Shaughnessy Number: 110201

Date out of EFGWB: JUL 25 1991

To: Susan Lewis, PM 23
Product Manager
Registration Division (H7505C)

From: Akiva Abramovitch, Section Head
Environmental Fate Review Section #3
Environmental Fate and Ground Water Branch
Environmental Fate and Effects Division (H7507C)

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

Attached, please find the EFGWB review of...

Reg./File #: 55947-UR

Chemical Name: Prodiamine

Type Product: herbicide

Product Name: Technical Prodiamine

Company Name: Sandoz Crop Protection

Purpose: submission of adsorption/desorption and fish bioaccumulation data

Date Received: 1/14/91

EFGWB#(s): 90-0328

Total Reviewing Time (decimal days): 5.0

Deferrals to:

___Ecological Effects Branch, EFED

___Dietary Exposure Branch, HED

___Science Integration and Policy Staff, EFED

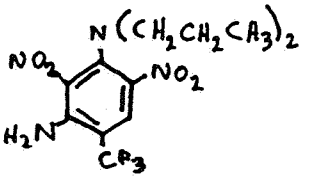
___Toxicology Branch

___Non-Dietary Exposure Branch, HED

bcp Prodiamine 91-0328

1. CHEMICAL:

chemical name: N^3,N^3-Di-n-propyl-2,4-dinitro-6-(trifluoromethyl)-m-phenylenediamine
common name: prodiamine
trade name: Endurance
structure:
CAS #: 29091-21-2
Shaughnessy #: 110201



PHYSICAL/CHEMICAL CHARACTERISTICS are as follows:

physical state -- crystalline powder
color -- dark yellow
odor -- odorless
m.p. -- 124-125° C
vapor pressure -- 2.5×10^{-7} mm Hg at 25° C
water solubility -- 0.05 ppm
octanol/water coefficient (k_{ow}) -- 3.3×10^4

2. TEST MATERIAL: as described below

3. STUDY/ACTION TYPE: submission of adsorption/desorption, fish bioaccumulation, and cosolvent data

4. STUDY IDENTIFICATION:

Schmidt, J. Soil/Sediment Adsorption-Desorption of ^{14}C-Prodiamine. performed by Analytical Bio-Chemistry Laboratories, Inc., Columbia, MO. Submitted by Sandoz Crop Protection Corporation, Des Plaines, IL. dated 8/29/90. received EPA 12/18/90 under MRID# 417272-02

Burgess, D. Uptake and Bioconcentration of ^{14}C-Prodiamine by Bluegill (*Lepomis Macrochirus*). performed by Analytical Bio-Chemistry Laboratories, Inc., Columbia, MO. Submitted by Sandoz Crop Protection Corporation, Des Plaines, IL. dated 8/29/90. received EPA 12/18/91 under MRID# 417272-01.

Ancillary Study:

Guirguis, A.S. and Yu, C.C. Solubility of Prodiamine in Reconstituted Fresh Water in the Presence of Cosolvents. performed and submitted by Sandoz Crop Protection Corporation, Des Plaines, IL. dated 3/23/90. received EPA 12/18/90 under MRID # 417272-03.

5. REVIEWED BY:

Typed Name: E. Brinson Conerly-Perks
Title: Chemist, Review Section 3
Organization: EFGWB/EFED/OPP

6. APPROVED BY:

Typed Name: Akiva Abramovitch
Title: Section Head, Review Section 3
Organization: EFGWB/EFED/OPP

Akiva Abramovitch
JUL 24 1991

7. CONCLUSIONS:

The newly submitted adsorption/desorption study is acceptable and is in agreement with the previous one which fulfilled the data requirement -- Prodiamine is not mobile in soils. The requirement for mobility data on the unaged compound was declared fulfilled in 1980 by a previous study, MRID# unknown. There is still no acceptable data on aged material.

The fish bioaccumulation study partially satisfies the data requirement. The study indicates significant uptake of Prodiamine resulting in BCF values of 390, 1200, and 2000X for the fillet, whole fish, and viscera respectively. Depuration was essentially complete (> 90%) in 14 days. For the study to become fully acceptable, the identity and quantities of metabolites, if any, must be supplied. If this information cannot be furnished, a new study is required.

The co-solvent data is acceptable and is noted, but does not serve to fulfill any data requirement.

