

US EPA ARCHIVE DOCUMENT



S-Metolachlor/PC Code 108800/Syngenta Crop Protection, Inc.
 DACO 7.4.1/7.4.2/OPPTS 860.1500/OECD IIA 6.3.1, 6.3.2, 6.3.3 and IIIA 8.3.1, 8.3.2, 8.3.3
 Crop Field Trial/Residue Decline - Soybean

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This DER was originally prepared under contract by Dynamac Corporation (1910 Sedwick Road, Building 100, Suite B, Durham, NC 27713; submitted 5/14/2008). The DER has been reviewed by the Health Effects Division (HED) and revised to reflect current Office of Pesticide Programs (OPP) policies.

STUDY REPORT:

47304702. Oakes, T., Ediger, K. (2004) S-Metolachlor - Magnitude of the Residues In or On Soybean: Lab Project Number: 787-02. Unpublished study prepared by Syngenta Crop Protection, Inc. 222 p.

EXECUTIVE SUMMARY:

Syngenta Crop Protection submitted field trial data for S-metolachlor on soybeans from 18 field trials conducted in Zones 2, 4, and 5 during 2002. A 7.64 lb/gal emulsifiable concentrate (EC) formulation of S-metolachlor was applied to soybeans using the following three application regimes: a single broadcast soil application at planting at 1.97-2.07 lb ai/A (Trt #2); a single preplant incorporated (PPI) application at planting at 1.96-2.03 lb ai/A (Trt #3); or a combination of a PPI application at 1.17-1.22 lb ai/A at planting followed by a broadcast foliar application at 1.28-1.34 lb ai/A prior to bloom, for a total of 2.47-2.55 lb ai/A/season (Trt # 4). The retreatment interval (RTI) was 23-81 days for the combined applications. Each field site included either two or three treated plots, along with a control plot. The combination of the PPI and foliar applications was tested at all 18 field sites, the single broadcast soil application was tested at 10 sites, and the single PPI application was tested at 8 sites. In addition, one test site included a fifth treatment (Trt #5), which was identical to Trt #4, except that the S-metolachlor was applied at exaggerated use rates of 6.01 lb ai/A for the PPI application and at 6.44 lb ai/A for the subsequent foliar application, for a total of 12.45 lb ai/A (reported 5x rate). All applications were made with ground equipment using 2-26 gal/A and did not include the use of any adjuvants.

Single control and duplicate treated samples of mature soybean seeds were harvested at 113-184 days after treatment (DAT) from Trt #2, 123-161 DAT from Trt #3, 85-103 DAT for Trt #4, and 94 DAT for Trt #5. To assess residue decline, seeds were also collected at ~7-day intervals from 115-129 DAT for Trt #2 at one site, from 146-174 DAT for Trt #3 at one site, and from 70-99 DAT for Trt #4 at three sites. Samples were stored frozen for up to 11.8 months prior to analysis, an interval that is supported by the available storage stability data.

Residues of S-metolachlor in/on soybean seeds were determined as SYN506357 and SYN508500 (S-enantiomers of CGA-37913 and CGA-49751) using a LC/MS/MS method (Syngenta Method No. 1848-01), which is derived from the current tolerance enforcement



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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. 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.

For the single broadcast soil application at 1.97-2.07 lb ai/A (Trt #2), the combined residues of SYN506357 and SYN508500 were <0.08-0.10 ppm in/on seeds harvested at 113-184 DAT. For the single PPI application at 1.96-2.03 lb ai/A (Trt #3), the combined residues of SYN506357 and SYN508500 were <0.08-0.09 ppm in/on seeds harvested at 123-161 DAT. For the combined PPI and post-emergence foliar applications totaling 2.47-2.55 lb ai/A (Trt #4), the combined residues of SYN506357 and SYN508500 were <0.08-0.11 ppm in/on seeds harvested at 85-103 DAT. Average combined residues in/on seeds were 0.08 ppm for Trts #2 and #3 and 0.09 ppm for Trt #4. These data indicate that the combined residues of S-metolachlor in/on soybean seeds are similar following either a single PPI or broadcast soil application at planting at ~2 lb ai/A, or following combined PPI and foliar applications totaling ~2.5 lb ai/A.

