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Date Out EFB: MAR 5 1981

To: Product Manager 25 Tayor
TS-767

From: Dr. Willa Garner
Chief, Review Section No. 1
Environmental Fate Branch

Attached please find the environmental fate review of:

Reg./File No.: 524-EUP-LA

Chemical: Acetochlor

Type Product: Herbicide

Product Name: MON 097

Company Name: Monsanto

Submission Purpose: EUP for use on corn and soybeans

ZBB Code: Sect 5

ACTION CODE: 705

Date in: 1/5/81

EFB # 732

Date Completed: MAR 5 1981

TAIS (level II)	Days
54	8

Deferrals To:

_____ Ecological Effects Branch

_____ Residue Chemistry Branch

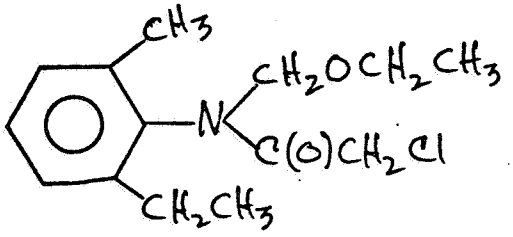
_____ Toxicology Branch

1. Introduction

Chemical Name and Type Pesticide: Acetochlor, 2-chloro-N-ethoxymethyl-N-(2-ethyl-6-methylphenyl)-acetamide, 86.4% a.i., herbicide.

Trade Name: MON-097

Chemical Structure:



Physical and Chemical Properties:

Form: Liquid
Color: Colorless to Dark Purple
B.P. : > 200°C
M.P. : > 0°C
Vapor Pressure: < 1 mm Hg
Hydrolysis Rate: Nondetectable at pH 5-9
Dissociation Constant: None

Solubility: Ether acetone; benzene; chloroform; alcohol; ethyl; acetate; water (223 ppm)

Stability: Stable (first detectable heat evolution at 170°C)

Specific Gravity: 1.11 at 30°C

The applicant requests an experimental use permit for a new herbicide, MON-097, for use on corn and soybeans. The two year request will involve 24,300 pounds active ingredient formulated as an 8 lb ai/gal EC. This amount of material will treat 12,150 acres in 41 states.

2. Directions for Use

See attached sheets.

3. Discussion of Data

RIN 2556-94 ACETOCHLOR REVIEW (12/6/01)

Page_____ is not included in this copy.

Pages 3 through 7 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.

3.1 HYDROLYSIS

The Environmental Studies of Acetochlor, D.H. Campbell and D.E. Hamilton, August 1980, Report # MSL-1255, Acc. # 099814.

Experimental Procedure

Sterile solutions of acetochhlor-carbonyl- ^{14}C at 57.4 ppm were prepared in deionized water, natural water, and commercially available pH 3, 6, and 9 buffers. Sampling was after 7, 14, 21, and 30 days. Samples were extracted with methylene chloride and the water layer analyzed by LSC. The methylene chloride layers were concentrated and assayed by GLC/RAD.

TABLE 1. SOIL DISSIPATION OF ACETOCHLOR UNDER AEROBIC CONDITIONS AT 22°C.

Soil	Days	% Acetochlor	% Organic Solubles	% Water Solubles	% NH_4OH Extractable	% CO_2	% Soil Bound
Ray	0	91.1	97.1	0.8	1.2	0.0	1.5
	21	15.3	24.6	45.0	2.5	3.5	62.8
	168	0.4	5.2	45.7	2.4	21.6	18.7
Drummer	0	93.8	101.5	0.9	0.5	0.0	1.1
	21	19.8	33.8	37.5	4.3	3.2	41.4
	168	0.9	7.6	40.2	4.2	16.2	24.5
Spinks	0	91.7	97.1	1.0	0.1	0.0	7.6
	21	25.5	25.5	28.0	9.1	4.2	34.3
	168	1.3	1.3	33.4	9.8	24.5	17.1

Results

Solutions of acetochlor in deionized water, sterile lake water, and in sterile buffer solutions at pH 3, 6, and 9 did not show any significent degradation. A half-life of greater than 24 months was estimated.

Conclusion

Acetochlor is stable to degradation by hydrolysis. The study satisfies this EC data requirement.