8. RECOMMENDATIONS:

An acceptable study on mobility of aged Prodiamine should be submitted as soon as possible.

The necessary additional information to make the fish bioaccumulation study acceptable should be furnished as soon as possible, or a new study performed.

9. BACKGROUND:

The applicant's reason for submitting a new adsorption/desorption study is not clear, since this data requirement has been satisfied for parent compound.

Prodamine is an not-yet-registered herbicide used to control the germination of grasses and broadleaf weeds in ornamentals and turf. Label directions indicate that it may be applied either to a cover crop (established turf) or to bare soil (around ornamental plants and in non-crop areas). The recommended label rate is up to 3.9 lb ai./A (3.9 ppm, 3" soil layer) per single application or 7.8 lb a.i./A/yr.

Available data indicate a compound which

1) is stable to hydrolysis (no degradation after 30 days -- all pHs).

2) is highly susceptible to photolysis in aqueous solution. Because of its extreme lability to photolysis in solution, it would also be

expected to photolyze rapidly on leaf surfaces exposed to light, although there are no specific leaf-surface photolysis data in EFGWB files.

3) metabolizes slowly under aerobic conditions (half-life ca. 2 months, one major degradate.

4) is not mobile in laboratory studies, nor, apparently, is the major degradate.

5) is not mobile based on a field study on turf.

6) accumulated in both confined rotational crops and fish.

Because of its extremely low solubility in water, short photolytic half life and lack of mobility, prodiamine does not appear likely to reach ground water. Though it is improbable that it would reach ground water, it would persist there, since it is resistant to hydrolysis and metabolizes only slowly in soil.

Prodiamine does not appear to be a major threat to surface water since it photolyzes rapidly. Although the probability seems very low, any prodiamine which is present on soil affected by a runoff event could be carried on suspended particles to adjacent bodies of surface water. Once there, it would be expected to remain in the sediment and degrade/dissipate very slowly.

The status of data requirements is as follows:

hydrolysis -- **FULFILLED** 6/22/90 [*Bowman and Fenessey*, MRID #'s 406091-01 and 413594-01 -- $t_{1/2}$ > 6 months is indicated at all three pHs

photolysis in water -- FULFILLED 5/13/80 [reference not indicated in that review] -- *not done under current Guidelines*. A short half life (ca. 20 min.) is indicated

soil photodegradation -- submitted study [reference not indicated in that review] unacceptable as of 5/13/80, not required for this use

aerobic soil metabolism -- FULFILLED 6/22/90 [*Krueger and Butz*, MRID #s 405934-24 and 413594-02]-- half-life ca. 2 mos, one major product

anaerobic soil metabolism -- submitted study unacceptable as of 5/14/80, not required for this use

leaching/adsorption/desorption -- FULFILLED 5/13/80 for parent [reference not indicated in that review; the new study, MRID# 417272-02, discussed in this review, supports the conclusions of the older study. A NEW STUDY IS REQUIRED ON AGED MATERIAL [as of 6/22/90 -- *Daly*, MRID #s 405934-26 and 413594-03 are not acceptable]. The mobility of primary degradate has not been satisfactorily defined at this time, although it is apparently also relatively immobile.

turf terrestrial field dissipation -- FULFILLED 6/22/90 [Bade and Rosas, MRID# 413594-05] -- no leaching or significant dissipation noted.

confined accumulation on rotational crops -- **FULFILLED** 5/14/80 [reference not indicated in that review] -- *not done under current Guidelines* -- not required for this use -- no significant accumulation except in root crops

fish bioaccumulation -- partially fulfilled by MRID# 417272-01, discussed in this review --indicates significant uptake of Prodiamine resulting in BCF values of 390, 1200, and 2000X for the fillet, whole fish, and viscera respectively. Depuration was essentially complete (> 90%) in 14 days. Identity and quantities of metabolites, if any, must be furnished to EFGWB for the study to become fully acceptable. Otherwise a new study will be required.

