Shaughnessy No.: 121601

Date out of EFGWB: MAY 9 1990

TO: R. Taylor/V. Walters
Product Manager #25
Registration Division (H7507C)

FROM: Emil Regelman, Supervisory Chemist
Chemistry Review Section #2
Environmental Fate and Ground Water Branch

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 #: 524-EUP-56

Chemical Name: 2-Chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide

Type Product: Selective preemergence herbicide

Common Name: Acetochlor

Company Name: Monsanto Company/ Monsanto Agricultural Products Co.

Purpose: Renewal of EUP on corn

Date Received: 1 May 1990 Date Completed: 7 May 1990

Action Code: 716

EFGWB #(s): 90-0334

Total Reviewing Time: 1.5 days

Deferrals to: ___Ecological Effects Branch, EFED

___Science Integration and Policy Staff, EFED

___Non-Dietary Exposure Branch, HED

___Dietary Exposure Branch, HED

___Toxicology Branch

1

1. CHEMICAL:

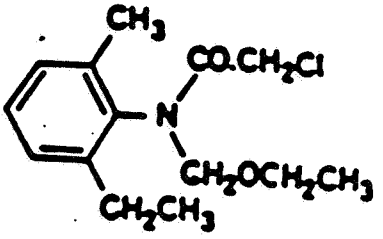
Chemical name: 2-Chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide

CAS no.: 34256-28-1

Common name: Acetochlor

Trade name: MON 8437, Harness

Chemical structure:



Molecular formula: $C_{14}H_{20}ClNO_2$

Molecular weight: 269.8

Formulation:
Acetochlor.....81.15%
Inert Ingredients.....18.85%

Physical/Chemical properties of active ingredient:

Physical characteristics: Colorless thick liquid, aromatic odor

Vapor Pressure: 4.4×10^{-5} mm Hg

Solubility: 233 mg/L at 25°C

Octanol/water partition coefficient: $1 \times 10^{2.6}$

2. TEST MATERIAL:

N/A

3. STUDY/ACTION TYPE:

Review of renewal request for EUP on corn.

4. STUDY IDENTIFICATION:

Kunstman, J. L. CORRESPONDENCE TO R. J. TAYLOR.: ACETOCHLOR REGISTRATION, MON 8437 (HARNESS) HERBICIDE, REQUEST FOR RENEWAL OF TEMPORARY TOLERANCES AND EXPERIMENTAL USE PERMIT, EPA FILE SYMBOL 524-EUP-56, PESTICIDE PETITION #1G2454. 15 November 1989.

Kunstman, J. L. CORRESPONDENCE TO R. J. TAYLOR: ACETOCHLOR REGISTRATION, EPA FILE SYMBOL 524-GUI, SUBMISSION OF ACUTE TOXICITY STUDIES FOR HARNESS HERBICIDE (MON-8437). 13 February 1989.

Kunstman, J. L. ADMINISTRATIVE MATERIAL SUPPORTING RENEWAL OF AN EXPERIMENTAL USE PERMIT FOR ACETOCHLOR AS MON 8437 (HARNESS) HERBICIDE. Submitted and Performed by Monsanto Agricultural Company, St. Louis, MO under Laboratory Project Number/R.D. No. 965; Completed 15 November 1989.

5. REVIEWED BY:

Gail Maske
Chemist, Review section #2
OPP/EFED/EFGWB

Signature: Gail Maske

Date: 3 May 90

6. APPROVED BY:

Emil Regelman
Supervisory Chemist
Review section #2
OPP/EFED/EFGWB

Signature: E Regelman

Date: MAY 9 1990

7. CONCLUSIONS:

There is sufficient environmental fate data to support the Experimental Use Permit (EUP) request for acetochlor. Acetochlor is toxic to aquatic life and should not be used in areas where contamination of surface water bodies is possible.

The EUP states that 8000 lbs of acetochlor will be used on a total of 4000 acres. The 4000 acres will be located over three states (Iowa, Minnesota, and South Dakota) with the test program lasting one year. From previous usage of acetochlor and data furnished with this EUP, there should be no adverse effect with the use of acetochlor over 1 year at the rate of application requested.

Acetochlor is stable to hydrolysis. However, acetochlor degrades rapidly in a variety of soils under aerobic and anaerobic conditions producing numerous metabolites. Microbial metabolism appears to be the major pathway of degradation for acetochlor. Acetochlor dissipates with a half-life of <3 days when applied to a California sandy soil. Soil adsorption and column leaching studies indicate that in soils with higher organic matter content (approximately 3.4%) acetochlor is moderately mobile and in soils with lower organic matter content (approximately 0.7%) acetochlor is very mobile. Therefore, acetochlor possibility can leach through soil to ground water, especially coarse soils where ground water is near the surface. Acetochlor may as well reach surface water bodies if there is flooding after application.

