FINAL REGISTRATION REPORT

Part B

Section 8

Environmental Fate

Detailed summary of the risk assessment

Product code: SHA 9700 B

Product name: RULER 10 EC

Chemical active substance:

Fenazaquin, 100 g/L

Interzonal

Zonal Rapporteur Member State: Poland

CORE ASSESSMENT

Applicant: Sharda Cropchem España S.L.

Submission date: July 2019

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Version history

When	What
July 2019	Submitted for evaluation
June 2020	RMS finalised of evaluation
March 2023	Final Registration Report

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8 Fate and behaviour in the environment (KCP 9)

8.1 Critical GAP and overall conclusions

Table 8.1-1: Critical use pattern of the formulated product

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use-No. *	Member state(s)	Crop and/or situation (crop destination / purpose of crop)	F, Fn, Fpn G, Gn, Gpn or I **	Pests or Group of pests controlled (additionally: develop-mental stages of the pest or pest group)	**Application**				**Application rate**			PHI (days)	Remarks: e.g. g safener/ synergist per ha	**Conclusion**
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. interval between applications (days)	kg or L product/ha a) max. rate per appl. b) max. total rate per crop/season	g or kg as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha min/max			Groundwater
Interzonal uses (use as seed treatment, in greenhouses (or other closed places of plant production), as post-harvest treatment or for treatment of empty storage rooms)														
1	CEU/SEU/NEU	**Melon**	G	Spider mites	Foliar Spray	Pest pres-ence BBCH 70-79	a) 1 b) 1	NA	a) 2 b) 2	a) 0.2 b) 0.2	1000	7		
2	CEU/SEU/NEU	**Ornamentals**	G	Spider mites	Foliar Spray	Pest pres-ence BBCH 35-67	a) 2 b) 2	7-10	a) 2 b) 4	a) 0.2 b) 0.4	1000			
3	CEU(SEU/NEU	**Tomato**	G	Spider mites	Foliar Spray	Pest pres-ence BBCH 51-89	a) 2 b) 2	7-10	a) 2 b) 4	a) 0.2 b) 0.4	1000	3		
4	CEU/SEU/NEU	**Strawberry**	G	Spider mites	Foliar Spray	Pest pres-ence BBCH 15-91	a) 2 b) 2	7-10	a) 2 b) 4	a) 0.2 b) 0.4	1000	3		

* Use number(s) in accordance with the list of all intended GAPs in Part B, Section 0 should be given in column 1

** F: professional field use, Fn: non-professional field use, Fpn: professional and non-professional field use, G: professional greenhouse use, Gn: non-professional greenhouse use, Gpn: professional and non-professional greenhouse use, I: indoor application

Explanation for column 15 “Conclusion”

A	Safe use
R	Further refinement and/or risk mitigation measures required
C	To be confirmed by cMS
N	No safe use

Table 8.1-2: Assessed (critical) uses during approval of Fenazaquin concerning the Section Environmental Fate

1	2	3	4	5	6	7	8	9	10	11	12	13	14
Use-No. *	Member state(s)	Crop and/or situation (crop destination / purpose of crop)	F, Fn, Fpn G, Gn, Gpn or I **	Pests or Group of pests controlled (additionally: develop-mental stages of the pest or pest group)	**Application**				**Application rate**			PHI (days)	Remarks: e.g. g safener/ synergist per ha
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. interval between applications (days)	kg a.s./hL min-max	g or kg as/ha min-max	Water L/ha min/max		
1	S-EU	**Grapes (table and wine)**	F	*Panonychus ulmi, Tetranychus urticae, Calipitrimerus vitis, Eotetranychus carpini Eriophyes vitis*	Spraying	When first symptoms or pests appear	a) 1 b) 1	NA	0.0075-0.015	0.12	800-1600	35	-
2	N-EU	**Grapes (table and wine)**	F	*Panonychus ulmi, Tetranychus urticae, Calipitrimerus vitis, Eotetranychus carpini*	Spraying	When first symptoms or pests appear	a) 1 b) 1	NA	0.032-0.044	0.08	180-250	28	-
3	S-EU	**Citrus**	F	*Panonynchus citri, Tetranychus urticae, Aleurothrixus floccosus*	Spraying	When first symptoms or pests appear	a) 1 b) 1	NA	0.005-0.01	0.2	200-400	28	-
4	C/N-EU	**Pome fruit (apples, pears)**	F	**Apple:** *Tetranychus urticae Panonychus ulmi Aculus schlechtendali* **Pear:** *Tetranychus urticae Panonychus ulmi Aculus schlechtendali Eriophyes pyri Epytrimerus pyri*	Foliar applica-tion	When first symptoms or pests appear	a) 1 b) 1	NA	0.01-0.015	0.1-0.2	670-2000	21	-
				Pear: *Psylla pyri*					0.013-0.02	0.2	1000-1500	21	-
5	S-EU	**Pome fruit (apples, pears)**	F	**Apple:** *Tetranychus urticae Panonychus ulmi Aculus schlechtendali* **Pear:** *Tetranychus urticae Panonychus ulmi Aculus schlechtendali Eriophyes pyri*	Foliar applica-tion	When first symptoms or pests appear	a) 1 b) 1	NA	0.01-0.015	0.1-0.2	670-2000	21	-

				Epytrimerus pyri **Pear:** *Psylla pyri*					0.013-0.02	0.2	1000-1500	21	-
6	S-EU	**Stone fruit**	F	*Tetranychus urticae* *Panonychus ulmi* *Aculus fockeui*	Foliar application	When first symptoms or pests appear	a) 1 b) 1	NA	0.01-0.015	0.1-0.2	670-2000	14	-
7	EU	**Ornamentals**	G	*Panonychus ulmi, Tetranychus urticae Polyphagtarsonemius latus; Phytonemus pallidus*	Spraying	When first symptoms or pests appear	a) 1 b) 1	NA	0.01	0.3	3000	NA	-

* Use number(s) in accordance with the list of all intended GAPs in Part B, Section 0 should be given in column 1

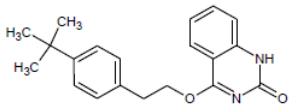
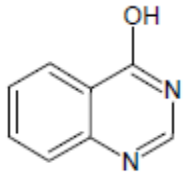
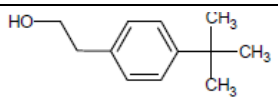
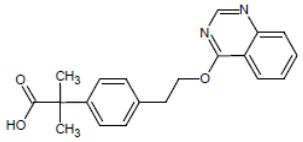
** F: professional field use, Fn: non-professional field use, Fpn: professional and non-professional field use, G: professional greenhouse use, Gn: non-professional greenhouse use, Gpn: professional and non-professional greenhouse use, I: indoor application

zRMS comments:

All comments and conclusions of the zRMS are presented in grey. Minor changes are introduced directly in the text and highlighted in grey. Not agreed or not relevant information is struck through and shaded for transparency.