A study previously submitted [Acc.# 243135] was not acceptable [static system], *not done under current Guidelines* -- significant accumulation and slow depuration

10. DISCUSSION OF INDIVIDUAL TESTS OR STUDIES:

11. COMPLETION OF ONE-LINER: updated report attached

12. CBI APPENDIX: attached to DERs

DATA EVALUATION REVIEW 1

I. Study Type: batch adsorption/desorption, Guideline 163-1

II. Citation:

Schmidt, J. Soil/Sediment Adsorption-Desorption of ^{14}C-Prodiamine. performed by Analytical Bio-Chemistry Laboratories, Inc., Columbia, MO. Submitted by Sandoz Crop Protection Corporation, Des Plaines, IL. dated 8/29/90. received EPA 12/18/90 under MRID# 417272-02

III. Reviewer:

Typed Name:	E. Brinson Conerly-Perks	E.B. Conerly-Perks
Title:	Chemist, Review Section 3	7/24/91
Organization:	EFGWB/EFED/OPP	

IV. Conclusions:

Prodiamine is immobile in the two soils tested. The study is acceptable, and supports the previously submitted acceptable study which fulfilled the data requirement.

V. Materials and Methods:

Abstract:

An adsorption/desorption study was conducted with ^{14}C-Prodiamine (uniform ring label) with two soil types including a loam and a clay loam. Aqueous test solutions of ^{14}C-Prodiamine in 0.01 M $CaCl_2$ were prepared at nominal concentrations of 0.006, 0.013, 0.020, 0.025 and 0.030 µgm/ml. The test solutions were equilibrated with the two soil types.

Quantification of ^{14}C-residues of prodiamine in the aqueous phase was by liquid scintillation counting. Soils were analyzed by combustion radioanalysis or solvent extraction after the desorption phase to determine the ^{14}C-mass balance accountability of the study which was 108% and 94.3% for the 58 clay loam and Kenyon loam soils, respectively.

Adsorption/desorption coefficients (K_d) and constants (K_{oc}) were obtained by applying the data to a linear isotherm model. Previous investigations with ^{14}C-Prodiamine have indicated that the linear model more appropriately describes the sorption characteristics of prodiamine to soil than the Freundlich model. Results are summarized [in the attached table].

The mobility of a chemical through soil can be directly related to its adsorption properties. K_{oc} values can be directly related to its adsorption properties. K_{oc} values can be used to rank and compare chemicals with respect to their leaching potential. As K_{oc} values greater than 5000 denote immobility of a chemical in soil, the leaching potential of prodiamine was estimated.

materials

test compound -- ^{14}C-Prodiamine sp. act. 25 mCi/mmol

test solutions -- primary stock ca. 1 mg/ml in methanol; dilutions with $CaCl_2$ to give the test solutions with nominal concentrations of 0.0, 0.006, 0.013, 0.020, 0.025, and 0.030 µg/ml. Actual concentrations were measured by LSC.

test soil -- #58 clay loam and Kenyon loam

test water -- deionized, sterilized, used to prepare the $CaCl_2$ solution

test protocol -- a preliminary study was performed to determine appropriate soil/water ratios and equilibration time. In the definitive study, 25 ml aliquots of test solutions were pipetted into culture tubes containing clay loam (2 gm dry weight) or Kenyon loam (1 gm dry weight). The suspensions were shaken in the dark at 25 ± 1° C for 24 hours to allow equilibration. They were then centrifuged for 15 minutes at ca. 2000 rpm, decanted, and the volumes recorded. For the desorption step, the volume of supernatant which had been removed was replaced with an equal volume of fresh 0.01 M $CaCl_2$, and the equilibration and centrifugation procedure repeated. Following this, the remaining soil was combusted.

analysis

LSC -- total radioactivity in supernatants

combustion followed by LSC -- residual activity in soil after extraction

VI. Study Author's Results and/or Conclusions:

RESULTS

1) The adsorption and desorption coefficients (K_d values) for prodiamine were determined to be 110.2 and 246.7 for the #58 clay loam, and 119.7 and 303.9 for the Kenyon loam.

2) The adsorption and desorption constants (K_{oc} values) were determined to be 5654 and 12,649 for the #58 clay loam and 5442 and 13,815 for the Kenyon loam.

3) The mass balance of the test compound was determined to be 108% and 94.3% for the #58 clay loam and Kenyon loam, respectively.

CONCLUSIONS

1) Due to the immobility of the compound in soil the percent adsorbed in the soils were outside the linear range of 20-80% for which the Freundlich model applies. Therefore, the adsorption/desorption coefficients and constants obtained from applying the data to the linear model are reported here.

