DP Barcode: D167459

Shaughnessy No.: 129016

Date out of EFGWB: 1 2 /

TO: J. Miller/S. Robins
Product Manager #23
Registration Division (H7505C)

3/24/91

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

3/24/91

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 #: 62719-EUP-RG formerly 464-EUP-RNG

Chemical Name: N-(2,6-difluorophenyl)-5-methyl-1,2,4-triazolo[1,5a] pyrimidine-2-sulfonamide

Type Product: Herbicide

Common Name: XRD-498

Company Name: DowElanco Chemical Company

Purpose: Application for corn and soybean Experimental Use Permit

Date Received: 13 Aug. 1991 Date Completed:

Action Code: 710

EFGWB #(s): 91-0846

Total Reviewing Time: 28.5 days

Deferrals to: ___Ecological Effects Branch, EFED

___Science Integration and Policy Staff, EFED

___Non-Dietary Exposure Branch, HED

___Dietary Exposure Branch, HED

___Toxicology Branch

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4. STUDY IDENTIFICATION:

Lade, D.H. XRD-5019 AND DE-498 (EPA PESTICIDE CHEMICAL CODE 129016) APPLICATION FOR EXPERIMENTAL USE PERMIT AND PETITION FOR TEMPORARY TOLERANCE. Submitted by DowElanco Chemical Company, Midland, MI; Received by EPA 19 June 1991; MRID No. 41931700.

Wolt, J.; Shepler, K.; Woodburn, K.; Chari, S.; and Ruzo, L.O. SUNLIGHT PHOTODEGRADATION OF [^{14}C-PYRIMIDINE]XRD-498 IN A BUFFERED AQUEOUS SOLUTION AT pH 5 AND 7. Performed by Pharmacology and Toxicology Research Laboratory, Richmond, CA; Submitted by DowElanco; Midland, MI; Study completed in 1991; Received by EPA 19 June 1991; MRID 41931726.

Wolt, J.; Shepler, K.; Woodburn, K.; Chari, S.; and Ruzo, L.O. SUNLIGHT PHOTODEGRADATION OF [^{14}C-ANILINE]XRD-498 IN A BUFFERED AQUEOUS SOLUTION AT pH 5 AND 7. Performed by Pharmacology and Toxicology Research Laboratory, Richmond, CA; Submitted by DowElanco; Midland, MI; Study completed in 1991; Received by EPA 19 June 1991; MRID 41931727.

Wolt, J.; Shepler, K.; Marx, M.; McGovern, P.; and Ruzo, L.O. PHOTODEGRADATION OF [^{14}C-PYRIMIDINE]XRD-498 ON SOIL BY NATURAL SUNLIGHT. Performed by Pharmacology and Toxicology Research Laboratory, Richmond, CA under PTRL Report No. 208W; Submitted by DowElanco; Mid land, MI under Dow Protocol No. 89088; Study completed on 29 January 1991; Received by EPA 19 June 1991; MRID 41931728.

Wolt, J.; Shepler, K.; Sripriya, C. McGovern, P.; and Ruzo, L.O. PHOTODEGRADATION OF [^{14}C-ANILINE]XRD-498 ON SOIL BY NATURAL SUNLIGHT. Performed by Pharmacology and Toxicology Research Laboratory, Richmond, CA under PTRL Report No. 209W; Submitted by DowElanco; Mid land, MI under Dow Protocol No. 89089; Study completed on 16 May 1991; Received by EPA 19 June 1991; MRID 41931729.

Wolt, J.; Shepler, K.; and Yung, V. PHOTODEGRADATION OF [^{14}C-ANILINE] XRD-498 ON SOIL BY NATURAL SUNLIGHT. Performed by Pharmacology and Toxicology Research Laboratory, Richmond, CA under PTRL Report No. 258W; Submitted by DowElanco; Midland, MI under Dow Protocol No. 90096; Study completed on 16 May 1991; Received by EPA 19 June 1991; MRID 41931730.

