12-6-93

Date Out: Chemical Code:121601
DP Barcode:D174457, D182799, D187736, [redacted] D193537, D194713

ENVIRONMENTAL FATE AND GROUND WATER BRANCH

Review Action

To: Robert Taylor PM 25
Registration Division (H7505C)

From: Akiva Abramovitch, Section Head
Chemistry Review Section 3
Environmental Fate & Ground Water Branch/EFED (H7507C)

Thru: Henry Jacoby, Chief
Environmental Fate & Ground Water Branch/EFED (H7507C)

Henry Jacoby 12/6/93

Attached, please find the EFGWB review of...

Common Name:	Acetochlor	**Trade name:**	
Company Name:	Acetochlor Registration Partnership (Zeneca and Monsanto)		
ID #:	279-3084		
Purpose:	Review of 162-1, 162-2, and 164-1 studies for registration. Also, Request for Extension of EUP on Corn.		

Type Product:	Action Code:	EFGWB #(s):	Review Time:
Herbicide	100, 101, 704, 716	92-0531, -1373, 93-0391, -0772, -0915, -1001	10 days

STATUS OF STUDIES IN THIS PACKAGE: REQUIREMENTS

Guideline #	MRID	Status[1]
162-1	41565147 41963316 41963317 ACC. 099814	U
162-2	41338501 41565148 41778301	U
164-1	41565152 41565153 41592012 41592013 42549917 42549918 42573402	U

STATUS OF DATA ADDRESSED IN THIS PACKAGE:

Guideline #	Status[2]
162-1	P
162-2	P
164-1	P

[1] Study Status Codes: A=Acceptable U=Upgradeable C=Ancillary I=Invalid.
[2] Data Requirement Status Codes: S=Satisfied P=Partially satisfied N=Not satisfied R=Reserved W=Waived.

1. CHEMICAL: Common name:

Acetochlor.

Chemical name:

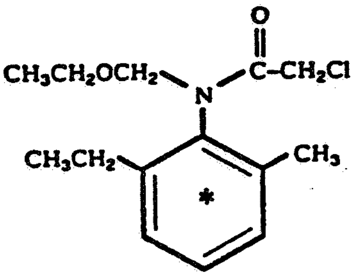
2-Chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide or
N-(ethoxymethyl)-2'-methyl-6'-ethyl-2-chloroacetanilide.

Trade name(s):

ICIA-5676, SC-5676, Harness, Top-Hand

Structure:

ICIA-5676.



Formulations:

7 lb ai/gal EC.

Physical/Chemical properties:

Molecular formula: $C_{14}H_{20}ClNO_2$.
Molecular weight: 269.8.
Physical state: Straw colored liquid (ICI Americas, Inc.)
Solubility: (25°C) 379 mg/L water (ICI Americas, Inc); also soluble in acetone, benzene, chloroform, ethanol and ethyl acetate.

2. TEST MATERIAL:

Active ingredient.

3. STUDY/ACTION TYPE:

The Acetochlor Registration Partnership submitted 162-1 and 164-1 studies for registration.

4. STUDY IDENTIFICATION:

Hawkins, D.R., D. Kirkpatrick, and G.M. Dean. 1991. The metabolism of ^{14}C-acetochlor in sandy loam soil under aerobic conditions. HRC Report No. ISN 185/90535. Unpublished study performed by Huntingdon Research Centre, Ltd., Cambridgeshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (41963317)

Part II. HRC Report No. STR 19/901756. Unpublished study performed by Huntingdon Research Centre, Ltd., Cambridgeshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (41963316)

Lauer, R. 1992. Stability of acetochlor and its metabolites in soil during frozen storage. Laboratory Project No. MSL-11981. Unpublished study performed by Monsanto Company, St. Louis, MO, and submitted by ICI Americas, Inc., Wilmington, DE. (42549907)

Lauer, R., and P.H. Lau. 1992. Terrestrial field dissipation study of acetochlor and its soil metabolites following preemergent application of MON 8437 to field corn. Laboratory Project No. MSL-12089. Unpublished study performed by Monsanto Company, St. Louis, MO, and Stewart Agricultural Services, Inc., Macon, MO; and submitted by ICI Americas, Inc., Wilmington, DE. (42573402)

Skidmore, M. 1989. The metabolism of ^{14}C-acetochlor in silty clay loam soil under aerobic conditions. HRC Report No. STR 19/881751. Unpublished study performed by Huntingdon Research Centre, Ltd., Cambridgeshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (41565147)

Veal, P., S. Grout, and N.D. Simmons. 1992a. Acetochlor: Residues of thioacetic acid sulphoxide soil metabolite under field conditions in Champaign, Illinois, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ1031B. Unpublished study performed by ICI Agrochemicals, Bracknell, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (42549917)

Veal, P., S. Grout, and N.D. Simmons. 1992b. Acetochlor: Residues of thioacetic acid sulphoxide soil metabolite under field conditions in Leland, Mississippi, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ1030B. Unpublished study performed by ICI Agrochemicals, Bracknell, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (42549918)

Zilka, S.A., B. Wilson, R.E. Hoag, B. Rodriguez, and N.D. Simmons. 1990. Acetochlor: Dissipation of residues in USA soil under field conditions - Visalia, California, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ0821B. Unpublished study performed by ICI Agrochemicals, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (42549915)

Zilka, S.A., B. Wilson, R.E. Hoag, O.H. Kirsch, and N.D. Simmons. 1990. Acetochlor: Dissipation of residues in USA soil under field conditions - Goldsboro, North Carolina, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ0822B. Unpublished study performed by ICI Agrochemicals, Bracknell, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE. (42549916)

5. <u>REVIEWED BY</u>:

James Breithaupt
Agronomist, Review Section 3
EFGWB/EFED/OPP

Signature: James Breithaupt

Date: 12/3/93

6. APPROVED BY:

Akiva Abramovitch
Chief, Review Section 3
EFGWB/EFED/OPP

Signature: Akiva Abramovitch

Date: DEC 5 1993

7. CONCLUSIONS:

Summary of Data Requirements and Extension of EUP on Corn

The Acetochlor Registration Partnership has submitted sufficient enough data to support an EUP Extension Request for application of 6,600 pounds of active ingredient to 3,300 acres of corn. An EUP (3/16/92 review) was approved by the agency for the 2-year period of 1992 through 1993. However, the anaerobic soil metabolism (162-2), leaching-adsorption-desorption (163-1), and spray drift (201-1, 202-1) data requirements remain unsatisfied for the purpose of registration. EFGWB is concerned about the potential mobility of acetochlor and its degradates.

Studies Addressed in This Review:

Aerobic Soil Metabolism (162-1, Upgradeable, DER's 1 and 2, MRID's 41963316, 41963317, 41565147, Acc. 099814) (Unsatisfied, upgradeable)

The aerobic soil metabolism data requirement may be satisfied if the registrant can satisfactorily explain the mechanism of formation of the newly-detected degradate thioacetic acid sulfoxide [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulphinyl] acetic acid and identify what the registrant refers to as the "sulfur-containing soil moieties" involved in its formation (MRID 41963317, figure 1, proposed biotransformation). The sulfur containing compounds from acetochlor formed at 11% (6% sulfonic acid and 5% thioacetic acid sulfoxide) and 22% (12% sulfonic acid and 10% thioacetic acid sulfoxide) in sandy loam and silty clay loam, respectively. These compounds were also formed in the field studies.

Zeneca and Monsanto submitted studies to satisfy the 162-1 data requirement for the Acetochlor Registration partnership. A Zeneca study (MRID 41963317) was a new 162-1 study conducted on a sandy loam soil. Another Zeneca study (MRID 41963316) contained a reanalysis of the soil samples from MRID 41565147 (reviewed on 1/18/91) for an additional degradate, thiacetic acid sulfoxide. This degradate was detected when the analytical methodology was changed. The Monsanto study (Acc. #099814, reviewed on 5/11/90) only provided persistence estimates of acetochlor and the degradates ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24, sulfonic acid) and N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (Compound 17, oxanilic acid). **These were rearrangement products of one amino moiety of the acetochlor molecule.**

In the Zeneca study, acetochlor persistence in aerobic soil increased with increasing application rate and coarser soil texture. In sandy loam soil with 2.9 % organic matter, acetochlor applied at 10.5 ppm (7.5X rate, x=1.4 ppm,) degraded with a first half-life of 110 days, followed by a second half-life of 245 days. When acetochlor was applied at 50 ppm (36X rate) to sandy loam soil, the half-life was 300 days (MRID 41963317, DER 1). However, in silty clay loam soil with 4.1 % organic matter, the half-lives of acetochlor were 14 and 55 days for the 4.5 ppm (3.2X rate) and 41 ppm (29X rate) soil concentrations, respectively (MRID's 41565147 and 41963316, DER 2). A previous Monsanto 162-1 study (Acc. #099814) reports half-lives of 8-12 days in Ray silt loam (1.2 % OM), Drummer silty clay loam (3.4 % OM), and Spinks sandy loam (2.4 % OM) soils treated with 3 ppm (2X rate) of acetochlor.

In sandy loam and silty clay loam soils, three polar degradates were identified: oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide. In sandy loam soil, an additional degradate was identified: N-(ethoxymethyl)-2'-ethyl-6'-methyl-2-hydroxyacetanilide (Compound 20). These were rearrangement products of an alkyl chain of the amino moiety. The oxamic acid, sulfonic acid, and thioacetic sulfoxide degradates reached maximum levels of 11 %, 6 %, and 5 % in the Zeneca sandy loam soil by 90, 60, and 120 days, respectively. These degradates also reached maximum levels of 17, 12 , and 10 % in the Zeneca silty clay loam soil by 60, 180, and 120 days, respectively.

According to the proposed label (attached), acetochlor is to be applied to medium-textured soils (loam, silt, silt loam) and fine-textured soils (silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, and clay) with 1.5-6 % OM. The application rates are 1.5-2.2 lbs ai/A for medium-textured soils and 1.75-2.2 lbs ai/A for fine-textured soils. Acetochlor may also be applied at 2.8-3.2 lbs ai/A to all soils with 6-10 % OM, regardless of soil texture. The application rate is 3.2 lbs ai/A for soils with >10 % OM, regardless of texture. The 162-1 studies in this review conducted by both Zeneca and Monsanto encompass the range of soils to be treated with acetochlor.

Anaerobic Soil Metabolism (162-2, Unsatisfied, Upgradeable)

The Acetochlor Registration Partnership may satisfy the 162-2 data requirement for acetochlor with characterization and identification of the residues associated with the flood water. MRID 41338501 (Monsanto study, reviewed on 5/9/90) and MRID's 41565148 and 41778301 (Zeneca studies, reviewed on 6/17/93) provided information on the TOTAL radioactivity in the water (10-25 %), but did not identify the aqueous residues, as required. The Acetochlor Registration Partnership should also explain why acetochlor was much more persistent under similar soils and conditions in the Zeneca study ($T_{1/2}$ of 230 days) than in the Monsanto study ($T_{1/2}$ of 17-21 days).

In the Monsanto study, the anaerobic half-lives of acetochlor ranged from 17-21 days in Ray silt loam (1.2 % OM), Drummer silty clay loam (3.4 % OM), and Spinks sandy loam (2.4 % OM) soils. Only 6-14 % of the applied acetochlor remained after the aerobic phase. About 10-20 % of the total residues were found in the water. Zeneca submitted two 162-2 studies with a calculated anaerobic half-life of 230 days in sandy loam soil with 3 % OM; 50 % of the applied acetochlor was present after the aerobic phase. Up to 25 % of the applied radioactivity was found in the water.

Leaching-Adsorption-Desorption (163-1) (Satisfied for parent, additional data required on degradates).

The 163-1 data requirement was satisfied for parent acetochlor and the

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degradates oxanilic acid (oxamic acid) and sulfonic acid on 6/17/93. The registrant later submitted additional aerobic soil metabolism studies that show the presence of another significant soil degradate, thioacetic acid sulfoxide. No acceptable laboratory data on the soil mobility of thioacetic acid sulfoxide have been submitted. The Acetochlor Registration Partnership should conduct either a batch equilibrium or soil column leaching study for the thioacetic acid sulfoxide degradate to determine its potential mobility.

Laboratory mobility data indicate that acetochlor and the oxanilic acid and sulfonic acid degradates are potentially mobile in soil, based on the Monsanto study (MRID 40198502, reviewed on 5/11/90) and the Zeneca study (MRID 41565149, reviewed on 1/18/91).

In the Monsanto study, acetochlor was very mobile in Lintonia sand (0.7 % OM, K_{ads}=0.4), Ray silt loam (1.2 % OM, K_{ads}=1.1), Spinks sandy loam (2.4 % OM, K_{ads}=1.6), and Drummer silty clay loam (3.4 % OM, K_{ads}=2.7) soils. In the Zeneca study, acetochlor was very mobile in Lilly Field coarse sand (0.77 % OM, K_{ads}=1.90), French A sand (1.5 % OM, K_{ads}=1.90), Frensham loamy sand (1.9 % OM, K_{ads}=0.81), moderately mobile in East Jubilee sandy loam (2.6 % OM, K_{ads}=6.3) and Old Paddock clay (5.4 % OM, K_{ads}=7.5), and immobile in French B sandy loam (8 % OM, K_{ads}=20). The Koc_{ads} values ranged from 74 - 428, also indicating potential mobility. However, in the desorption phase, acetochlor was only moderately mobile in Lilly Field coarse sand and East Jubilee sandy loam (K_{des} values of 5.8 and 6.3, respectively) and immobile in the other soils (K_{des} values of 20 - 124). In the soil column leaching portion of the Monsanto study, acetochlor concentrations in the soil increased with depth. Acetochlor reached 30, 42, 55, and 96 % of the applied amount in the leachate from the above silty clay loam, sandy loam, silt loam, and sandy soils.

<u>Terrestrial Field Dissipation (164-1) , DER's 3-8, (MRID's 41565152, 41565153, 41592012, 41592013, 42549917, 42549918, 42573402)</u> (data insufficient to address leaching)

The terrestrial field dissipation data requirement for the 7 EC formulation with the submitted 164-1 studies that were conducted at 5 sites in the U.S. is partially satisfied. The registrant should explain why the degradates of acetochlor leached in a silt loam soil (1.7 % OM) at the Elwood, Illinois site to a depth of 18 inches, but not in another silt loam soil (0.5 % OM) at the Leland, Mississippi site. Lower OM content normally means greater susceptibility to leaching, and the observed results from these studies are not consistent with what is normally observed. MRID 42573402 was a new 164-1 study conducted on a silt loam soil in Elwood, Illinois. MRID 42549918 contained the reanalysis of the soil samples from MRID 41565152 and 41565153 (Leland, MS, reviewed on 6/17/93) for the degradate thioacetic acid sulfoxide derivative. MRID 42549917 contained the reanalysis of the soil samples from MRID 41592012 and 41592013 (Champaign, Illinois, reviewed on 6/17/93) for thioacetic acid sulfoxide. The North Carolina and California field dissipation studies conducted on sandy loam soils (MRID's 42549916 and 42549915, respectively) provide consistent estimates of field persistence of parent acetochlor ($T_{1/2}$ of 8-9 days). However, they did not address the persistence and mobility of any degradates since the soil samples were analyzed for only parent acetochlor.

Acetochlor was moderately persistent in field soil with half-lives of 8-9 days in sandy loam (MRID's 42549916, 42549915), 14-36 days in silt loam (MRID's 42549918, 42573402), and 26 days in clay loam (MRID 42549917) soils that were treated with 3-4.3 lbs ai/A. These field persistence results are inconsistent with the laboratory aerobic soil metabolism results that indicate a faster rate of degradation/binding of acetochlor in fine-textured soils than in coarse-textured soils. This may indicate leaching in coarse soils.

The results of the latest studies (Elwood, Illinois, DER 3) and MRID 42549918 (Leland, Mississippi, DER 4) were not typical of what is normally observed in field dissipation studies. Leaching of the sulfonic acid and oxanilic acid degradates were observed at the Elwood, Illinois site to a depth of 18 inches in an Elliott silt loam soil (1.7% OM, pH 5.7). However, no leaching was observed at the Leland, Mississippi site in a silt loam soil with approximately half the organic matter (0.5-0.9 % OM, pH 6.7-7.1) of the Illinois site. More organic matter usually results in more adsorption of organic compounds. The soils were sampled to a depth of 42-48 inches, far below the lowest depth of acetochlor detections.

Freezer Storage Study (DER 8, MRID 42549907, Ancillary)

Acetochlor was stable in silt loam and silty clay soils fortified at 0.10 ppm and stored frozen at <0 °C for 776 and 739 days, respectively. The sodium salts of the acetochlor degradates oxanilic acid, thioacetic acid sulfoxide, and sulfonic acid were stable in silt loam and silty clay soils fortified at 0.10 ppm and stored frozen at <0 °C for 789 and 742 days, respectively. This information was requested in the 6/17/93 review.

Environmental Fate Assessment for Acetochlor

EFGWB is particularly concerned with the potential mobility of acetochlor and its degradates. Acetochlor with a water solubility of 23 mg/l and Kd values of 0.4-2.7 in various soils including sandy loam, loamy sand, silt loam and silty clay soils. Acetochlor also leached through soil columns. The degradates are expected to have even higher mobility based on structural features but mobility data on the degradates are incomplete. Additional aerobic and anaerobic metabolism data are needed as well as leaching data on the metabolites. The anaerobic studies submitted by different registrants provided vastly different estimates of persistence. Field studies have provided results that appear to be inconsistent with the laboratory data with respect to mobility and no mobility data submitted on the thioacetic acid sulfoxide degradate. At least in one study leaching of oxamic acid (oxanilic acid) and sulfonic acid and thioacetic acid sulfoxide was observed to a depth of 18 inches in a silt loam soil in Illinois containing 1.7% organic matter. However, no leaching was observed in another silt loam soil in Mississippi containing only 0.5% organic matter.

The major routes of dissipation for acetochlor appear to be microbially-mediated degradation and potential leaching. Laboratory degradation data indicate that acetochlor does not degrade by abiotic processes (hydrolysis and photolysis). While acetochlor has relatively short half lives in fine-textured aerobic soil, it may be moderately persistent in coarser soils and was shown to be mobile in laboratory mobility studies and one terrestrial field dissipation study.

Acetochlor persistence in a confined soil system appears to increase with coarser soil texture and increased application rate. The current label also specifies that acetochlor not be used on sand, sandy loam, and sandy loam soils with <6 % organic matter. The half-lives in aerobic soils for the 3, 4.5, 10.5, 41, and 50 ppm application rates were 8-12, 14, 110-245, 55, and 300 days, respectively. However, the most **representative** aerobic soil half-life is 8-14 days determined in the Monsanto study conducted in Ray silt loam (1.2 % OM), Drummer silty clay loam (3.4 % OM), and Spinks sandy loam (2.4 % OM) soils treated with 3 ppm (~2X label rate) of acetochlor. The 8-14 day half-life represents the labeled application rate and the soils to be treated with acetochlor. The longer half-lives were found only at exaggerated application rates (7.5-36X) labeled rates to coarser, lower OM soils. The major aerobic soil metabolism degradates were oxanilic acid (oxamic acid), sulfonic acid, and thioacetic acid sulfoxide. **The degradates were rearrangement products of one amino moiety of the acetochlor molecule.**

The oxanilic acid and sulfonic acid degradates were more mobile than parent acetochlor in the Zeneca study. Freundlich K_{ads} values ranged from 0.19 - 1.2 for oxanilic acid with K_{oc} values of 17 - 124. Also, the sulfonic acid degradate was very mobile in the above soils (K_{ads} values of 0.23 - 1.6) but was only moderately mobile in East Jubilee sandy loam with a K_{ads} value of 6.4. The K_{oc} values for sulfonic acid ranged from 21 - 430. No mobility data have been submitted for the degradate thioacetic acid sulfoxide.

Acetochlor (7 EC formulation) was moderately persistent in the field with half-lives of 8-9 days in sandy loam, 14-36 days in silt loam, and 26 days in clay loam soils that were treated with 3-4.3 lbs ai/A. Neither parent acetochlor or the degradate thioacetic acid sulfoxide was observed to be mobile in the five field studies. The oxanilic acid and sulfonic acid degradates were detected to 18 inches of depth in an Elliott silt loam soil in Illinois. No degradate mobility was observed in the other four terrestrial field dissipation studies conducted on sandy loam, silty clay loam, and clay loam soils. These field results are inconsistent with the laboratory aerobic soil metabolism results that indicate a faster rate of degradation/binding of acetochlor in fine-textured soils than in coarse-textured soils. Some undetected leaching may be occurring in coarse soils.

Acetochlor residues accumulated in bluegill sunfish exposed to 11 ppb of acetochlor, with maximum mean bioconcentration factors of 40x, 780x, and 150x for edible, nonedible, and whole fish tissue, respectively. By 28 days of depuration, 33 % remained in the edible portion, 2 % remained in the non-edible, and 10 % remained in whole fish.

