Document Title

Summary of the fate and behaviour in the environment for Aclonifen SC 600 (600 g/L)

Data Requirement(s)

Regulation (EC) No 1107/2009 & Regulation (EU) No 284/2013

Document MCP

Section 9: Fate and behaviour in the environment

According to the Guidance Document SANCO/10181/2013 for applicants on preparing dossiers for the approval of a chemical active substance

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[1] It is suggested that applicants adopt a similar approach to showing revisions and version history as outlined in SANCO/10180/2013 Chapter 4, 'How to revise an Assessment Report'.

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CP 9 FATE AND BEHAVIOUR IN THE ENVIRONMENT

Aclonifen was included in Annex I to Council Directive 91/414/EEC in 2008 (Directive 2008/116/EC, Entry into Force on 01 August 2009).

The formulation Aclonifen SC 600 G (or Aclonifen 600 g/L), is a suspension concentrate formulation containing 600 g/L of aclonifen. This formulation is registered throughout Europe under trade names such as Bandur (Aclonifen-SC600; AE-F068300-00-SC50-A2; EXP-04209). Aclonifen SC 600 G was already a representative formulation of Bayer for the Annex I inclusion of aclonifen under Council Directive 91/414/EEC.

This present dossier in support of approval renewal includes all the data submitted at the time of the Annex I inclusion, in summaries updated and re-evaluated as necessary to take account of current validity criteria and data requirements.

No laboratory studies have been conducted with the formulated product as it is possible to extrapolate from data on aclonifen. Full details of the fate and behaviour of aclonifen in soil can be found in the active substance dossier [Document MCA Section 7]. A summary of the fate in the environment is provided below.

CP 9.1 Fate and behaviour in soil

CP 9.1.1 Rate of degradation in soil

The fate and behaviour of aclonifen in soil has been investigated in a comprehensive series of laboratory studies and, when required, supported with data from field experiments. A number of studies were submitted for the first inclusion of aclonifen into Annex I of Council Directive 91/414/EEC and reviewed under uniform principles (DAR, Germany, 2006). In addition a number of new studies are provided for the current EU review. For further information on the rate of degradation in soil please refer to Document MCA, Section 7.1.2.

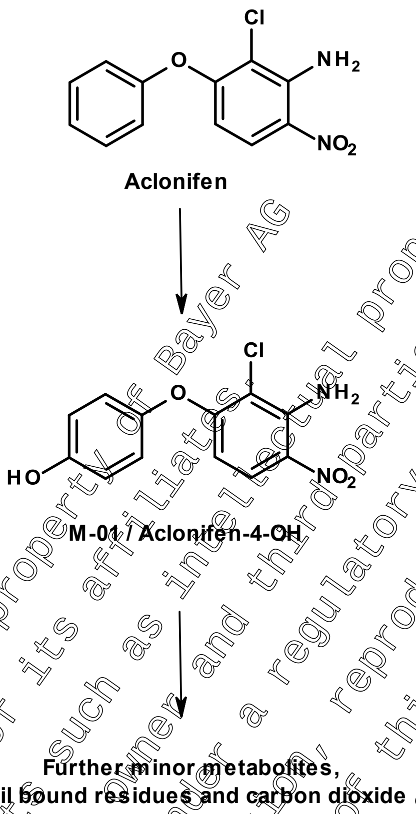
Microbial breakdown of aclonifen in soil leads to the formation of non-extractable soil bound residues, which accounted for a maximum of 20 to 58% of the applied [aniline-UL-^{14}C]-aclonifen and 42 to 71% of the applied [phenoxy-UL-^{14}C]-aclonifen, with very few intermediate products observed. Carbon dioxide was formed at maxima of between 1 to 12% AR in soil treated with the aniline label and 14 to 29% AR in soil treated the phenoxy label.

Supplemental studies have also been conducted to investigate the metabolism of aclonifen in soil under anaerobic and sterile conditions and to determine if photolysis contributed to the degradation of aclonifen on soil surfaces.

Under sterile conditions aclonifen was relatively stable confirming that its metabolism is largely microbially mediated. Non-extractable soil bound residues and material bound to aqueous soluble soil colloids were observed under sterile conditions at relatively constant levels throughout the incubation period, but at lower levels than observed in microbially viable soils, indicative of metabolites of aclonifen also binding to the soil matrix with time in microbially active soils. Aclonifen was more rapidly metabolised under flooded anaerobic conditions. Anaerobic metabolism of aclonifen led to the formation of non extractable soil residues indicating the metabolic pathway was similar to that observed under aerobic conditions. Under anaerobic conditions numerous minor unidentified metabolites were formed from the point when the redox potential in soil and water layer became reductive. The presence of light accelerated the rate of degradation on soil, with no unique metabolites formed exceeding 0.2% of applied radioactivity.

During the course of these studies, no metabolites have been observed at amounts > 5% of applied. The hydroxylated metabolite M-01 was detected in soil at a maximum of 1.5%.

Figure 9.1.1- 1: Metabolic pathway for aclonifen in soil



CP 9.1.1.1 Laboratory studies

One of the original aerobic soil laboratory studies submitted for the first inclusion of aclonifen KCA 7.1.1.1/01 ([redacted], 1994, M-174177-02-1) is still considered valid and acceptable. In addition three new aerobic soil metabolism studies KCA 7.1.1.1/04 ([redacted], 2016, M-558848-01-1), KCA 7.1.1.1/05 ([redacted], 2019, M-674036-01-1) and KCA 7.1.1.1/06 ([redacted] P. & [redacted] D., 2019, M-674477-01-1) have been conducted to supplement the original soil studies.

A new kinetic modelling assessment of laboratory aerobic soil according to FOCUS Degradation Kinetics (2006, 2014) has been provided (KCA 7.1.2.1.1/07, [redacted] & [redacted], M-674934-01-1). Aclonifen has been found to metabolise at a moderate rate in laboratory soil studies. $DegT_{50}$ values at 20ºC ranged from 35.3 to 252.3 days with a geometric mean of 79.1 days. The results have been normalised to standard temperature and soil moisture (20°C and pF 2) according to FOCUS recommendations prior to using in FOCUS groundwater and surface water exposure assessments.

Table 9.1.1- 1: Summary of laboratory normalised $DegT_{50}$ (20 °C and pF2) values for aclonifen

Compound	Laboratory Normalised DT_{50} (20 °C and pF2)		
	$DegT_{50}$ range (days)	Number of datasets (n)	Geometric mean $DegT_{50}$ (days) for exposure assessment
Aclonifen	35.3 – 252.3	12	79.1

For further information on laboratory studies please refer to Document MCA, Section 7.1.2.1.

CP 9.1.1.2 Field studies

CP 9.1.1.2.1 Soil dissipation studies

A terrestrial field dissipation study with aclonifen, formulated as BANDUR®, a suspension concentrate containing 600 g/L aclonifen, was conducted at four trial sites in Germany, Northern Europe. In addition, a second terrestrial field dissipation study with aclonifen, formulated as BANDUR®, was conducted at two trial sites in Southern Europe; [redacted] in Spain and [redacted] Southern France.

These studies were evaluated during the previous EU review and are still considered as reliable to assess the rate of degradation of aclonifen under field conditions. A new kinetic modelling assessment of field studies according to FOCUS Degradation Kinetics (2006, 2014) has been provided (KCA 7.1.2.2.1/07, [redacted] & [redacted], M-675285-01-1). Aclonifen was found to have moderate rates of degradation under field conditions with DT_{50} values similar to those observed under laboratory conditions. To provide a conservative risk assessment, the worst-case field $DisT_{50}$ value of 196.8 days was used to calculate the predicted environmental concentration in soil, including $PEC_{soil\ accumulation}$.

Table 9.1.1- 2: Summary of field DT_{50} values for aclonifen

Compound	Field dissipation $DisT_{50}$ (not normalised)		
	$DisT_{50}$ range (days)	Number of datasets (n)	Worst-case $DisT_{50}$ (days) for exposure assessment
Aclonifen	31.8 – 196.8	6	196.8

For further information on field dissipation studies please refer to Document MCA, Section 7.1.2.2.1.

CP 9.1.1.2.2 Soil accumulation studies

Soil accumulation studies were carried out with aclonifen, formulated as BANDUR®, a suspension concentrate containing 600 g/L aclonifen, as field DT_{90} values indicated some persistence leading to residual residue levels remaining one year after application under Northern European climates. Consequently, accumulation studies were conducted to determine aclonifen levels in soil following annual applications over a three year period at sites [redacted] No accumulation of aclonifen residues was observed at either location.

For further information on field accumulation studies please refer to Document MCA, Section 7.1.2.2.2. The studies were evaluated during the previous EU review and were accepted as plausible but were not considered sufficient to address the potential accumulation of aclonifen in soil. An assessment of accumulated PEC_{soil} for aclonifen is provided in Document MCP, Section 9.1.3.

CP 9.1.2 Mobility in the soil

CP 9.1.2.1 Laboratory studies

The adsorption/desorption characteristics of aclonifen was determined in standard batch equilibrium experiments. No correlation with soil pH was observed. For further information on laboratory studies please refer to Document MCA, Section 7.1.4.1.