8.2 Metabolites considered in the assessment

Table 8.2-1: Metabolites of Fenazaquin potentially relevant for exposure assessment

Metabolite	Molar mass	Chemical structure	Maximum observed occurrence in compartments	Exposure assessment required due to
2-oxy-fenazaquin 4-[2-(4-tertbutylphenyl) ethoxy]quinazolin-2(1H)-one	322.41 g/mol		Soil: 9.1% Sediment: 19.8% Water/sediment: 21.2%	PEC_{gw} PEC_{soil} $PEC_{sw/sed}$
4-OHQ quinazolin-4-ol	146.15 g/mol		Soil: 36.6% Water/sediment: 79.3%	PEC_{gw} PEC_{soil} $PEC_{sw/sed}$
TBPE 2-(4-tert-butylphenyl)ethanol	178.28 g/mol		Soil: 17.9% Water/sediment: 82.2%	PEC_{gw} PEC_{soil} $PEC_{sw/sed}$
4-(2-(4-(1,1-dimethylethanoic acid)phenyl)ethoxyl)quinazoline 2-methyl-2-{4-[2-(quinazolin-4-yloxy)ethyl]phenyl}propanoic acid	336.39 g/mol		Soil: 2.1% Sediment: 10.3% Water/sediment: 11.5%	$PEC_{sw/sed}$

8.3 Rate of degradation in soil (KCP 9.1.1)

Studies on degradation in soil with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance.

8.3.1 Aerobic degradation in soil (KCP 9.1.1.1)

Table 8.3-1: Summary of aerobic degradation rates for Fenazaquin - laboratory studies

Fenazaquin, Laboratory studies, aerobic conditions									
Soil type	**pH**	**t.oC**	**MWHC %**	**DT50 (d)**	**DT90 (d)**	**DT50 (d) 20°C pF2/10kPa**	**St. (X^2)**	**Kinetic model**	**Evaluated on EU level y/n/ Reference**
Sandy clay loam	7.4	20	40	55.5	184.3	34.4	3.8	SFO	y/ EFSA Journal 2013;11(4):3166
Clayish soil	7.0	20	40	58.9	195.6	34.2	5.3		
Silty sand	6.5	20	40	121.1	402.4	104.1	3.4		
Loamy sand	6.3	20	40	90.1	299.2	69.4	1.8		
Geometric mean (n=4)						**54.0**			
pH-dependency:						No			

Table 8.3-2: Summary of aerobic degradation rates for 2-oxy-fenazaquin - laboratory studies

2-oxy-fenazaquin, Laboratory studies, aerobic conditions									
Soil type	**pH**	**t.oC**	**MWHC %**	**DT50 (d)**	**DT90 (d)**	**DT50 (d) 20°C pF2/10kPa**	**St. (X^2)**	**Kinetic model**	**Evaluated on EU level y/n/ Reference**
Sandy clay loam	7.4	20	40	30.1	100	18.7	19.5	SFO	y/ EFSA Journal 2013;11(4):3166
Clayish soil	7.0	20	40	18.9	62.7	11.0	21.2		
Silty sand	6.5	20	40	108.1	359.1	93.0	25		
Loamy sand	6.3	20	40	128.2	425.9	98.7	15.4		
Geometric mean (n=4)						**37.1**			
pH-dependency:						No			

The laboratory DT_{50} and kinetic formation fraction for 2-oxy-fenazaquin from Fenazaquin have some uncertainty, but this is acceptable in this case due to high adsorption of 2-oxy-fenazaquin.

Table 8.3-3: Summary of aerobic degradation rates for 4-OHQ - laboratory studies

4-OHQ, Laboratory studies, aerobic conditions									
Soil type	**pH ($CaCl_2$)**	**t.oC**	**MWHC %**	**DT50 (d)**	**DT90 (d)**	**DT50 (d) 20°C pF2/10kPa**	**St. (X^2)**	**Kinetic model**	**Evaluated on EU level y/n/ Reference**
Silt loam	5.74	20	pF2	-	-	<< 2 hrs	-	SFO	y/ EFSA Journal

4-OHQ, Laboratory studies, aerobic conditions									
Soil type	**pH ($CaCl_2$)**	**t.oC**	**MWHC %**	**DT50 (d)**	**DT90 (d)**	**DT50 (d) 20°C pF2/10kPa**	**St. (X^2)**	**Kinetic model**	**Evaluated on EU level y/n/ Reference**
Loam	7.27	20	pF2	-	-	<< 2 hrs	-		2013;11(4):3166
Sandy loam	6.40	20	pF2	-	-	<< 2 hrs	-		
Geometric mean (n=3)						**<< 2 hrs**			
pH-dependency:						No			

Table 8.3-4: Summary of aerobic degradation rates for TBPE - laboratory studies

TBPE, Laboratory studies, aerobic conditions									
Soil type	**pH ($CaCl_2$)**	**t.oC**	**MWHC %**	**DT50 (d)**	**DT90 (d)**	**DT50 (d) 20°C pF2/10kPa**	**St. (X^2)**	**Kinetic model**	**Evaluated on EU level y/n/ Reference**
Silt loam	5.74	20	pF2	-	-	<< 4 hrs	-	SFO	y/ EFSA Journal 2013;11(4):3166
Loam	7.27	20	pF2	-	-	<< 4 hrs	-		
Sandy loam	6.40	20	pF2	-	-	<< 4 hrs	-		
Geometric mean (n=3)						**<< 4 hrs**			
pH-dependency:						No			

8.3.2 Anaerobic degradation in soil (KCP 9.1.1.1)

Table 8.3-5: Summary of anaerobic degradation rates for Fenazaquin - laboratory studies

Fenazaquin, Laboratory studies, anaerobic conditions									
Soil type	**pH**	**t.oC**	**MWHC %**	**DT50 (d)**	**DT90 (d)**	**DT50 (d) 20°C pF2/10kPa**	**St. (X^2)**	**Kinetic model**	**Evaluated on EU level y/n/ Reference**
Loamy sand	5.7	20	50	264[a] 320[b]	870 > 1000	-	4.8[a] 2.9[a] /2.9		y/ EFSA Journal 2013;11(4):3166
Geometric mean						-			

a: quinazoline
b: phenyl

8.4 Field studies (KCP 9.1.1.2)

8.4.1 Soil dissipation testing on a range of representative soils (KCP 9.1.1.2.1)

Triggering endpoints

Table 8.4-1: Summary of aerobic degradation rates for Fenazaquin - field studies: Triggering endpoints