2) The mobility of a chemical through soil can be directly related to its adsorption properties. From the K_{oc} values obtained, the leaching potential of Prodiamine was estimated as immobile.

VII. Reviewer's Comments:

The study is acceptable, and supports the previously submitted acceptable study which fulfilled the data requirement. The results of the study do appear to indicate that Prodiamine is immobile in the two soils tested.

VIII. CBI Information Addendum: attached

110201 PRODIAMINE RIN 1786-93

Page_____ is not included in this copy.

Pages 9 through 22 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) _____.

____ The document is not responsive to the request.

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 REVIEW 2

I. Study Type: fish bioaccumulation, Guideline 165-4

II. Citation:

Burgess, D. Uptake and Bioconcentration of ^{14}C-Prodiamine by Bluegill (*Lepomis Macrochirus*). performed by Analytical Bio-Chemistry Laboratories, Inc., Columbia, MO. Submitted by Sandoz Crop Protection Corporation, Des Plaines, IL. dated 8/29/90. received EPA 12/18/91 under MRID# 417272-01.

III. Reviewer:

Typed Name:	E. Brinson Conerly-Perks
Title:	Chemist, Review Section 3
Organization:	EFGWB/EFED/OPP

E.B. Conerly-Perks 7/24/91

IV. Conclusions:

The study is scientifically sound, but does not fulfill the data requirement at this time. The identity and quantities of metabolites, if any, must be supplied for the study to become fully acceptable to fulfill the data requirement. Supplemental information which the study does provide is that there is significant uptake of Prodiamine resulting in BCF values of 390, 1200, and 2000X for the fillet, whole fish, and viscera respectively. Depuration was essentially complete (> 90%) in 14 days.

V. Materials and Methods:

abstract

A dynamic 42-day study was conducted to evaluate the bioconcentration of ^{14}C-Prodiamine by bluegill sunfish (Lepomis Macrochirus)). A flow-through proportional diluter system was used to maintain a mean measured water concentration of 5.9 ± 1.1 µg/L ^{14}C-Prodiamine for a 28-day exposure period. Radioanalysis of fillet, whole fish and visceral portions were performed throughout the exposure period. In this study the fillet (body, muscle, skin and skeleton) will be considered the edible portion of the fish while the viscera (fins, head and internal organs) will be considered the non-edible portion. Daily bioconcentration factors ranged from 45 to 470x, 110 to 1300X and 180 to 2200X for fillet, whole fish and viscera, respectively. Uptake tissue concentrations of ^{14}C-Prodiamine ranged from 270 µg/kg to 2800 µug/kg for fillet, 680 µg/kg to 7700 µg/kg for whole fish and from 1100 µg/kg to 13,000 µg/kg for viscera. Tissue residues and bioconcentration factors reached a plateau at 14-21 days after ^{14}C-Prodiamine exposure.

To measure the elimination of ^{14}C-Prodiamine, the test fish were placed in clean water for 14 days. Radioanalysis throughout the depuration period indicated 90, 93, and 94% depuration from fillet, whole fish, and viscera, respectively. Fillet concentrations decreased from 2300 µg/kg on day 28 of the uptake phase to 240 µg/kg by day 14 of the depuration phase. Whoe fish levels decreased from 6900 µg/kg on day 28 uptake to 460 µg/kg by day 14 of depuration; whereas, viscera concentrations dropped from 12,000 µg/kg on day 28 uptake to 750 µg/kg by the end of the study.

During the study, no mortality or abnormal behavior was observed in the test fish. This indicated that the test fish were in good health and would provide acceptable data to define uptake/depuration potential of ^{14}C-Prodiamine. On two occasions the daily turnover rate fell below the minimum of 5 turnovers per day as specified in the study protocol. Analytical water sampling and water quality measurements taken around this time indicated no adverse effect occurred because of this lower turnover rate.

materials

test compound -- ring-U-labelled ^{14}C-Prodiamine, 25 mCi/mmol, 98% pure

test fish -- bluegill sunfish (*Lepomis macrochirus*), initial mean weight of 4.14 ± 0.77 gm and initial mean standard length of 51 ± 3.1 mm. The control group had a mean weight of 6.05 ± 1.2 gm and a mean standard length of 56 ± 3.1 mm at the end of the depuration phase.

