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This DER was originally prepared under contract by Dynamac Corporation (1910 Sedwick Rd., Building 100, Suite B; Durham, NC 27713; submitted 2/20/2005). This DER has been reviewed by the HED and revised to reflect current OPP policies.

STUDY REPORT:

44107106 Schneider, R.; Schneider, D. (1996) Acetochlor Residues in Alfalfa and Clover Rotational Crop Raw Agricultural Commodities Following Application of Acetochlor Herbicide to Field Corn: Lab Project Number: MSL-14276: 94-27-R-1: 94-27-R-1-IL. Unpublished study prepared by Monsanto Co. and American Agricultural Services, Inc. 614 p.

EXECUTIVE SUMMARY:

Eleven alfalfa and eight clover trials were conducted at field sites throughout the U.S. during 1994 -1995. At each test site, acetochlor (8.0 lb/gal EC) was applied to a primary crop of field or sweet corn as a single, early-season, postemergence broadcast application at ~3.0 lb ai/A. The corn was grown and harvested following common agricultural practices. The alfalfa and clover were planted at typical plantback intervals for the respective regions. Alfalfa was planted at 55-84 days after treatment (2-3 months) in four tests and at 291-355 DAT (9-12 months) in the other 7 tests. Clover was planted at 130 DAT (4 months) in one test and at 274-355 DAT (9-12 months) in the other 8 tests. The alfalfa and clover crops were cut 1-3 three times during the season at each site depending on local agricultural practices. A single control and duplicate treated samples of forage and hay were collected from each cutting; forage samples were collected and frozen immediately after cutting, and hay samples were field dried for 1-6 days before collection. Due to poor weather conditions, samples of clover forage and hay were not collected from one site. Samples were stored frozen for up to 239 days prior to analysis, an interval supported by available storage stability data.

A High Performance Liquid Chromatography/Oxidative Coulometric Electrochemical Detection (HPLC/OCED) method was used to determine residues of acetochlor (converted to EMA) and its metabolites containing the ethyl methyl aniline (EMA) and hydroxyethyl methyl aniline (HEMA)

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moieties in alfalfa and clover forage and hay. The method, which is equivalent to the current tolerance enforcement method and is therefore considered validated to recover field weather residues, has also been adequately validated in conjunction with the analysis of field rotational crop samples as a data collection method. The LOQ for HEMA is 0.014 ppm, the LOQ for EMA is 0.012 ppm, and the LOD is 0.004 ppm for both metabolites.

For alfalfa, combined residues of EMA and HEMA in forage were <0.04-0.56 ppm at the 1st cutting, <LOQ-0.30 ppm at the 2nd cutting, and <LOQ-0.16 ppm in the 3rd cutting. For alfalfa hay, residues were 0.11-1.95 ppm at the 1st cutting, 0.05-0.74 ppm at the 2nd cutting and <0.04-0.25 ppm at the 3rd cutting. For clover, combined residues in forage were <LOQ-0.59 ppm at the 1st cutting, <0.04-0.27 ppm at the 2nd cutting, and <0.03-0.05 ppm at the 3rd cutting. For clover hay, residues were <LOQ-1.25 ppm at the 1st cutting, <LOQ-0.58 ppm at the 2nd cutting, and <0.04-0.13 ppm at the 3rd cutting.

For forage and hay from both alfalfa and clover, residue levels declined steadily at later cuttings. Average combined residues at the 1st cutting were 0.27 ppm for alfalfa forage, 0.66 ppm for alfalfa hay, 0.20 ppm for clover forage and 0.31 ppm for clover hay. Although several of the alfalfa sites had PBIs of 2-3 months and one clover site had a PBI of 4 months, insufficient data are available to determine the impact on PBIs on residue levels given the limited geographic scope and number of trials reflecting a shorter PBI.

Samples of alfalfa and clover forage and hay were not analyzed for residues of acetochlor metabolites with the hydroxymethyl ethyl aniline (HMEA) moiety.

STUDY/WAIVER ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS:

Under the conditions and parameters used in this study, the field rotational crop data are classified as scientifically acceptable. The acceptability of this study for regulatory purposes is addressed in the forthcoming U. S. EPA document entitled *Acetochlor: Petitions for Tolerances on Sweet Corn and Rotational Crops of Nongrass Animal Feeds (Group 18), Sugar Beets, Dried Shelled Beans and Peas (Subgroup 6C), Sunflowers, Potatoes, Cereal Grains (Group 15), and Forage, Fodder, and Straw of Cereal Grains (Group 16). Summary of Analytical Chemistry and Residue Data* (D. Davis, D230310).