Fenazaquin, Field studies – Triggering endpoints								
Soil type	**Location**	**pH**	**Depth (cm)**	**DissT50 (d) actual**	**DT90 (d) actual**	**St. (x^2)**	**Method of calculation**	**Evaluated on EU level y/n/ Reference**
Silt loam	Lauter, Germany	5.9	20	27.1	90	26.5	SFO	y/ EFSA Journal 2013;11(4):3166
Silty clay loam	Landsberg, Germany	7.0	20	48.2	160	26		
Silt loam	Grebin, Germany	5.0	20	33.7	112	17.4		
Loamy silt	Herford-Eickum, Germany	5.8	20	31.7	105	24.2		
Loamy sand	Adelshausen, Germany	6.4	20	12.9	42.7	21.8		
Loamy	Grugno, Parma, Italy	8.06	25	43.6	145	4.1		
Clay loam	Fognamo, Parma, Italy	7.93	25	16.3	54.2	24.4		
Maximum (n=7)				**48.2**				

Modelling endpoints

Table 8.4-2: Summary of aerobic degradation rates for Fenazaquin - field studies: Modelling endpoints

Fenazaquin, Field studies – Modelling endpoints						
Soil type	**Location**	**pH**	**Depth (cm)**	**DT50 (d) 20°C, pF2**	**Fit, Kinetic**	**Evaluated on EU level y/n/ Reference**
Silt loam	Lauter, Germany	5.9	20	-	-	y/ EFSA Journal 2013;11(4):3166
Silty clay loam	Landsberg, Germany	7.0	20	-	-	
Silt loam	Grebin, Germany	5.0	20	-	-	
Loamy silt	Herford-Eickum, Germany	5.8	20	-	-	
Loamy sand	Adelshausen, Germany	6.4	20	-	-	
Loamy	Grugno, Parma, Italy	8.06	25	-	-	
Clay loam	Fognamo, Parma, Italy	7.93	25	-	-	
Geometric mean				-	-	
pH-dependency				No		

8.4.2 Soil accumulation testing (KCP 9.1.1.2.2)

Not required.

8.5 Mobility in soil (KCP 9.1.2)

Studies on mobility in soil with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance.

Table 8.5-1: Summary of soil adsorption/desorption for Fenazaquin

Fenazaquin								
Soil type	**OC (%)**	**pH**	**Kd (mL/g)**	**Koc (mL/g)**	**Kf (mL/g)**	**Kfoc (mL/g)**	**1/n**	**Evaluated on EU level y/n/ Reference**
Sand	0.3	7.7	-	-	54	17915	0.917	y/ EFSA Journal 2013;11(4):3166
Sandy loam	0.8	5.7	-	-	128	16020	0.896	
Loam	1.0	6.5	-	-	294	29365	0.887	
Clay loam	1.2	6.9	-	-	512	42695	0.890	
Geometric mean (n=4)						**24491.8**	-	
Arithmetic mean (n=4)						-	0.9	
pH-dependency						No		

Table 8.5-2: Summary of soil adsorption/desorption for 2-oxy-fenazaquin

2-oxy-fenazaquin								
Soil Type	**OC (%)**	**pH**	**Kd (mL/g)**	**Koc (mL/g)**	**Kf (mL/g)**	**Kfoc (mL/g)**	**1/n**	**Evaluated on EU level y/n/ Reference**
Silt loam	2.1	5.7	1163	54840	-	-	-	y/ EFSA Journal 2013;11(4):3166
Loam	2.7	7.3	2688	98814	-	-	-	
Sandy loam	1.0	6.4	1066	107735	-	-	-	
Geomeatric mean (n=3)				**83577.8**				
pH-dependency				No				

Table 8.5-3: Summary of soil adsorption/desorption for 4-OHQ

4-OHQ								
Soil Type	**OC (%)**	**pH**	**Kd (mL/g)**	**Koc (mL/g)**	**Kf (mL/g)**	**Kfoc (mL/g)**	**1/n**	**Evaluated on EU level y/n/ Reference**
Silt loam	2.1	5.7	-	-	-	173	0.79	y/ EFSA Journal 2013;11(4):3166
Loam	2.7	7.3	-	-	-	215	0.73	
Sandy loam	1.0	6.4	-	-	-	294	0.57	
Geomeatric mean (n=3)						**222**	-	

4-OHQ								
Soil Type	**OC (%)**	**pH**	**Kd (mL/g)**	**Koc (mL/g)**	**Kf (mL/g)**	**Kfoc (mL/g)**	**1/n**	**Evaluated on EU level y/n/ Reference**
Arithmetic mean (n=3)						-	0.70	
pH-dependency						No		

Table 8.5-4: Summary of soil adsorption/desorption for TBPE

TBPE								
Soil Type	**OC (%)**	**pH**	**Kd (mL/g)**	**Koc (mL/g)**	**Kf (mL/g)**	**Kfoc (mL/g)**	**1/n**	**Evaluated on EU level y/n/ Reference**
Silt loam	2.1	5.7	3.33	157	-	-	-	y/ EFSA Journal 2013;11(4):3166
Loam	2.7	7.3	3.56	131	-	-	-	
Sandy loam	1.0	6.4	2.13	217	-	-	-	
Geometric mean (n=3)				164.6	-	-	-	
pH-dependence				No				

8.5.1 Column leaching (KCP 9.1.2.1)

Column leaching	Eluation: 393 mL distilled water Time period (d): 2 d Leachate: 0.05-0.24% total residues/radioactivity in leachate 0.05-0.26% ^{14}C-Fenazaquin 93.42-97.35% of total residues/radioactivity retained in top 5 cm
Aged residues leaching	Aged for (d): 30 and 60 d Eluation: 393 mL distilled water or 508 mm 0.01 % $CaCl_2$ 68.8-83.03% total residues/radioactivity retained in top 0-5 cm Leachate: 0.25-2.4% total residues/radioactivity in leachate

8.5.2 Lysimeter studies (KCP 9.1.2.2)

Not required.

8.5.3 Field leaching studies (KCP 9.1.2.3)

Not required.

8.6 Degradation in the water/sediment systems (KCP 9.2, KCP 9.2.1, KCP 9.2.2, KCP 9.2.3)

Studies on degradation in water/sediment systems with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance.

Table 8.6-1: Summary of degradation in water/sediment of Fenazaquin

Fenazaquin Distribution (max. in water 62.6% after 0 d, max. in sediment 54.3% after 60 days)										
Water/sediment system	**pH water/ sed.**	**DegT50 whole syst. (d)**	**DegT90 whole syst. (d)**	**St. (r^2)**	**DissT50 water (d)**	**DissT90 water (d)**	**St. (r^2)**	**DissT50 sed. (d)**	**St. (r^2)**	**Evaluated on EU level y/n/ Reference**
Sandy loam sediment	7.14/5.7	41.9*[a] 42.8*[b]	- -	-	-	-	12.5 10.1	-	-	y/ EFSA Journal 2013;11(4):3166
Clay loam sediment	7.24/6.3	119*[a] 140*[b]	- -	-	-	-	3.6 4.9	-	-	
Geometric mean		-								

*: recalculated DT_{50} with Modelmaker
a: C-quinazoline label
b: C-phenyl label

Table 8.6-2: Summary of observed metabolites

2-oxy-fenazaquin Water/sediment system	Max. in water/sediment study: 21.2%, 19.8% AR (30 d) in the sediment	y/ EFSA Journal 2013;11(4):3166
4-(2-(4-(1,2-dimethylethanoic acid) phenyl) ethoxy) quinazoline Water/sediment system	Max. in water/sediment study: 11.5%, 10.3% AR (100 d) in the sediment	

8.7 Estimation of Octanol-Water partitioning coefficient

The Fenazaquin metabolites Octanol-Water coefficients were estimated by KOWwin v1.69.