In confined rotational crop data, the range of accumulation concentrations were 0.08-0.09 ppm (lettuce), 0.23-0.67 ppm (radish foliage), 0.14-0.30 ppm (radish roots), 0.14-0.38 ppm (wheat forage), 0.97-2.88 ppm (wheat straw), 0.05-0.10 ppm (wheat grain), and 0.78-1.37 ppm (wheat chaff). The major residues in the crops were the acetochlor metabolites CP 92,429 (2-hydroxy-N-(ethoxymethyl)-N-(2-ethyl-6-methylphenyl)acetamide) and CP 91,301 (N-(2-ethyl-6-methylphenyl)oxamic acid. In field rotational crop data, no residues were detected in wheat and sorghum (detection limit=0.03 ppm). The combined residues reached maximum concentrations of 0.769 ppm in forage, 0.128 ppm in seed, and 1.217 ppm in soybean hay.

Environmental Fate Assessment for [redacted] Attachment 1)

Acetochlor is formulated with a [redacted] A full battery of testing for [redacted] was not performed since it is a [redacted] and not an active ingredient. [redacted] degrades in aerobic silty clay loam soil with a half-life of 8 days, but is stable to hydrolysis and photolysis. [redacted] is very mobile in loamy sand, loam, silty clay loam, and clay soils with Freundlich K_{ads} values of 0.25-0.65. [redacted]

8. RECOMMENDATIONS

Inform the Acetochlor Registration Partnership that:
The data requirements remain unsatisfied but studies reviewed in this submission may be upgraded to satisfy data requirements. Available data is sufficient to raise concern that acetochlor use on corn will pose risk to groundwater particularly with high acreage use on corn. Restrictions on using acetochlor on sand, sandy loam and loamy sand soils have been already imposed on the label. This mitigating step may not suffice since leaching of acetochlor degradates was observed in a silt loam soil containing 1.7% organic matter to a depth of 18 inches. Acetochlor is resistent to chemical degradation (hydrolysis and photodegradation) and long half lives were also observed in some anaerobic and aerobic metabolism studies while other studies indicated half lives shorter than one month with no apparent explanations. Although the acetochlor metabolites appear to be more persistent and mobile than the parent, the data available to EFGWB is incomplete. Additional field mobility data will help clarify the mobility issue of acetochlor residues.

a. The aerobic soil metabolism data for acetochlor can be upgraded to satisfy data requirements.

b. The terrestrial field dissipation data for the 7 EC formulation of acetochlor can be upgraded to satisfy the 164-1 data requirement with studies that are included in this review and those reviewed on 6/17/93 (DER's 3-8). Additional field mobility data may be imposed after all required data are submitted and evaluated.

c. The anaerobic soil metabolism data requirement for acetochlor may be satisfied if the studies that were reviewed on 5/9/90 and 6/17/93 are upgraded. They should see the CONCLUSIONS section for further details.

d. Batch equilibrium or soil column leaching data are required for the aerobic soil metabolism degradate thioacetic acid sulfoxide.

e. The confined rotational crop (165-1) and field rotational crop (165-2) data requirements for acetochlor are satisfied, according to 8/23/93 memorandum

f. The spray drift (201-1 and 202-1) data requirements for acetochlor remain unsatisfied in this review.

g. There are no currently-outstanding data requirements for the [redacted] according to the 1/12/93 review.

Status of Data Requirements for Acetochlor for the Acetochlor Registration Partnership.

Satisfied:

Hydrolysis (161-1): MRID 41565144, 1/18/91. Stable at pH's 5, 7, and 9.

Photodegradation in water (161-2); MRID 41565145, 6/17/93). Stable in pH 7 buffer solution irradiated for 30 days. Acetochlor was 89 % of the applied radioactivity by 30 days of irradiation.

Photodegradation on soil (161-3); MRID 41565146, 6/17/93. Stable on sandy loam soil with only 13 % degradation by 33 days of irradiation.

Bioaccumulation in Fish (165-4); MRID 41565154. Acetochlor residues (uncharacterized) accumulated in bluegill sunfish exposed to 11 ppb of acetochlor, with maximum mean bioconcentration factors of 40x, 780x, and 150x for edible, nonedible, and whole fish tissues, respectively. After 28 days of exposure to pesticide-free water; 2-33% of the accumulated $[^{14}C]$residues remained in the fish tissue.

Confined (165-1) and Field (165-2) Rotational Crops; MRID's 42549919 and 42591501, respectively. These data requirements are satisfied according to 8/23/93 memorandum from the Health Effects Division (Attachment 1).

Partially Satisfied/upgreadable with additional data:

Aerobic Soil Metabolism (162-1); MRID's 41565147 and 41963316, this review. Half-life of 14 days in silty clay loam soil. The identified degradates were oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide. MRID 41963317, this review. First half-life of 110 days, followed by a second half-life of 245 days in sandy loam soil. The identified degradates were oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide. Accession No. 099814 (Monsanto study), 5/11/90. Half-lives of 8-12 days in sandy loam, silt loam, and silty clay loam.

Anaerobic soil metabolism (162-2); MRID's 41338501, 41565148, 41778301, 41963318, 5/9/90 and 6/17/93. Half-life of 230 days in sandy loam soil under anaerobic conditions. The identified degradates in soil were oxanilic acid (oxamic acid), sulfonic acid, thioacetic acid sulfoxide, N-(ethoxymethyl)-N-(2-ethyl-6-methylphenyl)acetamide, and ethoxymethyl (6-methyl-o-tolyl)carbamoylmethyl-thioacetic acid (reduction product). The registrant should characterize and identify the residues associated with flood water the applied radioactivity in the flood water that contained up to 25.8 % of the applied radioactivity and explain why acetochlor was much more persistent in the Zeneca studies ($T_{1/2}$ of 230 days) than in the Monsanto study ($T_{1/2}$ of 17-21 days).

Terrestrial Field Dissipation (164-1); MRID's 41565152, 41592012, 41592013 41565153, 426499917, 42549918, 42573402. Half-lives of 3-36 days in sandy loam, silt loam, and clay loam soils. The degradates oxanilic acid and sulfonic acid apparently leached to 18 inches of depth in an Elliott silt loam soil (1.7 % OM, pH 5.7). However, no other study showed any apparent leaching of parent or degradates.

Leaching/Adsorption/Desorption (163-1); MRID 41565149, 1/18/91. Acetochlor was very mobile in sandy and loamy sand soils with Freundlich K_{ads} values of 0.8-1.9 and moderately mobile to immobile in sandy loam and clay soils with K_{ads} values of 5.9-20. K_{oc} values ranged from 74-428 for acetochlor, 17-124 for oxanilic acid, and 21-68 for sulfonic acid. Oxanilic acid and sulfonic acid were very mobile in all soils with K_{ads} values of 0.19-1.2 and 0.23-1.6, respectively.

Unsatisfied:

Spray Drift (201-1 and 202-1). Because the registrants in the Acetochlor Registration Partnership are members of the Spray Drift Task Force, EFGWB concurs with the request that the droplet size spectrum and field drift evaluation data submissions be delayed until the final report of the Task Force is to be submitted (December 1994). EFGWB agrees that these data requirements may be satisfied through the work of the Spray Drift Task Force, provided that HED or EEB have no need of these data in advance of the Task Force's final report to be submitted in December 1994. This recommendation is in accordance with PR Notice 90-3 (4/10/90), allowing registrants to fulfill the spray drift (201-1 and 202-1) data requirements through the Task Force. If the registrant elects to satisfy these data requirements through the Task Force, the procedures outlined in PR Notice 90-3 should be followed.

Reserved:

Prospective Ground Water Monitoring (166-1, 166-2)

Waived:

Laboratory and Field Volatility (163-2 and 163-3). Waived on 4/24/89 because the vapor pressure (4.4 x 10^{-5} mm Hg) approximates the Agency's cutoff point of 1 x 10^{-6} mm Hg.

Combination & tank mixes (164-4). Combination and tank-mix data are only required on a case-by-case basis.

<u>Status of Data Requirements for the [redacted] for the Acetochlor Registration Partnership.</u>

Satisfied:*

Hydrolysis (161-1); MRID 41561409, 1/12/93. Stable at pH's 5, 7, and 9.

Photodegradation in water (161-2); MRID 41561410, 1/12/93. [redacted] did not

INERT INGREDIENT INFORMATION IS NOT INCLUDED

INERT INGREDIENT INFORMATION IS NOT INCLUDED

degrade in aqueous pH 7 buffer solutions that were continuously irradiated with a xenon lamp at 25 °C for 329 hours (13.7 days).

Photodegradation on soil (161-3); MRID 41561411, 1/12/93. Stable on sandy loam soil.

Aerobic Soil Metabolism (162-1); MRID's 41561412, 1/12/93. Half-life of 8 days in silty clay loam soil. The only identified metabolite was CO_2.

Leaching/Adsorption/Desorption (163-1); MRID 41561413, 1/12/93. [redacted] is very mobile in loamy sand, loam, silty clay loam, and clay soils with Freundlich Kads values of 0.25-0.65.

* There are no outstanding data requirements for [redacted] at this time, according to the 1/12/93 review.

9. BACKGROUND:

The Acetochlor Registration Partnership, a joint venture between Zeneca and Monsanto, is requesting registration of acetochlor for non-crop use and corn uses.

ICIA5676 6.4 EC herbicide is a novel combination of the [redacted] acetochlor, and the [redacted] Acetochlor will be used to control many annual grasses, yellow nutsedge and certain broadleaf weeds in transplanted junipers and yews and corn while the [redacted] provides reduces the phytotoxicity of the herbicide. According to the proposed label (attached), acetochlor is to be applied to medium-textured soils (loam, silt, silt loam) and fine-textured soils (silty clay loam, sandy clay loam, silty clay, sandy clay, clay loam, and clay) with 1.5-6 % OM.

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

10. DISCUSSION: Not Applicable

11: COMPLETION OF ONE-LINER: One-liner was updated.

12: CBI APPENDIX: Not Applicable

Acetochlor Registration Partnership
c/o ICI Americas Inc.
Agricultural Products
Concord Pike & New Murphy Road
Wilmington, DE 19897
302-886-1218

November 6, 1992

HAND DELIVERED

EFGWB

Mr. Robert Taylor
Product Manager (25)
Office of Pesticide Programs
Document Processing Desk (APPL)
U.S. Environmental Protection Agency
Crystal Mall 2, Room 241
1921 Jefferson Davis Highway
Arlington, VA 22202

Dear Mr. Taylor:

RE: *Acetochlor Registration Partnership (Company No. 66478)*
Application for Registration of ACETOCHLOR EC for Use on Corn

The Acetochlor Registration Partnership (ARP) herein submits an application for registration of ACETOCHLOR EC for use on field corn, silage corn and popcorn in accordance with the requirements of Section 3 of the Federal Insecticide, Fungicide and Rodenticide Act.

The Acetochlor Registration Partnership was formed by ICI Americas and Monsanto Company for the purpose of pursuing joint registration of acetochlor and for obtaining tolerances for acetochlor on certain agricultural commodities. All data owned by ICI Americas and Monsanto Company and previously submitted to the Environmental Protection Agency that is required to support these registration actions has now been transferred to the ARP (see attached letters).

Pesticide Petitions previously submitted by ICI Americas and Monsanto Company requesting establishment of tolerances for acetochlor on corn commodities have also been transferred to the ARP (see attached letter). Therefore, no new tolerance fees are being submitted with this application.

The application included herein contains one copy of an administrative volume, and three copies of data volumes as identified below.

Administrative Volume

Cover Letter
Letters of Authorization for ARP Registration Applications & Tolerance Petitions
Data Transmittal Document
Application for Registration
Certification with Respect to Citation of Data
Data Matrix
Confidential Statement of Formula
Section A: Product Chemistry
Section B: Label (5 copies)
Section C: Toxicology
Section D: Residue Chemistry
Section E: Ecological Effects
Section F: Environmental Fate

Data Volumes

Volumes 1 and 2 - Toxicology
Volumes 3 through 14 - Residue Chemistry
Volume 15 - Ecological Effects
Volume 16 through 31 - Environmental Fate

If you have any questions regarding this submission, please contact Cindy Faulkner at (302) 886-1227 or call me at (302) 886-1218.

Thank you for your assistance in this matter.

Respectfully submitted,

Robert E Ridsdale

Robert E. Ridsdale
Managing Agent
Acetochlor Registration Partnership

1:APPLTR

ICI **Agricultural Products** [redacted]

HAND DELIVERED

ICI Agricultural Products
Wilmington
Delaware 19897
Telephone (302) 886-1000
Telex 4945649
Fax (302) 886-1553

October 30, 1992

Mr. Frank T. Sanders
Branch Chief, Fungicides-Herbicides Branch
Registration Division (H7505C)
U.S. Environmental Protection Agency
401 M Street, S. W.
Washington, DC 20460

Dear Mr. Sanders:

RE: Acetochlor Registration Partnership (ARP)
<u>Letter of Authorization For ARP Registration Applications</u>

This letter confirms that ICI Americas and Monsanto have entered into a registration partnership (called the "Acetochlor Registration Partnership," EPA Company No. 66478) to expedite the registration of Acetochlor. Letters of transfer will be filed by each company to transfer existing data and data rights to the ARP.

In the meantime, ARP registration applications for Acetochlor are being filed which rely upon pooled data (referenced by MRID number). This letter authorizes the Environmental Protection Agency to refer to all referenced ICI data in support of the ARP's registration applications for Acetochlor.

This authorization does not give or imply any right to use these data by either party for any other use than specified above. If you have any questions, please call me at 302-886-1218.

Respectfully submitted,

Robert E Ridsdale

Robert E. Ridsdale, Ph.D.
Director
Registration and Regulatory Affairs

RER/ma
10279201

cc: C. I. Faulkner (ICIA)
N. P. Ferrant (ICIA)
J. L. Kunstman (Monsanto)
N. L. Yates-Parker (Monsanto)

A business unit of ICI Americas Inc.

Monsanto

The Agricultural Group
800 N. Lindbergh Boulevard
St. Louis, Missouri 63167
Phone: (314) 694-1000

October 30, 1992

Registration Division (H7505C)
U.S. Environmental Protection Agency
Room 266A, Crystal Mall #2
1921 Jefferson Davis Highway
Arlington, Virginia 22202

Attention: Mr. Frank T. Sanders
Branch Chief, Fungicides-Herbicides Branch

Subject: **Acetochlor Registration Partnership (ARP)**
Letter of Authorization for ARP Registration Applications

Dear Sir,

This letter confirms that ICI Americas and Monsanto have entered into a registration partnership (called the "Acetochlor Registration Partnership", EPA Company # 66478) to expedite the registration of acetochlor. Letters of transfer will be filed by each company to transfer existing data and data rights to the ARP.

In the meantime, ARP registration applications for acetochlor are being filed which rely upon pooled data (referenced by MRID number). This letter authorizes the Environmental Protection Agency to refer to all referenced Monsanto data in support of the ARP's registration applications for acetochlor.

This authorization does not give or imply any right to use these data by either party for any other use than specified above. If you have any questions concerning this subject - please feel free to contact me at (314) 694-3284.

Sincerely,

James L. Kunstman, PhD.
Registration Manager

cc: N.L. Yates-Parker
G.B. Fuller
R.E. Ridsdale (ICIA)
R.P. Schneider

Acetochlor Registration Partnership
c/o ICI Americas Inc.
Agricultural Products
Concord Pike & New Murphy Road
Wilmington, DE 19897
302-886-1218

November 5, 1992

HAND DELIVERED

Mr. Frank T. Sanders
Branch Chief, Fungicides-Herbicides Branch
Registration Division (H7505C)
U.S. Environmental Protection Agency
401 M Street, S. W.
Washington, DC 20460

Dear Mr. Sanders:

RE: Acetochlor Registration Partnership (ARP)
Letter of Authorization For Tolerance Petitions

This letter confirms that ICI Americas and Monsanto have entered into a registration partnership (called the "Acetochlor Registration Partnership") to expedite the registration of Acetochlor. Letters of transfer will be filed by each company to transfer existing data and data rights to the ARP.

This letter authorizes the U.S. Environmental Protection Agency to refer to all information referenced by ICI Americas and Monsanto Company in the following Pesticide Petitions to support the ARP's registration applications for acetochlor and formulated products containing acetochlor:

ICI Pesticide Petition No. IF4011
Monsanto Pesticide Petition No. 3F2966

This authorization does not give or imply any right to use these data by either party for any other use than specified above.

Robert E Ridsdale
Robert E. Ridsdale, Ph.D.
Managing Agent
ICI Americas Representative to ARP

James L. Kunstman
James L. Kunstman, Ph.D.
Monsanto Company Representative to ARP

Please read Instructions on reverse before completing form. Form Approved. OMB No. 2070-0060. Approval expires 11-30-93

(A) EPA

United States Environmental Protection Agency
Office of Pesticide Programs (H7505C)
Washington, DC 20460

Application for Pesticide:

☒ **Registration**
☐ **Amendment**
☐ **Other**

OPP Identifier Number
180991

Section I

1. Company/Product Number 66478 - E	2. EPA Product Manager R. J. Taylor	3. Proposed Classification ☐ None ☒ Restricted
4. Company/Product (Name) Acetochlor EC	PM# 25	

5. Name and Address of Applicant *(Include ZIP Code)*
Acetochlor Registration Partnership
c/o ICI Agricultural Products-DCC2
New Murphy Road & Concord Pike
Wilmington, DE 19897
☐ *Check if this is a new address*

6. **Expedited Review.** In accordance with FIFRA Section 3(c)(3)(b)(i), my product is similar or identical in composition and labeling to:
EPA Reg. No.________
Product Name________

Section II

☐ Amendment - Explain below
☐ Resubmission in response to Agency letter dated________.
☐ Notification - Explain below.
☐ Final printed labels in response to Agency letter dated________
☐ "Me Too" Application.
☐ Other - explain below.

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Section III

1. Material This Product Will Be Packaged In:

Child-Resistant Packaging	Unit Packaging	Water Soluble Packaging	2. Type of Container
☐ Yes* ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☒ Metal ☐ Plastic ☐ Glass ☐ Paper ☐ Other (Specify)____
*** Certification must be submitted.**	If "Yes," Unit Package wgt. / No. per container	If "Yes," Package wgt. / No. per container	

3. Location of Net Contents Information ☒ Label ☐ Container

4. Size(s) of Retail Container
110 gallons, 55 gallons, 2.5 gallons

5. Location of Label Directions
☒ On Label
On Labeling accompanying product

6. Manner In Which Label Is Affixed To Product
☒ Lithograph
☒ Paper glued
☒ Stenciled
☐ Other (________)

Section IV

1. Contact Point *(Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)*

Name	Title	Telephone No. (Include Area Code)
Cindy I. Faulkner	Regulatory Product Manager	302-886-1227
Robert E. Ridsdale	Managing Agent, ARP	302-886-1218

Certification

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

2. Signature
Robert E Ridsdale

3. Title
Managing Agent, ARP

4. Typed Name
Robert E. Ridsdale

5. Date
11/6/92

6. Date Application Received (Stamped)

18

RIN 2556-94 ACETOCHLOR REVIEW (121601)

Page _____ is not included in this copy.

Pages 19 through 47 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.

e read Instructions on reverse before completing form. Form Approved. OMB No. 2070-0060. Approval expires 11-30-93

(A) EPA

United States Environmental Protection Agency
Office of Pesticide Programs (H7505C)
Washington, DC 20460

Application for Pesticide:

☒ Registration
☐ Amendment
☐ Other

OPP Identifier Number
180990

Section I

1. Company/Product Number
66478 – R

2. EPA Product Manager
R. J. Taylor

3. Proposed Classification
☐ None ☒ Restricted

4. Company/Product (Name)
Acetochlor Technical

PM#
25

5. Name and Address of Applicant *(Include ZIP Code)*
Acetochlor Registration Partnership
c/o ICI Agricultural Products, DCC2
Concord Pike & New Murphy Road
Wilmington, DE 19897
☐ *Check if this is a new address*

6. **Expedited Review.** In accordance with FIFRA Section 3(c)(3)(b)(i), my product is similar or identical in composition and labeling to:

EPA Reg. No.__________

Product Name__________

Section II

☐ Amendment - Explain below
☐ Resubmission in response to Agency letter dated________
☐ Notification - Explain below.
☐ Final printed labels in response to Agency letter dated ________
☐ "Me Too" Application.
☐ Other - explain below.

Explanation: Use additional page(s) if necessary. (For section I and Section II.)

Section III

1. Material This Product Will Be Packaged In:

Child-Resistant Packaging
☐ Yes*
☒ No
* *Certification must be submitted.*

Unit Packaging
☐ Yes
☒ No
If "Yes," Unit Package wgt. No. per container

Water Soluble Packaging
☐ Yes
☒ No
If "Yes," Package wgt. No. per container

2. Type of Container
☒ Metal
☐ Plastic
☐ Glass
☐ Paper
☐ Other (Specify)________

3. Location of Net Contents Information
☐ Label ☒ Container

4. Size(s) of Retail Container
55 gallon drum, ISO Railcar, Truck

5. Location of Label Directions
☐ On Label
☒ On Labeling accompanying product

6. Manner In Which Label Is Affixed To Product
☐ Lithograph
☐ Paper glued
☒ Stenciled
☒ Other (accompanying shipping papers)

Section IV

1. Contact Point *(Complete items directly below for identification of individual to be contacted, if necessary, to process this application.)*

Name	Title	Telephone No. (Include Area Code)
Cindy I. Faulkner	Regulatory Product Manager	302-886-1227
Robert E. Ridsdale	Managing Agent, ARP	302-886-1218

Certification

I certify that the statements I have made on this form and all attachments thereto are true, accurate and complete. I acknowledge that any knowingly false or misleading statement may be punishable by fine or imprisonment or both under applicable law.