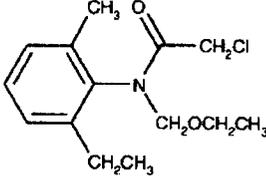
COMPLIANCE:

Signed and dated GLP, quality assurance, and data confidentiality statements were provided. No deviations from regulatory requirements were noted that would impact the study results or their interpretation.

A. BACKGROUND INFORMATION

Acetochlor is a chloroacetanilide herbicide used for preemergence control of weeds in corn. In the United States, acetochlor is conditionally registered for use on corn to the Acetochlor Registration Partnership (ARP), which is comprised of Monsanto and Dow AgroSciences. Acetochlor is formulated into a variety of emulsifiable concentrate (EC), emulsion in water (EW), microencapsulated (Mcap), or granular (G) formulations that can be applied to corn as a preplant, preemergence, or early postemergence application using only ground equipment. Tolerances are established for the combined residues of acetochlor and its metabolites convertible to EMA or HEMA, to be analyzed as acetochlor, and expressed as acetochlor equivalents [40 CFR §180.470]. Tolerances range from 0.05 to 1.5 ppm in/on corn commodities resulting from the direct use of acetochlor and from 0.02 to 1.0 ppm in commodities from rotational crops of sorghum, soybean, or wheat.

The ARP has submitted a petition (PP#6F4791) proposing the use of acetochlor (EC) on sweet corn and requesting tolerances on sweet corn commodities and tolerances for inadvertent residues in rotated non-grass animal feeds.

TABLE A.1. Acetochlor Nomenclature	
Chemical structure	
Common name	Acetochlor
Molecular Formula	C ₁₄ H ₂₀ ClNO ₂
Molecular Weight	269.8
IUPAC name	2-chloro-N-ethoxymethyl-6'-ethylacet-o-toluidide
CAS name	2-chloro-N-(ethoxymethyl)-N-(2-ethyl-6-methylphenyl)acetamide
CAS #	34256-82-1
PC Code	121601
End-use Product	6.4 lb/gal EC



Parameter	Value	Reference
Boiling point/range	163 °C at 10 mm Hg; decomposition occurs before the boiling point at atmospheric pressure; (calculated by extrapolation of vapor pressure at lower temperature)	Acetochlor HED Chapter of the TRED, 3/1/06
pH	4.41, 1% solution in acetone:water (1:1, v:v)	
Density at 20 °C	1.123 g/mL	
Water solubility at 25 °C	223 mg/L	
Solvent solubility at 25 °C	Infinitely soluble in acetone, benzene, carbon tetrachloride, ethanol, chloroform, and toluene	
Vapor pressure at 25 °C	0.045 μ Hg (4.5×10^{-5} mm Hg)	
Dissociation constant, pK_a	Not applicable because acetochlor is neither an acid nor a base.	
Octanol/water partition coefficient	970 or 1082	
UV/visible absorption spectrum	Not available	

Metabolite Type	Structure
EMA-type metabolites	
HEMA-type metabolites	
HIMEA-type metabolites	



B. EXPERIMENTAL DESIGN

B.1. Study Site Information

Seventeen field rotational crop trials on representative crops from the nongrass animal feeds (alfalfa and clover) were conducted at field sites throughout the US during 1994-1995. At each test site, acetochlor (8.0 lb/gal EC) was applied to a primary crop of field or sweet corn as a single broadcast post-emergence application at 2.84-3.10 lb ai/A using ground equipment. Alfalfa was planted as the rotational crop at 7 sites, clover was planted at 6 sites, and both alfalfa and clover were planted in separate plots at four sites. The alfalfa and clover were planted at typical planback intervals for the respective regions. Alfalfa was planted at 55-84 DAT (2-3 months) in four tests and at 291-355 DAT (9-12 months) in the other 7 tests. Clover was planted at 130 DAT (4 months) in one test and at 274-355 DAT (9-12 months) in the other 8 tests.

Detailed soil characteristics and meteorological data were provided, as well as maintenance pesticides and detailed plot history. Rainfall was supplemented with irrigation as needed. Compared to 10-year average from temperature and rainfall, weather conditions were generally normal over the trial period at the majority of sites. Periods of above-average rainfall were noted at six sites, but there was no adverse impact on crop growth. However, cool and wet conditions at one of the clover sites (Lamberton, MN) caused poor crop growth; therefore, no samples were collected from this site.