• 4-OHQ
Log Kow(version 1.69 estimate): 1.39
Experimental Database Structure Match:
Name: 4-QUINAZOLINOL
CAS Num: 017227-47-3
Exp Log P: 0.94
Exp Ref: HANSCH,C ET AL. (1995)
SMILES: Oc1ncnc2ccccc12
CHEM:
MOL FOR: C8 H6 N2 O1
MOL WT: 146.15

TYPE	NUM	LOGKOW FRAGMENT DESCRIPTION	COEFF	VALUE
Frag	8	Aromatic Carbon	0.2940	2.3520
Frag	2	Aromatic Nitrogen	-0.7324	-1.4648
Frag	1	-OH [hydroxy, aromatic attach]	-0.4802	-0.4802
Factor	1	Ring rx -> -OH ortho to aromatic nitrogen	0.7500	0.7500
Const		Equation Constant		0.2290

Log Kow = 1.3860

• TBPE
Log Kow(version 1.69 estimate): 3.48

SMILES: CC(C)(C)c1ccc(CCO)cc1
CHEM:
MOL FOR: C12 H18 O1
MOL WT: 178.28

TYPE	NUM	LOGKOW FRAGMENT DESCRIPTION	COEFF	VALUE
Frag	3	-CH3 [aliphatic carbon]	0.5473	1.6419
Frag	2	-CH2- [aliphatic carbon]	0.4911	0.9822
Frag	1	-OH [hydroxy, aliphatic attach]	-1.4086	-1.4086
Frag	6	Aromatic Carbon	0.2940	1.7640
Frag	1	-tert Carbon [3 or more carbon attach]	0.2676	0.2676
Const		Equation Constant		0.2290

Log Kow = 3.4761

8.8 Predicted Environmental Concentrations in soil (PEC_{soil}) (KCP 9.1.3)

8.8.1 Justification for new endpoints

Not relevant as there is no deviation to EU agreed endpoints.

8.8.2 Active substance and relevant metabolites

Table 8.8-1: Input parameters related to application for PEC_{soil} calculations

Use No.	1	2		3	4
Crop	**Melon**	**Ornamentals**		**Tomato**	**Strawberry***
		Grapevine**	Sunflower***		
Application rate (g as/ha)	Fenazaquin: 200				
Number of applications/interval	1/-	2/7			
Crop interception (%)	70%	60%	50%	80%	30%
Depth of soil layer (relevant for plateau concentration) (cm)	5 (no tillage) For greenhouse uses				

*** Worst case for PEC_{soil} calculations**
**** Surrogate crop for arbustive ornamentals**
***** Surrogate crop for herbaceous and ornamental flowers**

Table 8.8-2: Input parameter for active substance and relevant metabolites for PEC_{soil} calculation

Compound	Molecular weight (g/mol)	Max. occurrence (%)	DT50 (days)	Value in accordance to EU endpoint y/n/ Reference
Fenazaquin	306.4	-	121.1 d (worst-	EFSA Journal

Compound	Molecular weight (g/mol)	Max. occurrence (%)	DT50 (days)	Value in accordance to EU endpoint y/n/ Reference
			case of lab data, n=4)	2013;11(4):3166
2-oxy-fenazaquin	322.41	9.1	128.2 d (worst-case of lab data, n=4)	
4-OHQ	146.15	36.6	0.083 d (geomean, n=3)	
TBPE	178.28	17.9	0.167 d (geomean, n=3)	

8.8.2.1 Fenazaquin and its metabolites

Table 8.8-3: PEC_{soil} for Fenazaquin on strawberry

PEC_{soil} (mg/kg)		Strawberry			
		Single application		Multiple applications	
		Actual	TWA	Actual	TWA
Initial		0.187	-	0.366	-
Short term	24h	0.186	0.186	0.364	0.365
	2d	0.185	0.186	0.362	0.364
	4d	0.182	0.185	0.358	0.362
Long term	7d	0.179	0.183	0.352	0.359
	14d	0.172	0.179	0.338	0.352
	21d	0.166	0.176	0.325	0.345
	28d	0.159	0.172	0.312	0.338
	50d	0.142	0.463	0.278	0.320
	100d	0.105	0.142	0.206	0.279
Plateau concentration (5 cm) after year 4		-	-	0.054	-
$PEC_{accumulation}$ (PEC_{act} +$PEC_{soil\ plateau}$)		-	-	0.420	-

PEC_{soil} of metabolites

PEC_{soil} values for the metabolites were determined as for the parent with an application rate corrected taking into account the molecular weights (MW) and the maximum occurrence of the metabolite in soil as following:

Application $rate_{metabolite}$ = ($MW_{metabolite}$/ MW_{parent}) x (% maximum occurrence/100) x application $rate_{parent}$

The corresponding application rates for each metabolite are summarized in the table below.

Table 8.8-4: Corrected application rates for the metabolites

Metabolite	Application rate of the parent (g/ha)	MW_{parent}	$MW_{metabolite}$	Maximum occurrence in soil (%)	Corrected application rate (g/ha)
2-oxy-fenazaquin	200	306.4	322.41	9.1	19.15
4-OHQ			146.15	36.6	34.92
TBPE			178.28	17.9	20.83

The results of PEC_{soil} calculations are presented in the tables below.