8. RECOMMENDATIONS:

The registrant should be informed of the following:

a. There is sufficient environmental fate data to support the EUP request for acetochlor. Acetochlor is toxic to aquatic life and should not be used in areas where contamination of surface water bodies is possible.

b. The status of the Environmental Fate Data Requirements for registration of acetochlor for terrestrial food use is as follows:

Environmental Fate Data Requirements		Status of Data Requirement	MRID No.
Degradation Studies-Lab			
161-1	Hydrolysis	Fulfilled (HLM;03/05/81)	00064805
161-2	Photodegradation in water	Fulfilled (PRD;03/23/88)	00131388
161-3	Photodegradation on soil	Fulfilled (PRD;03/23/88)	00131388
Metabolism Studies-Lab			
162-1	Aerobic (Soil)	Fulfilled (HLM;03/05/81)	00064805
162-2	Anaerobic (Soil)	Only summary review	41338501
Mobility Studies			
163-1	Leaching, Adsorption/ Desorption	Only summary review	41338502
163-2	Volatility-lab	Not Required (PRD;04/24/89)	
Dissipation Studies-Field			
164-1	Terrestrial	Not Fulfilled (PRD;04/24/89)	40811901
Accumulation Studies			
165-1	Rotational crops-confined protocol	Not Fulfilled (PRD;03/23/88) (MIR;04/16/90)	00131390
165-2	Rotational crops-field	Deferred to 165-1	41338503
165-4	In fish	Fulfilled (NKW;01/25/84)	00131388

9. BACKGROUND:

General Background

Acetochlor, a chloroacetamide, is used as a preemergent corn herbicide. Harness (MON 8437), which has acetochlor as its active ingredient, is an emulsifiable herbicide used to control yellow nutsedge, many annual grass and broadleaf weed species on corn, soybean, peanuts, and sunflowers.

Harness is applied either as a surface application after planting or shallowly incorporated prior to planting to blend the acetochlor into the upper 1 to 2 inches of soil. The seedbed should be fine, firm, and free of clods and thrash. Harness is not applied to coarse textured soils or to medium and fine textured soils which have less than 1.5% organic matter content. When applied to coarse textured or to medium and fine textured soils which have less than 1.5% organic matter content, acetochlor may cause damage to the crop. The broadcast rate varies according to the organic matter content and type of soil to be treated.

ICI Agricultural Products, Wilmington, DE is requesting registration of acetochlor for noncrop use and use on corn crops. ICI began developing acetochlor use for registration as a herbicide in 1988.

Acetochlor is toxic to aquatic life, but is less toxic to bees.

Environmental Fate Background

Degradation:

Acetochlor in deionized water, sterile lake water, and in sterile buffer solutions at pH 3, 6, and 9 did not show any significant degradation. A half-life of greater than 24 months was estimated. Therefore, acetochlor should not hydrolysis under environmental conditions.

Acetochlor was stable when exposed to solar irradiation in water and on soil.

Metabolism:

Under aerobic conditions in viable soil at 22°C the half-life of acetochlor in Ray soil was 8 days, in Drummer soil was 10 days, and in Spinks soil was 12 days. Data from the sterile soil studies indicated that microbial metabolism was the dominant degradation pathway for acetochlor in soil.

Nineteen metabolites were identified in the study. The three major metabolites were unambiguously identified as derivatives of methyloxanilic acid, sulfinylacetic acid, and sulfoacetanilide. None of the metabolites accounted for more than 18% of the applied acetochlor. Therefore, acetochlor degrades fairly rapidly under aerobic soil conditions yielding several metabolites.

Rapid microbial degradation took place under anaerobic soil conditions. Numerous degradates were formed which continued to be broken down into a wide array of degradates. The metabolites appear to dissipate fairly rapid.

Mobility:

Soil adsorption and desorption of acetochlor were studied using Lintonia, Ray, Spinks, and Drummer soils having organic matter content of 0.7%, 1.4%, 2.4%, and 3.4%, respectively. Soils with a higher organic matter content bound acetochlor more tightly than those with lower organic matter content. The four soils (Lintonia, Ray, Spinks, and Drummer) had adsorption coefficients of 0.4, 1.1, 1.6, and 2.7, respectively.