Trial Identification (City, State, Year)	Soil characteristics			
	Type	%OM	pH	CEC (meq/g)
Alta, WY 1994	Silt Loam	3.5	6.9	17.6
Ault, CO 1994	Sandy Loam	1.6	7.7	25.6
Bagley, IA 1994	Loam	5.7	6.9	30.5
Brookshire, TX 1994	Sandy Loam	0.6	5.5	5.6
Conklin, MI 1994	Sandy Loam	1.9	5.9	10.0
Cunningham, KS 1994	Sandy Loam	1.3	8.9	21.6
Dayton, ID 1994	Loam	1.9	7.8	27.7
Delavan, WI 1994	Loam	2.3	5.9	12.3
Germansville, PA 1994	Loam	3.8	5.6	10.1
LaCenter, KY 1994	Silt Loam	2.8	6.7	12.1
Lamberton, MN 1994	Loam	5.0	7.4	36.6
Leonard, MO 1994	Sily Loam	2.2	6.3	20.4
Lesterville, SD 1994	Loam	3.1	6.1	22.0
Monmouth, IL 1994	Silt Loam	5.3	6.4	26.2
Northwoor, ND 1994	Loam	5.1	7.0	33.4
Waterloo, NY 1994	Sandy Loam	1.9	6.5	12.3
York, NE 1994	Silt Loam	3.3	5.3	25.5



Acetochlor/121601/Acetochlor Registration Partnership (ARP)
 DACO 7.4.4/OPPTS 860.1900/OECD IIA 6.6.3, 6.8.7 and IIIA 8.6
 Field Accumulation in Rotational Crops – Alfalfa and Clover

TABLE B.1.2. Study Use Pattern to Primary Corn Crop.						
Location (County, State) Year, Trial ID	End-use Product	Application Information				Rotational Crop
		Method ¹ ; Timing ²	Vol. (GPA)	Application Rate (lb ai/A)	PBI ³ (days)	
Alta, WY 1994 94-27-R-1-WY	8.0 lb/gal EC	Broadcast; postemergence	11.2	3.06	312	Alfalfa
Ault, CO 1994 94-27-R-1-CO	8.0 lb/gal EC	Broadcast; postemergence	9.6	2.91	300	Alfalfa
Bagley, IA 1994 94-27-R-1-IA	8.0 lb/gal EC	Broadcast; postemergence	9.9	2.95	83	Alfalfa
Brookshire, TX 1994 94-27-R-1-TX	8.0 lb/gal EC	Broadcast; postemergence	10.4	3.09	130	Clover
Conklin, MI 1994 94-27-R-1-MI	8.0 lb/gal EC	Broadcast; postemergence	10.1	3.02	313	Clover
Cunningham, KS 1994 94-27-R-1-KS	8.0 lb/gal EC	Broadcast; postemergence	10.3	2.91	291	Alfalfa
			10.1	2.86		Clover
Dayton, ID 1994 94-27-R-1-ID	8.0 lb/gal EC	Broadcast; postemergence	10.2	3.07	336	Alfalfa
Delavan, WI 1994 94-27-R-1-WI	8.0 lb/gal EC	Broadcast; postemergence	9.8	2.89	327	Clover
Germansville, PA 1994 94-27-R-1-PA	8.0 lb/gal EC	Broadcast; postemergence	10.2	3.03	59	Alfalfa
LaCenter, KY 1994 94-27-R-1-KY	8.0 lb/gal EC	Broadcast; postemergence	10.0	3.00	330	Clover
Lamberton, MN 1994 94-27-R-1-MN ³	8.0 lb/gal EC	Broadcast; postemergence	10.2	3.05	342	Clover
Leonard, MO 1994 94-27-R-1-MO	8.0 lb/gal EC	Broadcast; postemergence	10.0	3.27	274	Clover
Lesterville, SD 1994 94-27-R-1-SD	8.0 lb/gal EC	Broadcast; postemergence	10.2	2.97	355	Alfalfa
			10.6	3.10		Clover
Monmouth, IL 1994 94-27-R-1-IL	8.0 lb/gal EC	Broadcast; postemergence	9.5	2.89	84	Alfalfa
Northwoor, ND 1994 94-27-R-1-ND	8.0 lb/gal EC	Broadcast; postemergence	10.1	3.04	325	Alfalfa and Clover
Waterloo, NY 1994 94-27-R-1-NY	8.0 lb/gal EC	Broadcast; postemergence	10.3	3.05	55	Alfalfa
York, NE 1994 94-27-R-1-NE	8.0 lb/gal EC	Broadcast; postemergence	9.8	2.89	327	Alfalfa
			9.7	2.84		Clover

¹ All applications were made using ground equipment.

² Postemergence application was made when the primary corn crop was 5-8 inches in height, except at 2 sites where the corn was 10-16 inches in height.

³ This site did not produce any clover due to poor growing conditions.



TABLE B.1.3. Trial Numbers and Geographical Locations.