Lehmann, R.G.; Holbrook, D.L.; Altscheffel, S.A.; Batzer, F.R.; Brown, S.M.; White, F.H. AEROBIC SOIL METABOLISM OF ANILINE-LABELED DE-498 IN HOYTVILLE SOIL. Preformed and Submitted by DowElanco; Midland, MI under Dow Protocol No. 89002; Study completed on 31 May 1991; Received by EPA 19 June 1991; MRID 4191731.

Havens, P.L. and Miller, J.R. AEROBIC SOIL METABOLISM OF $_{14}$C-(ANILINE)-DE-498 IN TWO SOILS. Preformed and Submitted by DowElanco; Midland, MI under Laboratory Project ID ENV91006.00; Study completed on 7 June 1991; Received by EPA 19 June 1991; MRID 41931732.

the pattern of formation and decline of degradates and XRD-498 be completed. These new studies probably should be carried out at much higher application rates (e.g. 12X or higher), or a new test methodology developed that would increase the detection limit for the degradates.

Based on XRD-498 degrading into two separate rings, studies are needed and were submitted using the radiolabelled aniline portion and the radiolabelled pyrimidine portion. The conclusions of the following environmental fate studies are given below:

a. Photodegradation in Water (161-2)

The photodegradation in water studies (MRID 41931726 and 41931727) are acceptable to meet Subdivision N Data Requirement. No further photodegradation in water data for XRD-498 is required at this time.

Two photodegradation in water studies for XRD-498, one using [^{14}C-pyrimidine]XRD-498 and the other using [^{14}C-aniline]XRD-498, were submitted. In both studies, XRD-498 appeared to be stable to aqueous photolysis. However, there was a notable difference in reported half-lives for pH 5 buffered solutions and pH 7 buffered solutions (half-lives of 151 and 161 days were reported for pH 5, half-lives of 326 and 727 days were reported for pH 7) which indicated that XRD-498 may be more susceptible to photolysis at pH 5 than pH 7. However, because of the limited degradation of XRD-498 and the large degree of extrapolation these difference in half-lives may not be significant.

b. Photodegradation on Soil (161-3)

Photodegradation on soil studies (MRIDs 41931728, 41931729, and 41931730) when reviewed alone would not be acceptable to fully Subdivision N Data Requirement. However, when combined the photodegradation on soil studies are acceptable to meet Subdivision N Data Requirement. Therefore, no further photodegradation on soil data for XRD-498 is required at this time.

Three photodegradation in soil studies for XRD-498, two using [^{14}C-aniline]XRD-498 and one using [^{14}C-pyrimidine]XRD-498, were submitted. The data indicated that photodegradation is not a significant degradation pathway, but does contributed some to the degradation of XRD-498. The reported extrapolated half-lives were all ≈90 days for the light exposed XRD-498 when applied to non-sterile and sterile soil. The photodegradates were CO_2 (not >2.7% of applied) and numerous unidentified degradates which were present in insignificant amounts (none >6% of applied radioactivity).

c. Aerobic Soil Metabolism (162-1)

The aerobic soil metabolism studies (MRIDs 41931731 and 41931732) are marginally acceptable for EUP. However, the studies are not acceptable to fulfill the data requirement for section 3 for the following reason:

The pattern of decline and formation of parent and degradate(s) were not addressed.

A new terrestrial field dissipation study is required to fulfill the data requirement which addresses the above deficiencies. A much higher application rate probably would be required for this study.