2. Signature
Robert E Ridsdale

3. Title
Managing Agent, ARP

4. Typed Name
Robert E. Ridsdale

5. Date
November 6, 1992

6. Date Application Received (Stamped)

48

. RIN 2556-94 ACETOCHLOR REVIEW (121601)

Page 49 is not included in this copy.

Pages _____ through _____ 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.

. RIN 2556-94 ACETOCHLOR REVIEW (121601)

Page_____ is not included in this copy.

Pages 50 through 51 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.

ACETOCHLOR REGISTRATION PARTNERSHIP ENVIRONMENTAL FATE DATABASE REVIEW

1.0 PURPOSE OF THE DOCUMENT

ICI (now ZENECA) and Monsanto have formed a joint partnership (Acetochlor Registration Partnership, or ARP) for the purposes of registering technical acetochlor and an unsafened emulsifiable concentrate, for use on corn. To this end, all data previously submitted to EPA by either ICI (ZENECA) or Monsanto can be relied upon to support these registrations and reports of additional studies completed by the two companies have been submitted recently by the ARP. In this document the ARP wishes to provide an overview of all the existing environmental fate data on acetochlor and highlight any areas of apparent inconsistency in the data generated by the two companies. It is envisaged that this document will assist EFGWB in their review of the ARP environmental chemistry data.

2.0 USE AND PHYSICO-CHEMICAL CHARACTERISTICS OF ACETOCHLOR.

Acetochlor is a selective herbicide for the control of certain undesirable grasses and broadleaf weeds in corn (field, silage or popcorn). Experimental Use Permits have been granted to both ICI (ZENECA) and Monsanto allowing the use of acetochlor formulations in large scale testing programs in 1992 and 1993.

Common name:	Acetochlor
Chemical name:	2-chloro-2'-methyl-6'-ethyl-N-ethoxymethyl acetanilide
Alternate names:	CP 55097, MON 097, SC 5676, ICIA 5676, HARNESS™*, SURPASS®*
CAS No.:	34256-02-1
Molecular Wt.:	269.8
Primary Formulations:	6.4 or 7.5 lb/gal Emulsifiable Concentrate

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Application Timing:	Applied once per year (Spring) either pre-emergence or as a preplant incorporated treatment in conventional, reduced or no-tillage systems. Conventional ground application equipment or center pivot irrigation equipment are recommended on the proposed label.
Application Rates:	From 1.64 to 3.0 lb active ingredient per acre depending on soil type, environmental conditions and weed infestation. Average application rate is expected to be 2.0 lb a.i./acre. Applications are made with water or with liquid or dry fertilizer. Tank mixes are permitted.
Physico-chemical characteristics:	Water solubility: 233 ppm @ 25°C Vapor pressure: 4.5×10^{-5} mm Hg @ 25°C log K_{ow} 3.0

* HARNESS and SURPASS are registered trademarks of Monsanto Agricultural Company and ICI Agricultural Products (ZENECA Ag Products), respectively.

3.0 STUDIES SUBMITTED TO EPA

A full listing of the studies submitted to the EPA to fulfill Environmental Fate and Ground Water Branch guideline requirements with the MRID number and review status for each study, is provided in Appendix 1. Comments provided for each guideline requirement, as noted below, are derived from a comparison of the data presented by both of the participating companies in the ARP.

3.1 GUIDELINE 161-1 - HYDROLYSIS (ACCEPTED)

Acetochlor is stable to hydrolysis.

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3.2 GUIDELINE 161-2 - PHOTODEGRADATION - WATER (ACCEPTED)

Acetochlor is stable to photolysis in aqueous solution.

3.3 GUIDELINE 161-3 - PHOTODEGRADATION - SOIL (ACCEPTED)

The calculated half-life of acetochlor photodecomposition from soil was equivalent to approximately 133 days of Florida sunlight. Given the rapid microbial degradation of acetochlor in soil, it is unlikely that photolytic decomposition is a major contributor to the overall degradation observed.

3.4 GUIDELINE 161-4 - PHOTODEGRADATION - AIR (WAIVED)

This requirement has been waived by EPA, based upon a vapor pressure value of 4.5×10^{-5} mm Hg @ 25°C.

3.5 GUIDELINE 162-1 - METABOLISM - AEROBIC SOIL (ACCEPTED)

Laboratory aerobic soil half-life ranged from 8 to 14 days, following applications at rates equivalent to 3 to 4 lbs a.i./acre, in four different soil types. These half-lives are comparable with those found in field dissipation studies. A further laboratory study was conducted by ICI, which resulted in a longer half-life of 110 days. However, the soil used in this latter study had a relatively low microbiological activity, which was exacerbated by the relatively low moisture conditions of 75% 0.33 bar potential. In addition, experiments on other compounds have shown that mode of application is vital and, in this instance, the application of the test chemical in the smallest possible application volume reduced the soil microbiological availability and thus the degradation rate. Degradation in all studies was primarily by microbiological breakdown to give three major components ("oxanilic acid", "sulfonic acid" and "thioacetic acid sulfoxide").

3.6 GUIDELINE 162-2 - METABOLISM - ANAEROBIC SOIL (ACCEPTED)

Under flooded conditions, acetochlor degrades with a half-life of 17 to 21 days, the major degradates again being the "oxanilic acid", "sulfonic acid" and "thioacetic acid sulfoxide". In addition, a fourth metabolite resulting from the reduction of the aerobic soil metabolites was identified, although levels were generally small (up to 3 % of the applied material). However, under extreme anaerobic conditions (undisturbed nitrogen atmosphere), this fourth metabolite may represent up to 20% of the applied material. Under field conditions such extreme anaerobic

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conditions would not occur, even with occasional flooding, and the three principle degradates would predominate.

3.7 GUIDELINE 163-1 - LEACHING/ADSORPTION/DESORPTION (ACCEPTED)

K_d values for parent acetochlor range from 0.13 to 17.0 (K_{oc} from 130 to 400), while values for the "sulfonic acid" (0.15 to 0.97, K_{oc} 28), "oxanilic acid" (0.13 to 0.86, K_{oc} 20) and "thioacetic acid sulphoxide" (0.10 to 0.90, K_{oc} 20), were somewhat lower.

From these determinations, acetochlor and its three major degradates would be expected to exhibit moderate to high mobility in sandy soils. However, in practice the potential for any of these compounds to leach would be dramatically reduced due to the degradation of the compounds in the soil. This hypothesis was confirmed by data generated from field soil dissipation studies.

3.8 GUIDELINE 163-2 - VOLATILITY-LAB (WAIVED)

This requirement has been waived by EPA based upon a vapor pressure value of 4.5×10^{-5} mm Hg @ 25°C.

3.9 GUIDELINE 163-3 - VOLATILITY - FIELD (WAIVED)

This requirement has been waived by EPA based upon a vapor pressure value of 4.5×10^{-5} mm Hg @ 25°C.

3.10 GUIDELINE 164-1 - FIELD DISSIPATION-SOIL

Numerous soil dissipation studies have been conducted by the participants of the ARP over many years. In over 20 soil dissipation studies the degradation half-life ranged from 3 to 36 days with an average value of 17 days. Not surprisingly, given the rapid degradation of the parent material, mobility has not been significant. Indeed, when great care has been taken with the sampling technique, no detectable parent residues have been found below 3.5". The three principal soil metabolites have been monitored in a total of three dissipation studies in major corn-growing areas. These data have shown that all three metabolites are formed in the field and reach maximum concentrations of up to 0.7 ppm within six months of application. The appearance of these metabolites is only transient and levels decline rapidly with generally no detectable residues within one year. The rapid degradation

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3.11 GUIDELINE 164-2 THROUGH 164-5

Not applicable for the intended acetochlor use-pattern.

3.12 GUIDELINE 165-1 - CONFINED CROP ROTATION

The submitted study suggests the residues of concern are the EMA and HEMA containing metabolites of acetochlor. This is consistent with the position of EPA's Residue Chemistry Branch as stated in previous reviews concerning the magnitude of residues of acetochlor on corn, the primary crop. Small quantities of compounds representing a third moiety (HMEA) were identified but in total represented less than 10% of the total radioactive residue.

3.13 GUIDELINE 165-2 - FIELD CROP ROTATION

Twenty trials were carried out using soybeans, wheat and sorghum as rotated crops. Planting intervals were approximately 365 days for soybeans and sorghum, and approximately 120 days for wheat. Maximum residues, based on EMA- and HEMA-containing moieties, are shown in Table 1. In addition, residues containing a third moiety (HMEA) were reported in the study. At the time the study was conducted, the Agency had requested that the registrant (Monsanto) investigate the presence of HMEA in corn. HMEA was subsequently determined not to be necessary for inclusion in the tolerance for corn, and the presence of very low levels in some rotated commodities is not viewed as significant here. EPA have determined that EMA and HEMA moieties are required to be included in the tolerance for corn. It is the ARP's position that the data provides adequate residue information to conclude that this same tolerance expression should be utilized for rotated crops.

Table 1: **Maximum Residue Levels in Rotational Crops (Monsanto Study MSL-11963)**

Crop	Commodity	Nominal Planting Interval (days)	Maximum Residue (mg/kg)*		
			EMA	HEMA	Total Acetochlor
Wheat	Forage	120	0.32	0.14	0.46
	Straw	120	0.06	0.05	0.11
	Grain	120	<0.01	<0.01	<0.02
Soybeans	Forage	365	0.44	0.19	0.63
	Hay	365	0.73	0.31	1.0
	Grain	365	0.03	0.07	0.10
Sorghum	Forage	365	0.08	<0.01	0.09
	Hay	365	0.16	0.02	0.18
	Silage	365	0.04	<0.01	0.05
	Fodder	365	0.06	<0.01	0.07
	Grain	365	<0.01	<0.01	<0.02

* All residues are expressed as acetochlor equivalents.

3.14 GUIDELINE 165-4 - FISH BIOACCUMULATION (ACCEPTED)

Bioaccumulation of acetochlor in fish is consistent with what would be expected from its octanol/water partition coefficient (log K_{ow} 3). Bioconcentration factors for the studies conducted by Monsanto and ICI are broadly consistent, with maximum reported values in whole fish, muscle, and viscera of 150, 40, and 780, respectively. The only inconsistency between the two studies was for the reported viscera values which was due to differences in definition of viscera. In Monsanto's study, viscera included all of the non-edible tissue; therefore, the BCF was lower in this study.

Depuration was rapid with approximately 85% elimination after 14 days from the whole fish. The Monsanto study has been accepted as core. The ICI study, in EPA review, showed that parent acetochlor was present in all tissues and that, in addition, many other components were present which were characterized as components containing the EMA and HEMA moieties.

APPENDIX 1: ARP ENVIRONMENTAL FATE STUDIES

APPENDIX 1: SUMMARY TABLE-ARP ENVIRONMENTAL FATE DATA

GUIDELINE	MRID	COMPANY*	STATUS	ANALYSIS
161-1 Hydrolysis	41565144	ZENECA	Acceptable	Stable to hydrolysis
	00064805	Monsanto	Acceptable	
161-2 H_2O Photolysis	00131388	Monsanto	Acceptable	Stable to aqueous photolysis
	41565145	ZENECA	Acceptable	
161-3 Soil Photolysis	00131388	Monsanto	Acceptable	Essentially stable to photolysis from a soil surface, with a half-life of 133 days under Florida sunlight.
	41565146	ZENECA	Acceptable	
161-4 Photolysis - Air				Deferred. EPA review to ICI dated xx/xx/xx
162-1 Aerobic Soil Metabolism	00064805	Monsanto	Acceptable	Half-life 8 - 14 days
	41963317 41963316 41565147	ZENECA	In Review In Review Supplemental	Three major metabolites identified as the "Oxanilic Acid", "Sulphonic Acid" and "Thioacetic Acid Sulphoxide"

* ZENECA (formerly ICI) and Monsanto have now transferred all acetochlor data to the acetochlor Registration Partnership (ARP)

GUIDELINE	MRID	COMPANY*	STATUS	ANALYSIS
162-2 Anaerobic Soil Metabolism	41338501	Monsanto	Acceptable	Half-life 17-21 days under flooded conditions
	41565148 41778301 41963318	ZENECA	In review In review In review	Three major metabolites identified as the "Oxanilic Acid", "Sulphonic Acid" and "Thioacetic Acid Sulphoxide".
162-3 Anaerobic Aquatic				Not Applicable
162-4 Aerobic Aquatic				Not Applicable
163-1 Leaching Ad/Des.	41338502	Monsanto	Acceptable	Parent K_d 0.13 - 17.0 Sulfonic K_d 0.15 - 0.97 Oxanilic K_d 0.13 - 0.86 Thioacetic K_d 0.10 - 0.90
	41565149 41963319	ZENECA	Acceptable	
163-2 Lab Volatility				Waived. EPA review to ICI dated 5/4/89. EPA review to Monsanto dated 5/29/90.
163-3 Field Volatility				Waived. EPA review to ICI 5/4/89.

• ZENECA (formerly ICI) and Monsanto have now transferred all acetochlor data to the acetochlor Registration Partnership (ARP)

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GUIDELINE	MRID	COMPANY*	STATUS	ANALYSIS
164-1 Soil Dissipation	41565152 41565153 41592012 41592013 42549915 42549916 42549917 42549918	ZENECA	In review In review In review In review In review In review In review In review	Parent Field Half-Life is between 3 and 36 Days. The average half-life, which is more typical, is approximately 17 days. Residue-free zones below 3.5" for parent and 18" for all three metabolites
	00064803 00130838 42573402	Monsanto	Not acceptable Not acceptable In review	
164-2 through 164-5				Not Applicable
165-1 Confined Crop Rot.	42549919 00131390	Monsanto	In review Supplementary	Residues of concern are acetochlor and metabolites containing EMA and HEMA.
165-2 Field Crop Rot.	42591501	Monsanto	In review	See Table 1 in text.
165-3 Accumulation in Rotated Crops				Not Applicable

* ZENECA (formerly ICI) and Monsanto have now transferred all acetochlor data to the acetochlor Registration Partnership (ARP)

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GUIDELINE	MRID	COMPANY*	STATUS	ANALYSIS
165-4 Fish Accumulation	00131389	Monsanto	Acceptable	
	41963320 41565154	ZENECA	In review Not acceptable	BCF=150. Depuration 85% in 14 days.

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* ZENECA (formerly ICI) and Monsanto have now transferred all acetochlor data to the acetochlor Registration Partnership (ARP)

ARP ENVIRONMENTAL FATE DATABASE
(GUIDELINE SERIES: 161 to 165)

EPA Status: Studies accepted

: 161-1
: 161-2
: 161-3
: 162-1
: 162-2
: 163-1
: 165-4

Areas to be resolved: Studies under review

: 164-1-Soil Dissipation
: 165-1-Confined Rotation Crops
: 165-2-Field Crop Rotation

GUIDELINE #:	**161-1**
DATA REQUIREMENT:	**Hydrolysis**

ICI MRID#:	41565144
ICI REPORT#:	WRC 88-70
TITLE:	"ICIA5676: Hydrolysis Studies", Myers HW (1/89)
EPA STATUS:	Acceptable
EPA REVIEW DATED:	1/18/91

MONSANTO MRID#:	64805 (Accession #99814C) (R.D.326, V. 9.031)
MONSANTO REPORT #:	MSL-1255
TITLE:	"The Environmental Studies of Acetochlor - Hydrolysis", Monsanto Company, 1980.
EPA STATUS:	Acceptable
EPA REVIEW DATED:	May 29, 1990 (letter from R.J. Taylor to J.L. Kunstman)

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GUIDELINE #:	**161-2**
DATA REQUIREMENT:	**Photodegradation-Water**

ICI MRID#:	41565145
ICI REPORT#:	RJ0726B
TITLE:	"Acetochlor: Photolysis in Aqueous Solution at pH 7" Chotalia, RL (6/89)
EPA STATUS:	Fulfilled
EPA REVIEW DATED:	3/16/92

MONSANTO MRID#:	00131388
MONSANTO REPORT #:	MSL-2748 (in MSL-3125) (R.D. 487, V.5.01)
TITLE:	"The Environmental Photochemistry of Acetochlor"; Letendre LJ. et al (1982)
EPA STATUS:	Acceptable
EPA REVIEW DATED:	5/29/90 (in letter from RJ Taylor to JL Kunstman)

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GUIDELINE #:	**161-3**
DATA REQUIREMENT:	**Photodegradation-Soil**

ICI MRID#:	41565146
ICI REPORT#:	HRC/ISN 187/891375
TITLE:	"The Photodegradation of 14 C-Acetochlor on Soil"; Hawkins DR (4/90)
EPA STATUS:	Fulfilled
EPA REVIEW DATED:	3/16/92

MONSANTO MRID #:	131388
MONSANTO REPORT #:	MSL-2748 (R.D. 487, V. 5.01)
TITLE:	"The Environmental Photochemistry of Acetochlor", Letendre, L.J. et al. (12/82)
EPA STATUS:	Acceptable
EPA REVIEW DATED:	May 29, 1990 (letter from R.J. Taylor to JL Kunstman)

MONSANTO MRID#:	00160233
MONSANTO REPORT #:	MSL-5570
TITLE:	"Response to Review of Environmental Fate Data"; Groya F (1986)
EPA STATUS:	
EPA REVIEW DATED:	

66

GUIDELINE #: 162-1
DATA REQUIREMENT: Aerobic Soil Metabolism

ICI MRID#: 41565147
ICI REPORT#: HRC/STR 19/881751
TITLE: "The Metabolism of 14C-Acetochlor in Sandy Loam Soil Under Aerobic Conditions" Hawkins et al (7/89)
EPA STATUS: Not acceptable
EPA REVIEW DATED:

ICI MRID#: 41963316
ICI REPORT#: HRC/STR 19/901756
TITLE: "The Metabolism of 14C Acetochlor in Silty Clay Loam Under Aerobic Conditions Part II (Addendum to HRC Report No. STR 19/881751)"; Hawkins DR et al (4/91)
EPA STATUS: In review
EPA REVIEW DATED:

ICI MRID#: 41963317
ICI REPORT#: HRC/ISN 185-90535
TITLE: "The Metabolism of 14C Acetochlor in Sandy Loam Soil Under Aerobic Conditions"; Hawkins DR et al (2/91)
EPA STATUS: In Review
EPA REVIEW DATED:

MONSANTO MRID#: 00064805
MONSANTO REPORT #: MSL-1255 (R.D. 326, V.9.034)
TITLE: "The Environmental Studies of Acetochlor" Campbell, DH et al (1980)
EPA STATUS: Acceptable
EPA REVIEW DATED May 9, 1990 (EFGWB review to R. Taylor/V. Walters from E. Regelman) and May 29, 1990 (letter from R.J. Taylor to J.L. Kunstman).