Table 9.1.2- 1: Summary of soil adsorption coefficients for aclonifen

Report reference	Soil	Texture	pH	OC [%]	K_f	K_{OC}	1/n
KCA 7.1.3.1.1/01 M-174332-01-1	[redacted]	Loam	6.4	1.1	58.5	5318	0.878
	Hurley (90/10)	Sandy loam	7.3	1.7	92.6	5447	0.885
	Speyer 2.2 (90/9)	Loamy sand	5.7	2.5	265.3	10612	1.003
KCA 7.1.3.1.1/02 M-562667-02-1	[redacted]	Sandy loam	5.8	1.7	87.7	5156.9	0.8358
	[redacted]	Silt loam	6.2	2.0	111.9	5594.8	0.8522
	[redacted]	Loam	5.6	2.8	181.5	6480.4	0.8778
	[redacted]	Sandy loam	5.0	1.9	92.4	4863.8	0.8400
	[redacted]	Loam	7.0	6.1	252.5	4139.9	0.8615
Arithmetic mean					142.8	5951.6	**0.8792**
Geometric mean					125.0	**5727.0**	0.8778

The geometric mean K_{oc} value of 5727 and arithmetic mean 1/n value of 0.88 were selected for PEC_{gw} and PEC_{sw} modelling.

CP 9.1.2.2 Lysimeter studies

The potential mobility of aclonifen has been assessed by modelling and therefore a lysimeter study is not required.

CP 9.1.2.3 Field leaching studies

The potential mobility of aclonifen has been assessed by modelling and therefore a field leaching study is not required.

CP 9.1.3 Estimation of concentrations in soil

Predicted environmental concentrations in soil (PEC_S)

Data Point:	KCP 9.1.3/01
Report Author:	[redacted]; [redacted]
Report Year:	2004
Report Title:	Predicted environmental concentrations of aclonifen in soil, following application to sunflowers
Report No:	C042603
Document No:	M-232955-01-1
Guideline(s) followed in study:	not applicable
Deviations from current test guideline:	Current guideline: EU Commission (1995 and 2000). FOCUS (1997 and 2014) Major deviations; does not meet Current standards - Impact: modelling report invalid
Previous evaluation:	yes, evaluated and accepted Source: Study list relied upon, December 2011 (RMS: DE)
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Now is no longer acceptable

In the previous submission (DAR, 2006), this modelling report was evaluated and accepted as valid. However the modelling calcultions were performed for a crop use which is not one of the current representative uses and the modelling endpoint has been superseded by new kinetic evaluations. Consequently the results are not presented in this dossier. For procedural reasons it has to be included in the current dossier however it is now superseded by KCP 9.1.3/02, [redacted], & [redacted], 2019, M-675289-01-1.

Data Point:	KCP 9.1.3/02
Report Author:	[redacted]
Report Year:	2019
Report Title:	Aclonifen: PECsoil in Europe - Use as spray application in legumes and winter cereals in Europe
Report No:	VC/19/025G
Document No:	M-675289-01-1
Guideline(s) followed in study:	none
Deviations from current test guideline:	Current guideline: EU Commission (1995 and 2000). FOCUS (1997 and 2014) No deviation
Previous evaluation:	No, not previously submitted
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes

The predicted environmental concentrations in soil (PEC_{soil}) of aclonifen was estimated as follows using the standard approach for legumes and winter cereals. The results for legumes are summarised below. Calculations assumed an even distribution of the compound in upper 0-5 cm soil layer following application and a soil density of 1.5 g/cm^3. A simple Excel spreadsheet was used for the calculations.

The use of aclonifen on legumes was assessed according to the Good Agricultural Practice (GAP) as summarised below.

Table 9.1.3- 1: Application data of aclonifen according to the use pattern in UK

Individual crop	FOCUS crop	Rate	Interval	Plant interception	BBCH stage	Amount reaching soil
		g/ha	(days)	(%)	(-)	g/ha
Peas	Legumes	300	-	35	12-18	195
Peas	Legumes	600		35	11-30	390

The calculations were based on the maximum intended application rate together with the maximum intended number of applications per season and (for multi-application sequences) the minimum interval between the applications. Crop interception was taken into account according to the BBCH growth stage, as recommended by FOCUS (2014).

Substance parameters used as input in the calculations are summarised in Table 9.1.3- 2. The worst-case DT_{50} field value of 196.8 days was selected for the PEC_{soil} calculations.

Table 9.1.3- 2: Compound and scenario input parameters as used for the calculation

Compound	Molar mass (g/mol)	Max occur. in soil (%)	DT_{50} (days)	Molar mass corr. factor (-)
Aclonifen	264.7	100	196.8	1.0
Soil bulk density (g cm^{-3})	1.5			
Soil mixing depth (cm)	5			
Tillage depth for plateau (if relevant) (cm)	20			

Standard PEC_{soil} calculations use the soil mixing depth of 5 cm for the calculation of the maximum concentrations. For the cases where the agricultural practice involves deep soil tillage (or other mixing process), the effect of the soil processing is taken into account for the assessment of long-term behaviour of the respective substance. In such case, a tillage depth of 20 cm is used for the evaluation of background soil concentrations. The details of the calculation can be found below.

A 1st tier estimation of the initial PEC_{soil} concentration is done using the equation

$$PEC_{soil} = \frac{A \cdot f}{\rho_{soil} \cdot d} \qquad (1)$$

with A being the nominal single field application rate, f the fraction reaching soil surface (taking into account crop interception factors according to FOCUS), ρ_{soil} the dry soil bulk density, and d the thickness of the soil layer.

In single application scenarios, the initial PEC_{soil} value is equal to the overall maximum. For multiple (n) applications with constant application rate, crop interception, and application interval, the maximum PEC_{soil} can be written as

$$PEC_{soil,max} = \frac{A \cdot f}{\rho_{soil} \cdot d} \cdot \frac{1 - e^{-k\,n\,\Delta t}}{1 - e^{-k\,\Delta t}} \qquad (2)$$

where Δt the application interval and k is the first order degradation rate, calculated from the soil half-life (DT_{50}) as

$$k = \frac{\ln 2}{DT_{50}} \qquad (3)$$

For multiple (n) applications with variable application rate, crop interception, or application interval, the PEC_{soil} just after the application (i) can be calculated stepwise as

$$PEC(i)_{soil,max} = \frac{A(i) \cdot f(i)}{\rho_{soil} \cdot d} + PEC(i)_{soil,co} \qquad (4)$$

where $PEC_{soil,co}$ represents the residue from the preceding applications at the time of the actual application. For the first application, $PEC_{soil,co}$ is zero, for the following applications it can be written as

$$PEC(i)_{soil,co} = PEC(i-1)_{soil} \cdot e^{-k\,\Delta t(i)} \qquad (5)$$

with Δt(i) being the time interval between applications (i-1) and (i). $PEC_{soil,max}$ is then defined as the maximum of the individual PEC_{soil} values.

$$PEC_{soil,max} = \max(PEC(i)_{soil,max}) \qquad (6)$$

Concentrations over time

For first-order kinetics with a degradation rate k the declining PEC values at time t after the maximum can be calculated by

$$PEC(t) = PEC_{max} \cdot e^{-k\,t} \qquad (7)$$

For a better comparison of exposure and effect data time-weighted average concentrations (TWA) may be useful. For first-order kinetics, the TWA are given by the following formula.

$$TWA(t) = PEC_{max} \cdot \frac{1}{k \cdot t} \cdot (1 - e^{-k\,t}) \qquad (8)$$

Accumulation after long term use

Potential accumulation after long term use is also assessed, based on the maximum $PEC_{soil,max}$ concentration of the respective compound, obtained as described before.

In case of a single application (or a multiple application sequence leading to the maximum PEC_{soil} after the last application), it can be shown that the maximum concentration in soil after perpetual use ($PEC_{soil,accu}$) can be expressed as

$$PEC_{soil,accu} = PEC_{soil,max} \cdot \frac{1}{1 - e^{-k \cdot t}} \qquad (9)$$

where t is the number of days between two events where $PEC_{soil,max}$ is reached, *i.e.*, 365 days for yearly applications, 730 days for bi-yearly applications, *etc*. This PEC_{soil} value is based on a normal mixing depth. In the case of a multiple application sequence leading to the maximum PEC_{soil} before the last application another approach has to be used.

The concentration in soil after an infinite number of applications and immediately before the application in the last year (the so called plateau concentration $PEC_{plateau}$) can be written as

$$PEC_{plateau} = PEC_{soil,accu} \cdot \frac{d}{d_{accu}} \cdot e^{-k \cdot t} \qquad (10)$$

This formula can take the effect of deep soil tillage (or another mixing process) into account by distributing the soil residue amongst larger amounts of soil (larger soil mixing depth d_{accu} of, *e.g.*, 20 cm). In the absence of such mixing process, the factors involving mixing depth cancel out.
The total PEC_{soil} taking the effect of accumulation into account is then the sum of $PEC_{plateau}$ and the maximum PEC_{soil}, as defined previously.

$$PEC_{soil,total} = PEC_{plateau} + PEC_{soil,max} \qquad (11)$$

The plateau concentration is driven by the dissipation DT_{50} in soil. The ratio between maximum PEC_{soil} due to actual application and the respective plateau concentration (taking effect of tillage into account here) can be written as

$$\frac{PEC_{plateau}}{PEC_{soil,max}} = \frac{e^{-k \cdot t}}{1 - e^{-k \cdot t}} \cdot \frac{d}{d_{accu}} \qquad (12)$$

Inspection of Equation (12) shows that this ratio is independent of the application rate. For a DT_{90} of less than a year, the plateau concentration is marginal (< 3% of actual $PEC_{soil,max}$ for d = 5 cm and d_{accu} = 20 cm). It is thus deemed appropriate to neglect the plateau concentration in such a case.