XRD-498 had reported half-lives of 1.5 months, <1 week, 3 months, and 1.5 months when applied to sandy clay loam soil in Midland, MI; silty clay loam soil in Geneseo, IL; silt loam in Wayside, MS; and silt loam in Burdette, MS, respectively. XRD-498 did not appear to leach at Geneseo and Wayside (See Tables IV and V) test sites, despite ample rainfall during the testing period. Trace leaching (<5 ppb) to 18" of soil depth at Midland was found (See Table III), while XRD-498 moved more apparently through the soil profile at Burdette, with levels of 7 ppb in the 12-18" soil depth samples after 2 weeks, and an isolated detection <2.5 ppb in the 3-4 foot soil depth samples after 3 months (See Table VI). In summary, in well drained, low organic matter soil with rainfall shortly after application, XRD-498 may exhibit some leaching in the soil. Additionally, XRD-498 appears to degrade faster in soils with higher pH and lower organic carbon.

f. The confined rotational crops study is not acceptable to meet Subdivi sion N Data Requirement for the following reasons:

The degradates were not identified.

The registrant must satisfactorily address the deficiency above for the study to fulfill the data requirement. If the registrant does not address the above deficiency, a new confined rotational crops study is required to fulfill the data requirement.

In this study, the results, where the application rate was confirmed by analysis of soil samples taken immediately after application rate, were reported similar to the results from MRID 41263232. There was limited accumulated of XRD-498 (<0.005 ppm) when planted in 30 day aged treated soil. Three degradates, which were labelled as Components A, B, C were quantified. However, these degradates were only tentatively identified or not identified. Components A and B were present at >10% of applied and/or ≥0.01 ppm. Total XRD-498 residues were ≤100 ppb.

g. Based on the following studies not conforming to current guideline data requirements or the data not presently needed to fulfill the data requirement, the following studies were not reviewed in detail at this time. However, these will be reviewed at a later data and may used as supplemental data at that time.

Fontaine, D.D., Lehmann, R.G., and Miller, J.R. THE SOIL ADSORPTION OF A WEAKLY ACIDIC ORGANIC COMPOUND XRD-498. Performed and Submitted by DowElanco, Midland, MI under Laboratory project ID 87062; Study completed on 25 March 1991; Received by EPA 19 June 1991; MRID 41931734.

Fontaine, D.D. A COMPUTER MODELING ASSESSMENT OF THE MOBILITY OF DE-498 IN THREE MAJOR SOYBEAN GROWING REGIONS OF THE UNITED

ment of the mobility data requirement. Other aged mobility data may be needed, as well, pending evaluation of additional data.

e. The status of the Environmental Fate Data Requirements for an experimental use (terrestrial food crop) permit is as follows:

Environmental Fate Data Requirement	Status of Data Requirement	MRID No.
Degradation Studies-Lab		
161-1 Hydrolysis	Fulfilled (WGM;02/02/90)	41263229
Metabolism Studies-Lab		
162-1 Aerobic soil	Fulfilled[1] (WGM;06/22/90) (WGM;03/24/92)	41263230 41931731 41931732
162-3 Anaerobic aquatic	Not Fulfilled (WGM;03/24/92) Satisfied for EUP	41931733
Mobility Studies		
163-1 Leaching, Adsorption/ Desorption	Fulfilled for unaged (WGM;06/22/90)	41263231 41290403
Accumulation Studies		
165-1 Rotational crops-confined	Not required for EUP[2] (WGM;02/02/90)	41263232
165-4 in Fish	Waived (WGM;06/22/90)	

[1] EFGWB, in order to fully understand the environmental fate of XRD-498, will require for registration that the pattern of formation and decline of degradates and XRD-498 be explained. Therefore, for registration of XRD-498 new aerobic soil metabolism and terrestrial field dissipation studies are needed. These studies probably will require a much higher application rates.

[2] The rotational crops data are not required for crop destruct EUP's. However, supplemental data has been submitted and a new study will be submitted in August 1991.

f. The status of the Environmental Fate Data Requirements for terrestrial food and feed crops use pattern is as follows:

Environmental Fate Data Requirement	Status of Data Requirement	MRID No.
Degradation Studies-Lab		
161-1 Hydrolysis	Fulfilled (WGM;02/02/90)	41263229

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gence rates on soybeans are 0.0078-0.015 lb ai/A. Application is by ground spray; sufficient agitation should be maintained during mixing and spraying to ensure a uniform spray mixture. When applied for preplant incorporation, XRD-498 should be incorporated into the top 2 to 3 inches of the final seedbed. Preemergence and postemergence applications are made by broadcast spraying. Livestock should not be allowed to graze in treated areas, and harvest-treated silage or grain should not be fed to meat or dairy animals.