NAFTA Growing Zones ¹	Alfalfa		Clover	
	Submitted	Requested ²	Submitted	Requested ²
1	2	1	--	1
2	--	--	--	1
3	--	--	--	--
4	--	--	--	1
5	6	4	7	2
6	--	--	1	1
7	--	1	--	1
8	1	--	--	1
9	1	1	--	--
10	--	1	--	--
11	1	1	--	1
12	--	--	--	1
Total	11	9	8³	9

¹ Regions 13-21 and 1A, 5A, 5B, and 7A were not included as the use is restricted to the US.
² The number of requested trials for alfalfa and clover are for a crop group tolerance on non-grass animal feeds.
³ Nine clover field trials were conducted, but poor growing conditions resulted in no samples being collected from one site.

B.2. Sample Handling and Preparation

Single control and duplicate treated samples (0.25-9.3 lbs) of alfalfa forage and hay and clover forage and hay were harvested 1-3 times at intervals reflecting normal agricultural practices at each site. Forage samples were frozen immediately after cutting and hay samples were field dried for 1-6 days before collection and freezing. Samples were frozen within 5 hours of collection and placed in frozen storage at the test sites for 1-115 days, prior to shipment by ACDS freezer truck to the analytical laboratory (Monsanto Company, St. Louis, MO), where samples were stored at -18 °C until analysis. Samples were stored frozen from collection to analysis for up to 192 days for alfalfa forage, 239 days for alfalfa hay, 221 days for clover forage, and 193 days for clover hay.

B.3. Analytical Methodology

Samples of alfalfa and clover forage and hay were analyzed for acetochlor (converted to EMA) and its metabolites containing the ethyl methyl aniline (EMA) and hydroxyethyl methyl aniline (HEMA) moieties using the current tolerance enforcement method, which is an HPLC/OCED method (RES-074-93).

For this method, residues are extracted with acetonitrile:water (4:1 v:v), filtered, concentrated, and base hydrolyzed to yield EMA and HEMA. The resulting residues are steam-distilled into dilute acid, adjusted to a basic pH, and partitioned into methylene chloride. HEMA is methylated using acidic methanol and residues of EMA and methylated HEMA (MEMA) are separated and determined using HPLC/OCED. Residues of EMA and HEMA are expressed in



acetochlor equivalents, and the method LOQ for EMA and HEMA are 0.012 ppm and 0.014 ppm, respectively, in forage and hay. The LOD for both EMA and HEMA is 0.004 ppm. The HPL/OCED method was validated prior to and concurrently with the analysis of field trial samples with forage and hay samples fortified with EMA and HEMA producing metabolites at 0.01-2.0 ppm.

C. RESULTS AND DISCUSSION

Samples of forage and hay were stored frozen for a maximum of 239 days (Table C.1). Adequate storage stability data are available (44107107.der) indicating the EMA- and HEMA-type metabolites are stable up to 330 days in frozen alfalfa forage and clover hay. These data support the frozen storage intervals in this trial.

The HPLC/OCED method used to determine HEMA- and EMA-type residues in alfalfa and clover forage and hay was adequately validated prior to and in conjunction with the field sample analyses (Table C.2). Method validation recoveries of HEMA averaged 72-80% (\pm 4-17%), and recoveries of EMA averaged 94-108% (\pm 6-11%) from alfalfa and clover forage and hay. Concurrent recoveries of HEMA averaged 77-85% (\pm 9-13%), and recoveries of EMA averaged 100-108% (\pm 9-10%). Adequate sample calculations were provided along with example chromatograms. Apparent residues of both analytes were <LOQ in all control samples.

For alfalfa, combined residues of HEMA and EMA in forage were <0.04-0.56 ppm at the 1st cutting, <LOQ-0.30 ppm at the 2nd cutting, and <LOQ-0.16 ppm in the 3rd cutting. For alfalfa hay, residues were 0.11-1.95 ppm at the 1st cutting, 0.05-0.74 ppm at the 2nd cutting and <0.04-0.25 ppm at the 3rd cutting. For clover, combined residues in forage were <LOQ-0.59 ppm at the 1st cutting, <0.04-0.27 ppm at the 2nd cutting, and <0.03-0.05 ppm at the 3rd cutting. For clover hay, residues were <LOQ-1.25 ppm at the 1st cutting, <LOQ-0.58 ppm at the 2nd cutting, and <0.04-0.13 ppm at the 3rd cutting (Tables C.3.1 and C.3.2). For forage and hay from both alfalfa and clover, and declined steadily at later cuttings. Average combined residues at the 1st cutting were 0.27 ppm for alfalfa forage, 0.66 ppm for alfalfa hay, 0.20 ppm for clover forage and 0.31 ppm for clover hay (Table C.4). Although several shorter PBIs were included in the alfalfa (2-3 month PBI) and clover (4 month PBI) field trials, residues were not higher at these sites compared to the sites planted at 9-12 month PBIs.

Common cultural practices were used to maintain plants. With the exception of one test site on clover, the weather conditions and the maintenance chemicals and fertilizer used in the study did not have a notable impact on the residue data.