Detailed results (maximum, short-term and long-term PEC and TWA, and accumulation values) for individual uses are provided in the following tables.

Table 9.1.3- 3: PEC$_{soil}$ of aclonifen 1 x 600 g ha^{-1} post-emergence on legumes

PEC$_{soil}$ (mg/kg)		Legumes 1 x 600 g/ha (35% intercept)			
		Single application		Multiple applications	
		Actual	TWA	Actual	TWA
Initial		0.5200	-	N/A	N/A
Short term	24 h	0.5182	0.5191		
	2 d	0.5163	0.5182		
	4 d	0.5127	0.5164		
Long term	7 d	0.5073	0.5136		
	14 d	0.4950	0.5074		
	21 d	0.4829	0.5012		
	28 d	0.4712	0.4952		
	42 d	0.4485	0.4834		
	50 d	0.4360	0.4768		
	100 d	0.3656	0.4383		
Plateau concentration (20cm)		0.0497	-	N/A	N/A
PEC$_{accumulation}$ (PEC$_{act}$ + PEC$_{soil}$ plateau)		**0.5697**	-	N/A	N/A

Table 9.1.3- 4: PEC$_{soil}$ of aclonifen 1 x 300 g ha^{-1} post-emergence on legumes

PEC$_{soil}$ (mg/kg)		Legumes 1 x 300 g/ha (35% intercept)			
		Single application		Multiple applications	
		Actual	TWA	Actual	TWA
Initial		0.2600	-	N/A	N/A
Short term	24 h	0.2591	0.2595		
	2 d	0.2582	0.2591		
	4 d	0.2564	0.2582		
Long term	7 d	0.2537	0.2568		
	14 d	0.2475	0.2537		
	21 d	0.2415	0.2506		
	28 d	0.2356	0.2476		
	42 d	0.2242	0.2417		
	50 d	0.2180	0.2384		
	100 d	0.1828	0.2191		
Plateau concentration (20cm)		0.0248	-	N/A	N/A
PEC$_{accumulation}$ (PEC$_{act}$ + PEC$_{soil}$ plateau)		0.2848	-	N/A	N/A

Overview of maximum PEC$_{soil}$ values of aclonifen for all use patterns under consideration is shown below.

Use pattern	Aclonifen (mg/kg)
1 x 600 g/ha spray treatment on Legumes	0.5200
1 x 300 g/ha spray treatment on Legumes	0.2600

The accumulation potential of aclonifen after long term use was also assessed, employing the larger soil depth for the calculation of the background concentration in cases where tillage is relevant. The results are presented below.

Use pattern	PEC_{soil}	Aclonifen (mg/kg)
Legumes 1 x 600 g/ha	Plateau (20cm) Total (20 + 5 cm)	0.0497 0.5697
Legumes 1 x 300 g/ha	Plateau (20cm) Total (20 + 5 cm)	0.0248 0.2848

CP 9.2 Fate and behaviour in water and sediment

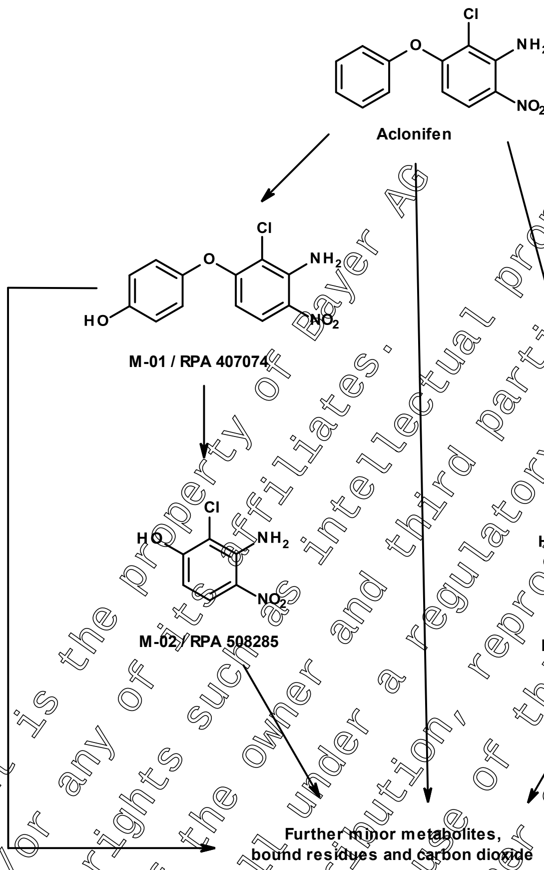
The fate and behaviour of aclonifen in aquatic systems has been investigated under abiotic and biotic conditions in a series of laboratory studies. A number of studies were submitted for the first inclusion of aclonifen into Annex I of Council Directive 91/414/EEC and reviewed under uniform principles (DAR, Germany, 2006). In addition a number of new studies are provided for the current EU review. All valid environment fate studies are considered in the MCA 7 dossier.

Under sterile aqueous conditions, at temperatures of 22°C, 50°C and 70°C, aclonifen was found to be hydrolytically stable at pH 5, 7 and 9. The photolytic degradation of [aniline-UL-^{14}C]-aclonifen in water has been investigated under sterile conditions in phosphate buffer solution at pH 7. Aclonifen exhibited slow degradation when irradiated in sterile pH 7 buffer solution at 25 °C, with up to 88 % of applied radioactivity still recovered as parent at the end of the study after 16 days (equivalent to 30 days natural sunlight). No major (>10%) metabolites were formed by photolysis in water. In aerobic mineralization studies treated with [aniline-UL-^{14}C]-aclonifen, the metabolites M-01 and M-02 were observed as major metabolites (≥ 10%).

Water sediment studies have been conducted with ^{14}C-aclonifen, uniformly labelled in either the phenoxy or aniline rings. In water/sediment systems aclonifen was readily degraded with total system DT_{50} values ranging from 5 to 44 days. The compound dissipated rapidly from the water phase with DT_{50} values of between <1 to 3 days. Once deposited in the sediment, parent continued to degrade over time with DT_{50} values of between 8 to 69 days.

In water sediment systems treated with [aniline-UL-^{14}C]-aclonifen, M-01, M-02 and M-03 were observed as minor metabolites. The combined sum of the cleaved metabolites M-02 and M-03 observed throughout the water sediment study was at a maximum of only 4%. No significant metabolites were observed in water sediment studies treated with [phenoxy-UL-^{14}C]-aclonifen. Formation of unextractable bound residues in sediment was the major metabolic pathway in aquatic systems. Under sterile conditions, aclonifen was relatively stable confirming that its metabolism is largely microbially mediated. Non-extractable sediment bound residues were observed under sterile conditions at much lower levels than observed in microbially viable systems, indicative of metabolites of aclonifen also binding to the sediment matrix with time in microbially active systems. The metabolic pathway for aclonifen in aquatic systems is shown below.

Figure 9.2- 1: Metabolic pathway for aclonifen in surface water



A new kinetic evaluation of the experimental data generated in two water sediment studies KCA 7.2.2.3/01 and KCA 7.2.2.3/06 has been conducted according to FOCUS kinetics guidance with the aim of deriving DT_{50} values for use as modelling and trigger endpoints ([redacted] & [redacted], 2019, KCA 7.2.2.3/08). The geometric mean modelling endpoints DT_{50} values for aclonifen are summarised in the table below.

Table 9.2- 1: Summary of modelling endpoint DT_{50} values for aclonifen in aquatic / sediment systems

Compound	Laboratory modelling endpoint DT_{50} (20 °C)		
	DT_{50} range (days)	Number of datasets (n)	Geometric mean DT_{50} (days) for exposure assessment
Total system	4.80 - 43.81	4	14.4
Water phase	0.83 - 3.39	4	1.7
Sediment	8.43 - 69.49	4	26.1

CP 9.2.1 Aerobic mineralisation in surface water

This study is a new requirement under **Commission Regulation (EU) No 284/2013**. Two aerobic mineralisation studies (OECD 309) with aclonifen were performed for Annex I Renewal, a 'pelagic' test system KCA 7.2.2.2/01 ([redacted] 2016, M-551820-01-1) representative of the water column of the open waters or oceans and a 'suspended sediment' test system KCA 7.2.2.2./02 ([redacted] & [redacted], 2019, M-674035-01-1) representative of most surface waters according to OECD Test Guideline 309.

In the 'pelagic' test system the aerobic mineralisation of aclonifen was investigated in natural water at pH 7.1. The results indicated that aclonifen was slowly degraded in both low and high concentration tests but did not significantly mineralise (<1% AR) over the study duration. DT_{50} values for aclonifen in pelagic water were 205.5 and 361 days. The aclonifen metabolite M-01 was formed at a maximum of 10% AR along with 3 other minor unidentified metabolites (≤ 3.5% AR).

However exposure of aclonifen to open water is not expected as the compound is very strongly adsorbed (mean K_{oc} > 5500) & immobile in soil. Any residues unintentionally reaching surface waters will not reach open water such as lakes, reservoirs, estuaries or the sea.

In the 'suspended sediment' test system the aerobic mineralisation of aclonifen was investigated in natural water at pH 6.9. The results indicated that aclonifen was readily metabolised in both low and high concentration tests but did not significantly mineralise (<5% AR) over the study duration. DT_{50} values for aclonifen in suspended sediment water were 25.7 and 39.2 days. The aclonifen metabolite M-02 was formed at a maximum of 17% AR in flasks treated with [aniline-UL-^{14}C]-aclonifen. No significant metabolites were observed in flasks treated with [phenoxy-UL-^{14}C]-aclonifen.