10. DISCUSSION:

EUP

XRM-5019, which is a water granular formulation containing 75% XRD-498 by weight, is to be applied as a preemergence, preplant, and post-emergence herbicide from 1 March 1992 to December 1993. XRM-5019 is to control velvetleaf, cocklebur, ragweeds, morning glory, triazine resistant lambsquarter, and pigweed in soybeans and corn. Plots established with research application equipment will be approximately 10 ft x 50 ft each using three replicates. Plots established with commercial application equipment will be one or more acres with generally no replicates. Acreage is requested in a total of 33 soybean and corn producing states with majority of the acreage (62%) in the Midwest soybean growing region. Additional acreage lies in the southern and north eastern coastal states. The states selected for testing encompass the top 20 soybean producing states, plus several additional states selected on basis of presence of target weed species. These states also represent a broad range of growing conditions, cultural practices, soil types, and weed problems (See Table 1). A total of 1765 soybean growing acres, 730 acres in the 1992 growing season and 1035 acres in the 1993 growing season, will be treated with a total of 159.65 pounds , 66.1 pounds in 1992 and 93.55 pounds in 1993, of XRM-5019; and a total of 2135 corn growing acres, 965 acres in the 1992 growing season and 1165 acres in the 1993 growing season, will be treated with a total of 192.50 pounds, 87.25 pounds in 1992 growing season and 105.25 pounds in the 1993 growing season, of XRM-5019. This corresponds to 3900 acres to be treated with a total of 352.15 lbs of XRM-5019 (≈264 pounds XRD-498) used. Application will be carried out with ground equipment at an application rate of 0.04 to 0.09 lb/acre or 0.03 to 0.07 lb ai/A XRD-498.

During the course of the EUP, XRM-5019 will be evaluated using commercial and farmer application equipment in different cultural conditions, different climate conditions, different types of user/application, different incorporation equipment, different spray volumes, and different soil conditions. In addition, tank mix and sequential use product interactions and formulation compatibility, liquid fertilizer compatibility, various timing of applications, one vs two pass incorporation, utility on conservation compliance acres, effects of other soil parameters, effects on rotational crops, such as corn and wheat, control of triazine resistant weeds, and potential to replace atrazine or reduce atrazine application rate by the use of XRD-498 will be determined. Furthermore, pH response, organic matter response, crop response, efficacy clarification, yield from large trials, performance comparisons to other products will be evaluated.

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
XRD 498
Last Update on November 13, 1991
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer:	Section Head:	Date:

Common Name:XRD 498
PC Code # : CAS #:98967-40-9 Caswell #:

Chem. Name :N-(2,6-difluorophenyl)-5-methyl-1,2,4-triazolo[1,5a] pyrimidine-2-sulfonamide
Action Type:Herbicide

Trade Names:
(Formul'tn):75% active ingredient
Physical State:

Use :to control broadleaf weeds in soybeans and field corn
Patterns :
(% Usage) :
:

Empirical Form: $C_{12}H_9F_2N_5O_2S$ 0.8×10^{-15}
Molecular Wgt.: 325.30 Vapor Pressure: 15.00E Torr
Melting Point : °C Boiling Point: °C
Log Kow : Kow = 1.62 pKa: @ °C
Henry's : E Atm. M3/Mol (Measured) 1.14E -3 (calc'd)

Solubility in ...					Comments
Water	5.65E	3	ppm	@25.0 °C	
Acetone	49.1 ppm pH 2.5	E	ppm	@ °C	
Acetonitrile		E	ppm	@ °C	
Benzene	5.65 g/L pH 7	E	ppm	@ °C	
Chloroform		E	ppm	@ °C	
Ethanol	5650 mg/L	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 :