Table 8.8-5: PEC_{soil} for 2-oxy-fenazaquin on strawberry

PEC_{soil} (mg/kg)		Strawberry			
		Single application		Multiple applications	
		Actual	TWA	Actual	TWA
Initial		0.018	-	0.035	-
Short term	24h	0.018	0.018	0.035	0.035
	2d	0.018	0.018	0.035	0.035
	4d	0.017	0.018	0.034	0.035
Long term	7d	0.017	0.018	0.034	0.034
	14d	0.017	0.017	0.033	0.034
	21d	0.016	0.017	0.031	0.033
	28d	0.015	0.017	0.030	0.033
	50d	0.014	0.016	0.027	0.031
	100d	0.010	0.014	0.020	0.027
Plateau concentration (5 cm) after year 3		-	-	0.006	-
$PEC_{accumulation}$ (PEC_{act} +$PEC_{soil\ plateau}$)		-	-	0.041	-

Table 8.8-6: PEC_{soil} for 4-OHQ on strawberry

PEC_{soil} (mg/kg)		Strawberry			
		Single application		Multiple applications	
		Actual	TWA	Actual	TWA
Initial		0.033	-	0.033	-
Short term	24h	< 0.001	0.004	< 0.001	0.004
	2d	< 0.001	0.002	< 0.001	0.002
	4d	< 0.001	0.001	< 0.001	0.001
Long term	7d	< 0.001	0.001	< 0.001	0.001
	14d	< 0.001	< 0.001	< 0.001	< 0.001
	21d	< 0.001	< 0.001	< 0.001	< 0.001
	28d	< 0.001	< 0.001	< 0.001	< 0.001
	50d	< 0.001	< 0.001	< 0.001	< 0.001

	100d	< 0.001	< 0.001	< 0.001	< 0.001
Plateau concentration (5 cm) after year		-	-	-	-
$PEC_{accumulation}$ (PEC_{act} +$PEC_{soil\ plateau}$)		-	-	-	-

Table 8.8-7: PEC_{soil} for TBPE on strawberry

PEC_{soil} (mg/kg)		Strawberry			
		Single application		Multiple applications	
		Actual	TWA	Actual	TWA
Initial		0.019	-	0.019	-
Short term	24h	< 0.001	0.005	< 0.001	0.005
	2d	< 0.001	0.002	< 0.001	0.002
	4d	< 0.001	0.001	< 0.001	0.001
Long term	7d	< 0.001	0.001	< 0.001	0.001
	14d	< 0.001	< 0.001	< 0.001	< 0.001
	21d	< 0.001	< 0.001	< 0.001	< 0.001
	28d	< 0.001	< 0.001	< 0.001	< 0.001
	50d	< 0.001	< 0.001	< 0.001	< 0.001
	100d	< 0.001	< 0.001	< 0.001	< 0.001
Plateau concentration (5 cm) after year		-	-	-	-
$PEC_{accumulation}$ (PEC_{act} +$PEC_{soil\ plateau}$)		-	-	-	-

8.8.2.2 PEC_{soil} of Fenazaquin 10% EC

Since Fenazaquin 20% SC is rapidly broken down into its constituent parts on contact with soil and/or crop material, it is appropriate to calculate the PEC_{soil} following a single application only, using the following equation:

$$PEC_S(mg/kg) = \frac{\text{Application rate (g/ha)} \times \text{(1-F)}}{100 \times \text{Soil depth (cm)} \times \text{Soil dry bulk density (g/cm}^3\text{)}}$$

Table 8.8-8: PEC_{soil} for Fenazaquin 20% SC on strawberry

Active substance/Preparation	Application rate (g/ha)	Crop interception (%)	PEC_{act} (mg/kg)
Fenazaquin /Fenazaquin 10% EC	2 x 1863.4*	30	3.478

*** Base on density value of 0.9317 g/cm^3 at 20°C**

ZRMS comments:

The PECs of fenazaquin and its metabolites 2-Oxy-fenazaquin, 4-OHQ and TBPE in soil has been assessed with the FOCUS groundwater interception values and the DT_{50} values established in the EU (EFSA conclusion) 2013;11(4):3166. The PECs calculations were carried out for the proposed GAP. The results of these calculations are suitable for use of the product in greenhouses permanents applications. The results of PECs are presented in Table 8.8 -3 – Table 8.8 -8.

Modelling results are acceptable and are appropriate to be used for the subsequent risk assessment for soil organisms.

8.9 Predicted Environmental Concentrations in groundwater (PEC_{gw}) (KCP 9.2.4)

8.9.1 Justification for new endpoints

Not relevant as there is no deviation to EU agreed endpoints.

8.9.2 Active substance and relevant metabolites (KCP 9.2.4.1)

Table 8.9-1: Input parameters related to application for PEC_{gw} calculations

Use No.	1	2		3	4
Crop	**Melon**	**Ornamentals**		**Tomato**	**Strawberry**
		Vines*	Sunflower**		
Application rate (g as/ha)	Fenazaquin: 200				
Number of applications/interval (d)	1/-	2/7			
Crop interception (%)	70%	50%	50%	80%	30%
Frequency of application	annual				
Models used for calculation	FOCUS PEARL v4.4.4, FOCUS PELMO v5.5.3				

*** Surrogate crop for arbustive ornamentals**
**** Surrogate crop for herbaceous and ornamental flowers**

It should be noted that as recommended in the Generic Guidance for Tier 1 FOCUS Ground Water Assessments (FOCUS 2011), a corrected application rate is calculated taking into account the interception by the crop canopy. Therefore, the substance is applied directly to the ground in the models, thus avoiding the internal interception routines in the models. The corrected application rate is 1 x 60 g Fenazaquin/ha for melon, 2 x 100 g Fenazaquin/ha for ornamentals (vine and sunflower), 2 x 40 g Fenazaquin/ha for tomato and 2 x 140 g Fenazaquin/ha for strawberry.

Table 8.9-2: Application dates used for groundwater risk assessment

Scenario	Application dates (absolute)*				
	Melon**	**Ornamentals (vines)*****	**Ornamentals (sunflower)**	**Tomato**	**Strawberry**
Châteaudun	17/07	08/05	-	15/06	-
Hamburg	-	24/05	-	-	24/03
Jokioinen	-	-	-	-	23/05
Kremsmünster	-	24/05	-	-	24/03
Piacenza	17/07	08/05	21/05	15/06	-
Porto	08/07	26/04	-	19/05	-
Sevilla	09/06	24/04	28/04	17/05	26/12
Thiva	30/06	17/04	-	15/05	-

***First application according to AppDate v3.05 (30 April 2019)**
****BBCH69**
*****BBCH 19**

8.9.2.1 Fenazaquin and its metabolites

Table 8.9-3: Input parameters related to active substance Fenazaquin and metabolites for PEC_{gw} calculations

Compound	Fenazaquin	2-oxy-fenazaquin	4-OHQ	TBPE	Value in accordance with EU endpoint y/n/ Reference*
Molecular weight (g/mol)	306.4	322.41	146.15	178.28	/EFSA Journal 2013;11(4):3166
Water solubility (mg/L):	0.1	1000 (default)	1000 (default)	1000 (default)	
Saturated vapour pressure (Pa):	1.9×10^{-5} at 25°C (9.88×10^{-6}, 20°C)	0 (default)	0 (default)	0 (default)	
DT_{50} in soil (d)	54 (geomean, normalisation to pF2, 20 °C with Q_{10} of 2.58, n =4)	37.1 (geomean, normalisation to pF2, 20°C with Q_{10} of 2.58, n=4)	0.08 (geomean, normalisation to pF2, 20°C with Q_{10} of 2.58, n=3)	0.17 (geomean, normalisation to pF2, 20°C with Q_{10} of 2.58, n=3)	
K_{foc} (mL/g)/K_{fom}	24491.8 (geomean, n=4)/14206.4	83577.8 (geomean, n=3)/48479	222 (geomean, n=3)/128.8	164.6 (geomean, n=3)/95.5	
1/n	0.9 (arithmetic mean, n=4)	1.0	0.70 (arithmetic mean, n=3)	1.0	
Plant uptake factor	0	0	0	0	
Formation fraction	-	0.196 from Fenazaquin	Simulation run as if applied as parent, with application rate calcualted assuming the maximum molar formation of:		