For further information on aerobic mineralisation in surface water studies please refer to Document MCA, Section 7.2.2.2.

CP 9.2.2 Water/sediment study

Water sediment studies KCA 7.2.2.3/01 ([redacted] P. & [redacted] E., 2000, M-199647-01-1) and KCA 7.2.2.3/06 ([redacted] 2019, M-674479-01-1) have been conducted with [^{14}C]-aclonifen, uniformly labelled in either the phenoxy or aniline rings. Aclonifen reached a maximum of 61.0% of applied radioactivity (AR) in the sediment at day 3 before declining to 4.1% at 100 days.

Aclonifen was degraded by hydroxylation to form M-01 and hydrolysis (of aclonifen or M-01) to form M-02. Under reduced conditions the formation of M-04 was observed on two occasions in the Manningtree system and once in the Ongar system, possibly as a result of the reduction of M-02 as the reduced forms of aclonifen and M-01 were not observed. During the course of these studies, no metabolites were observed in either water or sediment phases at levels > 5% AR at more than one timepoint.

A new kinetic evaluation of the two water sediment studies was conducted according to FOCUS kinetics guidance KCA 7.2.2.3/08 ([redacted] & [redacted], 2019, M-675507-01-1). The total system $DegT_{50}$ values calculated for aclonifen are provided in the table below. The geometric mean $DegT_{50}$ value of 14.4 days was used in FOCUS surface water exposure assessments.

Table 9.2.2- 1: Summary of total system $DegT_{50}$ values for aclonifen in aquatic / sediment systems

Phase	Sediment system	Model	St. (χ^2err) (%)	DT_{50} (days)
Total system	Manningtree	SFO	8.79	43.81
Total system	Ongar	HS DT_{90}/3.32	5.84	40.06
Total system	Anglersee	SFO	8.60	5.04
Total system	Wiehltalsperre	SFO	12.98	4.80
			Geometric mean	**14.4**

For further information on water/sediment studies please refer to Document MCA, Section 7.2.2.3.

CP 9.2.3 Irradiated water/sediment study

An irradiated water sediment study is an optional higher tier study which is not required for Aclonifen SC 600 G or aclonifen.

CP 9.2.4 Estimation of concentrations in groundwater

For the PEC calculations following use of Aclonifen SC 600 G, the following representative uses were considered.

Individual crop	FOCUS crop	Rate per Season	Interval	Timing of application
		(g a.s. /ha)	(days)	BBCH Stage
Beans (field)	Legumes	300	-	12-18
Beans (field)	Legumes	600	-	11-30
Peas (animal)	Legumes	300	-	12-18
Peas (animal)	Legumes	600	-	11-30

PEC_{gw} modelling approach

The predicted environmental concentrations in groundwater (PEC_{gw}) for the active substance aclonifen was calculated using the simulation models PEARL 4.4.4 and PELMO 5.5.3 following the recommendations of the FOCUS working group on groundwater scenarios. In addition, modelling was conducted for the Châteaudun scenario with MACRO 5.5.4.

The leaching calculations were run over 26 years, as proposed for pesticides which may be applied every year. The first six years are a ‘warm up’ period; only the last 20 years were considered for the assessment of the leaching potential (for biennial applications the simulations are run for 46 years, with the first six as ‘warm up’). The 80th percentile of the average annual groundwater concentrations in the percolate at 1 m depth under a treated field were evaluated and were taken as the relevant PEC_{gw} values. In respect to the assessment of a potential groundwater contamination this shallow depth reflects a worst case. The effective long-term groundwater concentrations will be even lower due to dilution in the groundwater layer.

According to FOCUS, the calculations were conducted based on geometric mean soil half-lives, referenced to standard temperature and moisture conditions. Crop interception will reduce the amount of a compound reaching the soil and therefore this has been taken into account depending on the growth stage at application.

CP 9.2.4.1 Calculation of concentrations in groundwater

Predicted environmental concentrations in groundwater (PEC_{GW})

Data Point:	KCP 9.2.4/01
Report Author:	[redacted]; [redacted]
Report Year:	2003
Report Title:	Predicted environmental concentrations in groundwater (PECgw) of aclonifen using the FOCUS groundwater scenarios.
Report No:	C032385
Document No:	M-231324-01-1
Guideline(s) followed in study:	not applicable
Deviations from current test guideline:	Current guideline: FOCUS (2000 and 2014) Major deviations; does not meet Current standards - Impact: modelling report invalid
Previous evaluation:	yes, evaluated and accepted Source: Study list relied upon, December 2011 (RMS: DE)
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Now is no longer acceptable

In the previous submission (DAR, 2006), this modelling report was evaluated and accepted as valid. However the modelling calculations were performed for a crop use which is not one of the current representative uses and the modelling endpoints have been superseded by new studies and new kinetic evaluations. Consequently a summary of the results is not presented in this dossier. For procedural reasons it has to be included in the current dossier however it is now superseded by KCP 9.2.4.1/02, [redacted], & [redacted], 2019, M-675020-02-1.

Data Point:	KCP 9.2.4.1/01
Report Author:	[redacted]; [redacted]
Report Year:	2019
Report Title:	Aclonifen: PECgw FOCUS PEARL, PELMO and MACRO - Use in winter cereals and legumes in Europe
Report No:	VC/19/025D
Document No:	M-675020-02-1
Guideline(s) followed in study:	none
Deviations from current test guideline:	Current guideline: FOCUS (2000 and 2014) No deviation
Previous evaluation:	No, not previously submitted
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes

Predicted environmental concentrations of the active substance aclonifen in groundwater recharge (PEC_{gw}) were calculated for the use in Europe, using the simulation models FOCUS PEARL 4.4.4, FOCUS PELMO 5.5.3 and FOCUS MACRO 5.5.4.

Use of aclonifen in winter cereals and legumes was investigated in the report. The results for legumes are summarised in this document. Detailed application parameters are presented in Table 9.2.4- 1.

Table 9.2.4- 1: Application data of aclonifen according to the use pattern in Europe

Individual crop	FOCUS crop	Rate	Interval	Plant interception	BBCH stage	Amount reaching soil
		g/ha	(days)	(%)	(-)	g/ha
Beans (field)	Legumes	300	-	35	12-18	195
Beans (field)	Legumes	600	-	35	11-30	390
Peas (animal)	Legumes	300	-	35	12-18	195
Peas (animal)	Legumes	600	-	35	11-30	390

Applications were made at the date of emergence date + 3 days for FOCUS ground water scenarios on legumes. Full details are given in Table 9.2.4- 2.

Table 9.2.4- 2: Application dates of aclonifen according to the use pattern in legumes

Crop	Scenario	Application relative day used in modelling
Beans (field)	[redacted]	Emergence+3 Emergence+3 Emergence+3
Peas (animal)	[redacted]	Emergence+3 Emergence+3 Emergence+3 Emergence+3

Further input parameters for PEC_{gw} modelling of aclonifen are summarised below in Table 9.2.4- 3.

Table 9.2.4- 3: Compound input parameters for aclonifen

Parameter	Unit	Aclonifen
Molecular weight	g mol^{-1}	264.7
Vapour pressure (at 20°C)	Pa	1.6 e-5
Solubility (at 20°C)	mg l^{-1}	1.4
DT_{50} in soil	d	79.1
Koc	mL g^{-1}	5727
Kom	mL g^{-1}	3322
Freundlich exponent	-	0.878
Plant uptake factor ()	-	0
Exponent moisture	(-)	0.49
Exponent temperature	(1/K)	0.0948

Following the proposal of the FOCUS working group on groundwater scenarios, the concentrations in the percolate at 1 m depth were evaluated. This shallow depth reflects a worst case with respect to the assessment of a potential groundwater contamination. The effective long-term groundwater concentrations will be even lower due to dilution in the upper groundwater layer. Detailed results for all scenarios for FOCUS PEARL, FOCUS PELMO and FOCUS MACRO are listed below.

Table 9.2.4- 4: FOCUS PEARL, PELMO and MACRO PEC_{gw} results of aclonifen in legumes at 600 g/ha

Crop	Scenario	80th percentile PECgw at 1 m soil depth (µg/L)	
		Aclonifen	
		PEARL	PELMO
Beans (field) Peas (Animal)	[redacted]	<0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	<0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001
MACRO	[redacted]	<0.001	

Table 9.2.4- 5: FOCUS PEARL, PELMO and MACRO PEC_{gw} results of aclonifen in legumes at 300 g/ha

Crop	Scenario	80th percentile PECgw at 1 m soil depth (µg/L)	
		Aclonifen	
		PEARL	PELMO
Beans (field) Peas (Animal)	[redacted]	<0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	<0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001
MACRO	[redacted]	<0.001	

Overview of the PECgw values obtained with individual FOCUS models (PEARL) and (PELMO) are shown below.

Table 9.2.4- 6: Maximum FOCUS PEARL PEC_{gw} results of aclonifen for uses on legumes

Use pattern	Aclonifen (µg/L)
Legumes 600 g a.s./ha 1 application each year	<0.001
Legumes 300 g a.s./ha 1 application each year	<0.001

Table 9.2.4- 7: Maximum FOCUS PELMO PEC_{gw} results of aclonifen for uses on legumes

Use pattern	Aclonifen (µg/L)
Legumes 600 g a.s./ha 1 application each year	<0.001
Legumes 300 g a.s./ha 1 application each year	<0.001

CP 9.2.4.2 Additional field tests

No additional studies on the formulation Aclonifen SC 600 under field conditions are deemed necessary. The fate and behaviour of the compound, aclonifen, in this formulation are fully covered from laboratory experiments and modelling.

