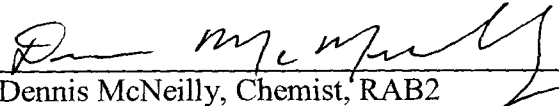





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 Crop Field Trial/Residue Decline - Corn, field

Primary Evaluator

  
 Dennis McNeilly, Chemist, RAB2

Date: Oct 21, 2008

Peer Reviewer

  
 Douglas Dotson, Ph.D., Chemist, RAB2

Date: Oct 21, 2008

This DER was originally prepared under contract by Dynamac Corporation (2275 Research Boulevard, Suite 300; Rockville, MD 20850; submitted 05/22/2008). The DER has been reviewed by the Health Effects Division (HED) and revised to reflect current Office of Pesticide Programs (OPP) policies.

### **STUDY REPORT:**

46829504 Oakes, T., Vincent, T. (2004) S-Metolachlor - Magnitude of the Residues In or On Field and Seed Corn: Lab Project Number: Syngenta Number 46-02. Unpublished study prepared by Syngenta Crop Protection, Inc. 200 p.

### **EXECUTIVE SUMMARY:**

Syngenta Crop Protection submitted six field corn field trials conducted in the United States during the 2002 growing season in Zones 5 and 6. Side-by-side plots at each trial were treated to provide bridging data between an emulsifiable concentrate (EC) formulation that is currently registered for use on corn, and lipophilic wax (LW) and capsule suspension (CS) formulations.

Each test site consisted of one untreated plot and two or three side-by-side treated plots. Each treated plot received a combination of a preplant incorporated (PPI) application of S-metolachlor at planting at a target rate of 2.38 lb ai/A, followed 40-61 days later, by a single directed application at lay-by at a target rate of 1.39 lb ai/A, for a total rate of ~3.77 lb ai/A. The applied S-metolachlor was formulated as either a 6.1 lb/gal LW (Trt #5), a 5.5 lb/gal CS (Trt #6), or a 7.64 lb/gal EC (Trt #7). In one field trial, S-metolachlor (7.64 lb/gal EC) was also applied as a PPI application and lay-by application at exaggerated rates (5x the target rates; Trt #8) for the generation of aspirated grain fractions (AGF). Applications were made using ground equipment in 13-27 gal/A spray volumes without an adjuvant.

For each test, control and duplicate treated samples of forage were harvested 28-34 days after the lay-by application (DAT), and samples of mature grain and stover were harvested at normal maturity (83-116 DAT). Bulk grain samples were also harvested at 114 DAT from two tests following applications of the EC formulation at 1x and 5x rates; these bulk grain samples were used to generate samples of AGF under simulated commercial conditions. Samples of the corn commodities were stored frozen for up to 17.6 months, an interval that is supported by the available storage stability data.

Residues of S-metolachlor in/on corn forage, stover, grain, whole kernels and AGF were determined as SYN506357 and SYN508500 (S-enantiomers of CGA-37913 and CGA-49751)



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using a LC/MS/MS method (Sygenta Method No. 1848-01), which is derived from the current tolerance enforcement method. For this method, residues are acid hydrolyzed to CGA-37913 and CGA-49751 and cleaned up by solvent partitioning and using an alumina column. Residues are then determined by LC/MS/MS analysis, using a reverse phase chiral column to separate out the S-enantiomers. For each matrix, the limit of quantitation (LOQ) is 0.03 ppm for SYN506357 and 0.05 ppm for SYN508500, each expressed in parent equivalents. The method limit of detection was not reported. The method was adequate for data collection for field corn matrices.

For corn treated with the **LW formulation** (Trt #5) at a total rate of 3.69-3.77 lb ai/A, maximum residues of SYN506357 and SYN508500 were 0.37 and 0.49 ppm, respectively, in/on forage harvested at 28-34 DAT, and the maximum combined residues were 0.86 ppm. Maximum residues of SYN506357 and SYN508500 were 0.35 and 1.3 ppm, respectively, in/on stover harvested at 83-116 DAT, and maximum combined residues were 1.7 ppm. Residues in/on grain harvested at 83-116 DAT were <LOQ for both analytes, for combined residues of <0.08 ppm.

For corn treated with the **CS formulation** (Trt #6) at a total rate of 3.68-3.78 lb ai/A, maximum residues of SYN506357 and SYN508500 were 0.74 and 0.50 ppm, respectively, in/on forage harvested at 28-34 DAT, and maximum combined residues were 1.2 ppm. Maximum residues of SYN506357 and SYN508500 were 0.56 and 0.47 ppm, respectively, in/on stover harvested at 83-116 DAT, and maximum combined residues were 1.0 ppm. Residues in/on grain harvested at 83-116 DAT were <LOQ for both analytes, for combined residues of <0.08 ppm.

For corn treated with the **EC formulation** (Trt #7) at a total rate of 3.68-3.85 lb ai/A, maximum residues of SYN506357 and SYN508500 were 0.60 and 0.49 ppm, respectively, in/on forage harvested at 28-34 DAT, and the maximum combined residues were 0.97 ppm. Maximum residues of SYN506357 and SYN508500 were 0.46 and 0.79 ppm, respectively, in/on stover harvested at 83-116 DAT, and the maximum combined residues were 1.2 ppm. Residues in/on grain harvested at 83-116 DAT were <LOQ for both analytes, for combined residues of <0.08 ppm.

The average combined residues from the LW, CS, or EC formulations were respectively 0.34, 0.50, and 0.37 ppm in/on corn forage and 0.40, 0.33, and 0.43 ppm in/on corn stover, and average combined residues were 0.08 ppm in/on grain from all three formulations. These data indicate that residues of S-metolachlor in/on field corn forage, stover and grain are similar following applications of the LW, CS, or EC formulations.