Compound	Fenazaquin	2-oxy-fenazaquin	4-OHQ	TBPE	Value in accordance with EU endpoint y/n/ Reference*
			- 36.6% for 4-OHQ - 17.9% for TBPE		

Table 8.9-4: PEC_{gw} for Fenazaquin and metabolites on melon (with FOCUS PEARL 4.4.4/PELMO 5.5.3)

Scenario	80th Percentile PEC_{gw} at 1 m Soil Depth (µg/L)							
	Fenazaquin		2-oxy-fenazaquin		4-OHQ		TBPE	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
Châteaudun	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Piacenza	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Porto	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sevilla	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Thiva	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 8.9-5: PEC_{gw} for Fenazaquin and metabolites on ornamentals (vine) (with FOCUS PEARL 4.4.4/PELMO 5.5.3)

Scenario	80th Percentile PEC_{gw} at 1 m Soil Depth (µg/L)							
	Fenazaquin		2-oxy-fenazaquin		4-OHQ		TBPE	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
Châteaudun	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Hamburg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Kremsmünster	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Piacenza	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Porto	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sevilla	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Thiva	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 8.9-6: PEC_{gw} for Fenazaquin and metabolites on ornamentals (sunflower) (with FOCUS PEARL 4.4.4/PELMO 5.5.3)

Scenario	80th Percentile PEC_{gw} at 1 m Soil Depth (µg/L)							
	Fenazaquin		2-oxy-fenazaquin		4-OHQ		TBPE	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
Piacenza	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Sevilla	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 8.9-7: PEC$_{gw}$ for Fenazaquin and metabolites on tomato (with FOCUS PEARL 4.4.4/PELMO 5.5.3)

Scenario	80th Percentile PEC$_{gw}$ at 1 m Soil Depth (µg/L)							
	Fenazaquin		2-oxy-fenazaquin		4-OHQ		TBPE	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
Châteaudun	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Piacenza	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Porto	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sevilla	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Thiva	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 8.9-8: PEC$_{gw}$ for Fenazaquin and metabolites on strawberry (with FOCUS PEARL 4.4.4/PELMO 5.5.3)

Scenario	80th Percentile PEC$_{gw}$ at 1 m Soil Depth (µg/L)							
	Fenazaquin		2-oxy-fenazaquin		4-OHQ		TBPE	
	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO	PEARL	PELMO
Hamburg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Jokioinen	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Kremsmünster	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sevilla	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

ZRMS comments:

The PECgw of fenazaquin and its metabolites 2-Oxy-fenazaquin, 4-OHQ and TBPE in groundwater has been assessed with standard FOCUS scenarios to obtain outputs from the FOCUS-PELMO and FOCUS PEARL models and values of parameters established in the EU (EFSA conclusion) 2013;11(4):3166.
The models predict that Fenazaquin and its metabolites will not be found in groundwater at concentrations greater than 0.1 µg/L. Based on the assessment, the use of Fenazaquin is not expected to lead to leaching into groundwater at levels that would be unacceptable when applied according to the recommended use pattern.
No risk of groundwater contamination with fenazaquin and its metabolites are expected when the product Ruler 10 EC is applied in permanent greenhouses.

PL: please see part A.

8.10 Predicted Environmental Concentrations in surface water (PEC_{sw}) (KCP 9.2.5)

8.10.1 Justification for new endpoints

Not relevant as there is no deviation to EU agreed endpoints.

8.10.2 Active substance, relevant metabolites and the formulation (KCP 9.2.5)

8.10.2.1 $PEC_{sw/sed}$ by GEM v3.3.2 software

For PECsw GEM v3.3.2 has been used for soilless crops due to our GAP is for permanent crops.

Table 8.10-1: Input parameters related to application for $PEC_{SW/SED}$ calculations

Plant protection product	**Fenazaquin 20% SC**			
Use No.	1	2	3	4
Crop	**Melon**	**Ornamentals**	**Tomato**	**Strawberry**
Application rate (kg as/ha)	Fenazaquin: 0.2			
Number of applications/interval (d)	1/-	2/7		
Application method	Foliar spray			
Models used for calculation	GEM v3.3.2			

8.10.2.2 $PEC_{sw/sed}$ with GEM v3.3.2 software

Table 8.10 -2: Input parameters related to application for PEC_{SW} calculations for green-house uses

Plant protection product	**Fenazaquin 20% SC**			
Crop	**Melon (cucurbits)**	**Ornamentals (cut flowers)**	**Tomato**	**Strawberry**
Application rate (kg as/ha)	Fenazaquin: 0.2			
Number of applications/interval (d)	1/-	2/7		
Application period/date	21 June (first application)	15 May (first application)	15 May (first application)	19 April (first application)
Reference period	2018-2020			
Filter water reused	Yes			
Target percentile	90 (worst case)			
Application method	Spraying			

Models used for calculation	GEM v3.3.2

Table 8.10-3: Input parameters related to active substance Fenazaquin and metabolites for GEM v3.3.2 PECsw/sed calculations

Compound	Fenazaquin	4-OHQ	TBPE	Value in accordance with EU endpoint y/n/ Reference*
Molecular weight (g/mol)	306.4	146.15	178.28	EFSA Journal 2013;11(4):3166
Log Kow	5.51	1.39 (calculated with KOWwin)	3.48 (calculated with KOWwin)	
Saturated vapour pressure (Pa):	1.9 x 10^{-5} at 25°C (9.88 x 10^{-6}, 20°C)	0 (default)	0 (default)	
Water solubility (mg/L):	0.1	1000 (default)	1000 (default)	
K_{foc} (mL/g)/K_{fom}	24491.8 (geomean, n=4) / 14206.4	222 (geomean, n=3) / 128.8	164.6 (geomean, n=3) / 95.5	
Freundlich Exponent 1/n	0.9 (arithmetic mean, n=4)	0.7 (arithmetic mean, n=3)	1 (default)	
$DT_{50,water}$ (d)	73.9 (geomean of entire system)	1000 (default)		
$DT_{50,sed}$ (d)	1000 (default)			
$DT_{50,whole\ system}$ (d)	73.9	1000 (default)		
$DT_{50,greenhouse\ floor}$ (d)	100 d (default)			
$DT_{50,substrate}$ (d)	54 (geomean, normalisation to pF2, 20 °C with Q_{10} of 2.58, n =4)	0.08 (geomean, normalisation to pF2, 20°C with Q_{10} of 2.58, n=3)	0.17 (geomean, normalisation to pF2, 20°C with Q_{10} of 2.58, n=3)	
$DT_{50,greenhouse\ air}$ (d)	0.277 (AOPwin calculated) at 25 °C	0.312 (AOPwin calculated) at 25 °C	0.92 (AOPwin calculated) at 25 °C	
Molar act. energy greenhouse air	45 kJ/mol			
$DT_{50,recirculation\ water}$ (d)	130 days at 25 °C, pH 7	1000 d at 20ºC (default)		
$DT_{50,disinfection\ tank}$ (d)				
Molar act. energy recirculation water	75 kJ/mol			
Formation fraction in surface water	-	79.3%	82.2%	
Formation fraction in recirculated water	-	32.4% (worst-case on aquatic photolysis)	18.6% (worst-case on aquatic photolysis)	

