Data Evaluation Report on the herbicidal activity of XDE-742 and 6 soil metabolites to terrestrial vascular plants in a post-emergence screening study.

PMRA Submission Number {2006-4727; ID 1283254} **EPA MRID Number {.....}** 469085-12

Data Requirement:	PMRA DATA CODE: 9.8.4 EPA DP Barcode: OECD Data Point: IIIA 10.8.1.1 (EP) EPA Guideline: U.S. EPA OPPTS 850.4250
Test material:	XDE-742 **Purity (%):** Not reported.
Common name:	Pyroxulam (active constituent)
Chemical name:	3-pyridinesulfonamide, N-(5,7-dimethoxy[1,2,4]triazolo[1,5-α]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)
IUPAC	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)pyridine-3-sulfonamide
CAS name	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)-3-pyridinesulfonamide
CAS No.	422556-08-9
Synonyms	None

In addition, 6 soil metabolites were tested. A full list of all test substances is provided below.

Primary Reviewer: Chris Lee-Steere **Date:** 8 May 2007
Australian Government Department of the Environment, Water, Heritage and the Arts (DEHWA)

Secondary Reviewer: Jack Holland **Date:** 5 June 2007
Australian Government Department of the Environment, Water, Heritage and the Arts

PMRA Reviewer: Émilie Larivière **Date:** 28 June 2007
Environmental Assessment Directorate, PMRA

EPA/EFED/ERBIV: Christopher Salice **Date**: 20 June 2007

Company Code: DWE
Active Code: JUA
Use Site Category: 13, 14
EPA PC Code:

CITATION:
R E Gast and P R Schmitzer (2006). Herbicidal activity of XDE-742 soil metabolites on weeds and crops in a discovery weed management level 3 post-emergence screen. Dow AgroSciences

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PMRA Submission Number {2006-4727; ID 1283254} EPA MRID Number {.....}

LLC, Indianapolis, Indiana 46268-1054. Dow AgroSciences, unpublished report, Study No. GH-C 5829. 4 January 2006.

Data Evaluation Report on the herbicidal activity of XDE-742 and 6 soil metabolites to terrestrial vascular plants in a post-emergence screening study.

PMRA Submission Number {2006-4727; ID 1283254} **EPA MRID Number** 468085-12 {.....}

Data Requirement:	PMRA DATA CODE: 9.8.4 EPA DP Barcode: OECD Data Point: IIIA 10.8.1.1 (EP) EPA Guideline: U.S. EPA OPPTS 850.4250
Test material:	XDE-742 **Purity (%):** Not reported.
Common name:	Pyroxulam (active constituent)
Chemical name:	3-pyridinesulfonamide, N-(5,7-dimethoxy[1,2,4]triazolo[1,5-α]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)
IUPAC	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)pyridine-3-sulfonamide
CAS name	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)-3-pyridinesulfonamide
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Synonyms	None

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PMRA Submission Number {2006-4727; ID 1283254} **EPA MRID Number {469085-12}**

Data Requirement: PMRA DATA CODE: 9.8.4
EPA DP Barcode:
OECD Data Point: IIIA 10.8.1.1 (EP)
EPA Guideline: U.S. EPA OPPTS 850.4250

Test material: XDE-742 **Purity (%):** Not reported.

Common name:	Pyroxulam (active constituent)
Chemical name:	3-pyridinesulfonamide, N-(5,7-dimethoxy[1,2,4]triazolo[1,5-α]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)
IUPAC	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)pyridine-3-sulfonamide
CAS name	N-(5,7-dimethoxy[1,2,4]triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)-3-pyridinesulfonamide
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Synonyms	None

In addition, 6 soil metabolites were tested. A full list of all test substances is provided below.

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Australian Government Department of the Environment and Water Resources

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EPA/EFED/ERBIV: Christopher Salice **Date:** 20 June 2007

Company Code: DWE
Active Code: JUA
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CITATION:
R E Gast and P R Schmitzer (2006). Herbicidal activity of XDE-742 soil metabolites on weeds and crops in a discovery weed management level 3 post-emergence screen. Dow

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PMRA Submission Number {2006-4727; ID 1283254} EPA MRID Number {469085-12}

AgroSciences LLC, Indianapolis, Indiana 46268-1054. Dow AgroSciences, unpublished report, Study No. GH-C 5829. 4 January 2006.