Soil column studies of aged and unaged acetochlor reflected the correlation between organic matter content and adsorption seen in the previous adsorption studies. Therefore, soil adsorption/desorption and column leaching studies indicate that acetochlor is moderately mobile when applied to soils with higher organic matter content (approximately 3.4%). Acetochlor appears to be very mobile when applied to soils with lower organic matter content (approximately 0.7%).

Dissipation:

Acetochlor when applied to California soil, which was sandy with less than 1% organic matter content and very low field moisture capacity (worst-case scenario), demonstrated a half-life of <3 days. Only trace levels of acetochlor were found to occur in depths below 6 inches. Soil samples taken at from 8 foot soil core at 258 days demonstrated complete dissipation with undetectable acetochlor residues levels (<0.005 ppm). From observations of the 2.0 lb/A treatment acetochlor residues in soil, significant residues in soil from typical acetochlor at 60 days posttreatment or at a depth of 6 inches would not be expected.

Accumulation:

Uptake of acetochlor into soybean was 1.2 ppm in foliage and 0.2 ppm in grain when harvested at maturity. When harvested at 30 days posttreatment, residues in the forage were 13.2 ppm from the carbonyllabelled acetochlor and 1.99 ppm from the phenyllabelled acetochlor.

Residues in follow crops were 0.2 ppm and 0.4 to 1.13 ppm in barley grain and straw, respectively. In cabbage the residues ranged from 0.09 to 0.2 ppm and 0.03 to 0.04 ppm 0.16 to 0.18 ppm in radishes, radishes greens, respectively. The amount of acetochlor uptake decreased as time of posttreatment planting increased. Five month rotational crops have residues which ranged from 0.03 to 1.13 ppm from all experiments, while those from the 1 year rotational crops ranged from 0.01 to 0.63 ppm.

The acetochlor bioconcentration factor (BCF) for whole fish is 84, for fillet 35, and for viscera 150. These values are consistent with the low octanol/water partition coefficient which is $1 \times 10^{2.6}$. Depuration at 14 days for whole fish was 85%, for fillet was 52%, and for viscera was 90%.

b

EUP Background

The Agency approved a crop destruct EUP for acetochlor on 20 March 1981 for use of Harness Herbicide on corn, soybeans, and peanuts, and grain sorghum. Temporary tolerances for acetochlor on corn and soybean grain were granted on 10 February 1982. Those temporary tolerances and the Harness EUP expired on 20 March 1985. Renewal of the acetochlor tolerances and the EUP for corn only was requested 28 April 1986. This request was not granted due to data gaps in residue chemistry and toxicology data requirements which must be satisfied before granting an EUP. Monsanto has attempted to satisfy these data requirements for this EUP and later registration of Acetochlor.

10. DISCUSSION:

The EUP for acetochlor use on corn is requested for 1 year in order to confirm that acetochlor is an acceptable product for commercial use on corn. The data form the proposed test program will include data on efficacy to define efficacious use rates lower than those currently recommended for conventional tillage systems; data to determine efficacy of early preplant applications in no-till systems; data to evaluate efficacy across conventional, reduced and no-till systems to ensure consistency and rate interactions; and data to assess efficacy and crop phytotoxicity of potential tank mix combinations.

There will be three states (Iowa, Minnesota, and South Dakota) involved in the 1 year test program. Iowa and Minnesota will each have 3600 lbs. of active ingredient distributed over 1800 acres of corn acreage. In South Dakota there will be 800 lbs. of active ingredient distributed over 400 acres of corn acreage. The application will be made predominantly ground broadcasting at a rate 1.5 to 3 lbs ai/acre with an average of 2 lb ai/acre during the planting season which ranges from April to June.

11: COMPLETION OF ONE-LINER:

See attached one-liner.

12: CBI APPENDIX:

The information is considered to be CBI by the registrant, and should be treated as such.