In the exaggerate rate test using the combined PPI and foliar applications at rates totaling 12.45 lb ai/A (Trt #5), residues of both SYN506357 and SYN508500 were <LOQ in/on seeds harvested at 94 DAT. No pattern of decline or increase in residues was apparent from any of the residue decline tests as seed samples from all of these tests were below or just above the LOQ at all sampling intervals.

STUDY/WAIVER ACCEPTABILITY/DEFICIENCIES/CLARIFICATIONS:

Although details of soil parameters (organic matter, pH, CEC) were not provided as required for soil applied herbicides, and only 18 of the required 20 trials were conducted, the soybean field trial residue data are classified as scientifically acceptable under the conditions and parameters used in the study. 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 soybeans. The current use on soybeans allows for use of S-metolachlor as a preplant surface, PPI, or preemergence application at 0.95-1.90 lb ai/A or a



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postemergence application at 0.95-1.26 lb ai/A, with the rate depending on the soil type and amounts of organic matter.

Syngenta has submitted the current soybean field trial data to support label amendments allowing for a combination of either a preplant, PPI, or preemergence application in conjunction with a post-emergence application. 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.

TABLE A.1. Nomenclature of S-Metolachlor and its Regulated Derivatives.	
Parent compound	
Common name	S-Metolachlor
Company experimental name	CGA-77102
IUPAC name	(S)-2-chloro-N-(2-ethyl-6-methylphenyl)-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)
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



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TABLE A.1. Nomenclature of S-Metolachlor and its Regulated Derivatives.	
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	Registration Division: Physical and Chemical Characteristics (D225258)
pH	7.8 at 25°C (1% aqueous dispersion)	
Density	1.117 g/cm ³ at 20°C	
Water solubility (25°C)	0.48 g/L	
Solvent solubility (mg/L at 25°C)	Miscible with methanol, acetone, toluene, n-octanol, n-hexane, ethyl acetate, dichloromethane	
Vapor pressure at 25°C	2.8 x 10 ⁻⁵ mm Hg	
Dissociation constant (pK _a)	No dissociation constant in pH range 2-12	
Octanol/water partition coefficient Log(K _{ow})	3.0 at 25°C	
UV/visible absorption spectrum	Not Provided	

B. EXPERIMENTAL DESIGN

B.1. Study Site Information

In 18 soybean field trials conducted in Zones 2, 4 and 5 during 2002 (Table B.1.1), S-metolachlor (7.64 lb/gal EC) was applied to soybeans using three different application regimes. S-Metolachlor was applied to soybeans as either a single broadcast soil application at planting at ca. 2.0 lb ai/A (Trt #2), a single PPI application at planting at ca. 2.0 lb ai/A (Trt #3), or as a combination of a PPI application at ca. 1.2 lb ai/A at planting followed by a broadcast foliar application at ca. 1.3 lb ai/A prior to bloom, for a total of ca. 2.5 lb ai/A/season (Trt #4). Each field site included either two or three treated plots, along with a control plot (Table B.1.2). The combination of the PPI and foliar applications was tested at all 18 field sites, the single broadcast soil application was tested at 10 sites, and the single PPI application was tested at 8 sites. In addition, one test site included a fifth treatment (Trt #5), which was identical to Trt #4, except that the S-metolachlor was applied at exaggerated use rates of 6.01 lb ai/A for the PPI application and at 6.44 lb ai/A for the subsequent foliar application, for a total of 12.45 lb ai/A (reported 5x rate). This plot was used to generate samples for a concurrent processing study (47304702.de2). All applications were made using ground equipment using volumes of 13-26 gal/A, except at two sites that used a volume of 2 gal/A to simulate aerial application. None of the applications included the use of an adjuvant.