EXECUTIVE SUMMARY:

The herbicidal activity of XDE-742 and 6 of its soil metabolites were tested on 22 species of weeds and crop plants in a post-emergence screening study. All test substances were sprayed as a foliar application at spray concentrations of 3.91, 7.81, 15.6, 31.3 and 62.5 ppm. In addition to the active ingredient, the final spray solutions contained acetone, deionized water, DMSO, Atplus 411F (crop oil concentrate), Triton X155 (48.5:39:10:1.5:1.0:0.02 v/v). Plants were sprayed to run-off; approximately 1.3 mL of spray solution was applied per pot (area of 91 cm^2). The treatments were not replicated, but multiple plants per species (from 5 to 15) were tested. Assessments of weed control and crop injury were made 14 days after application of the test chemicals.

The parent compound, XDE-742, showed a high level of herbicidal activity to all test species at all rates. Even at the lowest test concentration of 3.91 ppm, injury based on visual assessment ranged from 70-100% (100% being complete kill) to all species except wheat where the injury rating was 60%.

By contrast, evaluation of six soil metabolites of XDE-742 demonstrated that none of the metabolites tested had significant herbicidal activity in a multi-crop/weed screen at rates equivalent to XDE-742, up to 62.5 ppm applied post-emergence. Pigweed was the most sensitive species with measurable effects (visual assessment) for all of the six metabolites, particularly at the higher test concentrations.

The test did not allow for statistical calculation of EC50, EC25 or NOEC values.

This study is therefore of limited utility.

Results Synopsis

This is a non-guideline, non-GLP study.

XDE-742 demonstrated significant herbicidal activity to all test species at all tested rates under the conditions of this study.

By comparison, all six soil metabolites tested had little or no activity at any rate tested, up to 62.5 ppm, the highest spray concentration tested.

I. MATERIALS AND METHODS

GUIDELINE FOLLOWED: Non-guideline study.

Data Evaluation Report on the herbicidal activity of XDE-742 and 6 soil metabolites to terrestrial vascular plants in a post-emergence screening study.

PMRA Submission Number {2006-4727; ID 1283254} EPA MRID Number {469085-12}

COMPLIANCE: Non-GLP study. Data Confidentiality statement was provided.

A. MATERIALS:

Data Evaluation Report on the herbicidal activity of XDE-742 and 6 soil metabolites to terrestrial vascular plants in a post-emergence screening study.

PMRA Submission Number {2006-4727; ID 1283254} EPA MRID Number {469085-12}

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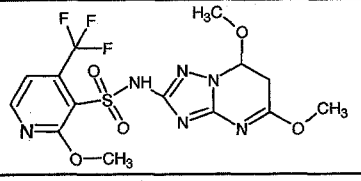
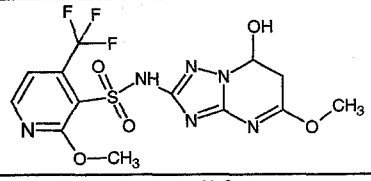
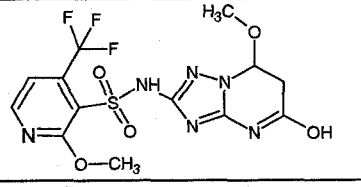
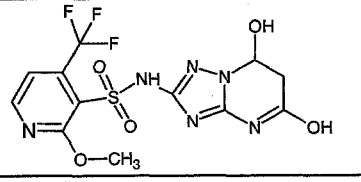
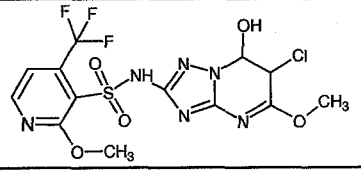
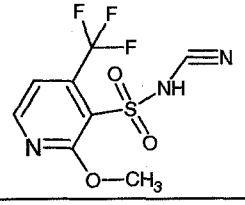
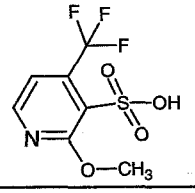
1. Test Material Parent XDE-742 (pyroxsulam) and six soil metabolites were tested. Structures and chemical identities were as follows:

Chemical name (IUPAC)	Abbreviated name	X number	TSN Number	Structure
N-(5,7-dimethoxy[1,2,4]triazolo [1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl) pyridine-3-sulfonamide	XDE-742 (parent compound)	X666742	TSN103826	
N-(7-hydroxy-5-methoxy[1,2,4] triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)-3-pyridinesulfonamide	7-OH-XDE-742	X11250641	TSN104231	
N-(5-hydroxy-7-methoxy[1,2,4] triazolo[1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)-3-pyridinesulfonamide	5-OH-XDE-742	X11250642	TSN104232	
N-(5,7-dihydroxy[1,2,4]triazolo [1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)-3-pyridinesulfonamide	5,7-di-OH-XDE-742	X11248352	TSN104222[1]	
N-(6-chloro-7-hydroxy-5-methoxy[1,2,4]triazolo [1,5-a]pyrimidin-2-yl)-2-methoxy-4-(trifluoromethyl)pyridine-3-sulfonamide	6-Cl-7-OH-XDE-742	X11301338	TSN104222[1]	
N-cyano-2-methoxy-4-(trifluoromethyl)pyridine-3-sulfonamide	Cyanosulfonamide	X11351478	TSN104748	
2-methoxy-4-(trifluoromethyl)pyridine-3-sulfonic acid	Sulfonic acid	X768773	TSN102274	

1) Both 5,7-di-OH-XDE742 and 6-Cl-7-OH-XDE-742 were given the same TSN number in the study report.

Description:	Not reported.
Lot No./Batch No. :	Not reported.
Purity:	Not reported.
Stability of Compound Under Test Conditions:	Not reported.
Storage conditions of test chemicals:	Not reported.

Table 1: Physicochemical properties of XDE-742.

Parameter	Values	Comments
Water solubility at 20°C		
Vapour pressure		
UV absorption		
pKa		
Kow		

Physicochemical properties of the six soil metabolites tested are not reported.

2. Test organisms:

Table 2: Test Plant Species

Monocotyledonous species:		**Dicotyledonous species:**	
Common name	Species	Common name	Species
Wild oat	(*Avena fatua*)	Soybean	*(Glycine max)*
Wheat	*Triticum aestivum*)	Oilseed rape	(*Brassica napus*)
Corn	(*Zea mays)*	Chickweed	*(Stellaria media)*
Wild buckwheat	(*Polygonum convolvulus*)	Field pansy	*(Viola tricolor)*
Blackgrass	(*Alopecurus myosuroides*)	Wild poinsettia	*(Euphorbia heterophylla)*
Barnyard grass	(*Echinochloa crus-galli*)	Giant foxtail	*(Setaria faberi)*
Large crab grass	(*Digitaria sanguinalis*)	Rox orange sorphum	*(Sorghum bicolor)*
Yellow nutsedge	(*Cyperus esculentus*)	Lambs quarter	*(Chenopodium allbum)*
		Ivy leaf morning glory	(*Ipomoea hederacea)*
		Redroot pigweed	(*Amaranthus retrophrasti*)
		Velvetleaf	(*Abutilon theophrasti*)
		Canada thistle	(*Cirsium arvense)*
		Volunteer sunflower	(*Helianthis annuus*)
		Rice	(*Oryza sativa*)

Seed source; Germination History:

No information was provided on where seed was obtained from, or germination history.

Prior seed treatment/sterilization: Not reported.

Seed storage, if any: Not reported.

B. STUDY DESIGN:

1. Experimental Conditions

a) Range-finding Study: No range finding study was performed.

b) Definitive Study (Screening test only)

Table 3. Experimental Parameters

Parameters	**Details**	**Remarks *Criteria***
Duration of the test	Assessment of weed control and crop injury were made 14 days after application of test chemicals.	
Number of seeds/plants/species/ replicate	22 species in the post emergence level 3 test; 5 rates; 1 replicate; 5-15 plants per species.	
Incubation	Following application, treated plants in pots were placed in the greenhouse, where pots were sub-irrigated with 1/2X solution of Excel fertilizer each day.	
Number of plants retained after thinning	Not reported. The test species were grown from seed. At the time of application, plant ages varied from 6 to 28 days and 5 to 15 plants per species were tested.	
Number of replicates: Control: Solvent control:	1 replicate. No control plants appear to have been tested. No solvent control test was conducted.	While the test report does not mention a control set of plants or application rate, the visual assessment of plant injury (see below) refers to comparison of affected plants with control plants.
Test concentrations (mg ai/kg soil and g ai/ha) Nominal: Measured:	5 rates were applied (same rates for all test substances) in 1/2X increments. Nominal application rates as concentrations in the spray mix were 3.91, 7.81, 15.6, 31.3 and 62.5 ppm.	
Method and interval of analytical verification.	No analytical verification of application rates was performed.	
Solvent (type, percentage, if used)	All test substances were dissolved in GPS (general purpose solvent: Acetone/DMSO 97:3 v/v).	
Test container (pot) Size/Volume Material: (glass/polystyrene)	Square plastic pots with a surface area of 91 cm^2.	
Growth facility	Greenhouse	
Method/depth of seeding	1.3 cm deep.	