protocol

acclimatization -- Test fish were held for at least 14 days in culture tanks on a 16-hour photoperiod, and observed during this time for abnormalities of behavior. They were fed *ad libitum* during both the holding and test periods. A modified proportional diluter was used to add compound and diluent water. Aerated well water was delivered to the aquaria at an average rate of 305 ml/minute/aquarium, which was sufficient to replace the 70 L volume approximately 6.5 times in a 24 hour period. The test solution was allowed to equilibrate for ca. 8 days. The ^{14}C-Prodiamine concentration of the treated aquarium ranged from 50 - 60% of nominal during this period. Since it remained consistent, it was decided to proceed with the uptake phase and to also take water from the mixing box each day. The concentration of the treatment aquarium was confirmed by radioanalysis before introducing the fish.

uptake -- The uptake phase was initiated by impartially transferring 120 fish in groups of 20 from the culture tank to the control and treatment aquaria. Since the conditions in the culture, test, and control tanks were essentially identical, no acclimatization period was necessary. Fish were observed initially and twice daily during the test period for any mortality and/or adverse [*sic*] behavior. Water and fish were sampled throughout the uptake period. Samples were maintained frozen before analysis.

depuration -- On day 28 of the exposure period, addition of ^{14}C-Prodiamine test material was terminated. Water was removed by siphoning until approximately 8 cm (ca. 20 l) remained in each aquarium. The siphoning process was repeated, and the fish were then exposed to untreated flowing well water for 14 days.

methods

LSC -- water, fish tissue (following combustion)

VI. Study Author's Results and/or Conclusions:

RESULTS

1) The tissue residues after 28 days of exposure were 2300 µg/kg for fillet, 6900 µg/kg for whole fish, and 12,000 µg/kg for viscera. These values corresponded to day 28 bioconcentration factors of 390, 1200, and 2000X for the fillet, whole fish, and viscera respectively. Daily bioconcentration factors for the uptake phase of the study ranged from 45 to 470X for fillet, 110 to 1300 for whole fish, and 180 to 2200X for viscera. Tissue residues and bioconcentration factors reached a plateau after 14-21 days of exposure to ^{14}C-Prodiamine.

Tissue residues decreased steadily during the depuration phase. An analysis of depuration data by day 14 of the elimination period showed 90,

93, and 94 percent depuration in the fillet, whole fish, and viscera, respectively.

No mortalities or abnormal behaviors were observed in the test aquaria during the 42 day study.

Average minimum quantifiable limits (MQL) for water, fillet, whole fish, and viscera for ^{14}C-Prodiamine were 0.156 µg/L, 7.10 µg/kg, 7.56 µg/kg, and 8.18 µg/kg, respectively. Mean recovery data for ^{14}C-Prodiamine in tissue sample oxidations were 98% for fillet and whole fish and 97% for viscera. ^{14}C-benzoic acid instrument combustion recovery, in the absence of tissue, averaged 98% for the study.

DISCUSSION/CONCLUSIONS

From the uptake and depuration data, ^{14}C-Prodiamine appears to reach steady-state plateau by day 21 of the study and depurated to an average of 92% by day 14. The BIOFAC model appears to fit the actual data points and adequately define the uptake/depuration kinetics. Although the average measured water concentration was 59% of the expected nominal concentration the values remained consistent throughout the uptake phase. The diluter system appeared to be working properly as evidenced by the mixing box values which averaged 100% of nominal. It is not certain why ca. 40% of the test material was lost in between the mixing box and the treatment tank. However since the treatment tank values did not vary widely during uptake phase it is felt that this did not compromise the overall validity of this study and the bioconcentration potential of ^{14}C-Prodiamine is adequately defined. It is possible that some of the test material was absorbed to the glass surface of the test system and reached an equilibrium. On two occasions the daily turnover rate fell below the minimum of 5 turnovers per day as specified in the study protocol. This fall in turnover rate was caused by reduced water pressure which was corrected as soon as identified. Since analytical and water quality measurements taken around this time frame indicated no adverse effect and no abnormal behavior was observed in the test fish it is felt this deviation did not compromise the results of the study.

VII. Reviewer's Comments:

1) There is no explicit statement regarding possible formation of metabolites -- was it determined that there were none, or is further investigation planned?

2) Since the weights and lengths of the exposed fish at the end of the study were not reported, it is not known whether they grew as well as the control fish. Very subtle toxic effects may be manifested only by a failure to grow, and therefore can compromise the results of the study. Can the applicant supply this information?