$PEC_{sw/sed}$

The PECsw for metabolites 2-oxy-fenazaquin and 4-(2-(4-(1,1-dimethylethanoic ac-id) phenyl) eth-oxyl) quinazoline has not been calculated due to them are only produced in sediment.

Table 8.10-4: PEC_{sw} for Fenazaquin and metabolites following <u>single/multiple</u> applications of Fenazaquin 20% SC to cut flower in greenhouse

Scenario **GEM - Soilless**	**90 percentile peak concentration (µg/L)**	**7 d- $PEC_{sw,twa}$ (µg/L)**	**21 d- $PEC_{sw,twa}$ (µg/L)**
Fenazaquin	0.266 / 0.421	0.104 / 0.167	0.048 / 0.069
4-OHQ	0.002 / 0.004	< 0.001 / 0.002	< 0.001 / < 0.001
TBPE	0.003 / 0.005	0.002 / 0.003	< 0.001 / 0.001
90% mitigation measures			
Fenazaquin	0.026 / 0.042	0.010 / 0.017	0.005 / 0.007
4-OHQ	- / -	- / -	- / -
TBPE	- / -	- / -	- / -
95% mitigation measures			
Fenazaquin	- / 0.021	- / 0.008	- / 0.003
4-OHQ	- / -	- / -	- / -
TBPE	- / -	- / -	- / -

Table 8.10-5: PEC_{sw} for Fenazaquin and metabolites following <u>single/multiple</u> applications of Fenazaquin 20% SC to strawberry in greenhouse

Scenario **GEM - Soilless**	**90 percentile peak concentration (µg/L)**	**7 d- $PEC_{sw,twa}$ (µg/L)**	**21 d- $PEC_{sw,twa}$ (µg/L)**
Fenazaquin	0.157 / 0.263	0.090 / 0.148	0.048 / 0.077
4-OHQ	0.003 / 0.004	0.002 / 0.003	0.001 / 0.002
TBPE	0.003 / 0.004	0.003 / 0.004	0.002 / 0.002
90% mitigation measures			
Fenazaquin	0.016 / 0.026	0.009 / 0.015	0.005 / 0.008
4-OHQ	- / -	- / -	- / -
TBPE	- / -	- / -	- / -

Table 8.10-6: PEC_{sw} for Fenazaquin and metabolites following <u>single/multiple</u> applications of Fenazaquin 20% SC to tomato in greenhouse

Scenario **GEM - Soilless**	**90 percentile peak concentration (µg/L)**	**7 d- $PEC_{sw,twa}$ (µg/L)**	**21 d- $PEC_{sw,twa}$ (µg/L)**
Fenazaquin	0.075 / 0.081	0.029 / 0.031	0.010 / 0.011
4-OHQ	< 0.001 / 0.001	< 0.001 / < 0.001	< 0.001 / < 0.001
TBPE	< 0.001 / < 0.001	< 0.001 / < 0.001	< 0.001 / < 0.001
60% mitigation measures			
Fenazaquin	0.030 / 0.032	0.012 / 0.013	0.004 / 0.004

Scenario GEM - Soilless	90 percentile peak concentration (µg/L)	7 d- $PEC_{sw,twa}$ (µg/L)	21 d- $PEC_{sw,twa}$ (µg/L)
4-OHQ	- / -	- / -	- / -
TBPE	- / -	- / -	- / -

Table 8.10-7: PEC_{sw} for Fenazaquin and metabolites following single application of Fenazaquin 20% SC to cucurbits (melon) in greenhouse

Scenario GEM - Soilless	90 percentile peak concentration (µg/L)	7 d- $PEC_{sw,twa}$ (µg/L)	21 d- $PEC_{sw,twa}$ (µg/L)
Fenazaquin	0.022	0.006	0.002
4-OHQ	< 0.001	< 0.001	< 0.001
TBPE	< 0.001	< 0.001	< 0.001

The mitigation measures can be activate carbon filters, waste water removal, UV radiation, etc or a combination. These can be applied before to discharge the greenhouse wastewater to the surface water.

8.10.2.3 $PEC_{sw/sed}$ of Fenazaquin 10% EC

The PEC_{SW} for Fenazaquin 20% SC was calculated using the following equation:

$$PECsw = \frac{0.1\% \; x \; Application \; rate \; (g/ha)}{Water \; depth \; (cm) x \; 10}$$

The single application of Fenazaquin 10% EC is 2 L/ha, corresponding to 1863.4 g/ha (taking into account a density of 0.9317 g/cm^3) for all crops. The depth of the static water body was assumed to be 30 cm. The resulting maximum instantaneous PEC_{SW} value is presented in the table 8.10-8. The values are not realistic since the application will be on greenhouse.

Table 8.10-8: PEC_{sw} for Fenazaquin 10% EC following <u>single/multiple</u> applications

Crop	Max PEC_{sw} (µg/L)
Melon	17.205 / -
Ornamentals, Tomato, Strawberry	17.205 / 29.566

The PEC_{sed} for Fenazaquin 10% EC was calculated using the following equation:

$$PECsed = \frac{0.1\% \; x \; Application \; rate \; \; (g/ha) \; x \; \%Active \; substance \; in \; sediment}{1000 \; x \; Sediment \; density \; x \; Sediment \; height \; (cm)}$$

The single application of Fenazaquin 10% EC is 2 L/ha, corresponding to 1863.4 g/ha (taking into account a density of 0.9317 g/cm^3) for all crops. The maximum percentage of Fenazaquin in the sediment is 54.3%. The height of the sediment was assumed to be 5 cm and the sediment density was assumed to be 1.3 g/cm^3. The resulting maximum instantaneous PEC_{sed} value is presented in the table 8.10-9. The values are not realistic since the application will be on greenhouse.