CP 9.2.5 Estimation of concentrations in surface water and sediment

Predicted environmental concentrations in surface water (PEC_{SW})

Predicted environmental concentrations of the herbicide aclonifen in surface water (PEC_{sw}) and sediment (PEC_{sed}) were calculated for the representative uses in Europe, employing the tiered FOCUS Surface Water (SW) approach. All relevant entry routes of a compound into surface water (principally a combination of spray drift and runoff/erosion or drain flow) were considered in these calculations.

Step 1: In this, the most conservative step, all inputs are considered as a single loading to the water body and a worst-case PEC_{sw} and PEC_{sed} is calculated.

Step 2: Individual loadings into the water body from different entry routes are considered. Scenarios are also considered for Northern and Southern Europe separately but no specific crop scenarios are defined.

Step 3: An exposure assessment using realistic worst-case scenarios is made. The scenarios are representative of agricultural conditions in Europe and consider weather, soil, crop and different water-bodies. Simulations use the models PRZM, MACRO and TOXSWA.

Step 4: PEC values are refined by considering mitigation measures or specific scenario descriptions on a case-by-case basis.

PEC_{sw} for aclonifen

For PEC_{sw} and PEC_{sed} calculations use of aclonifen at application rates of 600 g a.s./ha and 300 g a.s./ha on legumes was considered.

The simulation model FOCUS SWASH v5.3 comprising of FOCUS PRZM v4.3.1, FOCUS MACRO v5.5.4 and FOCUS TOXSWA v5.5.3 was used to calculate the reported PEC_{sw} values. SWAN v5.0.1 was used to apply Step 4 mitigation measures.

Predicted environmental concentrations in surface water and sediment (PEC_{sw} and PEC_{sed}) at Steps 1 and 2 have been calculated for use on legumes. A comparison of the concentrations predicted at Steps 1 and 2 with ecotoxicological endpoints indicated the exposure assessments for both compounds were too conservative to conduct a successful risk assessment for aquatic organisms. Consequently predicted environmental concentrations in surface water and sediment (PEC_{sw} and PEC_{sed}) at Step 3 and Step 4 have been calculated.

Data Point:	KCP 9.2.5/01
Report Author:	[redacted]; [redacted]
Report Year:	2004
Report Title:	Predicted environmental concentrations in surface water (PECsw) and sediment (PECsed) for aclonifen following use of the formulation Bandur (R) on sunflowers
Report No:	C042605
Document No:	M-232958-01-1
Guideline(s) followed in study:	not applicable
Deviations from current test guideline:	Current guideline: FOCUS (2001, 2007 and 2015) Major deviations; does not meet Current standards - Impact: modelling report invalid
Previous evaluation:	yes, evaluated and accepted Source: Study list relied upon, December 2011 (RMS: DE)
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Now is no longer acceptable

In the previous submission (DAR, 2006), this modelling report was submitted but ultimately not accepted as valid and was superseded by KCP 9.2.4.1/02, [redacted] & [redacted], 2008, M-300717-01-1. For procedural reasons it has to be included in the current dossier, but is considered invalid and consequently a summary of the results is not presented in this dossier.

Data Point:	KCP 9.2.5/02
Report Author:	[redacted]; [redacted]
Report Year:	2008
Report Title:	Predicted environmental concentrations in surface water (PECsw) and sediment (PECsed) for aclonifen following a pre-emergence application to sunflowers at 2400 g ha-
Report No:	VC/08/016C
Document No:	M-300717-01-1
Guideline(s) followed in study:	EU Council Directive 91/414/EEC, as amended by Commission Directive 95/36/EC of July 1995, Section 5, Point 9.2.3. (OECD 9.7)
Deviations from current test guideline:	Current guideline: FOCUS (2001, 2007 and 2015) Major deviations; does not meet Current standards - Impact: modelling report invalid
Previous evaluation:	yes, evaluated and accepted Source: Study list relied upon, December 2011 (RMS: DE)
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Now is no longer acceptable

In the previous submission (Addendum to DAR, 2008), this modelling report was evaluated and accepted as valid. However the modelling calculations were performed for a crop use which is not one of the current representative uses and the modelling endpoints have been superseded by new studies and new kinetic evaluations. Consequently a summary of the results is not presented in this dossier. For procedural reasons it has to be included in the current dossier however it is now superseded by KCP 9.2.5/03, [redacted], 2019, M-675040-01-1.

Data Point:	KCP 9.2.5/03
Report Author:	[redacted]
Report Year:	2019
Report Title:	Aclonifen (ACL): PECsw,sed FOCUS - Use in legumes in Europe
Report No:	EnSa-19-0663
Document No:	M-675040-01-1
Guideline(s) followed in study:	none
Deviations from current test guideline:	Current guideline: FOCUS (2001, 2007 and 2015) No deviation
Previous evaluation:	No, not previously submitted
GLP/Officially recognised testing facilities:	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes

Predicted environmental concentrations of the herbicide aclonifen in surface water (PEC_{sw}) and sediment (PEC_{sed}) were calculated for the use in legumes in Europe, employing the tiered FOCUS Surface Water approach. All relevant entry routes of a compound into surface water (principally a combination of spray drift and runoff/erosion or drain flow) were considered in these calculations.

Intended GAPs for the use of aclonifen in Europe were analysed and consolidated according to regulatory and modelling requirements. As a result, one or more uses may be covered by a single modelling GAP row (DGR). The translation of the regulatory GAP for modelling purposes is shown in Table 9.2.5- 1.

Table 9.2.5- 1: GAP translation for modelling purposes

GAP group ID	GAP group name (DGR) and use IDs	Covered crop(s)	Growth stage	Max. apps	Interval (days)	Rate (kg a.s./ha)
DGR I	peas	peas	BBCH 11 - 30	1	-	1×0.6
DGR II	half	peas	BBCH 12 - 18	1	-	1×0.3

The implementation of the modelling GAP at Steps 1-2 level is shown in Table 9.2.5- 2. One or more calculations (modelling tasks, PMT) are necessary to fully cover the use assessed. The number and name of the respective DGR is provided for easier reference.

Table 9.2.5- 2: FOCUS Steps 1-2 specific data for the GAPs assessed

Run IDs (DGR / PMT)	GAP group name (DGR)	Assessment name (PMT)	FOCUS crop (crop group)	Season	Crop cover
DGR I PMT I	peas	full	legumes (arable crops)	spring (Mar - May)	min crop cover
DGR II PMT II	half	half	legumes (arable crops)	spring (Mar - May)	min crop cover

The implementation of the modelling GAP at Step 3 level is shown in the following tables. Please note that PMTs at Steps 1-2 and Step 3 do not necessarily fully correspond to each other due to inherent differences in the models. A 30d window starting 3 days after emergence was used to simulate the post-emergence applications.

A summary of all Step 3 PMTs is provided in Table 9.2.5- 3. The detailed information on individual uses is given in Table 9.2.5- 4 and Table 9.2.5- 5 for use on peas at 600 g a.s./ha (DGR Peas, PMT Full) and in Table 9.2.5- 6 and Table 9.2.5- 7 for use on peas at 300 g a.s./ha (DGR Half, PMT Half).

Table 9.2.5- 3 Overview of FOCUS Step 3 assessments

Run IDs (DGR / PMT)	GAP group name (DGR)	Assessment name (PMT)	FOCUS crop (crop group)
DGR I PMT I	Peas	Full	Legumes (arable crops)
DGR II PMT II	Half	Half	Legumes (arable crops)

<u>Peas full rate 600 g a.s./ha</u>

Table 9.2.5- 4: Summarised FOCUS Step 3 application data (PAT settings)

Assessment name	Scenario	Application window used in modelling
Full	D3 Ditch D4 Pond/Stream D5 Pond/Stream D6 Ditch R1 Pond/Stream R2 Stream R3 Stream R4 Stream	18-Apr - 18-May 26-Apr - 26-May 18-Mar - 17-Apr 23-Apr - 23-May 18-Apr - 18-May 23-Apr - 23-May 24-Apr - 24-May 24-Apr - 24-May

Table 9.2.5- 5: Full FOCUS Step 3 application data

Run IDs **GAP group name (DGR)** **Assessment name (PMT)**			DGR I / PMT I Peas Full		
FOCUS model crop (crop group)			Legumes (arable crops)		
Use pattern			0.6 kg a.s./ha		
Appl. method (Run-off CAM, depth inc.)			Ground spray (2 - appln foliar linear, 4 cm)		
PAT start date (relative to crop event or absolute)			3 days after emergence		
PAT window range			30 days for all scenarios (min = 30 days)		
Drainage scenarios	**PAT start/end date (Julian day)**	**Application date**	**Runoff scenarios**	**PAT start/end date (Julian day)**	**Application date**
D3 Ditch	18-Apr/18-May (108/138)	20-Apr	R1 Pond/Stream	18-Apr/18-May (108/138)	26-Apr
D4 Pond/Stream	26-Apr/26-May (116/146)	14-May	R2 Stream	23-Apr/23-May (113/143)	23-Apr
D5 Pond/Stream	18-Mar/17-Apr (77/107)	08-Apr	R3 Stream	24-Apr/24-May (114/144)	24-Apr
D6 Ditch	23-Apr/23-May (113/143)	23-Apr	R4 Stream	24-Apr/24-May (114/144)	28-Apr

