

Document Title

Statement:

**Clothianidin: groundwater risk assessment for metabolite TZMU and
TZFA**

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5.1.2.e WOO

Bayer CropScience



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1 Introduction

In 2011 BCS reported the finding of a new metabolite (TZFA, BCS-CQ88479) and increased amounts of a second metabolite (TZMU) during a soil study performed with Clothianidin as potential adverse effects. At the time it was not possible to finalise the groundwater risk assessment for the metabolites as degradation and adsorption studies were being performed. The studies have now been completed and the groundwater risk assessment updated. The results confirm that there are no concerns for groundwater resulting from the presence of these metabolites TZMU and TZFA.

A summary of the findings is given below.

2 Additional studies and summarised results

TZFA = BCS-CQ88479

Study title	Document number	Comments/Findings
[Guanidine- ¹⁴ C]clothianidin: Time dependent sorption from four European field dissipation soils 5.1.2.e WOO	M-405885-01-1	In this study the new metabolite pattern has been detected TZFA formation max. 6.7% TZMU formation max. 10.6%
[Imidoformamide- ¹⁴ C] BCS-CQ88479: Adsorption/desorption in five different soils (5.1.2.e WOO 5.1.2.e WOO)	M-407208-01-1	Mean K_{Foc} 559.9 mL/g (5 soils) (range 212.1-1216.3) Mean 1/n 0.870 No pH dependence
BCS-CQ88479 (Clothianidin-TZFA): Degradation Rate in Three Soils Incubated Under Aerobic Conditions (5.1.2.e WOO, 5.1.2.e WOO)	M-420734-01-1	DT ₅₀ (3 soils) range 15 – 66 days (trigger values)
Kinetic Evaluation of the Aerobic Metabolism of Clothianidin (TI 435), MNG, TZNG, TZMU, TZFA and NTG in Soil for Modelling Purposes 5.1.2.e WOO	M-424016-01-1	Modelling input parameters DT ₅₀ TZMU geo mean 9.5 days Formation fraction 0.394 DT ₅₀ TZFA geomean 34 days Formation fraction 0.092
CTD PEC _{gw} EU: Predicted Environmental Concentrations in Groundwater Recharge Based on Model FOCUS PEARL. Use in Sugarbeets and Maize in EU. Clothianidin (TI-435), MNG, TZNG, NTG, TZMU, TZFA. 5.1.2.e WOO	M-424024-01-1	PEC _{gw} maize (50g/ha every year) TZFA < 0.001 µg/L TZMU < 0.001 µg/L PEC _{gw} sugarbeet (78g/ha every 3 rd year) TZFA < 0.001 µg/L TZMU 0.002 µg/L

3 Groundwater Calculations

PEC_{GW} calculations have been performed for Clothianidin and the major soil metabolites using FOCUS PEARL version, 4.4.4. Details of the input parameters are summarised below.

3.1 Model input parameters

Application data of clothianidin according to the use pattern in EU

Individual crop	FOCUS crop	Rate [kg a.s./ha]	Plant interception [%]	Application interval	Amount reaching soil [kg a.s./ha]
Sugarbeets	sugarbeets	1×0.078	0	Every 3 rd year	1×0.078
Maize	maize	1×0.05	0	Every year	1×0.050

Compound input parameters for clothianidin and its metabolites

Parameter	Unit	Clothianidin	MNG	TZNG	NTG	TZMU	TZFA
Common							
Molar Mass	[g/mol]	249.7	118.1	236.0	104.1	205.7	226.1
Solubility	[mg/L]	327	10000	19950	10000	10000	10000
Vapour Pressure	[Pa]	3.80E-11	1.00E-03	5.35E-04	1.96E+01	1.00E-19	1.00E-19
Freundlich Exponent		0.830	0.910	0.820	0.880	0.877	0.872
Plant Uptake Factor		0.0	0.5	0.5	0.5	0.5	0.5
Walker Exponent		0.7	0.7	0.7	0.7	0.7	0.7
PEARL Parameters							
Substance Code		CTDnk	MNG	TZNG	NTG	TZMU	TZFA
DT50	[days]	95.0 [#]	66.4	61.7	52.7	9.1	34.0
Molar Activ. Energy	[kJ/mol]	65.4	65.4	65.4	65.4	65.4	65.4
Kom	[mL/g]	92.8	11.9	159.7	9.3	35.8	324.8
Kf	[mL/g]	-	-	-	-	-	-
Desorp. Rate Coeff.	[1/days]	0.031	0.0	0.0	0.0	0.0	0.0
Equ. Factor		0.600	0.0	0.0	0.0	0.0	0.0
Formation fractions		0.34 CTDnk	-> TZNG				
		0.51 CTDnk	-> MNG				
		0.394 CTDnk	-> TZMU				
		0.092 CTDnk	-> TZFA				
		1 TZNG	-> NTG				