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GUIDELINE #:	**162-2**
DATA REQUIREMENT:	**Anaerobic Soil Metabolism**

ICI MRID#:	41565148
ICI REPORT#:	HRC/ISN 184/89619
TITLE:	"The Metabolism of 14C Acetochlor in Sandy Loam Soil Under Anaerobic Conditions"; Hawkins DR et al (7/89)
EPA STATUS:	In Review
EPA REVIEW DATED:	

ICI MRID #:	41778301
ICI REPORT#:	
TITLE:	"Addendum to the Study Entitled: The Metabolism of 14-C Acetochlor in Sandy Loam Soil Under Anaerobic Conditions"; Skidmore M (2/91)
EPA STATUS:	In Review
EPA REVIEW DATED:	

ICI MRID#:	41963318
ICI REPORT#:	HRC/ISN 184/901783
TITLE:	"The Metabolism of 14C Acetochlor in Sandy Loam Soil Under Anaerobic Conditions Part II (Addendum to HRC Report No. ISN 184/89619)"; Hawkins D et al (4/91)
EPA STATUS:	In Review
EPA REVIEW DATED:	

MONSANTO MRID#:	64805 (41338501 after reformatting)
MONSANTO REPORT #:	MSL-1255 (MSL-9183 after reformatting)
TITLE:	"The Environmental Studies of Acetochlor - Aerobic Soil Metabolism"
EPA STATUS:	Acceptable (after reformatting and resubmission)
EPA REVIEW DATED:	May 29, 1990 (in letter from RJ Taylor to JL Kunstman)

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GUIDELINE #:	**163-1**
DATA REQUIREMENT:	**Leaching/Adsorption/Desorption**

ICI MRID#: 41565149
ICI REPORT#: RJ0837B
TITLE: "Acetochlor and Its Two Major Metabolites Adsorption/Desorption in Soil"; Robbins AJ and Hatfield MW (6/90)
EPA STATUS: Acceptable
EPA REVIEW DATED:

ICI MRID #: 41963319
ICI REPORT#: RJ0887B
TITLE: "Acetochlor: Adsorption and Desorption of 5676/48, The Thioacetic Acid Sulphoxide Metabolite, In Soil"; Robbins AJ and Lane MCG (3/91)
EPA STATUS: In Review
EPA REVIEW DATED:

MONSANTO MRID#: 00064805 (41338502 after reformatting)
MONSANTO REPORT #: MSL-1255 (MSL-9184 after reformatting)
TITLE: "The Environmental Studies of Acetochlor-Leaching and Adsorption/Desorption"; Campbell DH et al (1980)
EPA STATUS: Acceptable (after reformatting and resubmission)
EPA REVIEW DATED: May 29, 1990 (in letter from RJ Taylor to JL Kunstman)

GUIDELINE #: 164-1
DATA REQUIREMENT: Soil dissipation

ICI MRID#: 41565152
ICI REPORT#: RJ0823B
TITLE: "Acetochlor: Dissipation of Residues in USA Soil Under Field Conditions-Leland, Mississippi, 1988" Zilcka SA et al (5/90)
EPA STATUS: In Review
EPA REVIEW DATED:

ICI MRID #: 41565153
ICI REPORT#: RJ0849B
TITLE: "Acetochlor: Residues of Oxanilic Acid and Sulphonic Acid and Sulphonic Acid Metabolites Under Field Conditions in Leland, Mississippi, 1988" Wilson B et al (5/90)
EPA STATUS: In Review
EPA REVIEW DATED:

ICI MRID #: 41592012
ICI REPORT#: RJ0803B
TITLE: "Acetochlor: Dissipation of Residues in USA Soil Under Field Conditions-Champaign, IL, 1988" Zilcka, SA et al (5/90)
EPA STATUS: In Review
EPA REVIEW DATED:

ICI MRID #: 41592013
ICI REPORT#: RJ0850B
TITLE: "Acetochlor: Residues of Oxanilic Acid and Sulphonic Acid Metabolites in USA Under Field Conditions in Champaign, IL 1988" Wilson B et al (5/90)
EPA STATUS: In Review
EPA REVIEW DATED:

ARP MRID#:	42549915
ICI REPORT #:	RJ0821B
TITLE:	"Acetochlor: Dissipation of Residues in USA Soil Under Field Conditions-Visalia, California, 1988, May 9, 1990"
EPA STATUS:	In Review
EPA REVIEW DATED:	

ARP MRID#:	42549916
ICI REPORT #:	RJ0822B
TITLE:	"Acetochlor: Dissipation of Residues in USA Soil Under Field Conditions-Goldsboro, NC, 1988, May 9, 1990"
EPA STATUS:	In Review
EPA REVIEW DATED:	

ARP MRID#:	42549917
ICI REPORT #:	RJ1030B
TITLE:	"Acetochlor: Residues of Thioacetic Acid Sulphoxide Soil Metabolite Under Field Conditions in Champaign, IL, 1988"
EPA STATUS:	In Review
EPA REVIEW DATED:	

ARP MRID#:	42549918
ICI REPORT #:	RJ1031B
TITLE:	"Acetochlor: Residues of Thioacetic Acid Sulphoxide Soil Metabolite Under Field Conditions in Leland, Mississippi, 1988"
EPA STATUS:	In Review
EPA REVIEW DATED:	

ARP MRID#:	42573402
ICI REPORT #:	MSL-12089
TITLE:	"Terrestrial Field Dissipation Study of Acetochlor and its Soil Metabolites Following Preemergent Application of MON 8437 to Field Corn", Lauer R & P Lau (1992)"
EPA STATUS:	In Review
EPA REVIEW DATED:	

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MONSANTO MRID#:	40811901
MONSANTO REPORT #:	MSL-8095
TITLE:	"Residues of Acetochlor in Field Soils Following Preemergent Treatment with Acetochlor Alone or in Tank Mix Combinations with Atrazine, Dyanap, Linuron, Metribuzine-Addendum to MSL-1260 and MSL-1717" Lottman, C (1988)
EPA STATUS:	Supplementary
EPA REVIEW DATED:	

MONSANTO MRID#:	00064803
MONSANTO REPORT #:	MSL-1260
TITLE:	"Residues of Acetochlor in Field Soil Following Preemergent Treatment with Acetochlor Alone or in Tank Mix Combinations with Atrazine, Dyanap, Linuron and Metribuzin" Horner LM et al (1980)
EPA STATUS:	Supplementary
EPA REVIEW DATED:	

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GUIDELINE #: 165-1
DATA REQUIREMENT: Confined Crop Rotation

MONSANTO MRID#: 00131390
MONSANTO REPORT #: MSL-2988
TITLE: "Uptake and Characterization of Acetochlor Residues in Primary, Emergency Replant and Rotation Crops"; Livingston, C and Purdum W (1983)
EPA STATUS: Supplementary
EPA REVIEW DATED:

ARP MRID#: 42549919
MONSANTO REPORT #: MSL-12105/PTRL 474
TITLE: "A Confined Rotational Crop Study with ^{14}C-Acetochlor Using Radishes, Lettuce, and Wheat", O'Neal S & T. Johnson (1992)
EPA STATUS: In Review
EPA REVIEW DATED:

GUIDELINE #: 165-2
DATA REQUIREMENT: Field Crop Rotation

ARP MRID#: 42591501
MONSANTO REPORT #: MSL-11963
TITLE: "Acetochlor Metabolite Residues in Rotational Crops Following Preemergent Application of Acetochlor To Corn", RS Sidhu (1992)
EPA STATUS: In Review
EPA REVIEW DATED:

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GUIDELINE #:	**165-4**
DATA REQUIREMENT:	**Fish accumulation**

ICI MRID#:	41565154
ICI REPORT#:	RJ0846B
TITLE:	"Acetochlor: An Investigation of Accumulation and Elimination in Bluegill Sunfish in a Flow-Through System"; Hamer MJ et al (5/90)
EPA STATUS:	Not acceptable
EPA REVIEW DATED:	

ICI MRID #:	41963320
ICI REPORT#:	RJ0846-B
TITLE:	"Acetochlor: An Investigation of Accumulation and Elimination in Bluegill Sunfish in a Flow-Through System-Addendum"; Hamer MJ et al (5/91)
EPA STATUS:	In Review
EPA REVIEW DATED:	

MONSANTO MRID#:	00131389
MONSANTO REPORT #:	MSL-2443
TITLE:	"Bioconcentration of Acetochlor in Bluegill Sunfish Under Dynamic Flow-Through Conditions" Malik, J (1982)
EPA STATUS:	Acceptable
EPA REVIEW DATED:	May 29, 1990 (in letter from RJ Taylor to JL Kunstman)

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DISCREPANCIES IN ICI AEROBIC SOIL METABOLISM STUDY

1. Half-life 110 days

2. Mineralisation only 0.5% after 1 year.

RATIONALISATION OF ICI RESULTS

1. Method of application would have reduced rate of degradation.

2. Soil microbial viability was well below that expected for this particular soil.

DATA EVALUATION RECORD 2

CHEM 121601 Acetochlor §162-1

FORMULATION--00--ACTIVE INGREDIENT

Study ID 41565147
Skidmore, M. 1989. The metabolism of ^{14}C-acetochlor in silty clay loam soil under aerobic conditions. HRC Report No. STR 19/881751. Unpublished study performed by Huntingdon Research Centre, Ltd., Cambridgeshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

STUDY ID 41963316
Hawkins, D.R., D. Kirkpatrick, G.M. Dean, and J. Riseborough. 1991. The metabolism of ^{14}C-acetochlor in silty clay loam soil under aerobic conditions, Part II. HRC Report No. STR 19/901756. Unpublished study performed by Huntingdon Research Centre, Ltd., Cambridgeshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

DIRECT REVIEW TIME = 33

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CONCLUSIONS:

Metabolism - Aerobic Soil

1. The aerobic soil metabolism data requirement may be satisfied if the registrant can satisfactorily explain the mechanism of formation of the newly-detected degradate thioacetic acid sulfoxide [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulphinyl] acetic acid and identify what the registrant refers to as the "sulfur-containing soil moieties" involved in its formation (MRID 41963317, Figure 1, proposed biotransformation). The sulfur containing compounds from acetochlor formed at 11% (6% sulfonic acid and 5% thioacetic acid sulfoxide) and 22% (12% sulfonic acid and 10% thioacetic acid sulfoxide) in sandy loam and silty clay loam, respectively. These compounds were also formed in the field studies.

2. Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide), at 4.5 ppm, degraded with a half-life of 14 days in silty clay loam soil that was incubated in darkness at 21.8 °C and 81% of 0.33 bar moisture. In contrast, acetochlor, at an increased application rate of 41 ppm, degraded with a half-life of 55 days in silty clay loam soil that was incubated under similar conditions. Three polar degradates identified by HPLC were N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (Compound 17, oxanilic acid), ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24, sulfonic acid), and [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethylsulphinyl] acetic acid (Compound 48, thioacetic acid sulfoxide).

METHODOLOGY:

Sieved (2 mm) silty clay loam soil (31% clay, 67% silt, 2% sand, 4.1% organic matter, pH 6.9, CEC 23.6 meq/100 g) was weighed into glass crystallizing dishes and treated at 4.5 ppm with uniformly ring-labeled [^{14}C]acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; radiochemical purity 96%, specific activity 2.93 x 10^7 dpm/mg, Amersham) dissolved in acetone. The treated soils were moistened to 81% of 0.33 bar with deionized water, then mixed. The dishes were placed in a steel rack inside two sealed glass chambers (Figure 1) and incubated in darkness at 19.5-25.0 °C (21.8 ± 0.9 °C). Humidified air was pumped continuously (flow rate not specified) through the chambers and vented through a series of traps containing 2-ethoxyethanol, aqueous sodium hydroxide, and ethanolamine:2-ethoxyethanol. Duplicate samples were removed for analysis at 0, 1, 3, 7, 14, 30, 60, 90, 120, 180, 275, and 365 days posttreatment. Trapping solutions were removed for analysis and replaced with fresh solutions at regular intervals through 365 days posttreatment. Periodically, the plastic tubing connecting the column and the traps was rinsed with acetone; at 365 days posttreatment, the glass columns and racks were rinsed with methanol:water (1:1, v:v).

The soil samples collected at 0 days posttreatment were extracted three times by shaking with acetonitrile for approximately 30 minutes. Later soil samples were extracted 1-2 times with acetonitrile by shaking for 30 minutes (Extracts 1 and 2), 1-2 times with acetonitrile:water (7:3, v:v) by shaking for 30 minutes (excluding day-0 samples; Extracts 3 and 4), and once with acetonitrile:water (7:3, v:v) by Soxhlet-extraction for 8 hours (excluding day-1 samples; Extract 5). The acetonitrile extracts were combined and the acetonitrile:water extracts were combined; aliquots of the combined extracts were analyzed for total radioactivity by LSC. The extracted soils were air-dried, and subsamples were analyzed for unextracted radioactivity by LSC following combustion. The combined acetonitrile and combined acetonitrile:water extracts were individually concentrated by rotary evaporation. Aliquots of the combined extracts were analyzed for total radioactivity by LSC, and for specific compounds using normal-phase TLC on silica gel

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plates developed with chloroform:methanol:acetic acid (70:30:3, v:v:v; Solvent System G) and reverse-phase TLC on octadecyl silane plates developed with acetonitrile:water:acetic acid (45:50:5, v:v:v; Solvent System F). Reference standards were cochromatographed with the extracts. The unlabeled reference standards were located by UV fluorescence quenching; radioactive areas were located by autoradiography and radioscanning. Additional aliquots of the concentrated extracts were analyzed for acetochlor by normal-phase TLC on silica gel plates developed with toluene:acetonitrile:acetic acid (85:10:5, v:v:v; Solvent System E). Aliquots of the concentrated extracts of select samples were analyzed by normal-phase TLC on silica gel plates developed with chloroform:methanol:formic acid:water (70:25:3:3, v:v:v:v; Solvent System J).

Aliquots of all of the extracts from selected soil samples were combined and aliquots of the combined extracts were analyzed by LSC. The combined acetonitrile extracts of the day-0 samples were combined by rotary evaporation. The concentrated solutions were diluted with acetonitrile, and aliquots were analyzed by LSC. The combined extracts from the remaining samples were then concentrated by rotary evaporation to remove acetonitrile, and aliquots of the aqueous solutions were analyzed by LSC. The aqueous solutions were applied to Bond-Elut C-18 solid-phase extraction columns; the columns were eluted sequentially once with 0.01 M sodium acetate buffer solution and three times with methanol (Figure 1A). Aliquots of the aqueous solution containing residues that did not adsorb to the column, the sodium acetate eluates, and the methanol eluates were analyzed by LSC; the methanol eluates contained >95% of the radioactivity applied to the SPE columns. The methanol eluates were then concentrated under nitrogen. Aliquots of the concentrated acetonitrile extracts from day 0 and the concentrated methanol eluates from all other sampling intervals were analyzed for acetochlor and the degradates, N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (Compound 17), ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24), and [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethylsulphinyl] acetic acid (Compound 48), by HPLC using a Partisil octylsilane (C-8) column eluted with a 0.1 M sodium perchlorate (pH 6.3):acetonitrile gradient; the column was equipped with UV (270 nm) and radioactive flow detection. Additionally, HPLC column eluate fractions, collected at 1-minute intervals, were analyzed by LSC.

The plastic tubing, glass columns, and racks rinsate were analyzed by LSC. Aliquots of the trapping solutions were analyzed by LSC; methanol was added to the ethanolamine/2-ethoxyethanol mixture prior to LSC. Also, the sodium hydroxide trapping solution was measured for $^{14}CO_2$ using barium chloride precipitation techniques.

In order to identify the major degradates, an ancillary experiment was performed at a higher application rate. Uniformly ring-labeled [^{14}C]acetochlor (radiochemical purity 97%, specific activity 1.53 X 10^7 dpm/mg, Amersham) plus nonradiolabeled acetochlor (purity not reported), dissolved in acetone, was added at 40.9 ppm to silty clay

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loam soil. The soil was incubated and analyzed as described above. The acetonitrile:water extracts from the 180-day sampling interval were pooled, and the acetonitrile was removed by rotary evaporation. An aliquot of the resulting aqueous solution was chromatographed on an Amberlite XAD-2 column eluted with methanol and acetonitrile:water (7:3, v:v). The eluants were pooled and evaporated to dryness (method not reported), and the residues were redissolved in methanol. The methanol solution was analyzed by TLC using Solvent System G. The radioactive areas were scraped from the plate and eluted in methanol; the extract was concentrated under a nitrogen stream and diluted with methylene chloride, and an aliquot of this extract was again analyzed by TLC using solvent system G. The remainder of the extract was analyzed by HPLC using a silica gel column eluted with methylene chloride:methanol (4:1, v:v). The major peak from the HPLC was concentrated under a nitrogen stream and analyzed by MS; aliquots of the major peak were also analyzed by TLC developed in either Solvent System G or J.

Additionally, the acetonitrile:water extracts from the 365-day sampling interval were pooled and the acetonitrile was removed by rotary evaporation. The resulting aqueous solution was acidified with HCl and partitioned twice with diethyl ether. The diethyl ether phase was partitioned twice with 0.01 M sodium hydroxide; the aqueous phases were combined, acidified with HCl, and partitioned twice with diethyl ether. An aliquot of the organic phase was evaporated to dryness and analyzed by direct insertion probe MS. The remainder of the organic phase was derivatized to the methyl or trimethylsilyl derivatives and analyzed by MS. Aliquots of the extract were also analyzed by TLC using Solvent System G or J.

The degradate identified as G2 by TLC analysis using Solvent System G was determined to be composed of two compounds (G2 and G2/J3) by TLC analysis using Solvent System J. In order to isolate and identify compound G2/J3, aliquots of the acetonitrile:water extracts of the 180-day samples from the ancillary experiment were combined, and the acetonitrile was evaporated by rotary evaporation. The remaining aqueous solution was applied to an Amberlite XAD-2 column, and the column was eluted with methanol and acetonitrile:water (7:3, v:v). The organic eluates were combined and evaporated to dryness (method unspecified), and the residues were redissolved in methanol. An aliquot of the methanol solution was analyzed by semi-preparatory TLC on silica gel plates developed in Solvent System G. Radioactive areas were located by autoradiography; the radioactive area corresponding to the degradate G2 was scraped from the plate, and the radioactivity was extracted from the silica gel with methanol. An aliquot of the methanol extract was analyzed by semi-preparatory TLC using Solvent System J; the radioactive area corresponding to the degradate G2/J3 was located and extracted with methanol as described above. Aliquots of the methanol extract were analyzed by normal-phase TLC on silica gel plates developed with Solvent Systems G and J; reference Compound 48 was cochromatographed with the samples. An additional aliquot of the methanol solution was analyzed by LC-MS

Sd

using an unspecified column eluted with 0.1 M aqueous ammonium acetate:acetonitrile (4:1, v:v) containing 0.1% acetic acid by volume.

DATA SUMMARY:

Uniformly phenyl ring-labeled [^{14}C]acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; radiochemical purity 96%), at 4.5 ppm, degraded with a registrant-calculated half-life of 13.5 days in silty clay loam soil that was incubated in darkness at 19.5-25.0 °C and 81% of 0.33 bar moisture. [^{14}C]Acetochlor was 93.8% of the applied radioactivity immediately posttreatment, 68.0-69.3% at 7 days, 45.5% at 14 days, 25.6% at 30 days, and 1.7% at 365 days (HPLC analysis; Table II). Three polar [^{14}C]degradates were identified:

N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (G2; Compound 17);

ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24); and

[ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethylsulphinyl] acetic acid (Compound 48).

Compound 17 decreased from a maximum of 17.1% of the applied at 60 days posttreatment to 6.4% at 365 days; Compound 24 decreased from a maximum of 11.8% at 180 days to 7.8% at 365 days; Compound 48 was 3.2-9.7% at 14-120 days and decreased to 0.7-0.8% at 275 and 365 days (Table II). Up to 24.0% of the applied radioactivity was not characterized during HPLC analysis (reviewer-calculated from Tables IA and II). Unidentified non-polar [^{14}C]degradates F1/F2 were a maximum of 5.2% of the applied, F4 at 1.0%, F5 at 4.5%, F6 at 3.8%, F7 at 2.8%, F8 at 2.0%, and F9 at 1.4% (TLC analysis using Solvent System F; Table XI). At 365 days posttreatment, volatile [^{14}C]residues totaled 8.6-10.9% of the applied radioactivity and unextracted [^{14}C]residues were 34.2-34.7% (Table I). The material balances were 91.2-114.5% of the applied through 30 days posttreatment, 82.9-85.4% at 60 days, and 76.6-77.1% at 365 days.

In contrast, [^{14}C]acetochlor, at 41 ppm, degraded with a registrant-calculated half-life of 55 days in silty clay loam soil that was incubated under similar conditions (Table IX). The material balances were 87.4-89.7%.

COMMENTS:

1. The mechanism of formation of the newly-detected degradate thioacetic acid sulfoxide [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulphinyl] acetic acid was not explained and the identify of what the registrant refers to as the "sulfur-containing soil moieties" involved in its formation (MRID 41963317, figure 1, proposed biotransformation) was not provided. The sulfur containing compounds

from acetochlor formed at 11% (6% sulfonic acid and 5% thioacetic acid sulfoxide) and 22% (12% sulfonic acid and 10% thioacetic acid sulfoxide) in sandy loam and silty clay loam, respectively. These compounds were also formed in the field studies.

2. "The metabolism of ^{14}C-acetochlor in silty clay loam soil under aerobic conditions, Part II" (MRID 41963316) was submitted by the registrant to supplement "The metabolism of ^{14}C-acetochlor in silty clay loam soil under aerobic conditions" (MRID 41565147), which had been previously reviewed by Dynamac in a Task-1 Report dated November 14, 1990. Data from both submissions have been combined in this review.

3. The calculations used to equate the approximate field application rate (4.0 lb ai/A) and the concentration of acetochlor (4.5 mg/kg) used in this study were not reported. Additionally, information provided to EPA by the registrant at a later date specify that the maximum proposed field application rate of Acetochlor EC (7.5 lb ai/gal EC) is 2.5 pints/A (1.06 kg ai/A or 2.34 lb ai/A).

4. Selected extracts from an aerobic soil metabolism study using sandy loam soil (Study 1, MRID 41963317) were cochromatographed during TLC analysis (Solvent Systems E, F, and G) with comparable extracts from this study; the study authors of the sandy loam soil study stated that no qualitative differences in the biotransformation pathways of acetochlor were observed in the two soil types. However, a degradate, N-(ethoxymethyl)-2'-ethyl-6'-methyl-2-hydroxyacetanilide (Compound 20), identified in the sandy loam soil study was not identified in these studies.

5. The material balances were acceptable (98.1-99.9% of the applied radioactivity) through 30 days posttreatment, but decreased to 76.6-77.1% applied radioactivity by 365 days. The material balances were acceptable for two half-lives of the parent before they declined to an unacceptable level.