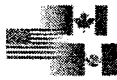


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Trial Identification (City, State; Year)	Soil characteristics			
	Type	%OM	pH	CEC (meq/g)
Conklin, MI 2002	Sandy Loam	NR	NR	NR
St. John KS 2002	Sand	NR	NR	NR
York, NE 2002	Silt Loam	NR	NR	NR
Centerville, SD 2002	Loam	NR	NR	NR
Oregon, MO 2002	Silt Loam	NR	NR	NR
Hedrick, IA 2002	Silt Loam	NR	NR	NR
Richland, IA 2002	Silt Loam	NR	NR	NR
Campbell, MN 2002	Loam	NR	NR	NR
Lexington, KY 2002	Silty Clay Loam	NR	NR	NR
Carlyle, IL 2002	Silt Loam	NR	NR	NR
Richmond TWP, WI 2002	Silt Loam	NR	NR	NR
Noblesville, IN 2002	Loam	NR	NR	NR
Marysville, OH 2002	Silt Clay	NR	NR	NR
West Memphis, AR 2002	Loam	NR	NR	NR
Hickory Withe, TN 2002	Silt Loam	NR	NR	NR
Rose Hill, NC 2002	Sand	NR	NR	NR
Elko, SC 2002	Loamy Sand	NR	NR	NR
Gardner ND 2002	Clay Loam	NR	NR	NR

NR = not reported

The average monthly temperatures and monthly precipitation were reported for each trial site, along with the departure of the temperature and precipitation from normal. Irrigation was used to supplement rainfall as needed. No unusual climatic conditions were noted. The tests were reportedly conducted according to normal agricultural practices for the different regions, and information was provided on maintenance pesticides and fertilizers used at each location. Although the soil type was indicated for each trial site, no information was provided on other soil parameters (organic matter, pH, CEC).



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TABLE B.1.2. Study Use Pattern.							
Location (City, State; Year) Trial ID	End-Use Product	Application information ¹					
		Method; Timing	TRT #	Volume (gal/A)	Single Rate (lb ai/A)	RTI ² (days)	Total Rate (lb ai/A)
Conklin, MI 2002 ED-HR-005-02	7.6 lb/gal EC	PPI application at planting	3	2.0 ³	1.99	--	1.99
		PPI application at planting followed by broadcast foliar application at R1 stage	4	2.0 ³	1.20, 1.31	58	2.51
St. John, KS 2002 NA-HR-009-02	7.6 lb/gal EC	Broadcast soil application at planting	2	2.0 ³	1.99	--	1.99
		PPI application at planting followed by broadcast foliar application, blossoms at 6 th node	4	2.0-2.1 ³	1.26 1.29	48	2.55
York, NE 2002 NB-HR-009-02	7.6 lb/gal EC	Broadcast soil application at planting	2	20	2.01	--	2.01
		PPI application at planting followed by broadcast foliar application at BBCH 59	4	20	1.20 1.30	38	2.50
Centerville, SD 2002 NC-HR-006-02	7.6 lb/gal EC	PPI application at planting	3	20	1.96	--	1.96
		PPI application at planting followed by broadcast foliar application at BBCH 37	4	20-21	1.18 1.34	41	2.52
Oregon, MO 2002 ND-HR-006-02	7.6 lb/gal EC	PPI application at planting	3	18	2.00	--	2.00
		PPI application at planting followed by broadcast foliar application at 4 th to 5 th trifoliolate	4	16-18	1.17 1.30	37	2.47
Hedrick, IA 2002 NE-HR-005-02	7.6 lb/gal EC	PPI application at planting	3	17	2.00	--	2.00
		PPI application at planting followed by broadcast foliar application at BBCH 13	4	13-17	1.21 1.29	29	2.50
		PPI application at planting followed by broadcast foliar application at BBCH 13	5	13-17	6.01 6.44	29	12.45
Richland, IA 2002 NE-HR-006-02	7.6 lb/gal EC	Broadcast soil application at planting	2	19	2.00	--	2.00
		PPI application at planting followed by broadcast foliar application at BBCH 14	4	13-20	1.19 1.28	31	2.47
Campbell, MN 2002 NF-HR-005-02	7.6 lb/gal EC	Broadcast soil application at planting	2	20	2.01	--	2.01
		PPI application at planting followed by broadcast foliar application at BBCH 61	4	20	1.21 1.31	51	2.52
Lexington, KY 2002 NG-HR-003-02	7.6 lb/gal EC	PPI application at planting	3	26	2.03	--	2.03
		PPI application at planting followed by broadcast foliar application at stage V4	4	26	1.20 1.31	32	2.51
Carlyle, IL 2002 NH-HR-005-02	7.6 lb/gal EC	Broadcast soil application at planting	2	24	2.07	--	2.07
		PPI application at planting followed by broadcast foliar application at stage R1	4	18-23	1.22 1.31	29	2.53
Richmond, WI 2002 NI-HR-004-02	7.6 lb/gal EC	PPI application at planting	3	18	1.98	--	1.98
		PPI application at planting followed by broadcast foliar application at stage R2	4	18-19	1.18 1.29	56	2.47
Noblesville, IN 2002 NJ-HR-005-02	7.6 lb/gal EC	Broadcast soil application at planting	2	15	2.01	--	2.01
		PPI application at planting followed by broadcast foliar application at stage V6	4	14-15	1.20 1.30	45	2.50
Marysville, OH 2002 NK-HR-007-02	7.6 lb/gal EC	PPI application at planting	3	19	2.00	--	2.00
		PPI application at planting followed by broadcast foliar application at BBCH 13	4	19	1.20 1.31	37	2.50
West Memphis, AR	7.6 lb/gal	Broadcast soil application at planting	2	17	2.02	--	2.02