Residues of SYN506357 and SYN508500 were each <LOQ (<0.03 and <0.05 ppm) in/on bulk samples of whole grain harvested 114 days after treatment with the EC formulation at rates totaling 3.75 lb ai/A (1x) or 18.77 lb ai/A (5x). Residues of both analytes were also <LOQ in/on the samples of AGF derived from the 1x- and 5x-treated grain. These data indicate that quantifiable residues of S-metolachlor are unlikely to occur in AGF from field corn treated at the maximum labeled rate (1x rate).



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Crop Field Trial/Residue Decline – Corn, field

### **STUDY/WAIVER ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS:**

Under the conditions and parameters used in the study, the corn field trial residue data are classified as scientifically acceptable. The acceptability of this study for regulatory purposes is addressed in the U.S. EPA Residue Chemistry Summary Document, D332842 (D. McNeilly; Oct 21, 2008).

### **COMPLIANCE:**

Signed and dated Good Laboratory Practice (GLP), Quality Assurance, and Data Confidentiality statements were provided. No deviations from regulatory requirements were reported which would have an adverse impact on the validity of the study.

### **A. BACKGROUND INFORMATION**

S-Metolachlor [S-2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-methoxy-1-methylethyl)acetamide] is a selective, chloroacetanilide herbicide that is applied to a variety of crops as a preplant, PPI, pre-emergence, or post-emergence-directed application, primarily for the control of grass weeds. It is currently registered to Syngenta Crop Protection for use on a wide variety of crops, including uses on corn (all types). The current use on corn allows for use of S-metolachlor as a preplant surface, PPI, preemergence, or postemergence layby application at 0.8-2.5 lb ai/A, for a maximum seasonal rate of 3.7 lb ai/A, with the rate depending on the soil type and amounts of organic matter.

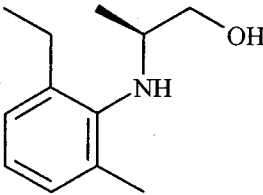
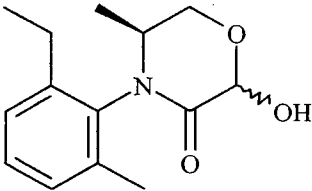
Syngenta submitted the field corn field trial data to provide bridging data between one of the EC formulations (Dual II Magnum®) currently registered for use on corn and a proposed lipophilic wax (LW) formulation and a capsule suspension (CS) formulation. The chemical structure and nomenclature of S-metolachlor and its regulated hydrolytic derivatives are presented in Table A.1, and the physicochemical properties of S-metolachlor are presented in Table A.2.

<b>TABLE A.1. Nomenclature of S-Metolachlor and its Regulated Derivatives.</b>	
Parent compound	
Common name	S-Metolachlor
Company experimental name	CGA-77102
IUPAC name	(S)-2-chloro-N-(2-ethyl-6-methyl-phenyl)-N-(2-methoxy-1-methyl-ethyl)-acetamide
CAS name	2-chloro-N-(2-ethyl-6-methylphenyl)-N-[(1S)2-methoxy-1-methylethyl]-acetamide
CAS registry number	87392-12-9
End-use product (EP)	7.64 lb/gal EC (Dual II Magnum Herbicide; EPA Reg. No. 100-818)



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 Crop Field Trial/Residue Decline – Corn, field

**TABLE A.1. Nomenclature of S-Metolachlor and its Regulated Derivatives.**

Regulated residue	
Common name	None
Company experimental names	SYN506357 (S-enantiomer of CGA 37913)
IUPAC name	(S)-2-[(2-ethyl-6-methylphenyl) amino]-1-propanol
CAS name	(S)-2-[(2-ethyl-6-methylphenyl) amino]-1-propanol
CAS #	82508-08-5
Regulated residue	
Common name	None
Company experimental names	CGA-49751 SYN508500 (S-enantiomer of CGA 49751)
IUPAC name	4-(2-ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholine
CAS name	4-(2-ethyl-6-methylphenyl)-2-hydroxy-5-methyl-3-morpholine
CAS #	61520-54-5

**TABLE A.2. Physicochemical Properties of S-Metolachlor.**

Parameter	Value	Reference
Melting point/range	Not applicable, liquid at room temperature	MRID 47121701
pH	7.8 at 25°C (1% aqueous dispersion)	
Density	1.117 g/cm <sup>3</sup> at 20°C	
Water solubility (25°C)	0.48 g/L	
Solvent solubility (mg/L at 25°C)	Completely miscible with methanol, acetone, toluene, n-octanol, n-hexane, ethyl acetate, dichloromethane	
Vapor pressure at 25°C	2.8 x 10 <sup>-5</sup> mm Hg	
Dissociation constant (pK <sub>a</sub> )	No dissociation constant in pH range 2-12	
Octanol/water partition coefficient Log(K <sub>ow</sub> )	3.05 at 25°C	
UV/visible absorption spectrum	Neutral: 534 l/mol•cm @ 266.4 nm 443 l/mol•cm @ 274.4 nm Acidic: 534 l/mol•cm @ 266.4 nm 444 l/mol•cm @ 274.4 nm Basic: 531 l/mol•cm @ 266.4 nm 411 l/mol•cm @ 274.4 nm	



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 Crop Field Trial/Residue Decline – Corn, field

## B. EXPERIMENTAL DESIGN

### B.1. Study Site Information

Six field corn field trials (Table B.1.1) were conducted in the United States during the 2002 growing season in Zones 5 (IA, IN, NE, OH, and WI; 5 trials) and 6 (TX; 1 trial).