   To characterize the radioactivity lost in the main study, the trapping system was modified to include foam plugs (material not described), and ethyl digol and ethanolamine:2-ethoxyethanol traps. It appeared that the loss of radioactivity in the main study may have been due to inefficient trapping of CO_2; the material balances for the modified 90-day study were >90% of the applied. However, the ancillary study was terminated too soon to confidently assume the pattern would continue until 365 days, the length of the original study.

6. Characterization and quantitations of acetochlor provided within the two documents (MRIDs 41565147 and 41963316) were obtained from HPLC analysis and TLC analyses using Solvent Systems E and F; the half-life of acetochlor provided by the study authors of MRID 41565147 was calculated from the averages of results obtained from TLC using Solvent Systems E and F (Table IX). Characterization and

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quantitations of the major polar metabolites were obtained primarily from HPLC; TLC using Solvent System G was also used for identification of polar metabolites, but this system could not adequately separate Compounds 17 and 48. TLC using Solvent System F was used to identify and quantify the non-polar metabolites.

The degradate identified as G2 during TLC analysis with Solvent System G was shown to be composed of two compounds during TLC analysis with Solvent System J (G2 and G2/J3). G2 was identified by MS in MRID 41565147 as Compound 17. The degradate G2/J3 was identified by MS in MRID 41963316 as Compound 48.

7. According to the study authors of MRID 41963317, a storage stability study was conducted in which two samples of sandy loam soil (treated at 10 ug/g with [^{14}C]acetochlor) were stored frozen at <-15 °C for 180 days. After 180 days of frozen storage, acetochlor was 97.6-98.7% of the applied in the soil samples. Experimental work for the original soil metabolism study (MRID 41565147) was performed between October 1986 and June 1989; the length and method of storage for individual samples was not specified. Additionally, HPLC analysis was performed between March 22 and August 28, 1990; during the interval between extraction and HPLC analysis, the soil extracts were reportedly stored at approximately -20 °C. Storage stability of acetochlor and degradates were not investigated under these conditions. However, HPLC quantitations of acetochlor and the degradates agree favorably with those obtained from TLC analysis.

RIN 2556-94 ACETOCHLOR REVIEW (121601)

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DATA EVALUATION RECORD 1

CHEM 121601 Acetochlor §162-1

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 41963317
Hawkins, D.R., D. Kirkpatrick, and G.M. Dean. 1991. The metabolism of ^{14}C-acetochlor in sandy loam soil under aerobic conditions. HRC Report No. ISN 185/90535. Unpublished study performed by Huntingdon Research Centre, Ltd., Cambridgeshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

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CONCLUSIONS:

Metabolism - Aerobic Soil

1. The aerobic soil metabolism data requirement may be satisfied if the registrant can satisfactorily explain the mechanism of formation of the newly-detected degradate thioacetic acid sulfoxide [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulphinyl] acetic acid and identify what the registrant refers to as the "sulfur-containing soil moieties" involved in its formation (MRID 41963317, figure 1, proposed biotransformation). The sulfur containing compounds from acetochlor formed at 11% (6% sulfonic acid and 5% thioacetic acid sulfoxide) and 22% (12% sulfonic acid and 10% thioacetic acid sulfoxide) in sandy loam and silty clay loam, respectively. These compounds were also formed in the field studies.

2. Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide), at 10.5 ug/g, degraded with an initial half-life of 110 days and a second half-life of 245 days in sandy loam soil that was incubated in darkness at 22 °C and 75% of 0.33 bar moisture capacity. In contrast, acetochlor, at an increased application rate of 49 ug/g, degraded with an initial half-life of approximately 300 days in sandy

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loam soil that was incubated under similar conditions. Three polar degradates were identified: N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (Compound 17), ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24), and [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethylsulphinyl] acetic acid (Compound 48). One non-polar degradate was identified: N-(ethoxymethyl)-2'-ethyl-6'-methyl-2-hydroxyacetanilide (Compound 20).

METHODOLOGY:

Sieved (2 mm) sandy loam soil (61.7% sand, 20.2% silt, 18.1% clay, 2.90% organic matter, pH 6.04, CEC 9.1 meq/100 g) was weighed (60 g dry weight) into glass crystallizing dishes and incubated in darkness (temperature unspecified) for 4 weeks; throughout incubation, humidified air was passed over the soil samples (rate unspecified). Following the incubation period, individual soil samples were treated at 10.5 ug/g with uniformly phenyl ring-labeled [^{14}C]acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; radiochemical purity 97.1-98.8%, specific activity 16.4 Ci/Mol, ICI) plus unlabeled acetochlor (purity 99.5%, ICI Americas) dissolved in acetone. The treated soils were moistened to 75% of 0.33 bar with deionized water. The dishes were placed in stainless steel racks inside two sealed glass chambers (Figure 2), and the samples were incubated in darkness at 20-24 °C; the soil moisture content was maintained at 75% of 0.33 bar throughout the study. Humidified, carbon dioxide-free air was pumped continuously (60 mL/minute) through the chambers, then sequentially through polyurethane foam plugs; either 2-(2-ethoxy)ethoxyethanol (ethyl digol; Days 0-120) or 0.05 M sulfuric acid (Days 224-365) trapping solutions (Trap 1); potassium hydroxide:water (10:90, w:v; Trap 2); and ethanolamine:2-ethoxyethanol (1:3, v:v; Traps 3 and 4) trapping solutions. Duplicate dishes (one from each glass chamber) were removed for analysis at 0, 1, 3, 7, 14, 30, 60, 90, 120, 180, 274, and 365 days posttreatment. Trapping solutions and polyurethane plugs were collected and replaced at each sampling interval, and at additional intervals of ≤15 days (Tables IV-VI).

The soil samples collected at 0 days posttreatment were extracted three times by shaking with acetonitrile for approximately 30 minutes. All other soil samples were extracted sequentially by shaking with acetonitrile for 30 minutes (Extract 1), shaking with acetonitrile:water (7:3, v:v) for 30 minutes (Extract 2), and Soxhlet-extraction with acetonitrile:water (7:3, v:v) for 8 hours (Extract 3). The soil samples collected between 120 and 365 days posttreatment were further Soxhlet-extracted with water overnight (Extract 4). After each extraction, the slurries were centrifuged and the supernatants were decanted. Aliquots of the individual extracts were analyzed by LSC. The extracted soils were air-dried, and subsamples were analyzed for unextracted radioactivity by LSC following combustion.

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Aliquots of the acetonitrile extracts from the day-0 samples were combined and concentrated by rotary evaporation. The concentrated solutions were diluted with acetonitrile, and aliquots were analyzed by LSC; the average recovery of radioactivity was 98.3 ± 5.6%. Aliquots of extracts 1, 2, and 3 from the 1- through 365-day samples were combined, and aliquots of the combined extracts were analyzed by LSC. The combined extracts were then concentrated by rotary evaporation to remove the acetonitrile, and aliquots of the aqueous solutions were analyzed by LSC. The aqueous solutions were applied to Bond-Elut solid-phase extraction columns; the columns were eluted sequentially once with 0.01 M sodium acetate buffer solution and three times with methanol (Figure 3). Aliquots of the aqueous solutions containing residues that did not adsorb to the column, the sodium acetate eluates, and the methanol eluates were analyzed by LSC; the methanol eluates contained >96% of the radioactivity applied to the columns. The methanol eluates were then concentrated under nitrogen.

Aliquots of the concentrated acetonitrile extracts from day 0 and the concentrated methanol eluates from all other sampling intervals were analyzed for acetochlor and the degradates, N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (Compound 17), ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24), and [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethylsulphinyl] acetic acid (Compound 48), by HPLC using a Partisil octylsilane (C-8) column eluted with a 0.1 M sodium perchlorate (pH 6.3):acetonitrile gradient; the column was equipped with UV (270 nm) and radioactive flow detection. Additionally, HPLC column eluate fractions were collected at 1-minute intervals and analyzed by LSC.

Also, aliquots of the concentrated solutions were analyzed for acetochlor and the non-polar degradates N-(ethoxymethyl)-2'-ethyl-6'-methyl-2-hydroxyacetanilide (Compound 20) and "Compounds 11, 12, and 31" (Section IIIE-iii) by one-dimensional TLC on silica gel plates developed in toluene:acetonitrile:acetic acid (85:10:5, v:v:v; Solvent System E), and by reverse-phase TLC on octadecyl silane (ODS) plates developed in acetonitrile:water:acetic acid (45:50:5, v:v:v; Solvent System F). Additional aliquots of the concentrated solutions were analyzed for Compounds 17, 24, and 48 by one-dimensional TLC on silica gel plates developed in either chloroform:methanol:acetic acid (70:30:3, v:v:v; Solvent System G) or chloroform:methanol:formic acid:water (70:25:3:3, v:v:v:v; Solvent System J). Aliquots of selected solutions were analyzed for the degradate Compound 20 by one-dimensional TLC on silica gel plates developed in toluene:ethyl acetate:chloroform:methanol (10:10:10:3, v:v:v:v; Solvent System Y). Unlabeled reference standards of acetochlor and the specific degradates were cochromatographed with the extracts and visualized by UV fluorescence quenching; radioactive areas were located by autoradiography and radioscanning.

Aliquots of the ethyl digol and sulfuric acid trapping solutions were analyzed by LSC. Aliquots of the potassium hydroxide solutions were

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diluted with water, and aliquots of the ethanolamine:2-ethoxyethanol trapping solutions were diluted with methanol; the diluted solutions were analyzed by LSC. The polyurethane foam plugs were extracted once or twice with acetonitrile for 15-20 minutes in an ultrasonic bath, and aliquots of the extracts were analyzed by LSC.

An ancillary experiment was performed using [^{14}C]acetochlor at a higher application rate. Portions of sandy loam soil were treated with uniformly phenyl ring-labeled [^{14}C]acetochlor plus unlabeled acetochlor at 49 ug/g, then incubated as described above. Duplicate samples were removed for analysis at 0, 30, 60, 120, 180, and 365 days posttreatment, and the volatile traps were collected and replaced at regular intervals. The soil samples were extracted as described, and the extracts were analyzed by TLC using Solvent System E, F, and G. The extracts of soil treated at 49 ug/g were not analyzed by HPLC.

DATA SUMMARY:

Uniformly phenyl ring-labeled [^{14}C]acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; radiochemical purity 97.1-98.8%), at 10.5 ug/g, degraded with an initial registrant-calculated half-life of 110 days (using data through 120 days posttreatment) and a second observed half-life of >245 days in sandy loam soil that was incubated in darkness at 20-24 °C (22 ± 0.5 °C) and 75% of 0.33 bar moisture (Table VII). [^{14}C]Acetochlor was 92.2-103% of the applied radioactivity at 0-3 days posttreatment, 60.5-63.6% at 60 days, 45.1-50.3% at 120 days, and 35.0-47.9% at 365 days (HPLC analysis; Table IX). The [^{14}C]degradates identified were

N-ethoxymethyl-N-(2'-ethyl-6'-methylphenyl)oxamic acid (Compound 17);

ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethanesulphonic acid (Compound 24);

[ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethylsulphinyl] acetic acid (Compound 48); and

N-(ethoxymethyl)-2'-ethyl-6'-methyl-2-hydroxyacetanilide (Compound 20).

Compound 17 decreased from a maximum of 7.0-11.0% of the applied at 90 days to 1.5 and 6.8% at 365 days; Compound 24 was 2.4-5.9% at 60 through 365 days with no pattern of formation or decline; and Compound 48 decreased from a maximum of 4.3-4.5% at 120 days to 1.6-3.0% at 365 days (Table IX). Compound 20 increased to a maximum of 6.6% of the applied by 365 days posttreatment (Table XI). Additional zones of radioactivity isolated by HPLC (Zones A-E) or TLC (F1/2, F4/5, F7, F8, F9) contained up to 3.2% of the applied but did not correspond to distinct radioactive components and were not characterized (Tables IX and XI). Uncharacterized aqueous-soluble [^{14}C]residues (Extract 4) totaled 2.2-3.8% of the applied (0.23-0.40 ppm) at 120 through 365 days (Table I). At 365 days, uncharacterized "neutral and basic" organic [^{14}C]volatiles totaled 2.1-2.3% of the applied (0.22-0.24 ppm), $^{14}CO_2$ (unconfirmed) totaled 0.5-0.6%, and unextracted [^{14}C]residues were 13.8-17.3% (Tables I and IV). Material balances were 95.9-109% at 0 through 60 days posttreatment, and 84.4-97.8% at 90 through 365 days.

In contrast, [^{14}C]acetochlor, at 49 ug/g, degraded with a registrant-calculated half-life of approximately 300 days in sandy loam soil that was incubated under similar conditions; [^{14}C]residue characterization was otherwise incomplete (Table VIII). The material balances were 98.0-106% of the applied at 0 through 60 days, and 93.6-96.9% at 120 through 365 days (Table II).

COMMENTS:

1. The mechanism of formation of the newly-detected degradate thioacetic acid sulfoxide [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulphinyl] acetic acid was not explained and the identify of what the registrant refers to as the "sulfur-containing soil moieties" involved in its formation (MRID 41963317, figure 1, proposed biotransformation) was not provided. The sulfur containing compounds from acetochlor formed at 11% (6% sulfonic acid and 5% thioacetic acid sulfoxide) and 22% (12% sulfonic acid and 10% thioacetic acid sulfoxide) in sandy loam and silty clay loam, respectively. These compounds were also formed in the field studies.

2. When the application rate was increased from 10.5 to 49 ppm, the initial half-life of acetochlor in the soil increased from 110 to approximately 300 days. No explanation for this increase was provided by the study authors. The 49 ppm application rate was intended for ease of degradate identification.

3. In order to establish that the degradation observed during the aerobic soil metabolism study was due primarily to biotransformation, additional soil samples were autoclaved, then treated and incubated as in the definitive metabolism study (Column C). Because little degradation occurred in the sterilized soil through 30 days posttreatment (Table XV), the study authors concluded that the degradation observed in the non-sterile soil was a result of microbiological activity.

4. Selected extracts from this study were cochromatographed during TLC analysis (Solvent Systems E, F, and G) with comparable extracts from an aerobic soil metabolism study using silty clay loam soil (Study 2, MRIDs 41565147 and 41963316); the study authors stated that no qualitative differences in the biotransformation pathways of acetochlor were observed in the two soil types. However, Compound

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20, which was identified in this study, was not identified in the other studies.

5. According to the study authors, the concentration of acetochlor applied to the soil in this study was equivalent to a field application rate of 3.0 kg ai/ha (7.41 kg ai/A). Information provided to EPA by the registrant specify that the maximum proposed field application rate of Acetochlor EC (7.5 lb ai/gal EC) is 2.5 pints/A (1.06 kg ai/A). This information indicates that the application rate employed in this study is approximately 7X the proposed field use rate.

6. A storage stability study was conducted in which two samples (treated at 10 ug/g with [^{14}C]acetochlor) were stored frozen at <-15 °C for 180 days. After 180 days of frozen storage, acetochlor comprised 97.6-98.7% of the applied in the soil samples (Table XVI).

7. A proposed biotransformation pathway for acetochlor in soil has been provided in Figure 1.

RIN 2556-94 ACETOCHLOR REVIEW (121601)

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DATA EVALUATION RECORD 3

CHEM 121601 Acetochlor §164-1

FORMULATION--12--EMULSIFIABLE CONCENTRATE (EC)

STUDY ID 42573402
Lauer, R., and P.H. Lau. 1992. Terrestrial field dissipation study of acetochlor and its soil metabolites following preemergent application of MON 8437 to field corn. Laboratory Project No. MSL-12089. Unpublished study performed by Monsanto Company, St. Louis, MO, and Stewart Agricultural Services, Inc., Macon, MO; and submitted by ICI Americas, Inc., Wilmington, DE.

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CONCLUSIONS:

Field Dissipation - Terrestrial

1. The terrestrial field dissipation study is upgradeable and partially satisfies the 164-1 data requirement. The registrant should explain why the degradates of acetochlor leached in a silt loam soil (1.7 %OM) at the Elwood, Illinois site, but not in another silt loam soil (0.5 % OM) at the Leland, Mississippi site. Lower OM content normally means greater susceptibility to leaching, and the observed results from these studies are not consistent with what is normally observed.

2. Acetochlor (MON 8437, 7.5 lb ai/gallon EC), applied once at 3 lb ai/A, dissipated with an observed half-life of approximately 14 days from the upper 6 inches of silt loam soil planted to corn in Illinois. Acetochlor was not detected in the soil below 12 inches. The degradates [(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]oxo acetic acid (oxanilic acid) and 2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)amino]-2-oxo ethanesulfonic acid (sulfonic acid), were detected to a depth of 18 inches. The degradate [{2-[(ethoxymethyl)-(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid,

(thioacetic acid sulfoxide) was detected only in the upper 6 inches of the soil. The soil was sampled to 48 inches of depth.

METHODOLOGY:

Acetochlor (MON 8437; 2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7.5 lb ai/gallon EC, Monsanto) was broadcast as a preemergence application at 3 lbs ai/A to a plot (60 x 70 feet) of silt loam soil (0- to 6-inch depth: 16% sand, 58% silt, 26% clay, 1.7% organic matter, pH 5.7, CEC 12.0 meq/100 g) in Elwood, Illinois, on June 10, 1989. The plot had been seeded to corn on June 9, 1989, and the corn plants emerged on June 15 (5 days posttreatment). An untreated plot (60 x 60 feet), located 250 feet from the treated plot, was maintained as a control; this plot was also planted to corn. For sampling purposes, both plots were divided into three subplots. Soil samples were collected from each subplot of the treated and control plots prior to treatment, at 0, 1, 3, 7, 14, 21, and 30 days posttreatment, and at 2, 4, 6, 12, and 18 months posttreatment. At each sampling interval, seven 4-foot soil cores (1.5- to 1.75-inch diameter) were randomly collected from each subsection of the treated plot and two soil cores were collected from each subsection of the control plot using a tractor-mounted zero-contamination hydraulic soil corer. Each soil core was divided into 6-inch segments, and the soil segments from the treated plot were composited by subplot, soil depth, and sampling interval; the soil segments from the control plot were composited by soil depth and sampling interval. The composited samples were thoroughly homogenized, then stored frozen at <0 °F for up to 19 and 13 months prior to extraction for acetochlor and its degradates, respectively. Extracts were stored for up to 8 days prior to analysis.

For analysis of acetochlor, subsamples (20 g) of the soil were extracted with 10% acetonitrile in water:20% ethyl acetate in iso-octane (10:50, v:v) by shaking on a reciprocating shaker for 1 hour. After the extraction, the slurries were allowed to settle for >1 hour, and the extract was then filtered through glass wool and anhydrous sodium sulfate. Aliquots of the extracts were analyzed by GC with electron capture detection. The identification and quantitation of acetochlor in the extracts were achieved by comparison to an acetochlor reference standard. The detection limit was 0.005 mg/kg. The average recoveries from soil samples fortified with acetochlor were 90.5-109%, (Master Summary Table). The results of the analysis of the soil samples were corrected for the average recovery and were expressed on a dry soil basis.

For analysis of the sodium salts of the acetochlor degradates [(ethoxymethyl)[2-ethyl-6-methylphenyl]amino]oxo acetic acid (oxanilic acid), [{2-[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid (sulfinyl acetic acid), and 2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)amino]-2-oxo ethanesulfonic acid (sulfonic acid), subsamples of the soil were extracted with acetonitrile:water (60:40, v:v) by shaking for 30 minutes. After the extraction, the slurries were centrifuged and the supernatants were decanted. The extracts were applied to pre-rinsed (water and 50% acetonitrile in water) C-18:Florisil:activated carbon columns. The eluates were collected, and the columns were rinsed with acetonitrile:water (50:50, v:v); the eluates and rinsates were combined. The combined solutions were centrifuged or filtered through glass wool, and the supernatants were concentrated using rotary evaporation under vacuum at 40 °C. The concentrated solutions were diluted with acetonitrile and acidified with dilute phosphoric acid; the solutions were filtered (0.22 um) and concentrated by rotary evaporation at room temperature. The residues were dissolved in acetonitrile:pH 6 potassium phosphate buffer (15:85, v:v) and the solutions were filtered (0.22 um). Aliquots of the filtrates were analyzed by HPLC using a Zorbax ODS column eluted with an acetonitrile:pH 6 potassium phosphate buffer gradient; the column was equipped with UV (210 nm) detection. Compound identifications and quantitations were achieved by comparison to reference standards of the three degradates. The detection limit was 0.01 mg/kg. The average recoveries from soil samples fortified with acetochlor oxanilic acid, acetochlorthioacetic acid sulfoxide, or acetochlor sulfonic acid were 73.2-88.7%, 75.8-86.7%, and 65.1-88.1%, respectively (Master Summary Table). The results of the analysis of the soil samples were corrected for the average recovery for each analyte, and were expressed on a dry soil basis.

