Tier 2 Summary of the Fate and Behaviour in the Environment of the Plant Protection Product Sivanto (BYI 02960, Flupyradifurone) SL 200

Specification number
102000021884

Data Requirements
Regulation (EC) No 1107/2009
Annex IIIA, Section 5, Point 9

Document M

According to OECD format guidance for industry data submissions on plant protection products and their active substances

Date
2012-04-03

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PECgw for BYI 02960

III A1 9.6.2 Relevant metabolites, degradation and reaction products PECgw values

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PECsw for BYI 02960

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III A1 9.8.2 Initial PECsw value for slow moving water bodies

III A1 9.8.3 Short-term PECsw values for static water bodies

III A1 9.8.4 Short-term PECsw values for slow moving water bodies

III A1 9.8.5 Long-term PECsw values for static water bodies

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III A1 9.10.2 Other/special studies - field studies
IIIA1 9  Fate and Behaviour in the Environment of the Plant Protection Product

In this chapter, estimates of Predicted Environmental Concentrations (PECs) of the insecticide BYI 02960 (Flupyradifurone) and the major metabolites are given. All relevant data concerning the behaviour of the active ingredient in the environment have been summarized in Section 5, Point 7 of the respective Annex IIA dossier. The data are summarized also briefly for the various compartments of the environment in this document.

The PECs were determined for representative uses of the formulation on hops and lettuce in the EU.

The formulating agent would not be expected to influence the environmental behaviour of an active substance (except in special formulation types such as slow release formulations). The effects of the formulating agents are limited to short term processes such as the formation of stable spray dispersions, sprayability and permeation into target organisms, while the impact on long term processes such as degradation and distribution is negligible. As this formulation does not fall into the slow release formulation category the results of environmental fate studies performed with the active substance are thus valid also for the formulation.

Authors of study reports sometimes used different names or short codes for the active ingredient and its transformation products. In this summary, single names are always used for the active substance BYI 02960 and its metabolites and degradates DFA, 6-CNA, BYI 02960 succinamide and BYI 02960 azabicyclusuccinamide.

The chemical structures of the metabolites and report names are given in the List of Metabolites which is an attachment to Document N. A list containing the metabolites identified in environmental matrices only and addressed in exposure assessments included at the end of this document.

**Intended application pattern**

The formulation is intended for use as an insecticide for hops and lettuce. The intended representative uses pattern for this formulation are summarised as follows:

**Table 9-1  Intended use pattern**

<table>
<thead>
<tr>
<th>Crop</th>
<th>F or G*</th>
<th>Timing of application (BBCH)</th>
<th>Maximum number of applications</th>
<th>Application interval [days]</th>
<th>Maximum dose rate formulation [L/ha]</th>
<th>Maximum application rate, individual treatment [g BYI 02960/ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hops</td>
<td>F</td>
<td>31 - 75</td>
<td>1</td>
<td>-</td>
<td>0.75</td>
<td>150</td>
</tr>
<tr>
<td>Lettuce</td>
<td>G</td>
<td>12 - 49</td>
<td>1</td>
<td>10</td>
<td>0.625</td>
<td>125</td>
</tr>
</tbody>
</table>

* F = Field use; G = Glasshouse use

IIIA1 9.1  Rate of degradation in soil

Specific studies on the preparation have not been performed. The results of laboratory studies performed with the active substance as provided in Annex IIA in the context of Section 5, Point 7 are also applicable for the preparation.
III A1 9.1.1 Aerobic degradation of the preparation in soil

Investigations into the fate and behaviour of BYI 02960 in the environment have been performed in a comprehensive series of laboratory studies and additionally in field studies. Laboratory studies were conducted with \(^{14}\text{C}\)-radiolabeled active substance with labelling in four positions to elucidate the complete metabolic pathway in soil.

Route of degradation in soil

The route of degradation of BYI 02960 in soil has been determined in European and American soils with four different label positions under standard laboratory conditions at 20°C for 120 days. Under aerobic conditions two major metabolites were observed, DFA (maximum 33.9%) and 6-CNA (maximum 17.1%) and two very minor metabolites. In all label positions there was significant mineralization to \(^{14}\text{CO}_2\) (maximum ca. 59%) with relatively low formation of non-extractable residues (max. ca. 34%). The results indicate that BYI 02960 is readily degraded in aerobic soil by microbial activity.

Under anaerobic soil conditions BYI 02960 was stable and it was concluded that photolysis on the soil surface would not be a significant route of degradation. The proposed degradation pathway in soil is given in Figure 9.1-1.