Matrix	Storage Temp. (°C)	Actual Storage Duration (days)	Limit of Demonstrated Storage Stability (days) ¹
Alfalfa Forage	-18	192	330
Alfalfa Hay	-18	239	
Clover Forage	-18	221	
Clover Hay	-18	193	

¹ 44107107.der; stability data were on alfalfa forage and clover hay.

Matrix	Analyte	Spike level (mg/kg)	Sample size (n)	Recoveries (%)	Mean ± std dev
Method Validation					
Alfalfa Forage	HEMA	0.01-2.00	6	67-86	76 ± 7
	EMA		6	101-118	108 ± 6
Alfalfa Hay	HEMA	0.01-0.50	8	60-89	80 ± 9
	EMA		8	82-119	105 ± 11
Clover Forage	HEMA	0.01-0.50	8	66-78	72 ± 4
	EMA		8	84-110	94 ± 10
Clover Hay	HEMA	0.01-2.00	5	67-109	79 ± 17
	EMA		5	94-110	102 ± 6
Concurrent Recovery					
Alfalfa Forage	HEMA	0.01-2.00	30	66-109 (5)	84 ± 12
	EMA		30	74-123 (1)	103 ± 10
Alfalfa Hay	HEMA	0.01-2.00	29	64-106 (7)	81 ± 11
	EMA		29	77-115	100 ± 10
Clover Forage	HEMA	0.01-1.00	19	69-118 (2)	85 ± 13
	EMA		19	86-123 (1)	108 ± 10
Clover Hay	HEMA	0.01-2.00	18	66-91 (5)	77 ± 9
	EMA		18	87-120	105 ± 9



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 Field Accumulation in Rotational Crops – Alfalfa and Clover

TABLE C.3.1. Residues of EMA and HEMA in Forage of Rotational Alfalfa and Clover.											
Location (County, State, Year)	EPA Region	Crop/ Variety	Total Rate (lb ai/A)	PBI ¹ (days)	Harvest DALA ²	Cutting	Residues (ppm) ³				
							HEMA	EMA	Combined Residues ⁴		
Alta, WY 1994 94-27-R-1-WY	9	Alfalfa/ Arrow	3.06	312	377	1	0.182, 0.196	0.292, 0.274	0.474, 0.470		
							429	2	0.114, 0.122	0.167, 0.175	0.281, 0.297
Ault, CO 1994 94-27-R-1-CO	8	Alfalfa/ Roughrider	2.91	300	414	1	0.168, 0.162	0.352, 0.398	0.52, 0.56		
							482	2	0.031, 0.033	0.078, 0.081	0.109, 0.114
Bagley, IA 1994 94-27-R-1-IA	5	Alfalfa/ Wensman	2.95	83	377	1	0.051, 0.049	0.140, 0.138	0.191, 0.187		
							501	2	(0.010), (0.012)	0.015, 0.015	0.029, 0.029
Brookshire, TX 1994 94-27-R-1-TX	6	Clover/ Yuchi Arrowleaf	3.09	130	306	1	0.023, 0.026	0.139, 0.155	0.162, 0.181		
							364	2	0.036, 0.045	0.213, 0.225	0.573, 0.270
Conklin, MI 1994 94-27-R-1-MI	5	Clover/Med ium Red	3.02	313	386	1	0.025, 0.023	0.097, 0.090	0.122, 0.113		
							418	2	0.022, 0.016	0.043, 0.033	0.065, 0.019
							469	3	(0.011), (0.010)	0.035, 0.029	0.049, 0.043
Cunningham, KS 1994 94-27-R-1-KS	5	Alfalfa/ Good as Gold	2.91	291	371	1	0.096, 0.113	0.238, 0.266	0.334, 0.379		
							400	2	0.044, 0.047	0.084, 0.097	0.128, 0.144
		423	3		0.056, 0.055	0.104, 0.103	0.16, 0.158				
Dayton, ID 1994 94-27-R-1-ID	11	Alfalfa/ Magnum IV	3.07	336	405	1	0.035, 0.030	0.055, 0.049	0.09, 0.079		
							447	2	(0.011), 0.016	0.020, 0.039	0.034, 0.055
Delavan, WI 1994 94-27-R-1-WI	5	Clover/ Northrup King AAAtlas®	2.89	327	378	1	0.023, 0.028	0.129, 0.167	0.152, 0.195		
							417	2	0.025, 0.023	0.080, 0.077	0.105, 0.100
							459	3	0.015, (0.013)	0.039, 0.035	0.054, 0.049
Germansville, PA 1994 94-27-R-1-PA	7	Alfalfa/ WL322HQ	3.03	59	336	1	(0.012), 0.015	0.035, 0.044	0.049, 0.059		
							386	2	(0.010), (0.010)	0.027, 0.029	0.041, 0.043
							427	3	0.012, 0.013	0.032, 0.028	0.044, 0.041
LaCenter, KY 1994 94-27-R-1-KY	5	Clover/ Crimson	3.00	330	412	1	ND, (0.013)	0.015, 0.037	0.029, 0.051		
Leonard, MO 1994 94-27-R-1-MO	5	Clover/ Medium Red	3.27	274	357	1	0.017, 0.015	0.079, 0.074	0.096, 0.089		
							426	2	(0.010), (0.010)	0.034, 0.041	0.048, 0.055
							497	3	(0.010), (0.010)	0.027, 0.027	0.041, 0.041
Lesterville, SD 1994 94-27-R-1-SD	5	Alfalfa/ Vernal	2.97	355	428	1	0.032, 0.036	0.087, 0.115	0.119, 0.151		
							469	2	0.023, 0.023	0.053, 0.052	0.076, 0.075
							516	3	0.017, 0.017	0.057, 0.058	0.074, 0.075
		Clover/ VNS	3.10		407	1	0.031, 0.029	0.066, 0.065	0.097, 0.094		
							462	2	0.021, 0.019	0.019, 0.030	0.04, 0.079
Monmouth, IL 1994 94-27-R-1-IL	5	Alfalfa/ Absolute Brand	2.89	84	363	1	0.037, 0.044	0.468, 0.468	0.505, 0.512		
							400	2	0.018, 0.016	0.059, 0.051	0.077, 0.067
							465	3	(0.004), (0.004)	0.017, 0.018	0.031, 0.032
Northwood, ND 1994 94-27-R-1-ND	5	Alfalfa/ Vernal	3.04	325	388	1	0.044, 0.045	0.156, 0.161	0.200, 0.206		
							447	2	(0.011), (0.010)	0.027, 0.022	0.041, 0.036
		Clover/ Arlington			3.04	386	1	0.086, 0.086	0.500, 0.461	0.586, 0.547	
								434	2	0.027, 0.027	0.126, 0.141