Each test site consisted of one untreated plot and two or three side-by-side treatment plots (Table B.1.2). Each treatment plot received a combination of a single PPI application of the test substance at planting at a target rate of 2.38 lb ai/A followed, 40-61 days later, by a single postemergence directed application at layby at a target rate of 1.39 lb ai/A, for a total rate of ~3.72 lb ai/A. The S-metolachlor test substance was formulated as either a lipophilic wax (6.1 lb/gal LW) designated as Trt #5, an encapsulated or capsule suspension (5.5 lb/gal CS) designated as Trt #6, or an emulsifiable concentrate (7.64 lb/gal EC) designated as Trt #7. In one field trial, an additional plot received applications of the 7.64 lb/gal EC formulation at exaggerated rates (5x the target rates), designated as Trt #8. Applications were made using ground equipment in 13-27 gal/A spray volumes without an adjuvant.

In addition, test sites received a single soil surface or PPI application at planting or an early postemergence broadcast application of the 7.64 lb/gal EC formulation designated as Trt #s 2, 3, and 4, respectively; however, samples from these treatments were not analyzed and are not presented herein.

Trial Identification (City, State; Year)	Soil characteristics			
	Type	%OM	pH	CEC (meq/100g)
York, NE; 2002 (NB-HR-004-02)	Silt loam	2.8	6.6	22.0
Webster City, IA; 2002 (NE-HR-003-02)	Clay loam	5.0	7.5	36.0
Fitchberg, WI; 2002 (NI-HR-001-02)	Silt loam	2.9	5.7	15.5
Noblesville, IN; 2002 (NJ-HR-002-02)	Loam	2.7	6.3	14.4
New Holland, OH; 2002 (NK-HR-002-02)	Clay loam	2.3	6.0	15.9
East Bernard, TX; 2002 (SB-HR-001-02)	Sandy loam	1.2	7.8	21.1

Common cultural practices were followed, and maintenance pesticides and fertilizers were used to produce a commercial quality crop. For each field trial, the petitioner presented the average monthly air temperatures and the total rainfall for the study period, as well as the departure from normal. The average air temperature and total rainfall were generally comparable to normal values (-6.0 to 5.2 degrees or -3.22 to 4.60 inches). Irrigation was used to supplement as needed.



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 Crop Field Trial/Residue Decline – Corn, field

TABLE B.1.2. Study Use Pattern.								
Location (City, State; Year) Trial ID	End-use Product	TRT No. <sup>1</sup>	Application Information					Tank Mix/Adjuvants
			Method; Timing	Volume (gal/A)	Rate (lb ai/A)	RTI <sup>2</sup> (days)	Total Rate (lb ai/A)	
York, NE; 2002 (NB-HR-004-02)	6.1 lb/gal LW	5	1. PPI spray at planting	20	2.43	--	3.77	None
			2. Directed spray at layby to 40" corn, V9 stage	20	1.34	61		
	5.5 lb/gal CS	6	1. PPI spray at planting	20	2.39	--	3.73	None
			2. Directed spray at layby to 40" corn, V9 stage	20	1.34	61		
	7.64 lb/gal EC	7	1. PPI spray at planting	20	2.41	--	3.74	None
			2. Directed spray at layby to 40" corn, V9 stage	20	1.34	61		
Webster City, IA; 2002 (NE-HR-003-02)	7.64 lb/gal EC	7	1. PPI spray at planting	20	2.40	--	3.75	None
			2. Directed spray at layby to 46" corn, V11 stage	16	1.35	43		
	7.64 lb/gal EC	8	1. PPI spray at planting	20	12.03	--	18.77	None
			2. Directed spray at layby to 46" corn, V11 stage	16	6.73	43		
Fitchberg, WI; 2002 (NI-HR-001-02)	6.1 lb/gal LW	5	1. PPI spray at planting	24	2.40	--	3.71	None
			2. Directed spray at layby to 40" corn, crop growth stage BBCH 39	19	1.31	45		
	5.5 lb/gal CS	6	1. PPI spray at planting	25	2.47	--	3.78	None
			2. Directed spray at layby to 40" corn, crop growth stage BBCH 39	19	1.32	45		
	7.64 lb/gal EC	7	1. PPI spray at planting	23	2.31	--	3.68	None
			2. Directed spray at layby to 40" corn, crop growth stage BBCH 39	20	1.37	45		
Noblesville, IN; 2002 (NJ-HR-002-02)	6.1 lb/gal LW	5	1. PPI spray at planting	15	2.40	--	3.70	None
			2. Directed spray at layby to 40" corn, V9 stage	27	1.31	40		
	5.5 lb/gal CS	6	1. PPI spray at planting	14	2.40	--	3.68	None
			2. Directed spray at layby to 40" corn, V9 stage	26	1.28	40		
	7.64 lb/gal EC	7	1. PPI spray at planting	15	2.40	--	3.71	None
			2. Directed spray at layby to 40" corn, V9 stage	27	1.32	40		
New Holland, OH; 2002 (NK-HR-002-02)	6.1 lb/gal LW	5	1. PPI spray at planting	14	2.38	--	3.69	None
			2. Directed spray at layby to 40" corn, V9 stage	13	1.31	48		
	5.5 lb/gal CS	6	1. PPI spray at planting	14	2.37	--	3.72	None
			2. Directed spray at layby to 40" corn, V9 stage	13	1.35	48		
	7.64 lb/gal EC	7	1. PPI spray at planting	14	2.37	--	3.69	None
			2. Directed spray at layby to 40" corn, V9 stage	13	1.32	48		



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 Crop Field Trial/Residue Decline – Corn, field