DATA SUMMARY:

Acetochlor (MON 8437; 2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7.5 lb ai/gallon EC), applied as a preemergence broadcast treatment on June 10, 1989, dissipated with an observed half-life of approximately 14 days from a plot of silt loam soil in Illinois that had been planted to corn. In the 0- to 6-inch soil depth, acetochlor was 1.183-1.697 ppm at 0 days, 1.091-1.685 ppm at 1 day, 0.901-1.013 ppm at 7 days, 0.629-0.847 ppm at 14 days, 0.449-0.744 ppm at 21 days, 0.145-0.207 ppm at 30 days, 0.023-0.041 ppm at 60 days, and ≤0.015 ppm at 120-544 days (Master Summary Table). In the 6- to 12-inch soil depth, acetochlor was 0.008-0.073 ppm at 0-1 days, ≤0.015 ppm at 3-21 days, and <0.005 ppm at 30-544 days; in the 12- to 18-inch soil depth, acetochlor was not detected, except at 0.011-0.020 ppm at 0 days posttreatment. The degradates detected in the soil were

[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]oxo acetic acid (oxanilic acid);

[{2-[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid (sulfinyl acetic acid); and

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2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)amino]-2-oxo ethanesulfonic acid (sulfonic acid).

In the 0- to 6-inch soil depth, <u>oxanilic acid</u> increased from 0.025-0.027 ppm at 1 day posttreatment to 0.059-0.148 ppm at 14-21 days, then decreased to 0.060-0.117 ppm at 30-120 days, and <0.010 ppm at 180-544 days (Master Summary Table). In the 6- to 12- and 12- to 18-inch depths, oxanilic acid reached average maximums of 0.060 ppm and 0.023 ppm, respectively, at 120 days posttreatment (Table 8). Oxanilic acid was not detected in the deeper soil depths. In the 0- to 6-inch soil depth, <u>thioacetic acid sulfoxide</u> increased from 0.014-0.034 ppm at 1-7 days posttreatment to 0.032-0.069 ppm at 14-60 days, then decreased to 0.012-0.022 ppm at 120 days and <0.010 ppm at 180-544 days. thioacetic acid sulfoxide was not detected in the deeper soil depths. In the 0- to 6-inch soil depth, <u>sulfonic acid</u> increased to 0.032-0.073 ppm at 14-120 days posttreatment and was <0.010 ppm at 180-544 days; in the 6- to 12- and 12- to 18-inch depths, sulfonic acid reached average maximums of 0.044 and 0.018 ppm, respectively, at 120 days posttreatment.

Rainfall plus irrigation totaled 0.86 inches through 14 days posttreatment and was approximately 78.5 inches at 544 days. The air temperatures ranged from -22 to 96 °F. The soil temperatures, measured at each sampling interval, ranged from 38 to 98 °F at the 2-inch depth, and from 39 to 90 °F at the 4-inch depth. The depth to the water table was 1-4 feet, and the slope of the plot was ≤1.5%. There was a subsurface drainage system (tile) in place at the test site.

<u>COMMENTS</u>:

1. Acetochlor was applied in a tank-mix with the safener MON 13999 (3:0.75, w:w active ingredient); no analytical interferences resulted from addition of the safener. Apparently MON 13900 is the active ingredient in the formulated product MON 13999.

2. Monthly precipitation plus irrigation during the growing season was 63% of the historical average in June, 1989. The study authors stated that although the early precipitation deficiency in June 1989 may have decreased the movement of acetochlor through the soil at the initiation of the study, precipitation of 174% and 245% of the historical average in July and August should have diminished the effects of the earlier shortage.

4. Soil temperatures were provided for individual sampling intervals only; soil temperatures determined daily for the duration of the study are preferable.

5. Prior to planting, plots were periodically plowed, cultivated, disked, and harrowed (4/25/89-6/8/89). Additionally, the plots were cultivated 30 days after application of acetochlor on June 30, 1989.

6. At the initiation of this study, test sites in eight states were treated with acetochlor. However, due to unexpected acetochlor contamination of lower soil depths (which may have resulted from mechanical drag during sampling), the registrant abandoned seven of the eight tests; only the test from the Illinois site was completed.

7. Soil samples were stored at <0 °F for up to 19 and 13 months prior to extraction for acetochlor and its three degradates, respectively. Data from a storage stability study reviewed concurrently (Study 6, MRID 42549907) indicated that acetochlor and its degradates are stable on soil stored frozen at <0 °C for up to approximately 2 years (739-789 days); soil samples from this site were used in the storage stability study.

8. In 1988, the test site was planted to soybeans and was treated with bentazon, fluazifop-butyl, and 2,4-DB at 1.0, 0.5, and 0.25 lb ai/A, respectively, and Squadron (pendimethalin + monochlorobenzene + imazaquin) at 3 pints/A. In 1987, the test site was planted to corn and was treated with paraquat and glyphosate, each at 2.0 lb ai/A. In 1986, the test site was planted to corn and was treated with atrazine and cyanazine at 2.2 and 1.1 lb ai/A, respectively. In 1985, the test site was planted to soybeans and was treated with bentazon at 1.0 lb ai/A and copper oxychloride (COC) at 1 quart/A. In 1984, the test site was planted to corn and was treated with atrazine at 2.2 lb ai/A and alachlor at 2.0 lb ai/A.

During the study, on June 9, 1989 (the date of acetochlor application), terbufos (Counter 15G) was applied to the test plots at 1.0 lb ai/A, and on June 14, 1989 (4 days after application) the plots were treated with atrazine and cyanazine at 1.1 and 2.0 lb ai/A, respectively. The corn seeds were treated with benomyl prior to planting.

RIN 2556-94 ACETOCHLOR REVIEW (121601)

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Pages 156 through 159 are not included.

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____ Description of quality control procedures.

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DATA EVALUATION RECORD 4

CHEM 121601 Acetochlor §164-1

FORMULATION--12--EMULSIFIABLE CONCENTRATE (EC)

STUDY ID 42549917

Veal, P., S. Grout, and N.D. Simmons. 1992a. Acetochlor: Residues of thioacetic acid sulphoxide soil metabolite under field conditions in Champaign, Illinois, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ1031B. Unpublished study performed by ICI Agrochemicals, Bracknell, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

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J. Breithaupt

SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

1. The field dissipation study is acceptable and partially satisfies the 164-1 data requirement. The registrant should explain why the degradates of acetochlor leached in a silt loam soil (1.7 % OM) at the Elwood, Illinois site, but not in another silt loam soil (0.5 % OM) at the Leland, Mississippi site. Lower OM content normally means greater susceptibility to leaching, and the observed results from these studies are not consistent with what is normally observed.

2. Acetochlor (7.0 lbs ai/gallon EC), at 3 lbs ai/A, dissipated with a half-life of 26 days from the upper 3.5 inches of clay loam soil in Illinois. Acetochlor was not detected below the 3.5-inch depth in any sample at any sampling interval. Three degradates were identified: 2-(ethoxymethyl)amino-N-(2-ethyl-6-methylphenyl)oxo-acetic acid (oxanilic acid); N-(ethoxymethyl-N-(2-ethyl-6-methylphenyl)-3-oxoethane sulfonic acid (sulfonic acid); and [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulfinyl]acetic acid (thioacetic acid sulfoxide). Oxanilic acid and sulfonic acid were not detected below the 7.0-inch soil depth; thioacetic acid sulfoxide was not detected below the 3.5-inch soil depth. The soil was sampled to a depth of 42 inches.

METHODOLOGY:

Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7.0 lbs ai/gallon EC, ICI) was applied at a nominal rate of 3 lbs ai/A to a plot (50 feet x 100 feet) of clay loam soil (0- to ≤18-inch depth: 17-29% sand, 44-52% silt, 27-33% clay, 2.8-3.7% organic matter, pH 6.2-6.9, CEC 15.1-17.7 meq/100 g) in Champaign, Illinois, on May 5, 1988. The herbicide was applied with a tractor-mounted spray boom and was incorporated to a depth of 2 inches immediately after application. After incorporation, the plot was planted to corn and the soil was rolled smooth. An untreated control plot (10 feet x 100 feet) was located 20 feet from the treated plot. The treated plot was subdivided into three subplots that were separated by buffer zones 10 feet wide. Seven cores were collected from the 0- to 15.5-inch soil depth of each subplot (2-inch diameter, 0- to 3.5-inch depth; 1-inch diameter, 3.5- to 15.5-inch depth), and three cores were collected from the 15.5- to 42-inch depth of each subplot (2-inch diameter) at 0, 7, 14, and 28 days, and 2, 3, 6, and 12 months posttreatment; the 15.5-to 42-inch cores were not collected at time 0. From the control plot, ten cores were collected from the 0- to 15.5-inch depth plus six cores were collected from the 15.5- to 42-inch depth at each sampling interval. The upper soil cores (0- to 3.5- and 3.5- to 15.5-inch depths) were collected with hand-held zero contamination corers; subsurface cores (15.5- to 42-inch depth) were collected with hydraulic coring equipment. The upper cores were divided into 0- to 3.5-, 3.5- to 7.0-, 7.0- to 10.5-, and 10.5- to 15.5-inch segments; subsurface cores were divided into 15.5- to 27.5 and 27.5- to 42.0-inch segments. Soil samples were frozen at ≤-10 °C after sampling, then transferred to the laboratory. In the laboratory, the samples were thawed briefly, and cores from each subplot were composited by depth and sampling interval. The composited cores were sieved (0- to 3.5-inch depth samples through a 2.0-mm screen, 3.5- to 27.5-inch depth samples through a 4.0-mm screen); and subsurface samples were mixed by hand. Samples were refrozen, then thawed for 2 hours prior to extraction.

Soil samples were extracted with acetonitrile:water (1:1, v:v) by shaking for 30 minutes at room temperature. Soil samples with a higher clay content were extracted with acetonitrile:water (3:1, v:v). The extracts were removed from the soil by vacuum filtration, then partitioned against methylene chloride. The organic phase was removed and evaporated to dryness under vacuum, and the residues were redissolved in hexane. Aliquots of the hexane solution were analyzed using GC with nitrogen detection. The detection limit was 0.01 mg/kg. The recovery of acetochlor from soil samples fortified at 0.025-0.5 mg/kg was 58-139% (Appendix III of MRID 41592012).

To determine the concentrations of oxanilic and sulfonic acid in the soil, samples were extracted with acetonitrile:water (1:1, v:v) containing 40 mM ammonium acetate by shaking for 30 minutes at room temperature. The extract was removed by centrifugation, then purified on a Bond-Elut column washed with water. The purified extract was analyzed by reverse-phase HPLC on a Hypersil SAS C_1 column eluted with acetonitrile:water (30:70, v:v) containing 10 mM PIC (tetrabutyl-ammonium-phosphate ion pair) with UV (220 nm) detection. The recoveries of oxanilic and sulfonic acid from soil samples fortified at 0.02-0.05 mg/kg were 56-104% and 64-100%, respectively (Appendices III and IV of MRID 41592013).

To determine the concentration of thioacetic acid sulfoxide in the soil, samples were extracted with acetonitrile:water (1:1, v:v) containing 40 mM ammonium acetate by shaking for 60 minutes at room temperature. The extract was removed by centrifugation, and an aliquot of each extract was concentrated by rotary evaporation at 40 °C. The pH of the concentrated extract was adjusted to 1.9-2.0 with 1 N HCl, and the extract was applied to a C-18 column. After application of the extract, the column was rinsed sequentially with water, hexane, and methylene chloride, and all rinsates were discarded. The column was then eluted three times with ethyl acetate and three times with 20% methanol in ethyl acetate. The eluates were combined and concentrated under vacuum, and the residues were dissolved in acetonitrile using sonification. The residues in the extract were derivatized with N-methyl-N-(tert-butyldimethylsilyl)trifluoroacetamide (MTBSTFA) and heating (110 °C). The mixture was diluted with acetonitrile, and an aliquot of the solution was analyzed for the MTBSTFA derivative of thioacetic acid sulfoxide by GLC/MS. The detection limit was 0.01 mg/kg. The recovery of thioacetic acid sulfoxide from soil samples fortified at 0.01-0.50 mg/kg was 61-127% (Appendix II of MRID 42549917).

DATA SUMMARY:

Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7.0 lbs ai/gallon EC), at 3 lbs ai/A, dissipated with a registrant-calculated half-life of 26 days from the upper 3.5 inches of plots of clay loam soil in Illinois that were treated on May 5, 1988, and immediately tilled to a 2-inch depth and planted to corn. In the 0- to 3.5-inch soil layer, acetochlor was 2.36-4.52 mg/kg immediately posttreatment, 1.20-2.18 mg/kg at 28 days, 0.65-1.71 mg/kg at 56 days, 0.41-0.61 mg/kg at 84 days, and 0.04-0.06 mg/kg at 390 days (Table II). Acetochlor was not detected (<0.01 mg/kg) below the 3.5-inch depth in any sample at any sampling interval.

The soils were analyzed for three degradates,

2-(ethoxymethyl)amino-N-(2-ethyl-6-methylphenyl)oxoacetic acid (oxanilic acid),

N-(ethoxymethyl-N-(2-ethyl-6-methylphenyl)-3-oxoethane sulfonic acid (sulfonic acid), and

[ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulfinyl]acetic acid (thioacetic acid sulfoxide).

which were at maximum concentrations of 0.50-0.83 mg/kg at 84 days posttreatment, 0.07-0.11 mg/kg at 168 days, and 0.21-0.48 mg/kg at 84 days, respectively, in the upper 3.5 inches of the soil; at 390 days posttreatment, the three compounds were ≤0.02 mg/kg (Tables IIa, IIb and IIc). In the 3.5- to 7.0-inch depth samples, oxanilic acid was <0.02-0.08 mg/kg and <0.02-0.06 mg/kg at 84 and 168 days posttreatment, respectively; sulfonic acid was <0.02-0.05 mg/kg and 0.05-0.10 mg/kg at 84 and 168 days. Thioacetic acid sulfoxide was not detected below the 3.5-inch soil depth at any sampling interval; oxanilic acid and sulfonic acid were not detected below the 7.0-inch soil depth.

The seasonal depth to the water table fluctuated from 0 to 8 feet, and the slope of the plot was 0-3%. Throughout the study, (5/5/88-5/30/89) air temperatures ranged from -10 to 107 °F; and soil temperatures ranged from 27 to 111 °F at the 2-inch depth, and from 34 to 94 °F at the 8-inch depth. During the study, rainfall plus irrigation totaled approximately 53 inches.

COMMENTS:

1. This study was submitted by the registrant to provide data on the terrestrial field dissipation of the acetochlor degradate thioacetic acid sulfoxide. Data for parent acetochlor and the degradates oxanilic acid and sulfonic acid from the same field study were previously reviewed by Dynamac in a Task 1 Report dated May 24, 1991 (Study 5; MRIDs 41592012 and 41592013). Because the thioacetic acid sulfoxide data alone has little meaning, data on the dissipation of acetochlor and other degradates were incorportated into this review from the original documents.

2. The range of soil textures in the topsoil (17-29% sand, 44-52% silt, and 27-33% clay) at the test site indicate that the soil is clay loam rather than the silty clay loam stated in the original document. The soil is referred to as a clay loam in this review. Characterization of the soil to a depth of 48 inches was provided by the study authors (Appendix 2).

3. Acetochlor was applied in a tank-mix with the corn safener R25788 (7:1.18, w:w).

4. Acetochlor, oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide have been shown to be stable in soil stored frozen at <0 °C for approximately 2 years (739-789 days; Study 6 of this submission, MRID 42549907).

5. Pesticide application records were available for this site for 4 years prior to the study. Atrazine (1-1.25 lb ai/A), alachlor (3-3.125 lb ai/A), and cyanazine (1.875-2 lb ai/A) were applied to the test site once each year between 1984 to 1986. In 1987, butylate (5.0 lb ai/A), atrazine (1.0 lb ai/A), cyanazine (2.0 lb ai/A), and

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tefluthrin (0.125 and 0.164 lb ai/A) were applied to the site.

6. The test plot was cultivated and fertilized (100 lb ai/A urea) on April 8 and 25, 1988, respectively. During the study, the test site was disced and cultivated several times and treated with atrazine, pendimethalin, cyanazine, glyphosate, and paraquat.

7. The study authors stated that at the test site the potential soil loss was 2.68 tons of soil per acre per year, and wind was the principal agent of erosion.

. RIN 2556-94 ACETOCHLOR REVIEW (121601)

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Pages 165 through 199 are not included.

The material not included contains the following type of information:

- ____ Identity of product inert ingredients.
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DATA EVALUATION RECORD 5

CHEM 121601 Acetochlor §164-1

FORMULATION--12--EMULSIFIABLE CONCENTRATE (EC)

STUDY ID 42549918
Veal, P., S. Grout, and N.D. Simmons. 1992b. Acetochlor: Residues of thioacetic acid sulphoxide soil metabolite under field conditions in Leland, Mississippi, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ1030B. Unpublished study performed by ICI Agrochemicals, Bracknell, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

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SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

1. The terrestrial field dissipation study is acceptable and partially satisfies the 164-1 data requirement. The terrestrial field dissipation study is upgradeable and partially satisfies the 164-1 data requirement. The registrant should explain why the degradates of acetochlor leached in a silt loam soil (1.7 %OM) at the Elwood, Illinois site, but not in another silt loam soil (0.5 % OM) at the Leland, Mississippi site. Lower OM content normally means greater susceptibility to leaching, and the observed results from these studies are not consistent with what is normally observed.

2. Acetochlor (7.0 lbs ai/gallon EC), at 3 lbs ai/A, dissipated with a half-life of 36 days from the upper 3.5 inches of silt loam soil in Mississippi. Acetochlor was not detected below the 3.5-inch depth in any sample at any sampling interval. Three degradates were identified: 2-(ethoxymethyl)amino-N-(2-ethyl-6-methylphenyl)oxo-acetic acid (oxanilic acid); N-(ethoxymethyl-N-(2-ethyl-6-methylphenyl)-3-oxoethane sulfonic acid (sulfonic acid); and [ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulfinyl]acetic acid (thioacetic acid sulfoxide). Oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide were not detected below the 7.0-inch soil depth. The soil was sampled to a depth of 42 inches.

METHODOLOGY:

Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7.0 lbs ai/gallon EC, ICI) was applied at a nominal rate of 3 lbs ai/A to a plot (100 feet x 100 feet) of silt loam soil (0- to ≤7-inch depth: 26-38% sand, 52-62% silt, 10-14% clay, 0.5-0.9% organic matter, pH 6.7-7.1, CEC 6.5-8.5 meq/100 g) in Leland, Mississippi, on April 28, 1988. The herbicide was applied with a tractor-mounted spray boom and was incorporated to a depth of 2 inches immediately after application. After incorporation, the plot was planted to corn and the soil was rolled smooth. An untreated control plot (20 feet x 100 feet) was located 30 feet upwind from the treated plot. The treated plot was subdivided into three subplots that were separated by buffer zones four rows wide. Seven cores were collected from the 0- to 15.5-inch soil depth of each subplot (2-inch diameter, 0- to 3.5-inch depth; 1-inch diameter, 3.5- to 15.5-inch depth), and three cores were collected from the 15.5- to 42-inch depth of each subplot (2-inch diameter) at 0, 6, 14, and 27 days, and 2, 3, 6, and 12 months posttreatment; the 15.5- to 42-inch cores were not collected at time 0. From the control plot, ten cores were collected from the 0- to 15.5-inch depth plus six cores were collected from the 15.5- to 42-inch depth at each sampling interval. The upper soil cores (0- to 3.5- and 3.5- to 15.5-inch depths) were collected with hand-held zero-contamination corers; subsurface cores (15.5- to 42-inch depth) were collected with hydraulic coring equipment. The upper cores were divided into 0- to 3.5-, 3.5- to 7.0-, 7.0- to 10.5-, and 10.5- to 15.5-inch segments; subsurface cores were divided into 15.5- to 27.5- and 27.5- to 42.0-inch segments. Soil samples were frozen at ≤-10 °C after sampling, then transferred to the laboratory. In the laboratory, the samples were thawed briefly, and cores from each subplot were composited by depth and sampling interval. The composited cores were sieved (0- to 3.5-inch depth samples through a 2.0-mm screen, 3.5- to 15.5-inch depth samples through a 4.0-mm screen), and subsurface samples were mixed by hand. Samples were refrozen, then thawed for 2 hours prior to extraction.

Soil samples were extracted with acetonitrile:water (1:1, v:v) by shaking for 30 minutes at room temperature. Soil samples with a higher clay content were extracted with acetonitrile:water (3:1, v:v). The extracts were removed from the soil by vacuum filtration, then partitioned against methylene chloride. The organic phase was removed and evaporated to dryness under vacuum, and the residues were redissolved in hexane. Aliquots of the hexane solution were analyzed using GC with nitrogen detection. The detection limit was 0.01 mg/kg. The recovery of acetochlor from soil samples fortified at 0.01-2.0 mg/kg was 81-140% (Appendix III of MRID 41565152).

To determine the concentrations of oxanilic and sulfonic acid in the soil, samples were extracted with acetonitrile:water (1:1, v:v) containing 40 m<u>M</u> ammonium acetate by shaking for 30 minutes at room temperature. The extract was removed by centrifugation, then purified on a Bond-Elut column washed with water. The purified extract was analyzed by reverse-phase HPLC on a Hypersil SAS $^{\circ}C_1$ column eluted with acetonitrile:water (30:70, v:v) containing 10 mM PIC (tetrabutyl-ammonium-phosphate ion pair) with UV (220 nm) detection. The recoveries of oxanilic and sulfonic acid from soil samples fortified at 0.02-0.5 mg/kg were 57-115% and 53-99%, respectively (Appendices III and IV of MRID 41565153).