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TABLE B.1.2. Study Use Pattern.

Location (City, State; Year) Trial ID	End-Use Product	Application information ¹					
		Method; Timing	TRT #	Volume (gal/A)	Single Rate (lb ai/A)	RTI ² (days)	Total Rate (lb ai/A)
2002 SE-HR-005-02	EC	PPI application at planting followed by broadcast foliar application at BBCH 63	4	17	1.18 1.32	41	2.50
Hickory Withe, TN 2002 SG-HR-002-02	7.6 lb/gal EC	Broadcast soil application at planting	2	17	2.01	--	2.01
		PPI application at planting followed by broadcast foliar application at pre-bloom	4	16-17	1.22 1.29	23	2.51
Rose Hill, NC 2002 SJ-HR-015-02	7.6 lb/gal EC	Broadcast soil application at planting	2	20	1.98	--	1.98
		PPI application at planting followed by broadcast foliar application at BBCH 65	4	20	1.22 1.29	81	2.51
Elko, SC 2002 SJ-HR-016-02	7.6 lb/gal EC	PPI application at planting	3	23	2.02	--	2.02
		One preplant incorporated spray at planting and one broadcast foliar application at bloom	4	15-23	1.21 1.30	76	2.51
Gardner, ND 2002 WI-HR-004-02	7.6 lb/gal EC	Broadcast soil application at planting	2	17	1.97	--	1.97
		PPI application at planting followed by broadcast foliar application at BBCH 13	4	17-18	1.19 1.30	27	2.49

¹ No adjuvants were used in any tests.
² RTI = Retreatment Interval.
³ Applications were made at 2 gal/A to simulate aerial application.

TABLE B.1.3. Trial Numbers and Geographical Locations.

NAFTA Growing Zones	Soybean		
	Submitted	Requested ¹	
		Canada	U.S.
1	--	--	--
2	2	--	2
3	--	--	--
4	2	--	3
5	14	--	15
6	--	--	--
7	--	--	--
8	--	--	--
9	--	--	--
10	--	--	--
11	--	--	--
12	--	--	--
13	--	--	--
Total	18	--	20

¹ Regions 14-21 and 1A, 5A, 5B, and 7A were not included as the proposed use is for the U.S. only.

B.2. Sample Handling and Preparation

Single control and duplicate treated samples of soybean seeds (amounts not specified) were harvested from each site at normal crop maturity, which was at 113-184 DAT for Trts #2 and #3



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and 85-103 DAT for Trts #4 and #5. To assess residue decline, soybeans seeds were collected at ~7-day intervals from 115-129 DAT at one site for Trt #2 and from 146-174 DAT at another site for Trt #3. For Trt #4, residue decline samples were collected at ~7-day intervals at three different test sites from either 84-98 DAT, 78-99 DAT, or 70-98 DAT.

After harvest, samples were frozen (time from field to freezer not specified), and shipped frozen to Syngenta Crop Protection (Greensboro, NC) for sample preparation. Samples were prepared by grinding with dry ice using a table top mill, and the prepared samples were then shipped frozen to the analytical laboratory (ADPEN Laboratories, Jacksonville, FL), where samples were stored at -20°C until extraction for analysis.

B.3. Analytical Methodology

Samples of soybean seeds 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 DYN508500) of the hydrolysis products CGA-37913 and CGA 49751. This method has been reviewed by HED (D296904, R. Loranger, 4/17/2006).

For this method, 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/acetone 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, using external standards. The m/z 194.3→136.6 transition is used for detection and quantitation of SYN506357, and the m/z 249.9→203.8 transition is used for detection and quantitation of SYN508500.