**TABLE B.1.2. Study Use Pattern.**

Location (City, State; Year) Trial ID	End-use Product	TRT No. <sup>1</sup>	Application Information					Tank Mix/Adjuvants
			Method; Timing	Volume (gal/A)	Rate (lb ai/A)	RTI <sup>2</sup> (days)	Total Rate (lb ai/A)	
East Bernard, TX; 2002 (SB-HR-001-02)	5.5 lb/gal CS	6	1. PPI spray at planting	20	2.43	--	3.78	None
			2. Directed spray at layby to 40" corn, pre-tassel stage	24	1.34	48		
	7.64 lb/gal EC	7	1. PPI spray at planting	21	2.48	--	3.85	None
			2. Directed spray at layby to 40" corn, pre-tassel	23	1.37	48		

Each treatment plot consisted of a combination of a single preplant incorporated (PPI) application at planting followed by a single directed application at layby. Four treatment regimes were used: Treatment #5 = 6.1 lb/gal LW formulation; Treatment #6 = 5.5 lb/gal CS formulation; Treatment #7 = 7.64 lb/gal EC formulation; and Treatment #8 = 7.64 lb/gal EC formulation at an exaggerated rate (5x).

<sup>2</sup> RTI = Retreatment Interval

**TABLE B.1.3. Trial Numbers and Geographical Locations.**

NAFTA Growing Zones	Field Corn		
	Submitted	Requested <sup>1</sup>	
		Canada	U.S.
1	--	--	1
2	--	--	1
3	--	--	--
4	--	--	--
5	5	--	17
6	1	--	1
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--
13	--	--	--
<b>Total</b>	<b>6<sup>2</sup></b>	<b>NA</b>	<b>20</b>

<sup>1</sup> Regions 14-21 and 1A, 5A, 5B, and 7A were not included as the proposed use is for the US only.

<sup>2</sup> Six side-by-side trials were conducted to provide bridging data between the currently labeled EC formulation (Dual II MAGNUM®) and the lipophilic wax (LW) and the capsule suspension (CS) formulations.

**B.2. Sample Handling and Preparation**

Duplicate control and treated samples of field corn forage, stover, and grain were collected from each treatment plot. Samples were harvested 28-34 days (forage) and 83-116 days (stover and grain) after the last application. The husks were removed and discarded in the field. After harvest, RAC samples were frozen and shipped within 1-93 days to Syngenta Crop Protection, Inc. (Greensboro, NC) for sample preparation.

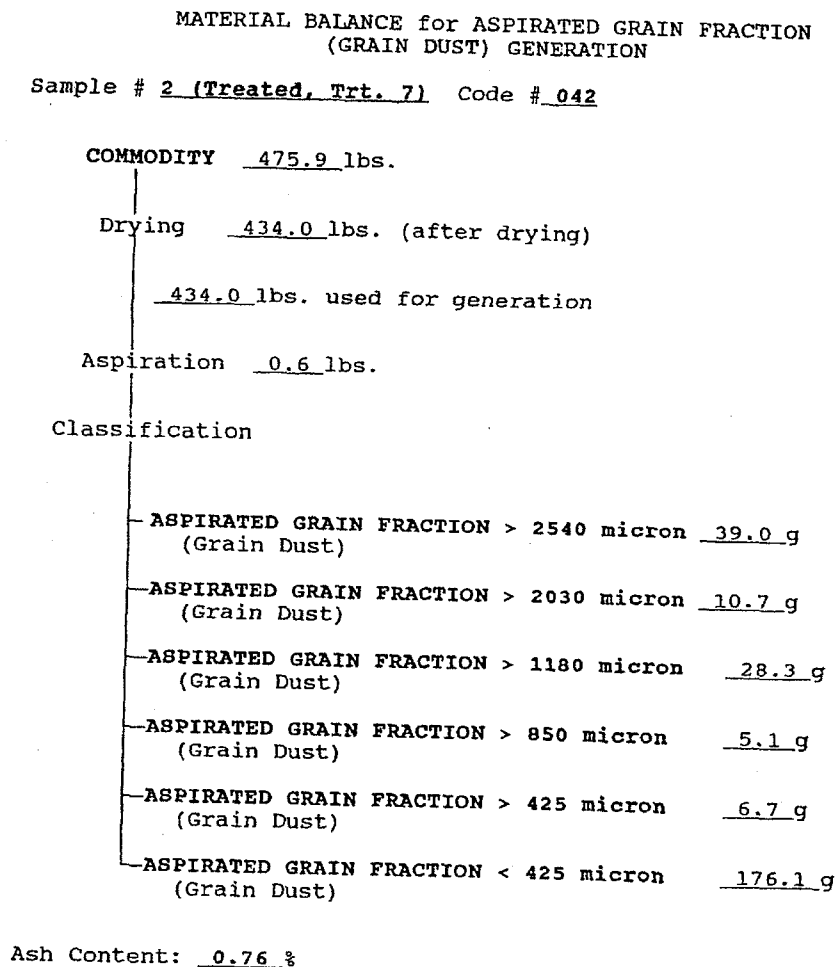


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In addition, composited bulk samples of corn grain were harvested at 114 DAT, following application of the EC formulation at the reported 1x and 5x rates at one trial site. These bulk samples were shipped frozen within 4 days of collection to Texas A&M University, Food Protein Research and Development Center (Bryan, TX), for generation of AGF. Samples were stored frozen ( $\leq -23^{\circ}\text{C}$ ) until processing. A subsample of whole grain was taken prior to processing. Samples were processed into AGF within 242-274 days of harvest using simulated commercial procedures via drying, aspiration, and classification of aspirated material (Figure B.1). After processing, the whole grain and AGF samples were shipped frozen to Syngenta Crop Protection, Inc. (Greensboro, NC) for sample preparation.