To determine the concentration of thioacetic acid sulfoxide in the soil, samples were extracted with acetonitrile:water (1:1, v:v) containing 40 mM ammonium acetate by shaking for 60 minutes at room temperature. The extract was removed by centrifugation, and an aliquot of each extract was concentrated by rotary evaporation at 40 °C. The pH of the concentrated solution was adjusted to 1.9-2.0 with 1 N HCl, and the remaining solution was applied to a C-18 column. The column was rinsed sequentially with water, hexane, and methylene chloride, and all rinsates were discarded. The column was then rinsed three times with ethyl acetate, and three times with 20% methanol in ethyl acetate. The eluates were combined and concentrated under vacuum, and the residues were dissolved in acetonitrile using sonification. The residues in the extract were derivatized with N-methyl-N-(tert-butyldimethylsilyl)-trifluoroacetamide (MTBSTFA) and heating (110 °C). The mixture was diluted with acetonitrile, and an aliquot of the solution was analyzed for the MTBSTFA derivative by GLC/MS. The detection limit was 0.01 mg/kg. The recovery of thioacetic acid sulfoxide from soil samples fortified at 0.01-0.50 mg/kg was 67-127% (Appendix II of MRID 42549918).

DATA SUMMARY:

Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7.0 lbs ai/gallon EC), at 3 lbs ai/A, dissipated with a registrant-calculated half-life of 36 days from the upper 3.5 inches of plots of silt loam soil in Mississippi that were treated on April 28, 1988, and immediately tilled to a 2-inch depth and planted to corn. In the 0- to 3.5-inch soil layer, acetochlor was 1.23-3.20 mg/kg immediately posttreatment, 1.71-2.39 mg/kg at 27 days, 0.54-1.04 mg/kg at 62 days, 0.03-0.1 mg/kg at 90 days, and 0.01 mg/kg at 362 days. Acetochlor was not detected (<0.01 mg/kg) below the 3.5-inch depth in any sample at any sampling interval except at <0.01-0.02 mg/kg in the 15.5- to 27.5-inch depth at 14 days posttreatment (Table II).

The soils were analyzed for three degradates,

2-(ethoxymethyl)amino-N-(2-ethyl-6-methylphenyl)oxoacetic acid (oxanilic acid),

N-(ethoxymethyl-N-(2-ethyl-6-methylphenyl)-3-oxoethane sulfonic acid (sulfonic acid), and

[ethoxymethyl(6-ethyl-o-tolyl)carbamoylmethyl sulfinyl]acetic acid (thioacetic acid sulfoxide), which were at maximum concentrations of 0.11-0.25 mg/kg, 0.02-0.06 mg/kg, and 0.12-0.23, respectively, at 90 days posttreatment in the top 3.5 inches of soil; at 189 days posttreatment, oxanilic and sulfonic acid were <0.02 mg/kg and thioacetic acid sulfoxide was <0.01 mg/kg (Tables IIa, IIb, and IIc). In the 3.5- to 7.0-inch soil depth samples, oxanilic acid was <0.02-0.02 mg/kg and 0.05-0.14 mg/kg at 6 and 90 days posttreatment, respectively; sulfonic acid was 0.02-0.08 mg/kg at 90 days; and thioacetic acid sulfoxide was 0.02-0.10 mg/kg at 90 days. Oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide were not detected below the 7.0-inch soil depth.

The seasonal depth to the water table was >6.5 feet, and the average slope of the plot was 0.2%. Throughout the study, (4/28/88-4/25/89) air temperatures ranged from 19 to 101 °F; and soil temperatures ranged from 30 to 111 °F at the 2-inch depth, and from 37 to 96 °F at the 8-inch depth. During the study, rainfall plus irrigation totaled approximately 50 inches.

COMMENTS:

1. This study was submitted by the registrant to provide data on the terrestrial field dissipation of the acetochlor degradate thioacetic acid sulfoxide. Data for parent acetochlor and the degradates oxanilic acid and sulfonic acid from the same field study were previously reviewed by Dynamac in a Task 1 Report dated May 24, 1991 (Study 4; MRIDs 41565152 and 41565153). Because the thioacetic acid sulfoxide data alone has little meaning, data on the dissipation of acetochlor and other degradates were incorportated into this review from the original documents.

2. Acetochlor, oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide have been shown to be stable in soil stored frozen at <0 C for approximately 2 years (739-789 days; Study 6 of this submission, MRID 42549907).

3. Acetochlor was applied in a tank-mix with the corn safener R25788 (7:1.18, w:w).

4. There is a typographical error in Table I. Based on data presented elsewhere in the document, the silt content of the soil from pit 11 is 56%, not 36% as cited in the table. Characterization of the soil to a depth of 48 inches was provided by the study authors (Appendix 2).

5. Since no pesticide application records were available to the registrant from this site, soil samples were collected and analyzed for unspecified residues. The study authors stated that no residues were detected.

6. The test site was disced and cultivated several times during the course of the study. Additionally, for weed control during the experiment, the plots were treated with atrazine on May 12 and glyphosate on June 6.

7. The study authors reported that the potential soil loss from the site is 6 tons of soil per acre per year.

RIN 2556-94 ACETOCHLOR REVIEW (121601)

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Pages 206 through 255 are not included.

The material not included contains the following type of information:

____ Identity of product inert ingredients.
____ Identity of product impurities.
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____ Description of quality control procedures.
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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 6

CHEM 121601 Acetochlor §164-1

FORMULATION--12--EMULSIFIABLE CONCENTRATE (EC)

STUDY ID 42549915
Zilka, S.A., B. Wilson, R.E. Hoag, B. Rodriguez, and N.D. Simmons. 1990. Acetochlor: Dissipation of residues in USA soil under field conditions - Visalia, California, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ0821B. Unpublished study performed by ICI Agrochemicals, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

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CONCLUSIONS:

Field Dissipation - Terrestrial

1. The field dissipation study provides consistent estimates of the persistence and leaching potential of parent acetochlor under field conditions. However, it does not address the persistence and mobility of degradates of acetochlor, since the soil samples were analyzed only for parent acetochlor.

2. Acetochlor (7 lb ai/gal EC), at 3 lb ai/A, dissipated with a registrant-calculated half-life of 8 days from the upper 3.5 inches of sandy loam soil in California. Acetochlor was not detected below the 7-inch depth in any sample at any sampling interval. The soil was sampled to a depth of 42 inches.

METHODOLOGY:

Acetochlor (2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide; 7 lb ai/gallon EC, ICI) was applied at 3 lb ai/A to a plot (50 feet x 110 feet) of sandy loam soil (0- to 6-inch depth: 52-62% sand, 30-36% silt, 8-12% clay, 0.6-1.0% organic matter, pH 8.0-8.3, CEC 7.3-9.4 meq/100 g) located near Visalia, California, on May 11, 1988. The herbicide was applied with a tractor-mounted spray boom and was incorporated with a rototiller to a depth of 2 inches immediately after application. After incorporation, the plot was planted to corn and the soil was rolled smooth. An untreated control plot (10 feet x 110 feet), was located 20 feet upwind from the treated plot. The treated plot was subdivided into three subplots that were separated by 10-foot wide alleyways. Seven soil cores were randomly collected from the 0- to 15.5-inch soil depth of each subplot (2-inch diameter, 0- to 3.5-inch depth; 1-inch diameter, 3.5- to 15.5-inch depth) and three cores were collected from the 6.0- to 42.0-inch depth of each subplot (2-inch diameter) at 0, 6, 13, and 28 days posttreatment, and at approximately 2, 3, and 6 months posttreatment; 6- to 42-inch cores were not collected at time 0. From the control plot, ten cores were collected from the 0- to 15.5-inch depth and six cores were collected from the 6.0- to 42.0-inch depth at each sampling interval. The upper soil cores (0- to 3.5- and 3.5- to 15.5-inch depths) were collected with hand-held zero-contamination corers, and subsurface cores (6.0- to 42.0-inch depth) were collected with hydraulic coring equipment. The upper cores were divided into 0- to 3.5-, 3.5- to 7.0-, 7.0- to 10.5-, and 10.5- to 15.5-inch segments; subsurface cores were divided into 6.0- to 15.5-, 15.5- to 27.5-, and 27.5- to 42.0-inch segments, and the 6.0- to 15.5-inch segments were discarded. Soil samples were frozen at <-10 °C after sampling, then transferred to the laboratory. In the laboratory, the samples were thawed briefly, and segments from each subplot were composited by depth and sampling interval. The composited cores were sieved (0- to 3.5-inch depth samples through a 2.0-mm screen, 3.5- to 27.5-inch depth samples through a 4-mm screen); and subsurface samples were mixed by hand. Samples were refrozen for up to 462 days at <-10 °C prior to analysis; the samples were thawed for 2 hours prior to extraction.

Soil subsamples were extracted with acetonitrile:water (1:1, v:v) by shaking for 30 minutes at room temperature. Soil samples with a higher clay content were extracted with acetonitrile:water (3:1, v:v). The extracts were removed from the soil by vacuum-filtration, then partitioned against methylene chloride. The methylene chloride layer was removed and evaporated to dryness under vacuum, and the resulting residues were dissolved in hexane. Aliquots of the hexane solution were analyzed using GC with nitrogen detection. The detection limit was 0.01 mg/kg. The recovery of acetochlor from soil samples fortified at 0.01-1.0 mg/kg was 78-124% (Appendix III).

DATA SUMMARY:

Acetochlor (2-chloro-N-ethoxymethyl-6′-ethylacet-o-toluidide; 7 lb ai/gallon EC) at 3 lbs ai/A, dissipated with a registrant-calculated half-life of 8 days from the upper 3.5 inches of plots of sandy loam soil in California that were treated on May 11, 1988 and immediately tilled to a 2-inch depth and planted to corn. In the 0- to 3.5-inch soil depth, acetochlor decreased from 0.25-1.66 mg/kg immediately posttreatment to 0.13-0.89 mg/kg at 6 days, 0.02-0.19 mg/kg at 28 days, and <0.01 mg/kg at 61 days. In the 3.5- to 7.0-inch soil depth, acetochlor was ≤0.02 mg/kg immediately posttreatment, and was <0.01 mg/kg at all other sampling intervals. Acetochlor was not detected (<0.01 mg/kg) below the 7.0-inch depth in any sample at any sampling interval (Table II). The soil was not analyzed for any other degradates.

The seasonal depth to the water table fluctuates from 10 to 25 feet, and the plot was levelled to 0%. Throughout the study (5/11/88-11/15/88), air temperatures ranged from 38 to 105 °F; and soil temperatures ranged from 52 to 112 °F at the 2-inch depth, and from 55 to 92 °F at the 8-inch depth. During the study, rainfall plus irrigation totaled approximately 22 inches.

COMMENTS:

1. The soil was analyzed only for parent acetochlor. Three degradates, oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide (or sulfinyl acetic acid; refer to Dynamac's appendix for chemical nomenclature and structures), were identified in the other field dissipation studies submitted with this study (Study 1, MRID 42573402; Study 2, MRID 42549917; and Study 3, MRID 42549918). Subdivision N guidelines state that the pattern of formation and decline of degradates must be addressed.

2. Acetochlor, oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide have been shown to be stable in soil stored frozen at <0 °F for approximately 2 years (739-789 days; Study 6 of this submission, MRID 42549907).

3. The study authors stated that the acetochlor residues detected at the 3.5- to 7-inch depth at 0 days posttreatment were a result of incorporation of the pesticide immediately after application. The pesticide was not detected below the 3.5-inch depth at any other sampling interval.

4. Approximately 0.5 inches of irrigation water was applied to the plots after collection of the day 0 soil samples.

5. Acetochlor was applied in a tank-mix with the corn safener R25788 (7:1.18, w:w).

6. Soil characterization to 48 inches was included in Appendix 2.

7. Pesticide application records were available for this site for 4 years prior to the study. In 1984, hexaconazole, "PP192", and flutriafol were applied at 0.045-0.09, 0.45-0.9, and 0.11 lb ai/A, respectively, and triphenyltin hydroxide and benomyl were applied at unspecified rates. In 1985, triadimefon, chlorothalonil, hexaconazole, and carbendazim were applied at 0.1249, 0.3304, 0.0599-1.1013, and 0.3304 lb ai/A, respectively. In 1986 and 1987, no pesticides were applied.

8. During the study, the test plots were treated with the dimethylamine salt of dicamba and spot-treated with glyphosate in June-November, 1988. Additionally, the plots were rototilled for trial maintenance and weed control in October and November.

RIN 2556-94 ACETOCHLOR REVIEW (121601)

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____ Identity of product impurities.

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____ Description of quality control procedures.

____ Identity of the source of product ingredients.

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DATA EVALUATION RECORD 7

CHEM 121601 Acetochlor §164-1

FORMULATION--12--EMULSIFIABLE CONCENTRATE (EC)

STUDY ID 42549916
Zilka, S.A., B. Wilson, R.E. Hoag, O.H. Kirsch, and N.D. Simmons. 1990. Acetochlor: Dissipation of residues in USA soil under field conditions - Goldsboro, North Carolina, 1988. Laboratory Project No. 5676-88-SD-01. Report No. RJ0822B. Unpublished study performed by ICI Agrochemicals, Bracknell, Berkshire, UK, and submitted by ICI Americas, Inc., Wilmington, DE.

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SIGNATURE:

CONCLUSIONS:

Field Dissipation - Terrestrial

1. The field dissipation study provides consistent estimates of persistence and mobility of parent acetochlor under field conditions. However, the study did not provide any information on the persistence and mobility of degradates of acetochlor.

2. Acetochlor (7 lb ai/gal EC), at 4.3 lb ai/A, dissipated with a registrant-calculated half-life of 9 days from the upper 3.5 inches of sandy loam soil in North Carolina. Acetochlor was not detected below the 7-inch depth in any sample at any sampling interval. The soil was sampled to a depth of 42 inches.

METHODOLOGY:

Acetochlor (2-chloro-N-ethoxymethyl-6′-ethylacet-o-toluidide; 7.0 lb ai/gallon EC, ICI) was applied at 4.3 lb ai/A to a plot (40 feet x 100 feet) of sandy loam soil (0- to 8-inch depth: 44-74% sand, 20-42% silt, 6-16% clay, 1.0-2.3% organic matter, pH 6.1-6.8, CEC 2.5-5.0 meq/100 g) located near Goldsboro, North Carolina, on May 3, 1988. The herbicide was applied with a tractor-mounted spray boom and was incorporated to a depth of 2 inches immediately after

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application. After incorporation, the plot was planted to corn; there was no further manipulation of the soil. An untreated control plot (13 feet x 100 feet) was located 20 feet upwind from the treated plot. The treated plot was subdivided into three subplots. Seven soil cores were randomly collected from the 0- to 15.5-inch soil depth of each subplot (2-inch diameter, 0- to 3.5-inch depth; 1-inch diameter, 3.5- to 15.5-inch depth) and three cores were taken from the 15.5- to 42.0-inch depth of each subplot (1- or 2-inch diameter) at 0, 6, 13, and 28 days posttreatment, and at approximately 2, 3, 6 and 12 months posttreatment; 15.5- to 42.0-inch cores were not collected at time 0. From the control plot, ten cores were collected from the 0- to 15.5-inch depth, and six cores were taken from the 15.5- to 42.0-inch depth at each sampling interval. The upper soil cores (0- to 3.5- and 3.5- to 15.5-inch depths) were collected with a hand-held zero-contamination corer. The 15.5- to 42.0-inch soil cores were collected by taking two successive 13.25-inch cores, rather than as a single core. To collect these samples, a hole was hand-excavated to a depth of 6.0 inches; the hole was deepened to 15.5 inches with a hand auger. Then the two successive 13.25-inch cores were collected from the bottom of the hole using a 48.0-inch zero-contamination hydraulic corer. The upper cores were divided into 0- to 3.5-, 3.5- to 7.0-, 7.0- to 10.5-, and 10.5- to 15.5-inch segments; subsurface cores were not further divided. Soil samples were frozen at approximately -18 °C after sampling, then transferred to the laboratory. In the laboratory, the samples were thawed briefly, and segments from each subplot were composited by depth and sampling interval. The composited cores were sieved (0- to 3.5-inch depth samples through a 2.0-mm screen, 3.5- to 27.5-inch depth samples through a 4-mm screen); and subsurface samples were mixed by hand. Samples were refrozen for up to 462 days at approximately -18 °C prior to analysis; the samples were thawed for 2 hours prior to extraction.

Soil subsamples were extracted with acetonitrile:water (1:1, v:v) by shaking for 30 minutes at room temperature. Soil samples with a higher clay content were extracted with acetonitrile:water (3:1, v:v). The extracts were removed by vacuum-filtration, then partitioned against methylene chloride. The methylene chloride layer was removed and evaporated to dryness under vacuum, and the resulting residues were dissolved in hexane. Aliquots of the hexane solution were analyzed by GC with nitrogen detection. The detection limit was 0.01 mg/kg. The recovery of acetochlor from soil samples fortified at 0.01-1.0 mg/kg was 86-126% (Appendix III).

DATA SUMMARY:

Acetochlor (2-chloro-N-ethoxymethyl-6′-ethylacet-o-toluidide; 7 lb ai/gallon EC), at 4.3 lbs ai/A, dissipated with a registrant-calculated half-life of 9 days from the upper 3.5 inches of plots of sandy loam soil in North Carolina that were treated on May 3, 1988 and immediately tilled to a 2-inch depth and planted to corn. In the

0- to 3.5-inch soil depth, acetochlor decreased from 2.90-3.63 mg/kg immediately posttreatment to 0.59-1.20 mg/kg at 13 days, 0.08-0.57 ppm at 28 days, and ≤0.01 mg/kg at 90-353 days. In the 3.5- to 7.0-inch depth, acetochlor was ≤0.01 mg/kg at all sampling intervals. Acetochlor was not detected (<0.01 mg/kg) below the 7-inch depth in any sample at any sampling interval (Table II). The soil was not analyzed for any other degradates.

The mean annual depth to the water table was >5 feet, and the slope of the plot was 0-1.2%. Throughout the study (5/3/88-4/21/89), air temperatures ranged from 15 to 103 °F; and soil temperatures ranged from 33 to 117 °F at the 2-inch depth, and from 29 to 89 °F at the 8-inch depth. During the study, rainfall plus irrigation totaled approximately 58 inches.

COMMENTS:

1. The soil was analyzed only for parent acetochlor. Three degradates, oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide (or sulfinyl acetic acid; refer to Dynamac's appendix for chemical nomenclature and structures), were identified in the other field dissipation studies submitted with this study (Study 1, MRID 42573402; Study 2, MRID 42549917; and Study 3, MRID 42549918). Subdivision N guidelines state that the pattern of formation and decline of degradates must be addressed.

2. Acetochlor, oxanilic acid, sulfonic acid, and thioacetic acid sulfoxide have been shown to be stable in soil stored frozen at <0 °F for approximately 2 years (739-789 days; Study 6 of this submission, MRID 42549907).

3. The test plots were treated at 4.34 lb ai/A rather that at 3 lb ai/A due to a calculation error made during the preparation of the tank mix.

4. Soil characterization to 48 inches was included in Appendix 2.

5. Acetochlor was applied as a tank-mix with the corn safener R25788 (7:1.18, w:w).

6. Pesticide application records were available for this site for five years prior to the study. In 1983, dicamba, 2,4-D, and "PP604" were applied at unspecified rates; in 1984, 1985, and 1986, no pesticides were applied; and in 1987, butylate and tefluthrin (2 applications) were applied at 5.025 lb ai/A and 0.289 lb ai/A (2 applications), respectively.

7. During the study, the plots were treated with cyanazine, paraquat, and glyphosate. No maintenance was performed during the course of the study.

8. The study authors stated that the potential for soil loss from the study site was <0.5 tons of soil per acre per year.

. RIN 2556-94 ACETOCHLOR REVIEW (121601)

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____ Identity of product impurities.

____ Description of the product manufacturing process.

____ Description of quality control procedures.

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____ The product confidential statement of formula.

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DATA EVALUATION RECORD 8

CHEM 121601 Acetochlor

FORMULATION--00--ACTIVE INGREDIENT

STUDY ID 42549907
Lauer, R. 1992. Stability of acetochlor and its metabolites in soil during frozen storage. Laboratory Project No. MSL-11981. Unpublished study performed by Monsanto Company, St. Louis, MO, and submitted by ICI Americas, Inc., Wilmington, DE.

DIRECT REVIEW TIME = 19

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J. Breithaupt

SIGNATURE:

CONCLUSIONS:

Ancillary Study - Freezer Storage Stability

1. This study provides ancillary information on the freezer storage stability of acetochlor, oxanilic acid, sulfinyl acetic acid, and sulfonic acid in soil stored at <0 °C for 739-789 days.