3.2 AEROBIC SOIL METABOLISH

The Environmental Studies of Acetochlor, D.H. Campbell and D.E. Hamilton, August 1980, Report # MSL-1255, Acc. #099814.

Experimental Procedure

The aerobic soil metabolism studies were conducted on three soils: Ray silt loam, Drummer silty clay loam, and Spinks sandy loam. The test apparatus consisted of a 250 ml Erlenmeyer flash and a two-piece trapping tower made up of ascarite and Drierite. Fifty grams of air dried soil was treated with enough radiolabeled acetochlor to give a 3 ppm dosage rate (about normal use rate). Incubation was at 22°C in the dark. Duplicate flasks (viable and sterile) were sampled after 0, 1, 3, 7, 14, 21, and 28 days. Flasks of viable soil were also sampled to 56, 84, and 168 days. Soils were extracted with aqueous acetonitrile, ammonium hydroxide, water and methylene chloride and analyzed by LSC and HPLC.

Results

The extraction, combustion, and CO_2 evalution data (Table 1) indicate:

1. A steady evolution of CO_2 (0.7-1.0% per week).
2. The level of organic solubles (methylene chloride extraction) decreased.
3. Water soluble and soil-bound material first increased and then dropped off.

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

Many metabolites were identified in the study; a total of 19 in all. All three significant metabolites were unambiguously identified. These were derivatives of methyloxanilic acid, sulfinylacetic acid, and sulfoacetanilide. Despite being the most significant metabolites, none accounted for more than 18% of the applied acetochlor. Sixteen other metabolites that were either minor, very minor, or noted at the end of the study were detected and identified.

Conclusion

Acetochlor degrades fairly rapidly in aerobic soil yielding many metabolites. The study satisfies this EC data requirement.

The preceeding two studies are required for an experimental use permit. The following studies are not required and will only be briefly summarized here. A more complete review will be done when acetochlor is submitted for full registration.

3.3 ADSORPTION

Part of environmental studies. See section 3.1

Soil adsorption and desorption of acetochlor were studied using Lintonia, Ray, Spinks and Drummer soils having % O.M. of 0.7, 1.2, 2.4, and 3.4, respectively. Soils with a higher organic content bound acetochlor more tightly than those with lower organic content. The four soils above had adsorption coefficients of 0.4, 1.1, 1.6, and 2.7.

3.4 SOIL LEACHING

Part of environmental stuides. See section 3.1.

Soil column studies of aged and unaged soils reflected the correlation between % O.M. and adsorption previously seen, e.g., Drummer soil (3.4% O.M) retained about 57% of the applied acetochlor, whereas Lintonic soil (0.7% O.M.) retained only 4% of applied acetochlor. Drummer and Spinks soils were of intermediate mobility (Helling and Turner). Ray soil was classified mobile and Lintonia as very mobile.

3.5 OCTANOL/WATER PARTITION COEFFICIENT

Part of environmental studies. Se section 3.1

The coefficients from two experminents gave relatively low values of 313 and 286, neither of which indicate much bioaccumulation in fatty tissues.

3.6 ANEROBIC SOIL METABOLISM

Part of environmental studies. See section 3.1

The authors concluded that rapid microbial degradation occurs under anaerobic conditions and the products formed aerobically continue to be broken down to a wide array of products.

4.0 Executive Summary and Conclusions

Acetochlor was stable to hydrolysis. Acetochlor degraded rapidly in a variety of soils under both aerobic and anaerobic conditions and produced a large number of metabolites. Soil adsorption and column leaching studies indicated that in soils with higher organic matter content (3.4%) acetochlor was of intermediate mobility and in soils with lower organic matter content (0.7%) acetochlor was very mobile.

5.0 Recommendations

EFB concurs with the use of acetochlor under the proposed experimental use permit, but since a rotational crop study was not submitted, the following qualifications or alternatives must apply:

1. On 18-month crop rotation restriction must be placed on the label, or

2. A crop destruct policy put into effect, or

3. A rotational crop study submitted along with a request for tolerances on rotational crops.

A statement is required on the label that the treated area should not be grazed or crops fed as forage to livestock.

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Review Section #1
Environmental Fate Branch
Hazard Evaluation Division