Table 8.10-9: PEC_{sed} for Fenazaquin 20% SC following single/multiple applications

Crop	% of Fenazaquin	Max PEC_{sed} (µg/kg) (based on maximum occurrence)
Melon	54.3%	43.119 / -
Ornamental, Tomato, Strawberry		43.119 / 74.097

ZRMS comments:

According to GAP, the use of fenazaquin in ornamentals, melon, tomato, strawberry is restricted to the application in greenhouses. Therefore an entry of fenazaquin to the environment after application is very unlikely to occur. Nevertheless, for precautionary reasons calculations have been performed with the maximum application rate of 200 g/ha demonstrating the safe use of the formulated product.

Calculations of PECsw/sed submitted by applicant performed by model GEM v3.3.2 should be considered at national level.

Since no FOCUS scenario currently exists for greenhouse uses, an emission to surface water of 0.1 % of applied amount was assumed according to the recommendations of the PL national authorities.

The calculations made by the evaluator taking into account o.1% emissions from the greenhouse:

An emission to surface water of 0.1 % of applied amount (0.20 kg ai/ha) was assumed to a standard water body of 100 m length, 1 m width and 30 cm depth, resulting in a water volume of 30.000 L:
[{200 g x 0.001 (drift)} : 100 (m^2)] : 30000 (L) = 6.66 x 10^{-8} g
(= 0.066 µg/L)
This results in an initial PECsw of 0.066 µg a.s./L for a standard water body of 30 cm depth.

Property	Fenazaquin	4-(2-(4-(1,1-dimethyl ethanoic acid) phenyl) ethoxyl) quinazoline	2-Oxy-fenazaquin	4-OHQ (4-hydroxy-quinazoline)	TBPE (2-(4-tert-Butylphenyl) ethanol)
Molar mass [g/mol]	306.4	336.39	322.4	146.15	178.28
Max occurrence in water/sediment study [%]	-	11.5	21.2	79.3	82.2
PECsw µg/L	0.066	0.0084	0.007	0.025	0.038

8.11 Fate and behaviour in air (KCP 9.3, KCP 9.3.1)

8.11.1 Atmospheric degradation and behaviour

Table 8.11-1 Summary of atmospheric degradation and behaviour

Compound	Fenazaquin
Direct photolysis in air	Not studies – no data requested
Quantum yield of direct phototransformation	Active substance: 3.0 x 10^{-3} molecules degraded/photon
Photochemical oxidative degradation in air	DT50 (h): 3.321 hrous derived by the Atkinson model

	(AOPWIN version 1.90) OH (12h or 24h) concentration assumed = 1.5 x 10^6 molecules/cm^3 considering 12 hours irradiation per day
Volatilisation	From plant surfaces (BBA guideline): <0.4% after 24 hours From soil surfaces (BBA guideline): < 1.0% after 24 hours Vapour pressure (Pa): 1.9 x 10^{-5} at 25°C (99.4% technhical) Henry's Law Constant (Pa.m3/mol): 5.71 x 10^{-2} $Pa.m^3.mol^{-1}$
Metabolites	-

The vapour pressure at 20°C of the active substance Fenazaquin is between < 10^{-5} Pa. Hence the active substance Fenazaquin is regarded as non-volatile. Therefore, exposure of adjacent surface waters and terrestrial ecosystems by the active substance Fenazaquin due to volatilization with subsequent deposition should not be considered.

ZRMS comments: According to EFSA Journal (2013), the volatility of fenazaquin is negligible. Moreover, its reactivity with OH radicals in the troposphere is predicted to be extremely rapid. Thus, it is unlikely that significant residues will occur in the air.

8.11.2 Estimation of degradation in air for Fenazaquin metabolites

The DT_{50} in air were estimated by AOPwin v1.93.

• 4-OHQ
SMILES: Oc1ncnc2ccccc12
CHEM:
MOL FOR: C8 H6 N2 O1
MOL WT: 146.15
---------- SUMMARY (AOP v1.92): HYDROXYL RADICALS (25 deg C) --------
Hydrogen Abstraction = 0.0000 E-12 cm3/molecule-sec
Reaction with N, S and -OH = 0.1400 E-12 cm3/molecule-sec
Addition to Triple Bonds = 0.0000 E-12 cm3/molecule-sec
Addition to Olefinic Bonds = 0.0000 E-12 cm3/molecule-sec
Addition to Aromatic Rings = 0.0000 E-12 cm3/molecule-sec
**Addition to Fused Rings = 34.1846 E-12 cm3/molecule-sec
OVERALL OH Rate Constant = 34.3246 E-12 cm3/molecule-sec
HALF-LIFE = 0.312 Days (12-hr day; 1.5E6 OH/cm3)
HALF-LIFE = 3.739 Hrs
..... ** Designates Estimation(s) Using ASSUMED Value(s)
---------- SUMMARY (AOP v1.91): OZONE REACTION (25 deg C) ----------
****** NO OZONE REACTION ESTIMATION ******
(ONLY Olefins and Acetylenes are Estimated)
NOTE: Reaction with Nitrate Radicals May Be Important!
Experimental Database: NO Structure Matches

• TBPE
SMILES: CC(C)(C)c1ccc(CCO)cc1
CHEM:
MOL FOR: C12 H18 O1
MOL WT: 178.28
---------- SUMMARY (AOP v1.92): HYDROXYL RADICALS (25 deg C) --------
Hydrogen Abstraction = 5.6715 E-12 cm3/molecule-sec
Reaction with N, S and -OH = 0.1400 E-12 cm3/molecule-sec
Addition to Triple Bonds = 0.0000 E-12 cm3/molecule-sec

Addition to Olefinic Bonds = 0.0000 E-12 cm3/molecule-sec
**Addition to Aromatic Rings = 5.8125 E-12 cm3/molecule-sec
Addition to Fused Rings = 0.0000 E-12 cm3/molecule-sec
OVERALL OH Rate Constant = 11.6240 E-12 cm3/molecule-sec
HALF-LIFE = 0.920 Days (12-hr day; 1.5E6 OH/cm3)
HALF-LIFE = 11.042 Hrs
..... ** Designates Estimation(s) Using ASSUMED Value(s)
---------- SUMMARY (AOP v1.91): OZONE REACTION (25 deg C) ----------
****** NO OZONE REACTION ESTIMATION ******
(ONLY Olefins and Acetylenes are Estimated)
Experimental Database: NO Structure Matches

Appendix 1 Lists of data considered in support of the evaluation

Tables considered not relevant can be deleted as appropriate.

MS to blacken authors of vertebrate studies in the version made available to third parties/public.

List of data submitted by the applicant and relied on

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner

List of data submitted or referred to by the applicant and relied on, but already evaluated at EU peer review

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner

The following tables are to be completed by MS

List of data submitted by the applicant and not relied on

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner

List of data relied on not submitted by the applicant but necessary for evaluation

Data point	Author(s)	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner

Appendix 2 Detailed evaluation of the new Annex II studies

Not relevant. No new Annex II study.

Appendix 3 Additional information provided by the applicant (e.g. detailed modelling data)