<u>Peas half rate 300 g a.s./ha</u>

Table 9.2.5- 6: Summarised FOCUS Step 3 application data (PAT settings)

Assessment name	Scenario	Application window used in modelling
Half	D3 Ditch D4 Pond/Stream D5 Pond/Stream D6 Ditch R1 Pond/Stream R2 Stream R3 Stream R4 Stream	18-Apr - 18-May 26-Apr - 26-May 18-Mar - 17-Apr 23-Apr - 23-May 18-Apr - 18-May 23-Apr - 23-May 24-Apr - 24-May 24-Apr - 24-May

Table 9.2.5- 7: Full FOCUS Step 3 application data

Run IDs **GAP group name (DGR)** **Assessment name (PMT)**	DGR II / PMT II Half Half
FOCUS model crop (crop group)	Legumes (arable crops)
Use pattern	0.3 kg a.s./ha
Appl. method (Run-off CAM, depth inc.)	Ground spray (2 - appln foliar linear, 4 cm)
PAT start date (relative to crop event or absolute)	3 days after emergence
PAT window range	30 days for all scenarios (min = 30 days)

Drainage scenarios	PAT start/end date (Julian day)	Application date	Runoff scenarios	PAT start/end date (Julian day)	Application date
D3 Ditch	18-Apr/18-May (108/138)	20-Apr	R1 Pond/Stream	18-Apr/18-May (108/138)	26-Apr
D4 Pond/Stream	26-Apr/26-May (116/146)	14-May	R2 Stream	23-Apr/23-May (113/143)	23-Apr
D5 Pond/Stream	18-Mar/17-Apr (77/107)	08-Apr	R3 Stream	24-Apr/24-May (114/144)	24-Apr
D6 Ditch	23-Apr/23-May (113/143)	23-Apr	R4 Stream	24-Apr/24-May (114/144)	28-Apr

Standard procedures and settings were used for Step 1-2 and Step 3 assessments. At Step 4 the following mitigation settings were used (see Table 9.2.5- 8 and Table 9.2.5- 9).

Table 9.2.5- 8: Mitigation approaches used

Buffer length	Mitigation type	Drift reduction nozzles
0 m 5 m 10 m 15 m 20 m	Spray drift Spray drift Spray drift & RunOff Spray drift & RunOff Spray drift & RunOff	0 %, 50 %, 75 %, 90 %

Table 9.2.5- 9: Runoff mitigation parameters used for the assessment

Fractional reduction in:		10 m, 15 m	20 m
Runoff:	**Volume**	0.60	0.80
	Flux	0.60	0.80
Erosion:	**Mass**	0.85	0.95
	Flux	0.85	0.95

Substance related parameters used for aclonifen in the calculations at FOCUS SW Steps 1-2 level are summarised in Table 9.2.5- 10 and at Step 3/4 level in Table 9.2.5- 11.

Table 9.2.5- 10: Substance parameters used at FOCUS Steps 1-2 level

Parameter	Unit	Aclonifen
Molar mass	(g/mol)	264.7
Water solubility	(mg/L)	1.4

Koc	(mL/g)	5727
Degradation DT_{50}		
Soil	(days)	79.1
Total system	(days)	14.4
Water	(days)	14.4
Sediment	(days)	14.4
Max occurrence		
Water / sediment	(%)	100
Soil	(%)	100

Table 9.2.5- 11: Substance parameters used for aclonifen at Step 3/4 level

Parameter	**Unit**	**Parent**
Substance		Aclonifen
SWASH code		ACL
General		
Molar mass	(g/mol)	264.7
Water solubility (temp.)	(mg/L)	1.4 (20 °C)
Vapour pressure (temp.)	(Pa)	1.6E-05 (20 °C)
Crop processes		
Coefficient for uptake by plant (TSCF)	(-)	0
Wash-off factor	(1/m)	50
Sorption		
K_{OC}	(mL/g)	5727.13
K_{OM}	(mL/g)	3322
Freundlich exponent ($^1/_n$)	(-)	0.88
Transformation		
DT_{50} in soil	(days)	79.1
temperature	(°C)	20
moisture content (pF)	(log(cm))	2
formation fraction in soil	(-)	-
DT_{50} in water	(days)	1000
temperature	(°C)	20
formation fraction in water	(-)	-
DT_{50} in sediment	(days)	14.4
temperature	(°C)	20
formation fraction in sediment	(-)	-
DT50 on canopy	(days)	10
Exponent for the effect of moisture		
PRZM and TOXSWA (Walker exp.)	(-)	0.7
MACRO (calibrated value)	(-)	0.49
Effect of temperature		
TOXSWA (molar activation energy)	(kJ/mol)	65.4
MACRO (effect of temperature)	(1/K)	0.0948
PRZM (Q_{10})	(-)	2.58

The PEC values were calculated for aclonifen according to the equations implemented in the "STEPS 1-2 in FOCUS" calculator (see Table 9.2.5- 12 and Table 9.2.5- 13).

Table 9.2.5- 12: FOCUS Steps 1-2 PEC_{sw} and PEC_{sed} for aclonifen, GAP group name peas, assessment name full (DGR I / PMT I)

Scenario FOCUS	Waterbody	Max PEC_{sw} (µg/L)*	Dominant entry route	7d-$PEC_{sw,twa}$ (µg/L)**	Max PECsed (µg/kg)*
Step 1	-	28.7	RunOff	20.6	1326

Scenario FOCUS	Waterbody	Max PEC_{sw} (µg/L)*	Dominant entry route	7d-$PEC_{sw,twa}$ (µg/L)**	Max PECsed (µg/kg)*
Step 2					
Northern Europe	Mar. - May (Spring)	5.52 *	Erosion	2.86	220 *
Southern Europe	Mar. - May (Spring)	7.48 *	Erosion	6.16	413 *

* Single applications are marked.
** TWA interval as required by ecotox

Table 9.2.5- 13: FOCUS Steps 1-2 PEC_{sw} and PEC_{sed} for aclonifen, GAP group name half, assessment name half (DGR II / PMT II)

Scenario FOCUS	Waterbody	Max PEC_{sw} (µg/L)*	Dominant entry route	7d-$PEC_{sw,twa}$ (µg/L)**	Max PEC_{sed} (µg/kg)*
Step 1	-	14.3	RunOff	10.3	663
Step 2					
Northern Europe	Mar. - May (Spring)	2.76 *	Erosion	1.43	110 *
Southern Europe	Mar. - May (Spring)	3.74 *	Erosion	3.08	206 *

* Single applications are marked.
** TWA interval as required by ecotox

Step 3 calculations were conducted for aclonifen employing the models of the FOCUS SW suite. Reported values represent loadings *via* all relevant entry routes (see Table 9.2.5- 14 and Table 9.2.5- 15).

Table 9.2.5- 14: FOCUS Step 3 PEC_{sw} and PEC_{sed} for aclonifen, GAP group name peas, assessment name full (DGR I / PMT I)

Scenario FOCUS	Waterbody	Max PEC_{sw} (µg/L)*	Dominant entry route	7d-$PEC_{sw,twa}$ (µg/L)**	Max PEC_{sed} (µg/kg)*
Step 3					
D3	Ditch	3.12 *	Spray drift	0.448	2.18 *
D4	Pond	0.125 *	Spray drift	0.111	0.853 *
D4	Stream	2.54 *	Spray drift	0.019	0.104 *
D5	Pond	0.126 *	Spray drift	0.111	0.923 *
D5	Stream	2.60 *	Spray drift	0.013	0.073 *
D6	Ditch	3.12 *	Spray drift	0.469	2.26 *
R1	Pond	0.133 *	Spray drift	0.118	1.41 *
R1	Stream	2.16 *	Spray drift	0.085	4.00 *
R2	Stream	2.87 *	Spray drift	0.037	25.0 *
R3	Stream	3.05 *	Spray drift	0.163	2.44 *
R4	Stream	2.15 *	Spray drift	0.443	9.73 *

* Single applications are marked.
** TWA interval as required by ecotox

Table 9.2.5- 15: FOCUS Step 3 PEC_{sw} and PEC_{sed} for aclonifen, GAP group name half, assessment name half (DGR II / PMT II)

Scenario FOCUS	Waterbody	Max PEC_{sw} (µg/L)*	Dominant entry route	7d-$PEC_{sw,twa}$ (µg/L)**	Max PEC_{sed} (µg/kg)*
Step 3					
D3	Ditch	1.56 *	Spray drift	0.224	1.10 *
D4	Pond	0.063 *	Spray drift	0.056	0.435 *
D4	Stream	1.27 *	Spray drift	0.010	0.052 *
D5	Pond	0.063 *	Spray drift	0.056	0.471 *
D5	Stream	1.30 *	Spray drift	0.007	0.037 *
D6	Ditch	1.56 *	Spray drift	0.234	1.43 *
R1	Pond	0.066 *	Spray drift	0.059	0.690 *
R1	Stream	1.08 *	Spray drift	0.039	2.33 *
R2	Stream	1.43 *	Spray drift	0.018	13.5 *
R3	Stream	1.52 *	Spray drift	0.081	1.43 *
R4	Stream	1.08 *	Spray drift	0.205	5.13 *

* Single applications are marked.
** TWA interval as required by ecotox.