Figure 9.1.1-1: Proposed Degradation Pathway for BYI 02960 in soil

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Rate of degradation in soil

Summaries of the European trigger endpoints in soil are given in the Table 9.1.1-1 for BYI 02960 and in Table 9.1.1-2 for the major metabolites. For BYI 02960, the DT$_{50}$ values ranged from 33 to 120 days in the European soils and from 56 days to 242 days in the American soils.

Table 9.1.1-1: Trigger “best-fit” DT$_{50}$ values for BYI 02960

<table>
<thead>
<tr>
<th>Soil</th>
<th>Label</th>
<th>Model</th>
<th>DT$_{50}$ [days]</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laacher Hof, AXXa (AX)</td>
<td>PYM</td>
<td>DFOP</td>
<td>63.4</td>
<td>KIIA 7.2.1/01</td>
</tr>
<tr>
<td></td>
<td>FUR</td>
<td>DFOP</td>
<td>62.4</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td></td>
<td>ETH</td>
<td>DFOP</td>
<td>52.4</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td>Hoechsen am Hohenseh (HF)</td>
<td>PYM</td>
<td>DFOP</td>
<td>52.4</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td></td>
<td>FUR</td>
<td>DFOP</td>
<td>52.4</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td></td>
<td>ETH</td>
<td>DFOP</td>
<td>34.1</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td></td>
<td>PYR</td>
<td>DFOP</td>
<td>32.8</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td>Hanscheiderhof, Plot 611 (HN)</td>
<td>PYM</td>
<td>DFOP</td>
<td>420.0</td>
<td>KIIA 7.2.1/01</td>
</tr>
<tr>
<td></td>
<td>FUR</td>
<td>DFOP</td>
<td>98.3</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td>Dollendorf II (DD)</td>
<td>PYM</td>
<td>DFOP</td>
<td>56.1</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td></td>
<td>FUR</td>
<td>DFOP</td>
<td>49.3</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td></td>
<td>ETH</td>
<td>DFOP</td>
<td>35.9</td>
<td>KIIA 7.2.1/02</td>
</tr>
<tr>
<td>Springfield NE</td>
<td>FUR</td>
<td>SFO</td>
<td>228</td>
<td>KIIA 7.2.1/03</td>
</tr>
<tr>
<td></td>
<td>PYM</td>
<td>FOMC</td>
<td>242</td>
<td>KIIA 7.2.1/06</td>
</tr>
<tr>
<td>Sanger CA</td>
<td>EUR</td>
<td>DFOP</td>
<td>58.3</td>
<td>KIIA 7.2.1/03</td>
</tr>
<tr>
<td></td>
<td>PYM</td>
<td>FOMC</td>
<td>56.3</td>
<td>KIIA 7.2.1/06</td>
</tr>
<tr>
<td>Overall mean</td>
<td></td>
<td></td>
<td>73 days</td>
<td></td>
</tr>
</tbody>
</table>
Table 9.1.1-2: Trigger “best-fit” DT$_{50}$ values for BYI 02960 metabolites

<table>
<thead>
<tr>
<th>Metabolite</th>
<th>Soil</th>
<th>Model</th>
<th>DT$_{50}$</th>
<th>Reference</th>
</tr>
</thead>
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<tr>
<td>DFA</td>
<td>Dollendorf II</td>
<td>SFO</td>
<td>44.9</td>
<td>KIIA 7.2.3/05 M-422874-01-1</td>
</tr>
<tr>
<td></td>
<td>Laacher Hof AXxa</td>
<td>SFO</td>
<td>73.6</td>
<td>KIIA 7.2.3/05 M-422874-01-1</td>
</tr>
<tr>
<td></td>
<td>Hoechsen am Hohenseh 4a</td>
<td>SFO</td>
<td>67.4</td>
<td>KIIA 7.2.3/05 M-422874-01-1</td>
</tr>
<tr>
<td>6-CNA</td>
<td>Aldham’s Farm</td>
<td>SFO</td>
<td>2.9</td>
<td>KIIA 7.2.3/02 M-428523-03-1</td>
</tr>
<tr>
<td></td>
<td>Flint Hall Farm</td>
<td>SFO</td>
<td>2.2</td>
<td>KIIA 7.2.3/02 M-428523-03-1</td>
</tr>
<tr>
<td></td>
<td>Boarded Barns Farm</td>
<td>SFO</td>
<td>3.1</td>
<td>KIIA 7.2.3/02 M-428523-03-1</td>
</tr>
<tr>
<td></td>
<td>Hoechsen am Hohenseh 4a</td>
<td>SFO</td>
<td>3.1</td>
<td>KIIA 7.2.3/02 M-428523-03-1</td>
</tr>
<tr>
<td></td>
<td>Sanger</td>
<td>SFO</td>
<td>3.1</td>
<td>KIIA 7.2.3/02 M-428523-03-1</td>
</tr>
</tbody>
</table>

IIIA1 9.1.2 Anaerobic degradation of the preparation in soil

The anaerobic soil studies showed that the amounts of BYI 02960 remain stable under flooded anaerobic conditions in soil. Degradation would be expected to continue according to the proposed kinetics of degradation of BYI 02960 when aerobic conditions were re-established. No anaerobic metabolites were detected.