2. Acetochlor was stable in silt loam and silty clay soils fortified at 0.10 ppm and stored frozen at <0 °C for 776 and 739 days, respectively. The sodium salts of the acetochlor degradates [(ethoxymethyl)[2-ethyl-6-methylphenyl]amino]oxo acetic acid (oxanilic acid), [{2-[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid (sulfinyl acetic acid), and (2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)amino]-2-oxo-ethanesulfonic acid (sulfonic acid) were stable in silt loam and silty clay soils fortified at 0.10 ppm and stored frozen at <0 °C for 789 and 742 days, respectively.

METHODOLOGY:

Portions of silt loam soil (16% sand, 58% silt, 26% clay, 1.7% organic matter, pH 5.7, CEC 12.0 meq/100 g) and silty clay soil (18% sand, 42% silt, 40% clay, 0.7% organic matter, pH 5.7, CEC 22.5 meq/100 g) were fortified at 0.01 ppm with acetochlor (2-chloro-N-ethoxymethyl-6′-ethylacet-o-toluidide; purity 99.5%, Monsanto) dissolved in acetonitrile. Additional portions of the soils were fortified with a mixture of the sodium salts of the acetochlor degradates [(ethoxymethyl)[2-ethyl-6-methylphenyl]amino]oxo acetic acid (oxanilic acid; purity >95%), [{2-[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid (sulfinyl acetic acid; purity ≥92.6%), and 2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)-amino]-2-oxo-ethanesulfonic acid (sulfonic acid; purity >95%), each at 0.10 ppm; the degradates were dissolved in acetonitrile:water (50:50, v:v). The fortified soil samples were stored frozen at <0 °C; duplicate samples were removed for analysis at intervals up to 776 days posttreatment for acetochlor and 789 days for acetochlor degradates.

For analysis of acetochlor, subsamples (20 g) of the soil were extracted with 10% acetonitrile in water:20% ethyl acetate in iso-octane (10:50, v:v) by shaking on a reciprocating shaker for 1 hour. After the extraction, the slurries were allowed to settle for >1 hour, and the extract was then filtered through glass wool and anhydrous sodium sulfate. Aliquots of the extracts were analyzed by GC with electron capture detection. The identification and quantitation of acetochlor in the extracts were achieved by comparison to an acetochlor reference standard. The detection limit was 0.005 mg/kg.

For analysis of the sodium salts of the acetochlor degradates: [(ethoxymethyl)[2-ethyl-6-methylphenyl]amino]oxo acetic acid (oxanilic acid), [{2-[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid (sulfinyl acetic acid), and 2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)amino]-2-oxo ethanesulfonic acid (sulfonic acid), subsamples of the soil were extracted with acetonitrile:water (60:40, v:v) by shaking for 30 minutes. After the extraction, the slurries were centrifuged and the supernatants were decanted. The extracts were applied to pre-rinsed (water and 50% acetonitrile in water) C-18:Florisil:activated carbon columns. The eluates were collected, and the columns were rinsed with acetonitrile:water (50:50, v:v); the eluates and rinsates were combined. The combined solutions were centrifuged or filtered through glass wool, and the supernatants were concentrated using rotary evaporation under vacuum at 40 °C. The concentrated solutions were diluted with acetonitrile and acidified with dilute phosphoric acid; the solutions were filtered (0.22 um), and concentrated by rotary evaporation at room temperature. The residues were dissolved in acetonitrile:pH 6 potassium phosphate buffer (15:85, v:v) and the solutions were filtered (0.22 um). Aliquots of the filtrates were analyzed by HPLC using a Zorbax ODS column eluted with an acetonitrile:pH 6 potassium phosphate buffer gradient; the column was equipped with UV (210 nm) detection. Compound identifications and quantitations were achieved by comparison to reference standards of the three degradates. The detection limit was 0.01 mg/kg.

DATA SUMMARY:

Acetochlor (2-chloro-N-ethoxymethyl-6′-ethylacet-o-toluidide, purity 99.5%) was stable in silt loam and silty clay soils fortified at 0.10 ppm and stored frozen at <0 °C for 776 and 739 days, respectively. Throughout the study, recoveries of acetochlor were 70.7-115% in the silt loam soil (Table 5), and 77.8-104% in the silty clay soil (Table 6); there was no discernable pattern of decline.

> [(Ethoxymethyl)[2-ethyl-6-methylphenyl]amino]oxo acetic acid (oxanilic acid; purity >95%);
>
> ({2-[(ethoxymethyl)(2-ethyl-6-methylphenyl)amino]-2-oxoethyl}sulfinyl]acetic acid (sulfinyl acetic acid; purity ≥92.6%); and
>
> (2-[(2-ethyl-6-methylphenyl)(ethoxymethyl)amino]-2-oxo-ethanesulfonic acid, (sulfonic acid; purity >95%)

were stable in silt loam and silty clay soils fortified at 0.10 ppm and stored frozen at <0 °C for 789 and 742 days, respectively. Throughout the study, the recoveries of oxanilic acid, sulfinyl acetic acid, and sulfonic acid were 74.8-116%, 69.2-111%, and 73.9-113%), respectively, in the silt loam soil (Tables 7-9). The recoveries of oxanilic acid, sulfinyl acetic acid, and sulfonic acid were 71.4-110%, 73.5-103%, and 69.6-109%, respectively, in the silty clay soil (Tables 10-12).

COMMENTS:

1. It was unclear from the methods description whether the soil was treated prior to or after transfer to the storage containers. Therefore, it could not be determined if the samples had been treated individually or were subsamples of a bulk treatment, and whether some of the observed variabilty could be due to errors introduced during application.

2. The soil samples fortified in this study were collected from the 0- to 6- and 18- to 24-inch soil depths at a test site in Elwood, Illinois used for a terrestrial field dissipation study (Study 1, MRID 42573402). The soil from the 0- to 6-inch depth was classified as a silt loam soil; the soil from the 18- to 24-inch depth was classified as a silty clay soil. The soil characterization reported in this review were taken from Study 1.

3. In the protocol provided within the study, it was specified that fortifications standards were to be prepared from analytical grade acetochlor and from the microencapsulated formulation of acetochlor (MON 8422). However, it appears from the methods description in the study that only analytical grade acetochlor was used for the study.

4. The reported results for the storage stability samples were not corrected for recoveries of analytical check standards prepared on each day of analysis.

. RIN 2556-94 Acetochlor Review (121601)

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Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
ACETOCHLOR (ARP)
Last Update on December 6, 1993
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

LOGOUT	Reviewer: JAB	Section Head:	Date:

Common Name:ACETOCHLOR (ARP)
Smiles Code:
PC Code # :121601 CAS #:34256-82-1 Caswell #:

Chem. Name :2-CHLORO-N-(ETHOXYMETHYL)-N-(2-ETHYL-6-METHYL-PHENYL)-ACETAMIDE
Action Type:HERBICIDE

Trade Names:HARNESS, TOPHAND, SURPASS
(Formul'tn): 7 EC
Physical State: STRAW-COLORED LIQU9ID

Use Patterns (% Usage) :CORN-100 %
:
:
:

Empirical Form:	$C_{14}H_{20}NO_2Cl$		
Molecular Wgt.:	269.80	Vapor Pressure:	4.40E -5 Torr
Melting Point :	°C	Boiling Point:	°C
Log Kow :	3.0	pKa:	@ °C
Henry's :	E Atm. M3/Mol (Measured)		7.00E -8 (calc'd)

Solubility in ...					Comments
Water	2.23E 2	ppm	@20.0	°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
[ ] pH 7.0:STABLE
[ ] pH 9.0:STABLE
[ ] pH :
[ ] pH :
[ ] pH :

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
ACETOCHLOR (ARP)
Last Update on December 6, 1993
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Photolysis (161-2, -3, -4)
[V] Water:STABLE
[ ] :
[ ] :
[ ] :

[V] Soil :STABLE
[ ] Air :

Aerobic Soil Metabolism (162-1)
[S] 14 DAYS IN SILTY CLAY LOAM (ICI)
[ ] 110 DAYS FOLLOWED BY 245 DAYS FOR SANDY LOAM (ICI)
[ ] 8-12 DAYS IN RAY, DRUMMER, AND SPINKS SOILS (MON)
[ ]
[ ]
[ ]
[ ]

Anaerobic Soil Metabolism (162-2)
[S] 230 DAYS IN SANDY LOAM SOIL. IDENTIFIED DEGRADATES WERE
[ ] OXANILIC ACID, SULFONIC ACID, AND N-(ETHOXYMETHYL)-N-(2-ETHYL-
[ ] 6-METHYLPHENYL)ACETAMIDE. (ICI)
[S] 17-21 DAYS IN SANDY LOAM, SILT LOAM, AND SILTY CLAY LOAM.
[ ]
[ ]
[ ]

Anaerobic Aquatic Metabolism (162-3)
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Aerobic Aquatic Metabolism (162-4)
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Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
ACETOCHLOR (ARP)
Last Update on December 6, 1993
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Soil Partition Coefficient (Kd) (163-1)

[V]	TEXTURE	OM	pH	Kads	Koc	OX ACID	SULF ACID
[ ]	LILLY FIELD SD	0.77	5.4	1.9	428	0.55	0.30
[ ]	FRENSHAM LM SD	1.90	6.3	0.81	74	0.19	0.23
[ ]	EAST JUBILEE SD LM	2.6	6.5	5.9	389	1.20	6.40
[ ]	OLD PADDOCK	5.4	6.8	7.5	239	0.77	1.60
[ ]	FRENCH A (CRS SD)	1.5	5.7	1.9	216	0.27	0.27

Soil Rf Factors (163-1)

[ ]	FRENCH B (SD LM)	8.0	5.3	20	422	0.91	1.10
[ ]							
[ ]							
[ ]							
[ ]							
[ ]							

Laboratory Volatility (163-2)
[ ]
[ ]

Field Volatility (163-3)
[ ]
[ ]

Terrestrial Field Dissipation (164-1)
[S] 8-36 days at 5 sites in U.S. No leaching below 12 inches in
[ ] 4 of the sites. The degradates oxanilic acid and sulfonic acid
[ ] leached to 18 inches of depth in silt loam soil in Illinois.
[ ]
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Aquatic Dissipation (164-2)
[ ]
[ ]
[ ]
[ ]
[ ]
[ ]

Forestry Dissipation (164-3)
[ ]
[ ]

322

Long-Term Soil Dissipation (164-5)
[ ]
[ ]

Accumulation in Rotational Crops, Confined (165-1)
[V] CONCENTRATION IN CROPS WERE 0.09 PPM IN LETTUCE, 0.14-0.67 PPM
[ ] IN RADISH, 0.05-2.88 PPM IN WHEAT.

Accumulation in Rotational Crops, Field (165-2)
[V] TOTAL RESIDUES WERE <DETECTION LIMIT (0.03 PPM). CONCENTRATIONS
[ ] RANGED FROM 0.128 PPM TO 0.769 PPM IN SOYBEAN PARTS.

Accumulation in Irrigated Crops (165-3)
[ ]
[ ]

Bioaccumulation in Fish (165-4)
[V] 40X, 780X, AND 150X FOR EDIBLE, NON-EDIBLE, AND WHOLE FISH,
[ ] RESPECTIVELY. 66-98 % DEPURATION BY 28 DAYS.

Bioaccumulation in Non-Target Organisms (165-5)
[ ]
[ ]

Ground Water Monitoring, Prospective (166-1)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Small Scale Retrospective (166-2)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Large Scale Retrospective (166-3)
[ ]
[ ]
[ ]
[ ]

Ground Water Monitoring, Miscellaneous Data (158.75)
[ ]
[ ]
[ ]

Field Runoff (167-1)
[ ]
[ ]
[ ]
[ ]

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

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

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

Degradation Products

OXANILIC ACID
SULFONIC ACID
THIOACETIC ACID SULFOXIDE
C02
OTHER MINOR PRODUCTS

Environmental Fate & Effects Division
PESTICIDE ENVIRONMENTAL FATE ONE LINE SUMMARY
ACETOCHLOR (ARP)
Last Update on December 6, 1993
[V] = Validated Study [S] = Supplemental Study [U] = USDA Data

Comments

References: EFGWB REVIEWS
Writer : JAB

RIN 2556-94 ACETOCHLOR REVIEW (121601)

Page _____ is not included in this copy.

Pages 326 through 355 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.

CASE: 194562
SUBMISSION: S411577

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/29/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: EUP (SECT 5)   ACTION: 704 EUP NC N-F/F USE AMND
CHEMICALS: 121601 Acetochlor (ANSI)   70.8700%

ID#: 010182-EUP-054
COMPANY: ZENECA INC
PRODUCT MANAGER: 23 JOANNE MILLER   703-305-7830   ROOM: CM2 237
PM TEAM REVIEWER: JESSE MAYES   703-305-5218   ROOM: CM2 235
RECEIVED DATE: 02/11/92   DUE OUT DATE: 06/10/92

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 174457   EXPEDITE: N   DATE SENT: 02/13/92   DATE RET.: / /
CHEMICAL: 121601 Acetochlor (ANSI)
DP TYPE: 001 Submission Related Data Package
CSF: N   LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	02/18/92	/ /
BRAN: EFGB	02/18/92	/ /
SECT: CRS3	02/19/92	/ /
REVR : JBREITHA	02/20/92	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 05/03/92
NEGOT DATE: / /
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Please review this response to your review of 1/18/91.

Thanks.

* * * DATA PACKAGE EVALUATION * * *

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL

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CASE: 194562
SUBMISSION: S425704

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/29/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: EUP (SECT 5) ACTION: 716 EUP NC F/F EXT/RENW REQ
CHEMICALS: 121601 Acetochlor (ANSI) 70.8700%

ID#: 010182-EUP-054
COMPANY: ZENECA INC
PRODUCT MANAGER: 23 JOANNE MILLER 703-305-7830 ROOM: CM2 237
PM TEAM REVIEWER: JESSE MAYES 703-305-5218 ROOM: CM2 235
RECEIVED DATE: 08/28/92 DUE OUT DATE: 12/26/92

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 182799 EXPEDITE: N DATE SENT: 09/21/92 DATE RET.: / /
CHEMICAL: 121601 Acetochlor (ANSI)
DP TYPE: 001 Submission Related Data Package
CSF: N LABEL: Y

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	09/21/92	/ /
BRAN: EFGB	09/21/92	/ /
SECT: CRS3	09/21/92	/ /
REVR : JBREITHA	09/21/92	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 12/10/92
NEGOT DATE: / /
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

ICI is requesting an extension of their EUP for use of acetechlor on corn. No new environmental fate data are submitted. Please indicate in light of your previous reviews if this extension is acceptable.

Thanks.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package.

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
182797	EEB/RS3	09/21/92	12/10/92	Y	N	Y
182801	TB-2/RS-1	09/21/92	12/10/92	Y	N	Y
182802	TSCB/TS-2	09/21/92	12/10/92	Y	N	Y

357

CASE: 015532
SUBMISSION: S434799

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/29/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REGISTRATION ACTION: 100 NC-FOOD/FEED USE
CHEMICALS: 121601 Acetochlor (ANSI) 81.1500%

ID#: 066478-E ACETOCHLOR EC
COMPANY: 066478 ACETOCHLOR REGISTRATION PARTNERSHIP
PRODUCT MANAGER: 25 ROBERT TAYLOR 703-305-6800 ROOM: CM2 241
PM TEAM REVIEWER: VICKIE WALTERS 703-305-5704 ROOM: CM2 257
RECEIVED DATE: 11/09/92 DUE OUT DATE: 05/18/93

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 187736 EXPEDITE: N DATE SENT: 02/05/93 DATE RET.: / /
CHEMICAL: 121601 Acetochlor (ANSI)
DP TYPE: 001 Submission Related Data Package
CSF: N LABEL: Y

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	02/09/93	/ /
BRAN: EFGB	02/10/93	/ /
SECT: CRS3	02/10/93	/ /
REVR : JBREITHA	02/10/93	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 06/05/93
NEGOT DATE: / /
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Please review entire data base for acetochlor and enclosed additional data to determine if proposed registration is supported.

Please Note: Monsanto and ICI(now Zeneca) have formed a partnership for the chemical acedtochlor(see enclosed letters), therefore the dat bases from both companies are to be used to support the proposed registration.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package.

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
187733	TSCB/TS-2	02/05/93	06/05/93	Y	N	Y
187734	TB-2/RS-1	02/05/93	06/05/93	Y	N	Y
187735	OREB/RSRS	02/05/93	06/05/93	Y	N	Y
187737	EEB/IO	02/05/93	06/05/93	Y	N	Y

CASE: 284617
SUBMISSION: S441876

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/29/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: MISCELLANEOUS ACTION: 400 DATA-MISC DATA-NOT REQUES
CHEMICALS: 121601 Acetochlor (ANSI) 0.0000%

ID#: 284617
COMPANY: ACETOCHLOR REGISTRATION PARTNERSHIP
PRODUCT MANAGER: 25 ROBERT TAYLOR 703-305-6800 ROOM: CM2 241
PM TEAM REVIEWER: VICKIE WALTERS 703-305-5704 ROOM: CM2 257
RECEIVED DATE: 05/19/93 DUE OUT DATE: 11/15/93

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 191846 EXPEDITE: N DATE SENT: 06/03/93 DATE RET.: 06/05/93
CHEMICAL: 121601 Acetochlor (ANSI)
DP TYPE: 001 Submission Related Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	06/03/93	06/05/93
BRAN: EFGB	06/03/93	06/05/93
SECT: IO	06/03/93	06/05/93
REVR : HJACOBY	06/03/93	06/05/93
CONTR:	/ /	/ /

ADMIN DUE DATE: 09/21/93
NEGOT DATE: / /
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Attention: Hank Jacoby
Minutes of meeting held April 20, 1993 between Acetochlor Parternership and Agency to discuss acetochlor data base.
Please review and comment/concur.

* * * DATA PACKAGE EVALUATION * * *

No comments

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL
191847	EEB/RS3	06/03/93	09/21/93	Y	N	N

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CASE: 015532
SUBMISSION: S445173

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/29/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REGISTRATION ACTION: 101 RESB NC-FOOD/FEED USE
CHEMICALS: 121601 Acetochlor (ANSI) 81.1500%

ID#: 066478-E ACETOCHLOR EC
COMPANY: 066478 ACETOCHLOR REGISTRATION PARTNERSHIP
PRODUCT MANAGER: 25 ROBERT TAYLOR 703-305-6800 ROOM: CM2 241
PM TEAM REVIEWER: VICKIE WALTERS 703-305-5704 ROOM: CM2 257
RECEIVED DATE: 07/29/93 DUE OUT DATE: 02/04/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 193537 EXPEDITE: N DATE SENT: 07/29/93 DATE RET.: / /
CHEMICAL: 121601 Acetochlor (ANSI)
DP TYPE: 001 Submission Related Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	08/02/93	/ /
BRAN: EFGB	08/02/93	/ /
SECT: CRS3	08/02/93	/ /
REVR : JBREITHA	08/02/93	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 11/26/93
NEGOT DATE: 11/26/93
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Attention Jim Briethaupt:
Please review aerobic soil metabolism studies (MRIDs 41963316 and 41963317) in support of the registration of acetochlor for use on corn (Partnership).

Please note: review already has data in his possession.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package.

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL

CASE: 015532
SUBMISSION: S447198

DATA PACKAGE RECORD
BEAN SHEET

DATE: 09/29/93
Page 1 of 1

* * * CASE/SUBMISSION INFORMATION * * *

CASE TYPE: REGISTRATION ACTION: 101 RESB NC-FOOD/FEED USE
CHEMICALS: 121601 Acetochlor (ANSI) 81.1500%

ID#: 066478-E ACETOCHLOR EC
COMPANY: 066478 ACETOCHLOR REGISTRATION PARTNERSHIP
PRODUCT MANAGER: 25 ROBERT TAYLOR 703-305-6800 ROOM: CM2 241
PM TEAM REVIEWER: VICKIE WALTERS 703-305-5704 ROOM: CM2 257
RECEIVED DATE: 08/25/93 DUE OUT DATE: 03/03/94

* * * DATA PACKAGE INFORMATION * * *

DP BARCODE: 194713 EXPEDITE: N DATE SENT: 09/03/93 DATE RET.: / /
CHEMICAL: 121601 Acetochlor (ANSI)
DP TYPE: 001 Submission Related Data Package
CSF: N LABEL: N

ASSIGNED TO	DATE IN	DATE OUT
DIV : EFED	09/07/93	/ /
BRAN: EFGB	09/07/93	/ /
SECT: CRS3	09/08/93	/ /
REVR : JBREITHA	09/08/93	/ /
CONTR:	/ /	/ /

ADMIN DUE DATE: 01/01/94
NEGOT DATE: 01/01/94
PROJ DATE: / /

* * * DATA REVIEW INSTRUCTIONS * * *

Attention Jim Briethaupt:
Soil analyses data from crop rotation data. Enclosed is a copy of TSCB's review of crop rotation information.

* * * DATA PACKAGE EVALUATION * * *

No evaluation is written for this data package.

* * * ADDITIONAL DATA PACKAGES FOR THIS SUBMISSION * * *

DP BC	BRANCH/SECTION	DATE OUT	DUE BACK	INS	CSF	LABEL