The above method was validated in conjunction with the analysis of field trial samples, using control samples of soybean seed fortified with SYN506357 at 0.03 ppm and SYN508500 at 0.05 ppm.

C. RESULTS AND DISCUSSION

The LC/MS/MS method (Method No. 1848-01) used for determining residues of S-metolachlor in/on soybean seeds was adequately validated in conjunction with the analysis of field trial samples. Concurrent recoveries averaged 86% for SYN506357 and 89% for SYN508500 (Table C.1). Apparent residues of both analytes were <LOQ in/on all control samples. Adequate sample calculations and example chromatograms were provided, and the fortification levels used for the concurrent recoveries were similar in magnitude to the measured residue levels.



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Samples of soybean seeds were stored frozen ($\leq -5^{\circ}\text{C}$) for 10.1-11.8 months prior to analysis (Table C.2). Adequate storage stability data are available indicating that metolachlor residues are stable under frozen storage conditions for at least 37 months in cottonseed (D292881, S. Kinard, 8/15/2003). These data will support the storage conditions and durations of samples from the current soybean field trials.

The reviewers noted that sample extracts were stored for >30 days (47-78 days) prior to analysis for SYN508500. Although HED typically requires supporting stability data when extracts are stored for more than one month, no additional storage stability data are required for these field trials because the recoveries of SYN508500 were adequate from fortified control samples extracted and analyzed concurrently with the field samples. The adequate concurrent recoveries demonstrate the stability of the residue in the extracts.

Following a single broadcast soil application at 1.97-2.07 lb ai/A (Trt #2), residues of SYN506357 were <0.03-0.04 ppm and residues of SYN508500 were <0.05-0.06 ppm in/on seeds harvested at 113-184 DAT, for combined residues of <0.08-0.10 ppm (Table C.3). Following a single PPI application at 1.96-2.03 lb ai/A (Trt #3), residues of SYN506357 were <0.03-0.04 ppm and residues of SYN508500 were <0.05-0.06 ppm in/on seeds harvested at 123-161 DAT, for combined residues of <0.08-0.09 ppm. Following a combined PPI application and post-emergence foliar application totaling 2.47-2.55 lb ai/A (Trt #4), residues of SYN506357 were <0.03-0.05 ppm and residues of SYN508500 were <0.05-0.07 ppm in/on seeds harvested at 85-103 DAT, for combined residues of <0.08-0.11 ppm. The average combined residues in/on seeds were 0.08 ppm for Trts #2 and #3 and 0.09 ppm for Trt #4 (Table C.4). These data indicate that the combined residues of S-metolachlor in/on soybean seeds are similar following either a single PPI or broadcast soil application at planting at ca. 2 lb ai/A, or following combined PPI and foliar applications totaling ca. 2.5 lb ai/A.

In the exaggerated rate test using the combined PPI and foliar applications at rates totaling 12.45 lb ai/A (Trt #5), residues of both SYN506357 and SYN508500 were <LOQ in/on seeds harvested at 94 DAT.

No pattern of decline or increase in residues was apparent from any of the residue decline tests, as seed samples from all of these tests were below or just above the LOQ at all sampling intervals.

Common cultural practices were reportedly 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.



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TABLE C.1. Summary of Concurrent Recoveries of S-Metolachlor Residues from Soybean Seeds.

Matrix	Analyte	Spike Level (ppm)	Sample Size (n)	Recoveries (%)	Mean ± Std. Dev. (%)
Soybean seed	SYN-506357	0.03	31	83, 89, 94, 88, 82, 73, 80, 63, 88, 74, 97, 89, 86, 67, 83, 70, 69, 74, 86, 66, 119, 117, 94, 99, 105, 99, 98, 96, 86	86 ± 14
Soybean seed	SYN-508500	0.05	31	75, 75, 120, 112, 75, 75, 70, 75, 91, 108, 99, 95, 74, 79, 79, 75, 87, 108, 83, 116, 70, 75, 75, 99, 95, 104, 75, 79	89 ± 16

TABLE C.2. Summary of Storage Conditions.