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 Field Accumulation in Rotational Crops – Alfalfa and Clover

TABLE C.3.1. Residues of EMA and HEMA in Forage of Rotational Alfalfa and Clover.

Location (County, State, Year)	EPA Region	Crop/ Variety	Total Rate (lb ai/A)	PBI ¹ (days)	Harvest DALA ²	Cutting	Residues (ppm) ³		
							HEMA	EMA	Combined Residues ⁴
Waterloo, NY 1994 94-27-R-1-NY	1	Alfalfa/ Edge	3.05	55	344	1	0.055, 0.051	0.254, 0.232	0.309, 0.283
					380	2	0.019, 0.016	0.065, 0.060	0.084, 0.076
					427	3	0.015, (0.013)	0.043, 0.039	0.058, 0.053
York, NE 1994 94-27-R-1-NE	5	Alfalfa/ Alfalfa Leaf	2.89	327	397	1	0.023, 0.023	0.071, 0.071	0.094, 0.094
					428	2	0.028, 0.035	0.043, 0.050	0.071, 0.071
					458	3	0.036, 0.028	0.034, 0.030	0.07, 0.058
		Clover/ Medium Red	2.84		399	1	0.023, 0.023	0.145, 0.151	0.168, 0.174
					427	2	0.024, 0.025	0.074, 0.082	0.098, 0.107
					458	3	(0.011), (0.012)	0.036, 0.040	0.050, 0.054

¹ PBI - Plant Back Interval.

² DALA= Days After Last Application

³ The LOQ is 0.012 ppm for EMA and 0.014 ppm for HEMA. The LOD is 0.004 ppm for both analytes. Values between the LOD and LOQ are in parentheses.

⁴ For calculating combined residues, the LOQ is used for values <LOQ.

ND = not detected.

TABLE C.3.2. Residues of EMA and HEMA in Hay of Rotational Alfalfa and Clover.