FOCUS Step 4 calculations considering various mitigation measures for runoff and spray drift were conducted based on the Step 3 results (see Table 9.2.5- 16 and Table 9.2.5- 17 for PEC_{sw} values and Table 9.2.5- 18 and Table 9.2.5- 19 for PEC_{sed} values).

Predicted environmental concentrations in surface water (PEC_{SW})

Table 9.2.5- 16: FOCUS Step 4 PECsw results for aclonifen, GAP group name peas, assessment name full (DGR I / PMT I)

PEC_{sw} (µg/L)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
None	D3 Ditch	3.12	1.02	0.541	0.369	0.281	0.541	0.369	0.281
50 %		1.56	0.510	0.270	0.185	0.140	0.270	0.185	0.140
75 %		0.778	0.255	0.135	0.092	0.070	0.135	0.092	0.070
90 %		0.311	0.102	0.054	0.037	0.028	0.054	0.037	0.028
None	D4 Pond	0.125	0.112	0.081	0.064	0.054	0.081	0.064	0.054
50 %		0.063	0.056	0.040	0.032	0.027	0.040	0.032	0.027
75 %		0.031	0.028	0.020	0.016	0.013	0.020	0.016	0.013
90 %		0.013	0.011	0.008	0.007	0.007	0.008	0.007	0.007
None	D4 Stream	2.54	1.07	0.565	0.386	0.294	0.565	0.386	0.294
50 %		1.27	0.533	0.282	0.193	0.147	0.282	0.193	0.147
75 %		0.633	0.266	0.141	0.096	0.073	0.141	0.096	0.073
90 %		0.253	0.106	0.056	0.051	0.051	0.056	0.051	0.051
None	D5 Pond	0.126	0.112	0.081	0.064	0.054	0.081	0.064	0.054
50 %		0.063	0.056	0.040	0.032	0.027	0.040	0.032	0.027

PEC_{sw} (µg/L)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
75 %		0.031	0.028	0.020	0.016	0.014	0.020	0.016	0.014
90 %		0.013	0.011	0.008	0.006	0.005	0.008	0.006	0.005
None	D5 Stream	2.60	1.09	0.578	0.395	0.300	0.578	0.395	0.300
50 %		1.30	0.545	0.289	0.197	0.150	0.289	0.197	0.150
75 %		0.648	0.272	0.144	0.099	0.075	0.144	0.099	0.075
90 %		0.259	0.109	0.058	0.039	0.030	0.058	0.039	0.030
None	D6 Ditch	3.12	1.02	0.541	0.370	0.281	0.541	0.370	0.281
50 %		1.56	0.510	0.270	0.185	0.140	0.270	0.185	0.140
75 %		0.779	0.255	0.135	0.092	0.070	0.135	0.092	0.070
90 %		0.311	0.102	0.054	0.043	0.043	0.054	0.043	0.043
None	R1 Pond	0.133	0.119	0.088	0.079	0.079	0.083	0.067	0.055
50 %		0.079	0.079	0.079	0.079	0.079	0.043	0.035	0.028
75 %		0.079	0.079	0.079	0.079	0.079	0.032	0.032	0.016
90 %		0.079	0.079	0.079	0.079	0.079	0.032	0.032	0.016
None	R1 Stream	2.16	0.907	0.707	0.707	0.707	0.481	0.328	0.250
50 %		1.08	0.707	0.707	0.707	0.707	0.318	0.318	0.166
75 %		0.707	0.707	0.707	0.707	0.707	0.318	0.318	0.166
90 %		0.707	0.707	0.707	0.707	0.707	0.318	0.318	0.166
None	R2 Stream	2.87	1.21	0.639	0.436	0.332	0.639	0.436	0.332
50 %		1.43	0.602	0.319	0.218	0.186	0.319	0.218	0.166
75 %		0.715	0.301	0.186	0.186	0.186	0.159	0.109	0.083
90 %		0.286	0.186	0.186	0.186	0.186	0.085	0.085	0.044
None	R3 Stream	3.05	1.28	0.680	0.502	0.502	0.680	0.464	0.353
50 %		1.52	0.641	0.502	0.502	0.502	0.340	0.232	0.176
75 %		0.761	0.502	0.502	0.502	0.502	0.229	0.229	0.120
90 %		0.502	0.502	0.502	0.502	0.502	0.229	0.229	0.120
None	R4 Stream	2.15	1.16	1.16	1.16	1.16	0.516	0.516	0.268
50 %		1.16	1.16	1.16	1.16	1.16	0.516	0.516	0.268
75 %		1.16	1.16	1.16	1.16	1.16	0.516	0.516	0.268
90 %		1.16	1.16	1.16	1.16	1.16	0.516	0.516	0.268

Table 9.2.5- 17: FOCUS Step 4 PECsw results for aclonifen, GAP group name half, assessment name half (DGR II / PMT II)

PEC$_{sw}$ (µg/L)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
None	D3 Ditch	1.56	0.510	0.270	0.184	0.140	0.270	0.184	0.140
50 %		0.778	0.255	0.135	0.092	0.070	0.135	0.092	0.070
75 %		0.389	0.127	0.067	0.046	0.035	0.067	0.046	0.035
90 %		0.155	0.051	0.027	0.018	0.014	0.027	0.018	0.014
None	D4 Pond	0.063	0.056	0.040	0.032	0.027	0.040	0.032	0.027
50 %		0.031	0.028	0.020	0.016	0.013	0.020	0.016	0.013
75 %		0.016	0.014	0.010	0.008	0.007	0.010	0.008	0.007
-		0.006	0.006	0.004	0.003	0.003	0.004	0.003	0.003
None	D4 Stream	1.27	0.533	0.282	0.193	0.147	0.282	0.193	0.147
50 %		0.633	0.266	0.141	0.096	0.073	0.141	0.096	0.073
75 %		0.316	0.133	0.071	0.048	0.037	0.071	0.048	0.037
90 %		0.126	0.053	0.028	0.021	0.021	0.028	0.021	0.021
None	D5 Pond	0.063	0.056	0.040	0.032	0.027	0.040	0.032	0.027
50 %		0.031	0.028	0.020	0.016	0.013	0.020	0.016	0.013
75 %		0.016	0.014	0.010	0.008	0.007	0.010	0.008	0.007
90 %		0.006	0.006	0.004	0.003	0.003	0.004	0.003	0.003
None	D5 Stream	1.30	0.545	0.289	0.197	0.150	0.289	0.197	0.150
50 %		0.648	0.272	0.144	0.099	0.075	0.144	0.099	0.075
75 %		0.324	0.136	0.072	0.049	0.037	0.072	0.049	0.037
90 %		0.129	0.054	0.029	0.020	0.015	0.029	0.020	0.015
None	D6 Ditch	1.56	0.510	0.270	0.185	0.140	0.270	0.185	0.140
50 %		0.779	0.255	0.135	0.092	0.070	0.135	0.092	0.070
75 %		0.389	0.127	0.068	0.046	0.035	0.068	0.046	0.035
90 %		0.155	0.051	0.027	0.018	0.017	0.027	0.018	0.017
None	R1 Pond	0.066	0.059	0.044	0.037	0.037	0.042	0.033	0.028
50 %		0.037	0.037	0.037	0.037	0.037	0.021	0.017	0.014
75 %		0.037	0.037	0.037	0.037	0.037	0.015	0.015	0.008
90 %		0.037	0.037	0.037	0.037	0.037	0.015	0.015	0.008
None	R1 Stream	1.08	0.453	0.326	0.326	0.326	0.240	0.164	0.125
50 %		0.538	0.326	0.326	0.326	0.326	0.146	0.146	0.076
75 %		0.326	0.326	0.326	0.326	0.326	0.146	0.146	0.076
90 %		0.326	0.326	0.326	0.326	0.326	0.146	0.146	0.076
None	R2 Stream	1.43	0.602	0.319	0.218	0.166	0.319	0.218	0.166
50 %		0.715	0.301	0.159	0.109	0.085	0.159	0.109	0.083
75 %		0.357	0.150	0.085	0.085	0.085	0.080	0.054	0.041

PEC$_{sw}$ (µg/L)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
90 %		0.143	0.085	0.085	0.085	0.085	0.039	0.039	0.020
None	R3 Stream	1.52	0.641	0.340	0.232	0.231	0.340	0.232	0.176
50 %		0.761	0.320	0.231	0.231	0.231	0.170	0.116	0.088
75 %		0.380	0.231	0.231	0.231	0.231	0.105	0.105	0.055
90 %		0.231	0.231	0.231	0.231	0.231	0.105	0.105	0.055
None	R4 Stream	1.08	0.531	0.531	0.531	0.531	0.240	0.237	0.124
50 %		0.537	0.531	0.531	0.531	0.531	0.237	0.237	0.123
75 %		0.531	0.531	0.531	0.531	0.531	0.237	0.237	0.123
90 %		0.531	0.531	0.531	0.531	0.531	0.237	0.237	0.123

Predicted environmental concentrations in sediment (PEC$_{SED}$)

Table 9.2.5- 18: FOCUS Step 4 PECsed results for aclonifen, GAP group name peas, assessment name full (DGR I / PMT I)

