Chemicals Division, Agricultural Chemicals Group. RTP, North Carolina. BASF Report Number M8725. MRID Number 412473-01.

REVIEWED BY:

Richard J. Mahler, Hydrologist
Review Section I, EFGWB

Signature: Richard J. Mahler
Date: 2/12/90

APPROVED BY:

Paul J. Mastradone, Chief
Review Section I, EFGWB

Signature: Paul J. Mastradone
Date: FEB 13 1990

TYPE OF STUDY: 162-1--Aerobic Soil Metabolism

CONCLUSIONS:

1. EFGWB concludes that this study is scientifically valid and satisfies the requirement for an Experimental Use Permit.

2. Based on the results of this study, EFGWB concludes that quinclorac is persistent in the aerobic soil environment. The chemical did not degrade under the conditions of the experiment, since 365 days of continuous aerobic metabolism produced essentially extractable parent compound.

3. EFGWB notes that these studies were well written, easy to follow and definitely made the review process less time consuming.

MATERIALS AND METHODS:

BAS 514 H-^{14}C (Quinclorac; 3,7-dichloro-8-quinoline carboxylic acid; specific activity: 9.74 Ci/mole, 8.93 x 10^{10} dpm; radiopurity: 96.6%) was added at a rate of approximately 0.5 mg pesticide/kg soil to two soils with characteristics as listed in Table I.

Moisture content was maintained at approximately 50% and 70% of the 1/3 bar moisture content for the Savoy and Greenville soils, respectively. The treated soil was incubated aerobically at 23° ± 0.86 °C in the dark under a stream (rate not given) of water-saturated CO_2-free air for 12 months.

$^{14}CO_2$ was determined using standard 500 ml gas traps containing 200 ml of OXIFLUOR-CO_2 (NEN) or CARBON 14 cocktail (Harvey Instrument Corp.). The volume of cocktail was measured approximately once a month and 10 ml was transferred to a scintillation vial and counted in the Beckman LS9800 counter. Soil samples were collected at 0, 7, 14, 30, 60, 120, 180 and 365 days after treatment and placed in a glass jar and frozen at -20°C until analyzed according to the sequential extraction procedures listed in Figures 1 and/or 2. Briefly, soil samples were subjected to successive water, cold alkalai and hot alkalai extractions to determine free, ionically and covalently bound residues. Residues extracted with NaOH were assumed to be ionically bound to the soil and residues extracted by refluxing with NaOH were assumed to be covalently bound.

The amount of radioactivity in soil extracts, combusted samples and as $^{14}CO_2$ were determined using Liquid Scintillation Counting LSC). Thin Layer Chromatography (TLC) analysis was used with two solvent systems following methylation with diazomethane (CH_2N_2), to identify the products by comparing the results with known standards as shown on pages 6-7.

REPORTED RESULTS:

The sequential extraction steps in the procedure were designed to extract ^{14}C residues in the soil and also to characterize the association of the residue with the soil. Residues freely extracted with water were considered to have no relationship with the soil other that adsorption. On the other hand, extraction with aqueous 0.1 N NaOH provided a counter cation to release residues ionically bound to the soil, presumably via the carboxyl group. Refluxing with 0.1 N NaOH was thought to release those residues which were covalently bound to the soil, presumably by hydrolyzing esters involving the carboxylic acid group of BAS 514 and a phenolic group from the soil humin fraction. Lastly, those residues which remain unextractable were considered to be small fragments incorporated into the larger natural soil components.

The study author reported that the material balance varied from 101.8 to 109.0 % at day 14 to 95.45 to 100.68% of the applied radioactivity at day 365 (Table VII).

Degradation products of quinclorac were identified as CO_2 and BH 514-1 (parent compound minus one chlorine atom, see pages 6 and 7 for structure), accounting for <0.1% and an unquantified trace amount, respectively.

Identification of ^{14}C residues throughout the length of the study showed that at all sampling times only parent quinclorac was detected in the Savoy, IL soil; while essentially all of the residues in the Greenville, MS soil were parent quinclorac with just a trace of BH 514-1 (Figure 5).

DISCUSSION:

After 365 days of incubation under aerobic soil metabolism conditions, the extracted residues were essentially undegraded parent compound in both the IL and MS soil samples when treated with 0.5 ppm quinclorac. Unextractable residues of parent quinclorac accounted for up to 2.5 to 11.3 %, $^{14}CO_2$ accounted for only 0.077 % and extractable residues up to 84 to 98 % (about 15 to 22 % of which was extracted by reflux).

The main route of dissipation of quinclorac under aerobic soil conditions in these two soils is by soil binding; however, the amount is low since only 2.5 to 11.3% was unextractable parent quinclorac after 365 days.

RIN 0633-94 QUINCLORAC Review
(128974)

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Pages 22 through 31 are not included.

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