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Soil Partition Coefficient (Kd) (163-1)
[V] 0.05 to 2.42 from sandy loam to clay soils
[ ]
[ ]
[ ]
[ ]
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Soil Rf Factors (163-1)
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Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[S] half-life=1.5 months to 3 months
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Aquatic Dissipation (164-2)
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Forestry Dissipation (164-3)
[ ]
[ ]

Environmental Fate & Effects Division
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XRD 498
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Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

Surface Water Monitoring (167-2)
[ ]
[ ]
[ ]
[ ]

Spray Drift, Droplet Spectrum (201-1)
[ ]
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Spray Drift, Field Evaluation (202-1)
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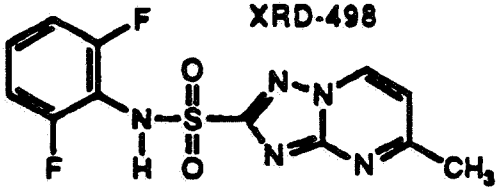
[ ]
[ ]

Degradation Products

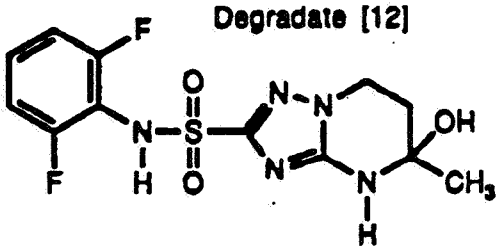
See attached sheet.

XRD-498

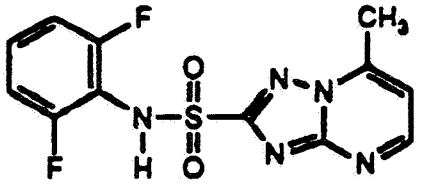


N-(2,6-difluorophenyl)-5-methyl-(1,2,4)triazolo(1,5-a)-pyrimidine-2-sulfonamide

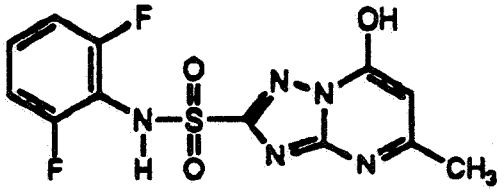
Degradate [12]



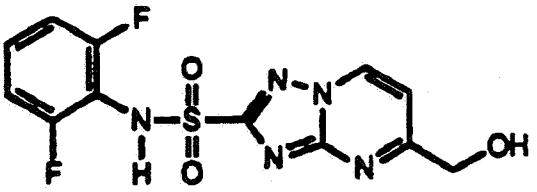
N-(2,6-difluorophenyl)-4,5,6,7-tetrahydro-5-hydroxy-5-methyl-(1,2,4)triazolo(1,5-a)-pyrimidine-2-sulfonamide



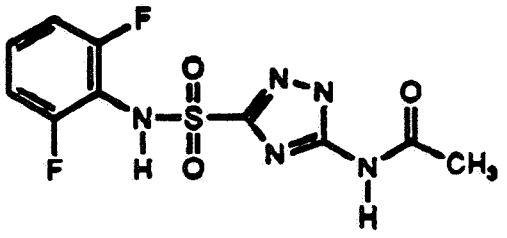
N-(2,6-difluorophenyl)-7-methyl-(1,2,4)triazolo(1,5-a)-pyrimidine-2-sulfonamide



N-(2,6-difluorophenyl)-5-methyl-7-hydroxy-(1,2,4)triazolo(1,5-a)-pyrimidine-2-sulfonamide



N-(2,6-difluorophenyl)-5-hydroxy methyl-(1,2,4)triazolo(1,5-a)-pyrimidine-2-sulfonamide



N-(2,6-difluorophenyl)-(1,2,4)triazolo-3-acetamide-2-sulfonamide