PEC$_{sed}$ (µg/kg)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
None	D3 Ditch	2.18	0.719	0.383	0.262	0.199	0.383	0.262	0.199
50 %		1.10	0.361	0.192	0.131	0.100	0.192	0.131	0.100
75 %		0.550	0.181	0.096	0.066	0.050	0.096	0.066	0.050
90 %		0.221	0.073	0.039	0.026	0.020	0.039	0.026	0.020
None	D4 Pond	0.853	0.764	0.555	0.445	0.375	0.555	0.445	0.375
50 %		0.435	0.390	0.283	0.227	0.191	0.283	0.227	0.191
75 %		0.222	0.198	0.144	0.115	0.097	0.144	0.115	0.097
90 %		0.091	0.081	0.068	0.067	0.067	0.068	0.067	0.067
None	D4 Stream	0.104	0.044	0.033	0.033	0.033	0.033	0.033	0.033
50 %		0.052	0.033	0.033	0.033	0.033	0.033	0.033	0.033
75 %		0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
90 %		0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
None	D5 Pond	0.923	0.827	0.601	0.482	0.406	0.601	0.482	0.406
50 %		0.471	0.422	0.307	0.246	0.208	0.307	0.246	0.208
75 %		0.241	0.216	0.157	0.126	0.106	0.157	0.126	0.106
90 %		0.099	0.089	0.065	0.053	0.044	0.065	0.053	0.044
None	D5 Stream	0.073	0.031	0.016	0.011	0.009	0.016	0.011	0.009
50 %		0.037	0.015	0.008	0.006	0.004	0.008	0.006	0.004

PEC$_{sed}$ (µg/kg)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
75 %		0.018	0.008	0.004	0.003	0.002	0.004	0.003	0.002
90 %		0.007	0.003	0.002	0.001	0.001	0.002	0.001	0.001
None	D6 Ditch	2.26	0.744	0.396	0.271	0.206	0.396	0.271	0.206
50 %		1.13	0.374	0.199	0.136	0.104	0.199	0.136	0.104
75 %		0.569	0.187	0.100	0.068	0.052	0.100	0.068	0.052
90 %		0.228	0.075	0.040	0.028	0.021	0.040	0.028	0.021
None	R1 Pond	1.41	1.40	1.40	1.39	1.39	0.664	0.567	0.429
50 %		1.39	1.39	1.39	1.38	1.38	0.561	0.559	0.287
75 %		1.38	1.38	1.38	1.38	1.38	0.556	0.556	0.284
90 %		1.38	1.38	1.38	1.38	1.38	0.554	0.553	0.282
None	R1 Stream	4.00	4.00	4.00	4.00	4.00	0.739	0.734	0.302
50 %		4.00	4.00	4.00	4.00	4.00	0.731	0.728	0.298
75 %		4.00	4.00	4.00	4.00	4.00	0.727	0.725	0.295
90 %		4.00	4.00	4.00	4.00	4.00	0.724	0.724	0.294
None	R2 Stream	25.0	25.0	25.0	25.0	25.0	3.80	3.80	1.28
50 %		25.0	25.0	25.0	25.0	25.0	3.80	3.80	1.28
75 %		25.0	25.0	25.0	25.0	25.0	3.80	3.80	1.28
90 %		25.0	25.0	25.0	25.0	25.0	3.80	3.80	1.28
None	R3 Stream	2.44	2.44	2.44	2.44	2.44	0.392	0.392	0.160
50 %		2.44	2.44	2.44	2.44	2.44	0.392	0.392	0.156
75 %		2.44	2.44	2.44	2.44	2.44	0.392	0.392	0.155
90 %		2.44	2.44	2.44	2.44	2.44	0.392	0.392	0.153
None	R4 Stream	9.73	9.68	9.66	9.65	9.65	2.17	2.16	0.927
50 %		9.68	9.66	9.65	9.65	9.64	2.15	2.15	0.922
75 %		9.66	9.65	9.64	9.64	9.64	2.15	2.15	0.919
90 %		9.65	9.64	9.64	9.64	9.64	2.15	2.15	0.917

Table 9.2.5- 19: FOCUS Step 4 PECsed results for aclonifen, GAP group name half, assessment name half (DGR II / PMT II)

PEC$_{sed}$ (µg/kg)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
None	D3 Ditch	1.10	0.361	0.192	0.131	0.100	0.192	0.131	0.100
50 %		0.550	0.181	0.096	0.066	0.050	0.096	0.066	0.050

PEC$_{sed}$ (µg/kg)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
75 %		0.276	0.091	0.048	0.033	0.025	0.048	0.033	0.025
90 %		0.111	0.036	0.019	0.013	0.010	0.019	0.013	0.010
None	D4 Pond	0.435	0.390	0.283	0.227	0.191	0.283	0.227	0.191
50 %		0.222	0.198	0.144	0.115	0.097	0.144	0.115	0.097
75 %		0.113	0.101	0.073	0.059	0.049	0.073	0.059	0.049
90 %		0.046	0.041	0.030	0.028	0.028	0.030	0.028	0.028
None	D4 Stream	0.052	0.022	0.013	0.013	0.013	0.013	0.013	0.013
50 %		0.026	0.013	0.013	0.013	0.013	0.013	0.013	0.013
75 %		0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
90 %		0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
None	D5 Pond	0.471	0.422	0.306	0.246	0.207	0.306	0.246	0.207
50 %		0.240	0.215	0.156	0.125	0.105	0.156	0.125	0.105
75 %		0.122	0.110	0.080	0.064	0.054	0.080	0.064	0.054
90 %		0.050	0.045	0.033	0.027	0.022	0.033	0.027	0.022
None	D5 Stream	0.037	0.015	0.008	0.006	0.004	0.008	0.006	0.004
50 %		0.018	0.008	0.004	0.003	0.002	0.004	0.003	0.002
75 %		0.009	0.004	0.002	0.001	0.001	0.002	0.001	0.001
90 %		0.004	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
None	D6 Ditch	1.13	0.373	0.199	0.136	0.103	0.199	0.136	0.103
50 %		0.568	0.187	0.100	0.068	0.052	0.100	0.068	0.052
75 %		0.285	0.094	0.050	0.034	0.026	0.050	0.034	0.026
90 %		0.115	0.038	0.020	0.014	0.011	0.020	0.014	0.011
None	R1 Pond	0.690	0.688	0.684	0.683	0.681	0.336	0.279	0.217
50 %		0.682	0.682	0.680	0.679	0.678	0.272	0.271	0.138
75 %		0.679	0.678	0.678	0.677	0.677	0.269	0.269	0.137
90 %		0.677	0.677	0.676	0.676	0.676	0.268	0.268	0.136
None	R1 Stream	2.33	2.33	2.33	2.33	2.33	0.383	0.383	0.151
50 %		2.33	2.33	2.33	2.33	2.33	0.383	0.383	0.148
75 %		2.33	2.33	2.33	2.33	2.33	0.383	0.383	0.147
90 %		2.33	2.33	2.33	2.33	2.33	0.383	0.383	0.147
None	R2 Stream	13.5	13.5	13.5	13.5	13.5	2.06	2.06	0.692
50 %		13.5	13.5	13.5	13.5	13.5	2.06	2.06	0.692
75 %		13.5	13.5	13.5	13.5	13.5	2.06	2.06	0.692
90 %		13.5	13.5	13.5	13.5	13.5	2.06	2.06	0.692
None	R3 Stream	1.43	1.43	1.43	1.43	1.43	0.227	0.227	0.079
50 %		1.43	1.43	1.43	1.43	1.43	0.227	0.227	0.079
75 %		1.43	1.43	1.43	1.43	1.43	0.227	0.227	0.079

PEC$_{sed}$ (µg/kg)	Scenario	Step 4 Aclonifen							
Nozzle reduction	Vegetated strip (m)	None	None	None	None	None	10 m	10 m	20 m
	No spray buffer (m)	0 m	5 m	10 m	15 m	20 m	10 m	15 m	20 m
90 %		1.43	1.43	1.43	1.43	1.43	0.227	0.227	0.079
None	R4 Stream	5.13	5.10	5.09	5.09	5.09	1.10	1.10	0.463
50 %		5.10	5.09	5.09	5.08	5.08	1.10	1.09	0.460
75 %		5.09	5.09	5.08	5.08	5.08	1.09	1.09	0.459
90 %		5.09	5.08	5.08	5.08	5.08	1.09	1.09	0.458

CP 9.3 Fate and behaviour in air

CP 9.3.1 Route and rate of degradation in air and transport via air

The fate and behaviour in air of aclonifen were evaluated during the original EU review (**EFSA Scientific Report 2008; 149, 1-80**). Aclonifen has a low vapour pressure (1.6 x 10^{-5} Pa at 20°C) and Henry's law constant (3.03 x 10^{-3} Pa·m^3·mol^{-1} at 20°C); therefore volatilisation from soil or water is unlikely to constitute a relevant route for its environmental fate.

Table 9.3.1- 1: Fate and behaviour in air (aclonifen; EFSA Scientific Report 2008; 149, 1-80)

Parameter	Aclonifen
Henry's Law Constant (at 25°C) [Pa m^3/mol]	3.03 x 10^{-3} Pa·m^3·mol^{-1} at 20°C
Quantum yield of direct phototransformation Σ > 290nm [mole/Einstein]	5.19 x 10^{-6}
Vapour pressure (at 20°C) [Pa]	1.6 x 10^{-5}
Photochemical oxidative degradation in air	DT$_{50}$: 30.234 hours (Atkinson method)

For further information on route and rate of degradation in air and transport via air please refer to Document MCA, Sections 7.3.1 and 7.3.2.

CP 9.4 Estimation of concentrations for other routes of exposure

There are no other routes of exposure if the product is used according to good agricultural practice. Therefore no further estimations are considered necessary.