ENVIRONMENTAL FATE & GROUND WATER BRANCH
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY Page 1

Common Name: **ACETOCHLOR** Date: 04/19/89
Chem. Name : 2-CHLORO-N-(ETHOXYMETHYL)-N-(2-ETHYL-6-METHYL-PHENYL)-
: ACETAMIDE
Shaugh. # : 121601 CAS Number: ~~34256-82-1~~
Type Pest. : Herbicide 34256-82-1
Formulation: EC
Uses : POSTEMERGENCE BROADLEAVED WEED CONTROL
:
:

Empir. Form: $C_{14}H_{20}NO_2Cl$ VP (Torr): ~~4.4x10^{-5}~~
Mol. Weight: 269 Log Kow : 2.6
Solub.(ppm): 223 @ 20 C Henry's :

Hydrolysis (161-1)
pH 5:[*] STABLE
pH 7:[*] STABLE
pH 9:[*] STABLE
pH :[ ]
pH :[ ]
pH :[ ]

Photolysis (161-2, -3, -4)
Air :[ ]
Soil :[#] INSIGNIFICANT
Water:[#] "
:[ ]
:[ ]
:[ ]

MOBILITY STUDIES (163-1)

Soil Partition (Kd)

	SOIL	%OM	Kd
1.[*]	SOIL	%OM	Kd
2.[ ]	LINTONIA	0.7	.4
3.[ ]	RAY	1.2	1.1
4.[ ]	SPINKS	2.4	1.6
5.[ ]	DRUMMER	3.4	2.7
6.[ ]			

Rf Factors
1.[ ] DRUMMER SOIL RETAINED ABOUT
2.[ ] 57% OF APPL. ACETOCHLOR WHILE
3.[ ] LINTONIA RETAINED ONLY 4%.
4.[ ]
5.[ ]
6.[ ]

METABOLISM STUDIES (162-1,2,3,4)

Aerobic Soil (162-1)
1.[*] RAY SOIL: 8 DAYS 22 C
2.[*] DRUMMER SOIL: 10 DAYS "
3.[*] SPINKS SOIL: 12 DAYS "
4.[ ]
5.[ ]
6.[ ]
7.[ ]

Anaerobic Soil (162-2)
1.[ ] RAPID MICROBIAL DEGRADATION
2.[ ]
3.[ ]
4.[ ]
5.[ ]
6.[ ]
7.[ ]

Aerobic Aquatic (162-4)
1.[ ] 8-12 DA (SOIL?)
2.[ ]
3.[ ]
4.[ ]

Anaerobic Aquatic (162-3)
1.[ ]
2.[ ]
3.[ ]
4.[ ]

[*] - Acceptable Study. [#] = Supplemental Study

Common Name: **ACETOCHLOR** Date: 04/19/89

VOLATILITY STUDIES (163-2,3)

[ ] Laboratory:
[ ] Field:

DISSIPATION STUDIES (164-1,2,3,5)

Terrestrial Field (164-1)

1.[ ] % ACETOCHL. AND EXTRACT. IN SOIL, AEROBIC CONDITIONS AT 22 C

	SOIL	DAYS	ACETOCHL.	ORG. SOL.	WAT. SOL.	CO2	SOIL BOUND
2.[ ]							
3.[ ]	RAY	0	91.1	97.1	0.8	0.0	1.5
4.[ ]	"	21	15.3	24.6	45.0	3.5	62.8
5.[ ]	DRUMMER	0	93.8	101.5	0.9	0.0	1.1
6.[ ]	"	21	19.8	33.8	37.5	3.2	41.4

Aquatic (164-2)

1.[ ]
2.[ ]
3.[ ]
4.[ ]
5.[ ]
6.[ ]

Forestry (164-3)

1.[ ]
2.[ ]

Other (164-5)

1.[ ]
2.[ ]

ACCUMULATION STUDIES (165-1,2,3,4,5)

Confined Rotational Crops (165-1)

1.[ ] DO NOT ROTATE
2.[ ]

Field Rotational Crops (165-2)

1.[ ]
2.[ ]

Irrigated Crops (165-3)

1.[ ]
2.[ ]

Fish (165-4)

1.[*] BLUEGILL SUNFISH 35X EDIBLE, 150X VISCERA, 84X WHOLE FISH.
2.[ ] DEPURATION AT 14 DAYS =52%, 90%, 85% FOR EDIB., VISC., WHOLE

Non-Target Organisms (165-5)

1.[ ]
2.[ ]

Common Name: **ACETOCHLOR** Date: 04/19/89

GROUND WATER STUDIES (158.75)

1.[ ]
2.[ ]
3.[ ]

DEGRADATION PRODUCTS

1. MULTIPLE DEGRADATES. OF THE THREE MAJORS (DERIVATIVES OF
2. METHYL OXANILIC ACID, SULFINYLACETIC ACID, AND SULFOACETANILIDE),
3. NONE ACCOUNTED FOR MORE THAN 18% OF THE ACETOCHLOR APPLIED.
4.
5.
6.
7.
8.
9.
10.

COMMENTS

References:
Writer : J. HANNAN