Samples were prepared by grinding with dry ice using a table top mill, and the prepared samples were shipped frozen to EN-CAS Laboratories (Winston-Salem, NC) for analysis.

**FIGURE B.1. Processing Flowchart for Corn Aspirated Grain Fractions.**







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### **B.3. Analytical Methodology**

Samples of field corn forage, stover, grain, and AGF were analyzed for residues of S-metolachlor using an LC/MS/MS method (Syngenta Method No. 1848-01). This method is an updated version of the current tolerance enforcement method (AG-338) that utilizes LC/MS/MS detection rather than GC/NPD and uses a chiral HPLC column to separate out the S-enantiomers (SYN506357 and SYN508500) of the hydrolysis products CGA-37913 and CGA 49751. This method has been previously reviewed by HED (D296904, R. Loranger, 4/17/2006).

Briefly, samples are initially refluxed in 6 N HCl for 16 hours. An aqueous aliquot is cooled, filtered, and made basic. Residues are then partitioned into dichloromethane (DCM) and cleaned up using an alumina column. The column is initially eluted with DCM followed by acetone/water. Residues of SYN506357 in the initial DCM eluate are concentrated and redissolved in water/acetonitrile for LC/MS/MS analysis. Residues of SYN508500 in the secondary acetone/water eluate are concentrated and redissolved in water/propanol/methanol for LC/MS/MS analysis. The method uses a reverse phase chiral HPLC column to separate out the two S-enantiomers, which are then detected and quantified by MS/MS. Residues of SYN506357 and SYN508500 are converted to S-metolachlor equivalents by the respective molecular weight factors of 1.47 and 1.14. The LOQ is 0.05 ppm for SYN508500 and 0.03 ppm for SYN506357, each expressed in parent equivalents. The method limit of detection was not reported.

The above method was validated in conjunction with the analysis of field trial samples, using control samples fortified with SYN506357 and SYN508500 at the LOQ (0.03 and 0.05 ppm, respectively) and up to 10x the LOQ for forage and grain, or 2 ppm for SYN 508500 in stover and 0.5 ppm for SYN506357 in forage.

### **C. RESULTS AND DISCUSSION**

The LC/MS/MS method (Method No. 1848-01) used for determining residues of S-metolachlor in/on corn matrices was validated in conjunction with the analysis of the study samples (Table C.1). The validated LOQ is 0.05 ppm for SYN508500 and 0.03 ppm for SYN506357, each expressed in parent equivalents. Concurrent method recoveries for SYN506357 were generally within the acceptable range of 70-120% with the exception of two high recoveries (121-125%) observed from one corn stover sample fortified at 0.30 ppm and one AGF sample fortified at 0.03 ppm. Average concurrent method recoveries of SYN506357 were within the acceptable range of 70-120% for all commodities. For SYN508500, concurrent method recoveries were generally within the acceptable range of 70-120% with the exception of four low recoveries (61-68%) observed from two corn forage samples fortified at 0.05 and 0.50 ppm, one corn grain sample and one whole kernel sample each fortified at 0.05 ppm. Apparent residues of both analytes were below the respective LOQs in/on six samples each of untreated corn forage, stover and grain and one sample each of bulk grain and AGF. Adequate sample calculations and chromatograms were provided, and the fortification levels used in concurrent method recovery adequately bracketed (within an order of magnitude) the observed residue levels in treated samples.



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Samples were stored frozen from harvest to extraction for up to 536 days (17.6 months) for corn forage, 438 days (14.4 months) for corn stover, 505 days (16.6 months) for corn grain, and 447 days (14.7 months) for bulk grain and AGF (Table C.2). Adequate storage stability data are available indicating that CGA-37913 and CGA-49751 are stable under frozen storage conditions for at least 2 years in corn grain and forage and soybean hulls and meal, and 37 months in cottonseed (D292881, S. Kinard, 8/15/03). These data will support the conditions and durations of sample storage from the current corn field trials.

The reviewers noted that the majority of sample extracts were analyzed within 1-28 days of extraction, with the exception of 7 sample extracts of corn forage, 41 sample extracts of corn grain, and 3 sample extracts each of corn kernel and AGFs which were stored longer than 30 days prior to analysis (41-145 days). Given the limited number of extracts held for this long (54 out of 236), HED will not require supporting stability data; however, the registrant is reminded that supporting storage stability data are required for extracts held for >30 days prior to analysis.

Residue data from the field corn field trials, reflecting a combined PPI application and postemergence application using three different S-metolachlor formulations are reported in Table C.3.

For the field corn treated with the LW formulation (Trt #5; Table C.4.1) at a total rate of 3.69-3.77 lb ai/A, residues of SYN506357 were 0.046-0.37 ppm and residues of SYN508500 were 0.051-0.49 ppm in/on forage harvested at 28-34 DAT, for combined residues of 0.11-0.86 ppm. Residues of SYN506357 were 0.040-0.35 ppm and residues of SYN508500 were <0.05-1.3 ppm in/on stover harvested at 83-116 DAT, for combined residues of <0.09-1.7 ppm. Residues of both analytes were <LOQ in/on grain harvested at 83-116 DAT, for combined residues of <0.08 ppm.

For the field corn treated with the CS formulation (Trt #6; Table C.4.2) at a total rate of 3.68-3.78 lb ai/A, residues of SYN506357 were 0.037-0.74 ppm and residues of SYN508500 were 0.055-0.50 ppm in/on forage harvested at 28-34 DAT, for combined residues of 0.093-1.2 ppm. Residues of SYN506357 were <0.03-0.56 ppm and residues of SYN508500 were <0.05-0.47 ppm in/on stover harvested at 83-116 DAT, for combined residues of <0.08-1.0 ppm. Residues of both analytes were <LOQ in/on grain 83-116 DAT, for combined residues of <0.08 ppm.