Matrix	Storage Temperature (°C)	Actual Storage Duration (months) ¹	Interval of Demonstrated Storage Stability (months)
Dried Seed	≤-5	10.1-11.8	37

¹ Interval from harvest to extraction. Sample extracts were stored for 1-27 days prior to analysis of SYN506357 and for 45-78 days prior to analysis for SYN508500.

² Residues of both analytes are stable for up to 37 months in frozen cottonseed.

TABLE C.3. Residue Data from Soybean Field Trials with S-Metolachlor (EC) using Three Different Application Regimes.

Trial ID (City, State; Year)	Zone	Variety	Total Rate (lb ai/A)	TRT# ¹	Matrix	PHI (days)	Residues (ppm) ²					
							SYN508500		SYN506357		Combined	
Conklin, MI 2002 ED-HR-005-02	5	92B05, 92B71	1.99	3	Dried Seed	143	<0.05	<0.05	0.04	<0.03	<0.09	<0.08
			2.51	4	Dried Seed	85	0.07	<0.05	0.03	<0.03	0.10	<0.08
St. John KS 2002 NA-HR-009-02	5	3A72RR	1.99	2	Dried Seed	134	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.55	4	Dried Seed	86	0.05	<0.05	0.05	0.04	0.10	<0.09
York, NE 2002 NB-HR-009-02	5	SN79553	2.01	2	Dried Seed	132	<0.05	0.06	<0.03	0.04	<0.08	0.10
			2.50	4	Dried Seed	94	0.06	0.06	0.04	0.05	0.10	0.11
Centerville, SD 2002 NC-HR-006-02	5	NK S24-K4	1.96	3	Dried Seed	134	0.06	0.05	<0.03	<0.03	<0.09	<0.08
			2.52	4	Dried Seed	93	0.06	0.06	<0.03	<0.03	<0.09	<0.09
Oregon, MO 2002 ND-HR-006-02	5	Pioneer 93B72	2.00	3	Dried Seed	127	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.47	4	Dried Seed	90	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Hedrick, IA 2002 NE-HR-005-02	5	93 B09	2.00	3	Dried Seed	123	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.50	4	Dried Seed	94	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			12.45	5	Dried Seed	94	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Richland, IA 2002 NE-HR-006-02	5	Willcross	2.00	2	Dried Seed	115	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						122	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.47	4	Dried Seed	129	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						84	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						91	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
98	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08						



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 Crop Field Trial/Residue Decline - Soybean

TABLE C.3. Residue Data from Soybean Field Trials with S-Metolachlor (EC) using Three Different Application Regimes.

Trial ID (City, State; Year)	Zone	Variety	Total Rate (lb ai/A)	TRT# ¹	Matrix	PHI (days)	Residues (ppm) ²					
							SYN508500		SYN506357		Combined	
Campbell, MN 2002 NF-HR-005-02	5	Dekalb 06-51	2.01	2	Dried Seed	139	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.52	4	Dried Seed	88	0.06	0.06	<0.03	<0.03	<0.09	<0.09
Lexington, KY 2002 NG-HR-003-02	5	AG4403	2.03	3	Dried Seed	123	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.51	4	Dried Seed	91	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Carlyle, IL 2002 NH-HR-005-02	5	BT 441CR Roundup Ready	2.07	2	Dried Seed	118	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.53	4	Dried Seed	89	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Richmond, WI 2002 NI-HR-004-02	5	261RR	1.98	3	Dried Seed	147	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.47	4	Dried Seed	90	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Noblesville, IN 2002 NJ-HR-005-02	5	Beck's Hybrid 323RR	2.01	2	Dried Seed	135	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.50	4	Dried Seed	90	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Marysville, OH 2002 NK-HR-007-02	5	Vigrow 372 RR	2.00	3	Dried Seed	129	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						78	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.50	4	Dried Seed	85	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						92	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
West Memphis, AR 2002 SE-HR-005-02	4	AG4403	2.02	2	Dried Seed	132	0.06	0.05	<0.03	<0.03	<0.09	<0.08
			2.50	4	Dried Seed	91	<0.05	0.07	<0.03	<0.03	<0.08	<0.10
Hickory Withe, TN 2002 SG-HR-002-02	4	AG5901	2.01	2	Dried Seed	113	<0.05	<0.05	0.04	0.04	<0.09	<0.09
			2.51	4	Dried Seed	90	<0.05	<0.05	0.04	0.04	<0.09	<0.09
Rose Hill, NC 2002 SJ015-02	2	DP6880RR	1.98	2	Dried Seed	184	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.51	4	Dried Seed	103	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
Elko, SC 2002 SJ-HR-016-02	2	Hartz H724RR	2.02	3	Dried Seed	146	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						154	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						161	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						167	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.51	4	Dried Seed	174	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
						70	<0.05	<0.05	0.03	0.03	<0.08	<0.08
						78	<0.05	<0.05	0.04	0.03	<0.09	<0.08
						85	0.05	0.06	0.03	0.03	0.08	0.09
91	0.07	0.07	<0.03	0.03	<0.10	0.10						
98	0.07	0.07	<0.03	<0.03	<0.10	<0.10						
Gardner, ND 2002 WI-HR-004-02	5	Mycogen 5007	1.97	2	Dried Seed	118	<0.05	<0.05	<0.03	<0.03	<0.08	<0.08
			2.49	4	Dried Seed	91	<0.05	<0.05	0.04	0.04	<0.09	<0.09