Location (County, State, Year)	EPA Region	Crop/ Variety	Total Rate (lb ai/A)	PBI ² (days)	Harvest DALA ¹	Cutting	Residues (ppm) ³		
							HEMA	EMA	Combined Residues ⁴
Alta, WY 1994 94-27-R-1-WY	9	Alfalfa/ Arrow	3.06	312	382	1	0.466, 0.489	0.484, 0.498	0.950, 0.987
					434	2	0.346, 0.358	0.372, 0.379	0.718, 0.737
Ault, CO 1994 94-27-R-1-CO	8	Alfalfa/ Roughrider	2.91	300	415	1	0.568, 0.508	1.379, 1.285	1.947, 1.793
					490	2	0.064, 0.074	0.106, 0.126	0.17, 0.200
Bagley, IA 1994 94-27-R-1-IA	5	Alfalfa/ Wensman	2.95	83	380	1	0.116, 0.096	0.280, 0.288	0.396, 0.384
					505	2	0.024, 0.023	0.036, 0.034	0.06, 0.057
Brookshire, TX 1994 94-27-R-1-TX	6	Clover/ Yuchi Arrowleaf	3.09	130	325	1	0.043, 0.027	0.272, 0.191	0.315, 0.218
					366	2	0.097, 0.097	0.471, 0.486	0.568, 0.583
Conklin, MI 1994 94-27-R-1-MI	5	Clover/ Medium Red	3.02	313	393	1	0.027, 0.028	0.101, 0.105	0.128, 0.133
					426	2	0.040, 0.045	0.078, 0.084	0.118, 0.129
					480	3	0.021, 0.023	0.055, 0.058	0.118, 0.081
Cunningham, KS 1994 94-27-R-1-KS	5	Alfalfa/ Good as Gold	2.91	291	373	1	0.196, 0.232	0.567, 0.655	0.763, 0.887
					406	2	0.129, 0.114	0.227, 0.204	0.356, 0.318
					424	3	0.083, 0.097	0.143, 0.163	0.226, 0.260
		Clover/ Kenland Red	2.86		387	1	0.109, 0.127	0.609, 0.668	0.718, 0.795
Dayton, ID 1994 94-27-R-1-ID	11	Alfalfa/ Magnum IV	3.07	336	408	1	0.103, 0.091	0.205, 0.159	0.308, 0.250
					451	2	0.044, 0.042	0.121, 0.114	0.165, 0.156
Delavan, WI 1994 94-27-R-1-WI	5	Clover/ Northrup King AAtlas®	2.89	327	394	1	0.051, 0.087	0.267, 0.479	0.318, 0.566
					437	2	0.019, 0.028	0.047, 0.071	0.066, 0.099
					483	3	(0.011), 0.012	0.028, 0.032	0.042, 0.044
Gemansville, PA 1994 94-27-R-1-PA	1	Alfalfa/ WL322HQ	3.03	59	338	1	0.035, 0.039	0.073, 0.084	0.108, 0.123
					390	2	0.017, 0.017	0.037, 0.038	0.054, 0.055
					429	3	0.015, (0.013)	0.033, 0.029	0.048, 0.043
LaCenter, KY 1994 94-27-R-1-KY	5	Clover/ Crimson	3.00	330	422	1	ND, ND	ND, ND	0.026, 0.026



Acetochlor/121601/Acetochlor Registration Partnership (ARP)
 DACO 7.4.4/OPPTS 860.1900/OECD IIA 6.6.3, 6.8.7 and IIIA 8.6
 Field Accumulation in Rotational Crops – Alfalfa and Clover

TABLE C.3.2. Residues of EMA and HEMA in Hay of Rotational Alfalfa and Clover.										
Location (County, State, Year)	EPA Region	Crop/ Variety	Total Rate (lb ai/A)	PBI ² (days)	Harvest DALA ¹	Cutting	Residues (ppm) ³			
							HEMA	EMA	Combined Residues ⁴	
Leonard, MO 1994 94-27-R-1-MO	5	Clover/ Medium Red	3.27	274	392	1	0.068, 0.069	0.232, 0.235	0.300, 0.304	
					449	2	(0.005), (0.005)	(0.009), (0.010)	0.026, 0.026	
Lesterville, SD 1994 94-27-R-1-SD	5	Alfalfa/ vernal	2.97	355	433	1	0.069, 0.076	0.204, 0.225	0.273, 0.301	
					472	2	0.045, 0.037	0.111, 0.103	0.156, 0.140	
		Clover/ VNS	3.10		433	1	0.056, 0.060	0.076, 0.098	0.132, 0.158	
					472	2	0.017, 0.016	0.059, 0.052	0.076, 0.068	
Monmouth, IL 1994 94-27-R-1-IL	5	Alfalfa/ Absolute Brand	2.89	84	365	1	0.105, 0.091	1.056, 0.947	1.161, 1.038	
					403	2	0.026, 0.028	0.091, 0.093	0.117, 0.121	
					468	3	0.014, (0.012)	0.045, 0.038	0.059, 0.052	
										394
Northwood, ND 1994 94-27-R-1-ND	5	Alfalfa/ Vernal	3.04	325	450	2	0.030, 0.027	0.077, 0.073	0.107, 0.100	
					Clover/ Arlington	418	1	0.230, 0.230	1.004, 1.023	1.234, 1.253
		456								
		Waterloo, NY 1994 94-27-R-1-NY			1	Alfalfa/ Edge	3.05	55	348	1
382	2		0.049, 0.055	0.173, 0.190					0.222, 0.245	
433	3		0.029, 0.029	0.077, 0.079					0.106, 0.108	
										400
York, NE 1994 94-27-R-1-NE	5	Alfalfa/ Alfalfa Leaf	2.89	327	431	2	0.091, 0.079	0.111, 0.098	0.202, 0.177	
					Clover/ Medium Red	2.84	460	3	0.054, 0.083	0.058, 0.085
		407					1	0.063, 0.056	0.370, 0.327	0.433, 0.383
		443			2	0.072, 0.076	0.164, 0.172	0.236, 0.248		
					470	3	0.038, 0.036	0.093, 0.093	0.131, 0.219	

¹ DALA = Days After Last Application

² PBI = Plant Back Interval.