For the field corn treated with the EC formulation (Trt #7; Table C.4.3) at a total rate of 3.68-3.85 lb ai/A, residues of SYN506357 were 0.032-0.60 ppm and residues of SYN508500 were <0.05-0.49 ppm in/on forage harvested at 28-34 DAT, for combined residues of 0.082-0.97 ppm. Residues of SYN506357 were <0.03-0.46 ppm and residues of SYN508500 were <0.05-0.79 ppm in/on stover harvested at 83-116 DAT, for combined residues of <0.08-1.2 ppm. Residues of both analytes were <LOQ in/on grain 83-116 DAT, for combined residues of <0.08 ppm.

The average combined residues from the LW, CS, or EC formulations were respectively 0.34, 0.50, and 0.37 ppm in/on corn forage and 0.40, 0.33, and 0.43 ppm in/on corn stover, and average combined residues were 0.08 ppm in/on grain from all three formulations. These data indicate that residues of S-metolachlor in/on field corn forage, stover and grain are similar



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following applications of the LW, CS, or EC formulations. No discernible differences or trends in residues detected in/on corn forage and stover were observed, and residues of both analytes were <LOQ in/on all grain samples.

In addition, residues of SYN506357 and SYN508500 were each below the respective method LOQ (<0.03 and <0.05 ppm) in/on bulk samples of whole grain harvested 114 days after treatment with the EC formulation at either 3.75 lb ai/A (1x) or 18.77 lb ai/A (5x). Residues of both analytes were also <LOQ in/on the samples of AGF derived from the 1x- and 5x-treated grain. These data indicate that quantifiable residues of S-metolachlor are unlikely to occur in AGF from field corn treated at the maximum labeled rate (1x rate).

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

<b>TABLE C.1. Summary of Concurrent Recoveries of S-Metolachlor Residues from Corn Commodities.</b>					
Analyte	Matrix	Spike Level (ppm)	Sample Size (n)	Recoveries (%)	Mean ± Std. Dev. (%) <sup>1</sup>
SYN508500	Forage	0.05	2	68, 71	70
		0.50	4	68, 71, 74, 77	73 ± 4
	Stover	0.05	3	74, 74, 101	83 ± 16
		0.50	3	84, 89, 105	93 ± 11
		2.0	1	93	93
	Grain	0.05	4	68, 89, 95, 108	90 ± 17
		0.50	2	91, 109	100
	Whole kernel	0.05	1	61	61
	AGF	0.05	1	91	91
	SYN506357	Forage	0.03	2	88, 103
0.30			3	92, 101, 106	100 ± 7
0.50			1	100	100
Stover		0.03	3	89, 97, 98	95 ± 5
		0.30	3	102, 105, 125	111 ± 13
Grain		0.03	4	73, 75, 93, 119	90 ± 21
		0.30	2	111, 119	115
Whole kernel		0.03	1	103	103
AGF		0.03	1	121	121

<sup>1</sup> Standard deviation is only calculated for a sample size (n) of ≥ 3 samples.



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**TABLE C.2. Summary of Storage Conditions.**

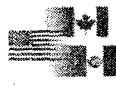
Matrix	Storage Temperature (°C)	Actual Storage Duration <sup>1</sup>	Interval of Demonstrated Storage Stability
Corn, forage	Frozen (temperature unspecified)	RAC: 403-536 days (13.3-17.6 months) Extract: 2-16 days (majority); 72-145 days (n = 7)	24 months in corn grain and forage and soybean meal and hulls, and 37 months in cottonseed. <sup>2</sup>
Corn, stover		RAC: 352-438 days (11.6-14.4 months) Extract: 1-16 days	
Corn, grain		RAC: 376-505 days (12.4-16.6 months) Extract: 4-23 days (majority); 41-76 days (n = 41)	
Corn, kernel		RAC: 404-447 days (13.3-14.7 months) Extract: 28 days (n = 3); 71 days (n = 3)	
AGF		RAC: 395-447 days (13.0-14.7 months) Extract: 19 days (n = 3); 71 days (n = 3)	

<sup>1</sup> Actual storage duration from collection to analysis. The majority of corn samples were analyzed within 1-28 days of extraction; 54 sample extracts were stored longer than 30 days prior to analysis.

<sup>2</sup> D292881, S. Kinard, 8/15/03.