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Test material application: Application time including the plant growth stage Number of applications Application interval Method of application	 Plant age at application ranged from 6-28 days with desirable stage of growth of 2-2.5 leaves for the majority of plants, with a range of 1-4 leaf stages.. Single application Single application Solutions sprayed onto the foliage of test plants. Plants were sprayed to run-off with ~1.3 mL of spray solution applied per pot. A DeVilbiss atomizer driven by compressed air at a pressure of 2-4 psi was used for application.	It was noted in the report that the volume of spray solution (1.3 mL per pot) consistently provided thorough spray coverage of plants at the desired stage of growth.
Details of soil used Geographic location Depth of soil collection Soil texture % sand % silt % clay pH: % organic carbon CEC Moisture at 1/3 atm (%)	Seeds grown in Grace-Sierra Metromix 306 (vermiculite 37-47%, sphagnum 31-45%, peatbark 12-25%, Ash) Not relevant. Artificial growth medium. Not relevant. Artificial growth medium. 6.0-6.8	
Details of nutrient medium, if used	Test species grown from seed in Grace-Sierra Metromix 306. All species were fertilized by subirrigation with ½ x solution of Excel fertilizer each day. Rice and corn were sub-irrigated one time 4 days prior to treatment with a solution of 18 g Sprint 330 and 25 g of ammonium sulphate per 18 liters of water to eliminate iron deficiency.	
Watering regime and schedules Water source/type: Volume applied: Interval of application: Method of application:	 Not reported. Not reported. Daily (except rice and corn – see above) Sub-irrigated.	
Any pest control method/fertilization, if used	Pest control not reported. Following application, treated plants in pots were placed in the greenhouse, where pots were sub-irrigated with 1/2X solution of Excel fertilizer each day.	

Test conditions Temperature: Photoperiod: Light intensity and quality: Relative humidity:	 Not reported. 14 h photoperiod Illumination: 500µEm-2s-1 PAR at plant canopy. Not reported.	
Reference chemical	No reference chemical tested.	
Other parameters, if any	None.	

2. Observations:

Table 4: Observation parameters

Parameters	Details	Remarks *Criteria*
Parameters measured	Assessments of weed control and crop injury were made 14 days after application of the test chemicals.	
Measurement technique for each parameter	Plant injury was visually assessed.	
Observation intervals	Once only, 14 days after application.	
Other observations, if any	None	
Were raw data included?	No	
Phytotoxicity rating system, if used	Visual assessment was on a scale of 0-100% as compared to the control plants (0 = no injury and 100 = complete kill). No further details are provided.	This scale refers to rating compared to control plants. However, no control application rate or mention of control plants appears elsewhere in the test report.

II. RESULTS and DISCUSSION:

A. INHIBITORY EFFECTS:

All 6 metabolites tested had little or no activity at any rate tested, up to 62.5 ppm. Pigweed was the most sensitive species in the study with some metabolites showing very weak activity. The 7-OH-XDE-742 metabolite showed the highest level of activity on pigweed, providing up to 60% control at the highest rate tested (62.5 ppm). It had little or no activity on other species and the activity on pigweed was still significantly less than XDE-742 which provided 100% control at the lowest rate tested (3.9 ppm).

No effects on any species at any tested rate were observed for the 6-CL-7-OH-XDE-742 or cyanosulfonamide metabolites. The range of impacts on affected species at the different application rates are shown for XDE-742 and the other metabolites in the following tables.

In these tables, visual injury assessments are based on the scale of 0-100 with 0 indicating no injury and 100 indicating maximum effect. Values listed are the range of average visual injury assessment from minimum (not including control) to maximum effect observed across rates when evaluated at 14 days.