VIII. CBI Information Addendum: attached

110201 PRODIAMINE RIN 1786-93

Page_____ is not included in this copy.

Pages 26 through 36 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.

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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 REVIEW 3

I. Study Type: ancillary study, not directly related to a specific Guideline

II. Citation:

Guirguis, A.S. and Yu, C.C. Solubility of Prodiamine in Reconstituted Fresh Water in the Presence of Cosolvents. performed and submitted by Sandoz Crop Protection Corporation, Des Plaines, IL. dated 3/23/90. received EPA 12/18/90 under MRID # 417272-03.

III. Reviewer:

Typed Name:	E. Brinson Conerly-Perks
Title:	Chemist, Review Section 3
Organization:	EFGWB/EFED/OPP

E.B. Conerly-Perks 7/3/91

IV. Conclusions:

V. Materials and Methods:

abstract

The solubility of Prodiamine in reconstituted hard fresh water containing various levels of cosolvents was determined by adding excess amounts of ^{14}C-Prodiamine and equilibrating for up to two days. The solubility of a formulated Prodiamine 65WDG product at the maximum of 1% (w/v) in reconstituted hard fresh water without cosolvent was also determined. These mixtures were shaken in a water bath at 22°C for up to 2 days. These mixtures were centrifuged, then radioassayed directly or extracted with hexane and analyzed by GC. The data showed no significant differences in Prodiamine solubility in water containing cosolvent between sampling days or between centrifugation forces. Prodiamine solubility was 66 ± 4 ppb with 0.5% methanol as cosolvent, 52 ± 5 ppb with 0.5% acetone, 66 ± 4 ppb with 1% methyl fofmamide, 65 ± 6 ppb with 1% tetrahydrofuran and 83 ± 5 ppb with polyethylene glycol. Thus polyethylene glycol was slightly better than other cosolvents in increasing Prodiamine water solubility. Prodiamine water solubility at lower polyethylene glycol concentration was further evaluated. Prodiamine water solubility was 103 ± 27 ppb with 0.5% polyethylene glycol as cosolvent, 105 ± 26 ppb with 0.05%, and 126 ± 28 ppb with 0.01%.

Prodiamine formulated as a 65WDG at 1% concentration in fresh water provided the best water solubility (204 to 265 ppb). Prodiamine 65WDG at other concentrations had lower solubility than those with the presence of cosolvent. Prodiamine 65WDG at 0.1% and 0.01% had a water solubility of about 60 ppb and at 0.001% a solubiity of about 26 ppb.

The extent of dissolved prodiamine removed by a 0.45 μm pore size filter was determined for water containing various levels of polyethylene glycol as cosolvent. The data showed that 59.5 ± 2.8%, 54.7 ± 1.5%, 57.6 ± 0.6% and 52.6 ± 1.2 ppb of the dissolved prodiamine passed through the 0.45 μm pore size filter respectively for water containing 0.01%, 0.05%, 0.5% and 1% polyethylene glycol. The amount of Prodiamine passed through the filter was not affected by the amount of polyethylene glycol present in the water.

VI. Study Author's Results and/or Conclusions:

RESULTS/DISCUSSION

Water solubility data for each cosolvent are presented in tables I to VIII. Additional data for varying concentrations of polyethylene glycol are presented in table IX. Solubility data for a formulated Prodiamine product are presented in tables X - XIII. Other data relating to different experimental parameters are presented in subsequent tables.

There were no significant differences in Prodiamine solubility with cosolvent in the triplicate analyses between sampling days or between centrifugation forces.

CONCLUSIONS

The solubility of Prodiamine in reagent grade water is 13 ppb. Water solubility of Prodiamine is slightly increased (83 ppb) by using 1% polyethylene glycol. Further tests to decrease the amount of polyethylene glycol did not decrease Prodiamine solubility.

The solubility of formulated prodiamine (65WDG) was incareased with increasing concentration. At 1% of 65WDG, prodiamine solubility was 204 ppb whereas it decreased to 26 ppb at 0.001%. However, the presence of suspended particles remained even after centrifugation at 12,000XG.

Approximately 55% of dissolved Prodiamine passed through a 0.45 μm pore size filter. The amount of Prodiamine passing through the filter was not affected by the amount of polyethylene glycol present as cosolvent in the hard fresh water.