¹ Trt #2 – broadcast soil surface application at planting; Trt #3 – PPI application at planting; Trt #4 – combination of PPI application at planting followed by single broadcast foliar application, 1x rate tests; and Trt #5 - PPI application at planting followed by single broadcast foliar application (5x test for processing).

² 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.



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 Crop Field Trial/Residue Decline - Soybean

TABLE C.4. Summary of Residue Data from Soybean Trials with S-Metolachlor (EC).										
Commodity	TRT#	Total Applic. Rate (lb ai/A)	PHI (days)	Residue Levels (ppm) ¹						
				n	Min.	Max.	HAFT ²	Median (STMdR)	Mean (STMR)	Std. Dev.
SYN506357										
Dried Seed	2	1.97-2.07	113-184	20	<0.03	0.04	0.04	0.03	0.03	0.004
Dried Seed	3	1.96-2.03	123-161	16	<0.03	0.04	0.04	0.03	0.03	0.003
Dried Seed	4	2.47-2.55	85-103	36	<0.03	0.05	0.05	0.03	0.03	0.006
SYN508500										
Dried Seed	2	1.97-2.07	113-184	20	<0.05	0.06	0.06	0.05	0.05	0.003
Dried Seed	3	1.96-2.03	123-161	16	<0.05	0.06	0.06	0.05	0.05	0.003
Dried Seed	4	2.47-2.55	85-103	36	<0.05	0.07	0.06	0.05	0.05	0.006
Combined Residues										
Dried Seed	2	1.97-2.07	113-184	20	<0.08	0.10	0.09	0.08	0.08	0.006
Dried Seed	3	1.96-2.03	123-161	16	<0.08	0.09	0.09	0.08	0.08	0.003
Dried Seed	4	2.47-2.55	85-103	36	<0.08	0.11	0.11	0.08	0.09	0.008

¹ 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.

² HAFT = Highest Average Field Trial.

D. CONCLUSION

Although only 18 of the required 20 soybean field trials were conducted for the combined PPI and foliar application regime, the available field trial data are adequate as the residue data from the 18 tests were consistent. The data indicate that S-metolachlor residues in/on soybean seeds resulting from the three types of applications are similar. The available data support the use of S-metolachlor (EC) on soybeans as a combination of a PPI or soil surface application at planting at up to 1.2 lb ai/A followed by a broadcast foliar application prior to bloom at up to 1.3 lb ai/A. The data support a maximum seasonal application rate of 2.5 lb ai/A for the combined application and a 90-day PHI for the post-emergence application.

E. REFERENCES

D292881; PP#s: 7F04897, 9E06055, 7E04916, 2E06374, 4E04420, 8E05029, and 8E05030. Revised Metolachlor and S-metolachlor Residue Chemistry Chapter for the Tolerance Reassessment Eligibility Decision (TRED) and Registration for Use on Asparagus, Carrots, Cotton, Horseradish, Green Onions, Peppers, Rhubarb, Sugar Beet, Sunflower, and Swiss Chard. R. Loranger; 8/15/2003. MRIDs: 44378401, 44908701, 45544701

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; 4/17/2006. MRIDs: 45499609, 45499610, and 46046501 through 46046506



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F. DOCUMENT TRACKING

Petition Number: None
DP#: D350492
PC Code: 108800