Table 5: Level 3 post-emergence greenhouse results for XDE-742

Species	Rate (ppm)				
	62.5	31.3	15.6	7.81	3.91
	Injury, 0-100 scale				
Soybean	95	95	95	90	90
Oilseed rape	100	100	90	85	85
Chickweed	100	100	100	100	95
Lambsquarter	100	100	98	98	90
Ivy leaf morning glory	90	90	85	80	80
Redroot pigweed	100	100	100	100	100
Velvetleaf	100	95	95	95	85
Field pansy	100	100	100	100	95
Wild buckwheat	100	100	98	95	95
Wild poinsettia	100	100	100	90	90
Canada thistle	98	95	90	85	95
Volunteer sunflower	100	100	100	98	98
Corn	100	98	98	95	90
Rice	100	90	85	85	75
Wheat	90	85	75	65	60
Blackgrass	100	100	100	100	98
Wild oat	100	100	100	100	100
Barnyard grass	100	100	100	100	99
Large crab grass	100	100	100	98	95
Giant foxtail	100	100	100	95	95
Rox orange sorphum	100	100	100	100	100
Yellow nutsedge	95	90	80	75	70
MEAN	**98.5**	**97.2**	**95.0**	**92.2**	**90.0**

Table 6: Level 3 post-emergence greenhouse results for 7-OH-XDE-742

Species	Rate (ppm)				
	62.5	31.3	15.6	7.81	3.91
	Injury, 0-100 scale				
soybean	30				
redroot pigweed	60	40	30	10	
wild poinsettia	30	10			
volunteer sunflower	10				
MEAN**	**5.9**	**2.3**	**1.4**	**0.5**	**0.0**

**Species shown are those that were affected only. The mean is calculated taking into consideration the results for all 22 species tested including those where no effects were observed.

Table 7: Level 3 post-emergence greenhouse results for 5-OH-XDE-742

Species	Rate (ppm)				
	62.5	31.3	15.6	7.81	3.91
	Injury, 0-100 scale				
redroot pigweed	10				
wild poinsettia	30	10			
corn	20				
MEAN**	**2.7**	**0.5**	**0.0**	**0.0**	**0.0**

**Species shown are those that were affected only. The mean is calculated taking into consideration the results for all 22 species tested including those where no effects were observed.

Table 8: Level 3 post-emergence greenhouse results for 5,7-di-OH-XDE-742

Species	Rate (ppm)				
	62.5	31.3	15.6	7.81	3.91
	Injury, 0-100 scale				
redroot pigweed	25	10			
MEAN**	**1.1**	**0.5**	**0.0**	**0.0**	**0.0**

**Species shown are those that were affected only. The mean is calculated taking into consideration the results for all 22 species tested including those where no effects were observed.

Table 9: Level 3 post-emergence greenhouse results for sulfonic acid metabolite

Species	Rate (ppm)				
	62.5	31.3	15.6	7.81	3.91
	Injury, 0-100 scale				
redroot pigweed	20	10			
MEAN**	**0.9**	**0.5**	**0.0**	**0.0**	**0.0**

**Species shown are those that were affected only. The mean is calculated taking into consideration the results for all 22 species tested including those where no effects were observed.

B. REPORTED STATISTICS:

Plant injury was visually assessed on a scale of 0-100% as compared to the control plants (0 = no injury and 100 = complete kill).

The study authors report EC50 values for XDE-742 and 7-OH-XDE-742 for mean control across all species as 0.09 g/ha and 475 g/ha respectively, stating these values were calculated using dose-response analysis with log-probit transformation of data.

C. VERIFICATION OF STATISTICAL RESULTS BY THE REVIEWER:

Statistics have not been verified. The application rates were made based on nominal levels of test compound in the spray solution. An approximate equivalent rate/ha can be estimated based on an approximate 1.3 mL spray solution applied per 91 cm^2 pot. However, actual amounts of spray solution applied per pot were not measured, and these would impact application rates of the test materials so no meaningful translation of spray solution concentrations to field application rates is considered possible.

Further, the application rates used resulted in significant effects to all species at all rates for the parent XDE-742. Therefore, the test did not define a response curve to allow accurate values to be calculated. Similarly for the metabolite demonstrating the highest level of activity (7-OH-XDE-742), with the exception of redroot pigweed, effects to all other species at all application rates were 30% or less thereby not allowing a definition of a response curve.

D. STUDY DEFICIENCIES:

This is a screening level study only. It does not follow any formal guideline and was not done to GLP. Given this, no compilation of deficiencies has been made.

E. REVIEWERS COMMENTS:

Nothing additional to issues already discussed above.

F. CONCLUSIONS:

The study is for information only.

XDE-742 demonstrated broadspectrum grass and broadleaf control on a range of crop and weed species under the conditions of this test.

By comparison, there was a lack of herbicidal activity of all XDE-742 metabolites on the same range of grass and broadleaf whole plants.

III. REFERENCES:

Alexander A and Devore K. September 1997. Weed Management Level 3 Post and Pre-emergence Test Methodology, DEI#0426