VII. Reviewer's Comments:

This is an ancillary study, and as such, does not require a detailed review. The data presented are acceptable to establish the behavior of Prodiamine in the presence of various cosolvents.

VIII. CBI Information Addendum: attached

110201 PRODIAMINE RIN 1786-93

Page_____ is not included in this copy.

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Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
PRODIAMINE
Last Update on July 18, 1991
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	Section Head:	Date: JUL 24 1991

Common Name:PRODIAMINE
Smiles Code:
PC Code # :110201 CAS #:29091-21-2 Caswell #:

Chem. Name :N3,N3-Di-n-propyl-2,4-dinitro-6-(trifluoromethyl)-m-phenylen
e diamine
Action Type:HERBICIDE

Trade Names:Endurance
(Formul'tn):
Physical State:

Use :TO CONTROL THE GERMINATION OF GRASSES AND BROADLEAF WEEDS
Patterns :IN ORNAMENTALS AND TURF
(% Usage) :
:

Empirical Form: $C_{13}H_{17}N_4O_4F_3$
Molecular Wgt.: 350.30 Vapor Pressure: 2.50E -7 Torr
Melting Point : °C Boiling Point: °C
Log Kow : 3.3E4 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured)

Solubility in ...					Comments
Water	E	ppm	@	°C	
Acetone	E	ppm	@	°C	
Acetonitrile	E	ppm	@	°C	
Benzene	E	ppm	@	°C	
Chloroform	E	ppm	@	°C	
Ethanol	E	ppm	@	°C	
Methanol	E	ppm	@	°C	
Toluene	E	ppm	@	°C	
Xylene	E	ppm	@	°C	
	E	ppm	@	°C	
	E	ppm	@	°C	

Hydrolysis (161-1)
[V] pH 5.0:STABLE
[V] pH 7.0:STABLE
[V] pH 9.0:STABLE
[ ] pH :
[ ] pH :
[ ] pH :

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
PRODIAMINE
Last Update on July 18, 1991
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)
[ ] Air :
[ ] Soil :
[V] Water:ABOUT 20 MINUTES
[ ] :
[ ] :
[ ] :

Aerobic Soil Metabolism (162-1)
[S] ABOUT 2 MONTHS
[ ]
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Anaerobic Soil Metabolism (162-2)
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Anaerobic Aquatic Metabolism (162-3)
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Aerobic Aquatic Metabolism (162-4)
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Soil Partition Coefficient (Kd) (163-1)

	SOIL	Kads	Koc
[ ]	SAND	19.54	19,540
[V]	SILT LOAM	54.47	10,890
[V]	CLAY LOAM	181.6	9,310
[V]	SANDY LOAM	398.5	12,860
[ ]	(UNAGED STUDY)		

Soil Rf Factors (163-1)
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Laboratory Volatility (163-2)
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Field Volatility (163-3)
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Terrestrial Field Dissipation (164-1)
[V] PARENT AND MAJOR DEGRADATE DO NOT LEACH
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Aquatic Dissipation (164-2)
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Forestry Dissipation (164-3)
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Long-Term Soil Dissipation (164-5)
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Accumulation in Rotational Crops, Confined (165-1)
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Accumulation in Rotational Crops, Field (165-2)
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Accumulation in Irrigated Crops (165-3)
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Bioaccumulation in Fish (165-4)
[S] BCFs 390 (FILLET), 1200 (WHOLE), 2000 (VISCERA)
[ ]

Bioaccumulation in Non-Target Organisms (165-5)
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Ground Water Monitoring, Prospective (166-1)
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Ground Water Monitoring, Small Scale Retrospective (166-2)
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Ground Water Monitoring, Large Scale Retrospective (166-3)
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Ground Water Monitoring, Miscellaneous Data (158.75)
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Field Runoff (167-1)
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Surface Water Monitoring (167-2)
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Spray Drift, Droplet Spectrum (201-1)
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Spray Drift, Field Evaluation (202-1)
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Degradation Products

6-amino-2-ethyl-7-nitro-1-propyl-5-trifluoromethyl-benzimid-azole

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Comments

In the study of confined accumulation on rotational crops, there was no accumulation except in root crops.

References:
Writer : PJH, EBC (7/18/91)