**TABLE C.3. Residue Data from Corn Field Trials with S-Metolachlor using Three Different Formulations.**

Trial ID (City, State; Year)	Zone	Crop; Variety	Total Rate (lb ai/A)	Trt # (form) <sup>1</sup>	Matrix	PHI (days)	Residues (ppm) <sup>2</sup>					
							SYN506357		SYN508500		Combined	
York, NE; 2002 (NB-HR-004-02)	5	Field corn; Pioneer 33B50	3.77	5 (LW)	forage	30	0.26	0.37	0.25	0.49	0.51	0.86
			3.73	6 (CS)		30	0.23	0.21	0.10	0.47	0.33	0.68
			3.74	7 (EC)		30	0.13	0.22	<0.05	0.11	<0.18	0.33
			3.77	5 (LW)	stover	98	0.17	0.30	0.050	0.11	0.22	0.41
			3.73	6 (CS)		98	0.21	0.25	0.084	0.094	0.29	0.34
			3.74	7 (EC)		98	0.29	0.33	0.14	0.14	0.43	0.47
			3.77	5 (LW)	grain	98	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.73	6 (CS)		98	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.74	7 (EC)		98	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
Webster City, IA; 2002 (NE-HR-003-02)	5	Field corn; N32-L9	3.75	7 (EC)	forage	30	0.034	0.049	0.12	0.18	0.15	0.23
			3.75	7 (EC)	stover	114	0.036	0.049	0.053	0.075	0.089	0.12
			18.77	8 (EC)	114	0.15	0.18	0.22	0.20	0.37	0.38	
			3.75	7 (EC)	grain	114	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			18.77	8 (EC)	114	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08	
			3.75	7 (EC)	Bulk grain	114	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			18.77	8 (EC)	114	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08	
			3.75	7 (EC)	AGF	114	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
18.77	8 (EC)	114	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08				
Fitchberg, WI; 2002 (NI-HR-001-02)	5	Field corn; N45-T5	3.71	5 (LW)	forage	29	0.048	0.046	0.084	0.10	0.13	0.15
			3.78	6 (CS)		29	0.037	0.052	0.056	0.055	0.093	0.11
			3.68	7 (EC)		29	0.032	0.054	<0.05	0.13	<0.082	0.18
			3.71	5 (LW)	stover	116	0.040	0.043	<0.05	<0.05	<0.09	<0.093
			3.78	6 (CS)		116	<0.03	0.061	<0.05	<0.05	<0.08	<0.11
			3.68	7 (EC)		116	<0.03	0.031	<0.05	<0.05	<0.08	<0.081
			3.71	5 (LW)	grain	116	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.78	6 (CS)		116	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
3.68	7 (EC)	116	<0.03	<0.03		<0.05	<0.05	<0.08	<0.08			



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 Crop Field Trial/Residue Decline – Corn, field

**TABLE C.3. Residue Data from Corn Field Trials with S-Metolachlor using Three Different Formulations.**

Trial ID (City, State; Year)	Zone	Crop; Variety	Total Rate (lb ai/A)	Trt # (form) <sup>1</sup>	Matrix	PHI (days)	Residues (ppm) <sup>2</sup>					
							SYN506357	SYN508500	Combined			
Noblesville, IN; 2002 (NJ-HR-002-02)	5	Field corn; Beck's Hybrids 5622	3.70	5 (LW)	forage	28	0.14	0.23	0.25	0.23	0.39	0.46
			3.68	6 (CS)		28	0.13	0.14	0.12	0.15	0.25	0.29
			3.71	7 (EC)		28	0.12	0.22	0.26	0.41	0.38	0.63
			3.70	5 (LW)	stover	109	0.11	0.11	0.15	0.18	0.26	0.29
			3.68	6 (CS)		109	0.060	0.097	0.081	0.089	0.14	0.19
			3.71	7 (EC)		109	0.080	0.086	0.13	0.26	0.21	0.35
			3.70	5 (LW)	grain	109	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.68	6 (CS)		109	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.71	7 (EC)		109	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
New Holland, OH; 2002 (NK-HR-002-02)	5	Field corn; SC 1122	3.69	5 (LW)	forage	34	0.058	0.075	0.051	0.064	0.11	0.14
			3.72	6 (CS)		34	0.14	0.25	0.21	0.50	0.35	0.75
			3.69	7 (EC)		34	0.075	0.16	<0.05	0.10	<0.13	0.26
			3.69	5 (LW)	stover	83	0.047	0.35	0.068 <sup>3</sup>	1.3	0.12	1.7
			3.72	6 (CS)		83	0.069	0.13	0.10	0.21	0.17	0.34
			3.69	7 (EC)		83	0.24	0.46	0.79 <sup>3</sup>	0.71	1.0	1.2
			3.69	5 (LW)	grain	83	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.72	6 (CS)		83	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.69	7 (EC)		83	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
East Bernard, TX; 2002 (SB-HR-001-02)	6	Field corn; Dekalb	3.78	6 (CS)	forage	32	0.65	0.74	0.31	0.43	0.96	1.2
			3.85	7 (EC)		32	0.38	0.60	0.49	0.37	0.87	0.97
			3.78	6 (CS)	stover	116	0.36	0.56	0.30	0.47	0.66	1.0
			3.85	7 (EC)		116	0.35	0.41	0.16	0.21	0.51	0.62
			3.78	6 (CS)	grain	116	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08
			3.85	7 (EC)		116	<0.03	<0.03	<0.05	<0.05	<0.08	<0.08

Each treatment plot consisted of a combination of a single PPI application at planting followed by a single directed application at layby. Four treatment regimes were used: Treatment #5 = 6.1 lb/gal LW formulation; Treatment #6 = 5.5 lb/gal CS formulation; Treatment #7 = 7.64 lb/gal EC formulation; and Treatment #8 = 7.64 lb/gal EC formulation at an exaggerated rate.

<sup>2</sup> Residues are expressed in parent equivalents. The LOQs are 0.05 ppm for SYN508500, 0.03 ppm for SYN506357, and 0.08 ppm for the combined residues. For calculating combined residues, the LOQ was used for values <LOQ.

<sup>3</sup> Duplicate analyses of a single sample; higher residue is reported.