³ The LOQ is 0.012 ppm for EMA and 0.014 ppm for HEMA. The LOD is 0.004 ppm for both analytes. Values between the LOD and LOQ are in parenthesis

⁴ For calculating combined residues, the LOQ is used for values <LOQ.

ND = not detected



TABLE C.4. Summary Data for Combined Acetochlor Residues (EMA + HEMA) in Rotational Alfalfa and Clover.

Commodity	Total Rate (lb ai/A)	PBI (days)	Cutting	Residue Levels (ppm) ¹						
				n	Min.	Max.	HAFT ²	Median (STMdR ³)	Mean (STMR ³)	Std. Dev.
Alfalfa										
Forage	2.84-3.27	55-355	1 st	22	<0.04	0.56	0.54	0.20	0.27	0.18
			2 nd	22	<0.026	0.30	0.29	0.08	0.09	0.07
			3 rd	12	<0.026	0.16	0.16	0.06	0.07	0.05
Hay	2.84-3.27	55-355	1 st	22	0.11	1.95	1.87	0.39	0.66	0.52
			2 nd	22	0.05	0.74	0.73	0.16	0.21	0.19
			3 rd	10	<0.04	0.25	0.24	0.11	0.12	0.08
Clover										
Forage	2.84-3.27	130-355	1 st	18	<0.026	0.59	0.57	0.16	0.20	0.16
			2 nd	14	<0.04	0.27	0.26	0.10	0.11	0.08
			3 rd	8	<0.03	0.05	0.05	0.04	0.04	0.01
Hay	2.84-3.27	130-355	1 st	18	<0.026	1.25	1.24	0.31	0.41	0.37
			2 nd	14	<0.026	0.58	0.58	0.12	0.23	0.21
			3 rd	6	<0.04	0.13	0.13	0.08	0.08	0.04

¹ LOQ is 0.012 ppm for EMA and 0.014 ppm for HEMA. The combined LOQ is 0.026 ppm.
² HAFT = Highest Average Field Trial.
³ STMdR = Supervised Trial Median Residue; STMR = Supervised Trial Mean Residue. For calculation of the median, mean and standard deviation, ½ the LOQ (0.006 or 0.007 ppm) was used for residues reported at <LOQ.

D. CONCLUSION

HED concludes that the submitted study is adequately supported by field documentation and storage stability data and was derived using a validated analytical method.

In field trials conducted at various locations throughout the U.S. alfalfa and clover were planted 2 – 12 months following application of acetochlor to a primary crop of corn at 3.0 lb ai/A. For alfalfa, combined residues of HEMA and EMA in forage were <0.04-0.56 ppm at the 1st cutting, <LOQ-0.30 ppm at the 2nd cutting, and <LOQ-0.16 ppm in the 3rd cutting. For alfalfa hay, residues were 0.11-1.95 ppm at the 1st cutting, 0.05-0.74 ppm at the 2nd cutting and <0.04-0.25 ppm at the 3rd cutting. For clover, combined residues in forage were <LOQ-0.59 ppm at the 1st cutting, <0.04-0.27 ppm at the 2nd cutting, and <0.03-0.05 ppm at the 3rd cutting. For clover hay, residues were <LOQ-1.25 ppm at the 1st cutting, <LOQ-0.58 ppm at the 2nd cutting, and <0.04-0.13 ppm at the 3rd cutting (Tables C.3.1 and C.3.2). For forage and hay from both alfalfa and clover, and declined steadily at later cuttings. Average combined residues at the 1st cutting were 0.27 ppm for alfalfa forage, 0.66 ppm for alfalfa hay, 0.20 ppm for clover forage and 0.31 ppm for clover hay.



E. REFERENCES

DP Barcode: D292336
Subject: **ACETOCHLOR**. Revised HED Chapter of the Tolerance Reassessment
Eligibility Decision (TRED) Document.
From: A. Protzel
To: F. Fort
Dated: 3/1/06
MRID(s): None

F. DOCUMENT TRACKING

RDI: D. Davis (3/23/06); M. Doherty (4/17/06).
Petition Number(s): 6F4791
DP Barcode(s): D230310 and D275019
PC Code: 121601