[#] valid only in combination with kinetic sorption

3.2 PEC_{gw} Results

FOCUS PEARL PEC_{gw} results of clothianidin and its metabolites (Sugarbeets, 1×0.078 kg a.s./ha, 0% interception, Every 3rd Year)

Scenario	PEC _{gw} [µg/L]					
	Clothianidin	MNG	TZNG	NTG	TZMU	TZFA
Chateaudun	0.005	0.405	<0.001	0.519	<0.001	<0.001
Hamburg	0.004	0.532	<0.001	0.686	<0.001	<0.001
Jokioinen	<0.001	0.435	<0.001	0.606	<0.001	<0.001
Kremsmuenster	<0.001	0.361	<0.001	0.486	<0.001	<0.001
Okehampton	0.003	0.382	<0.001	0.466	<0.001	<0.001
Piacenza	0.003	0.301	<0.001	0.396	<0.001	<0.001
Porto	<0.001	0.272	<0.001	0.359	<0.001	<0.001
Sevilla	<0.001	0.153	<0.001	0.241	<0.001	<0.001
Thiva	<0.001	0.266	<0.001	0.451	<0.001	<0.001

FOCUS PEARL PEC_{gw} results of clothianidin and its metabolites (Maize, 1×0.05 kg a.s./ha, 0% interception, Every Year)

Scenario	PEC _{gw} [µg/L]					
	Clothianidin	MNG	TZNG	NTG	TZMU	TZFA
Chateaudun	0.001	0.713	<0.001	0.991	<0.001	<0.001
Hamburg	0.016	1.065	0.001	1.396	0.002	<0.001
Kremsmuenster	0.006	0.732	<0.001	0.982	<0.001	<0.001
Okehampton	0.021	0.790	0.002	0.948	0.002	<0.001
Piacenza	0.013	0.620	0.001	0.866	0.002	<0.001
Porto	0.002	0.445	<0.001	0.587	<0.001	<0.001
Sevilla	<0.001	0.289	<0.001	0.452	<0.001	<0.001
Thiva	<0.001	0.481	<0.001	0.788	<0.001	<0.001

4 Conclusion

The PEC_{gw} for the metabolites TZFA and TZMU do not exceed the trigger of 0.1 µg/L (maximum 0.002 µg/L), the metabolites therefore do not pose a concern for groundwater. Additionally the concentration of clothianidin and the metabolite TZNG do not exceed the trigger of 0.1 µg/L. Although the concentration of the metabolites MNG and NTG may exceed 0.1 µg/L, these metabolites have been shown to be non-relevant in groundwater.

5 References

5.1.2.e WOO 2011

[Guanidine-14C]clothianidin: Time dependent sorption from four European field dissipation soils
Bayer CropScience Document no: M-405885-01-1

5.1.2.e WOO 2011

[Imidoformamide-14C] BCS-CQ88479: Adsorption/desorption in five different soils
Bayer CropScience Document no: M-407208-01-1

5.1.2.e WOO 2011

BCS-CQ88479 (Clothianidin-TZFA): Degradation rate in three soils incubated under aerobic conditions

Bayer CropScience Document no: M-420734-01-1

5.1.2.e WOO 2012

Kinetic evaluation of the aerobic metabolism of clothianidin (TI 435), MNG, TZNG, TZMU, TZFA and NTG in soil for modelling purposes

Bayer CropScience Document no: M-424016-01-1

5.1.2.e WOO 5.1.2.e WOO 2012

CTD PECgw EU: Predicted environmental concentrations in groundwater recharge based on model FOCUS PEARL - Use in sugarbeets and maize in EU

Bayer CropScience Document no: M-424024-01-1