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 Crop Field Trial/Residue Decline – Corn, field

**TABLE C.4.1. Summary of Residue Data from Crop Field Trials with S-Metolachlor, Lipophilic Wax Formulation (Treatment #5).**

Commodity	Total Applic. Rate (lb ai/A)	PHI (days)	Residue Levels (ppm) <sup>1</sup>						
			n	Min.	Max.	HAFT <sup>2</sup>	Median (STMdR)	Mean (STMR)	Std. Dev.
<b>SYN506357</b>									
Corn, forage	3.69-3.77	28-34	8	0.046	0.37	0.32	0.11	0.15	0.12
Corn, stover		83-116	8	0.040	0.35	0.24	0.11	0.15	0.12
Corn, grain		83-116	8	<0.03	<0.03	<0.03	0.03	0.03	--
<b>SYN508500</b>									
Corn, forage	3.69-3.77	28-34	8	0.051	0.49	0.37	0.17	0.19	0.15
Corn, stover		83-116	8	<0.05	1.3	0.68	0.089	0.25	0.43
Corn, grain		83-116	8	<0.05	<0.05	<0.05	0.05	0.05	--
<b>Combined</b>									
Corn, forage	3.69-3.77	28-34	8	0.11	0.86	0.69	0.27	0.34	0.26
Corn, stover		83-116	8	<0.09	1.7	0.91	0.24	0.40	0.54
Corn, grain		83-116	8	<0.08	<0.08	<0.08	0.08	0.08	--

Residues are expressed in parent equivalents. The LOQs are 0.05 ppm for SYN508500, 0.03 ppm for SYN506357, and 0.08 ppm for the combined residues.

<sup>2</sup> HAFT = Highest Average Field Trial.

**TABLE C.4.2 Summary of Residue Data from Crop Field Trials with S-Metolachlor, Capsule Suspension Formulation (Treatment #6).**

Commodity	Total Applic. Rate (lb ai/A)	PHI (days)	Residue Levels (ppm) <sup>2</sup>						
			n	Min.	Max.	HAFT <sup>3</sup>	Median (STMdR)	Mean (STMR)	Std. Dev.
<b>SYN506357</b>									
Corn, forage	3.68-3.78	28-34	10	0.037	0.74	0.70	0.18	0.26	0.24
Corn, stover		83-116	10	<0.03	0.56	0.46	0.11	0.18	0.17
Corn, grain		83-116	10	<0.03	<0.03	<0.03	0.03	0.03	--
<b>SYN508500</b>									
Corn, forage	3.68-3.78	28-34	10	0.055	0.50	0.37	0.18	0.24	0.17
Corn, stover		83-116	10	<0.05	0.47	0.39	0.092	0.15	0.14
Corn, grain		83-116	10	<0.05	<0.05	<0.05	0.05	0.05	--
<b>Combined</b>									
Corn, forage	3.68-3.78	28-34	10	0.093	1.2	1.1	0.34	0.50	0.38
Corn, stover		83-116	10	<0.08	1.0	0.83	0.24	0.33	0.29
Corn, grain		83-116	10	<0.08	<0.08	<0.08	0.08	0.08	--

Residues are expressed in parent equivalents. The LOQs are 0.05 ppm for SYN508500, 0.03 ppm for SYN506357, and 0.08 ppm for the combined residues.

<sup>2</sup> HAFT = Highest Average Field Trial.



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 Crop Field Trial/Residue Decline – Corn, field

<b>TABLE C.4.3. Summary of Residue Data from Crop Field Trials with S-Metolachlor, Emulsifiable Concentrate Formulation (Treatment #7).</b>									
Commodity	Total Applic. Rate (lb ai/A)	PHI (days)	Residue Levels (ppm) <sup>1</sup>						
			n	Min.	Max.	HAFT <sup>2</sup>	Median (STMdR)	Mean (STMR)	Std. Dev.
<b>SYN506357</b>									
Corn, forage	3.68-3.85	28-34	12	0.032	0.60	0.49	0.13	0.17	0.17
Corn, stover	3.68-3.85	83-116	12	<0.03	0.46	0.38	0.16	0.20	0.16
Corn, grain	3.68-3.85	83-116	12	<0.03	<0.03	<0.03	0.03	0.03	--
<b>SYN508500</b>									
Corn, forage	3.68-3.85	28-34	12	<0.05	0.49	0.43	0.13	0.19	0.15
Corn, stover	3.68-3.85	83-116	12	<0.05	0.79	0.19	0.14	0.23	0.25
Corn, grain	3.68-3.85	83-116	12	<0.05	<0.05	<0.05	0.05	0.05	--
<b>Combined</b>									
Corn, forage	3.68-3.85	28-34	12	<0.082	0.97	0.92	0.25	0.37	0.30
Corn, stover	3.68-3.85	83-116	12	<0.08	1.2	0.57	0.39	0.43	0.37
Corn, grain	3.68-3.85	83-116	12	<0.08	<0.08	<0.08	0.08	0.08	--

<sup>1</sup> Residues are expressed in parent equivalents. The LOQs are 0.05 ppm for SYN508500, 0.03 ppm for SYN506357, and 0.08 ppm for the combined residues.

<sup>2</sup> HAFT = Highest Average Field Trial.

#### D. CONCLUSION

The field corn field trial data are adequate and indicate that S-metolachlor residues in/on field corn commodities resulting from the three types of formulations (LW, CS, and EC) are similar. The available data support the use of S-metolachlor on field corn as a combination of a PPI application at planting at up to 2.38 lb ai/A followed by a directed application at lay-by at up to 1.39 lb ai/A. The data support a maximum seasonal application rate of 3.77 lb ai/A for the combined application and PHIs of 30 days for forage and 85 days for grain and stover following the postemergence application.

In addition, the results from the AGF tests indicate that quantifiable residues of S-metolachlor are unlikely to occur in/on AGF from field corn treated at the maximum labeled rate (1x rate).

#### E. REFERENCES

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D296904; PP# 3E6787. S-Metolachlor. Petition for Tolerances on Various Crops, Crop Groups, and Livestock Commodities. Summary of Analytical Chemistry and Residue Data; R. Loranger; 4/17/06. MRID(s): 45499609, 45499610, and 46046501 through 46046506.



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**F. DOCUMENT TRACKING**

Petition Number: None

DP#: 332849

PC Code: 108800