IIIA1 9.2 Field studies

IIIA1 9.2.1 Soil dissipation testing on a range of representative soils

The dissipation of BYI 02960 under field conditions has been studied at 6 sites in Europe. The study, performed with the representative formulation BYI 02960 SL 200, was described in the Annex IIA, of Section 5, Point 7.3.1. A brief overview of the results is presented in the Annex III document. Based on the results of the dissipation study it can be concluded that BYI 02960 shows biphasic degradation behaviour under field conditions. BYI 02960 residues remained in the upper 0-20 cm soil layer, small amounts below the LOQ could be detected to a maximum depth of 30 cm. At study completion, i.e. 540 days post-application, the remaining BYI 02960 residues in soil corresponded to between 2.9 to 29.8% of the applied amount. The calculated DT$_{50}$ of BYI 02960 ranged between 8.3 and 251 days.

In general the field dissipation behaviour observed for BYI 02960 residues, i.e. for BYI 02960 and its main soil metabolite DFA, was comparable to that found within the standardized laboratory studies.
Table 9.2.1- 1: Dissipation DT50 values of BYI 02960 under field conditions

<table>
<thead>
<tr>
<th>Location and Trial No.</th>
<th>BYI 02960</th>
<th>DT50 [d]</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monheim, Germany 09-2702-01</td>
<td>DFOP</td>
<td>41.0</td>
<td>KIIA 7.3.1/01 M-414245-01-1</td>
</tr>
<tr>
<td>Great Chishill, United Kingdom 09-2702-02</td>
<td>DFOP</td>
<td>251</td>
<td>KIIA 7.3.1/01 M-414245-01-1</td>
</tr>
<tr>
<td>Burscheid, Germany 09-2702-03</td>
<td>DFOP</td>
<td>42.5</td>
<td>KIIA 7.3.1/01 M-414245-01-1</td>
</tr>
<tr>
<td>Albaro, Italy 09-2702-05</td>
<td>DFOP</td>
<td>22.0</td>
<td>KIIA 7.3.1/01 M-414245-01-1</td>
</tr>
<tr>
<td>Vilobi d’Onyar, Spain 09-2702-06</td>
<td>DFOP</td>
<td>80.0</td>
<td>KIIA 7.3.1/01 M-414245-01-1</td>
</tr>
<tr>
<td>Hanscheider Hof, Germany 09-2702-07</td>
<td>DFOP</td>
<td>5.5</td>
<td>KIIA 7.3.1/01 M-414245-01-1</td>
</tr>
</tbody>
</table>

IIIA1 9.2.2 Soil residue testing
Not required under regulation (EC) 1107/2009.

IIIA1 9.2.3 Soil accumulation testing
No study has been performed as the potential accumulation can be determined from the existing studies and calculated accumulation plateaus are summarized in the soil PEC calculations under point IIIA1 9.4.

IIIA1 9.2.4 Aquatic (sediment) field dissipation

IIIA1 9.2.5 Forestry field dissipation

IIIA1 9.3 Mobility of the plant protection product in soil
Specific studies on the mobility of the formulation BYI 02960 SL200 G have not been performed; data generated for the active substance and major metabolites is also valid for the formulation. All studies are summarized in KIIA Section 5 and only a brief outline of the results is presented below.

For BYI 02960 in standard batch equilibrium studies on 6 soils the adsorption Koc ranged from 74.9 to 132.2 mL/g, desorption Kdoc were higher indicating significant stronger sorption. In time dependent sorption studies the sorption of BYI 02960 was shown to increase over time with an ageing factor of 2.4 to 4.4.

The Koc of the major metabolite 6-CNA was determined in four soils (excluding one soil with very low organic carbon content and the sediment) ranged from 70 to 129 indicating medium mobility. The Koc ads for the metabolite DFA determined in five soils ranged from 1.7 to 9.5 indicating high mobility in soil.
IIIA 9.3.1 Column leaching

IIIA 9.3.2 Lysimeter studies
As the concentration in groundwater can be predicted by environmental modelling lysimeter studies have not been performed and are not required.

IIIA 9.3.3 Field leaching studies
As the concentration in groundwater can be predicted by environmental modelling field leaching studies have not been performed and are not required.

IIIA 9.3.4 Volatility - laboratory studies
Volatility studies for the formulation have not been performed and are not required under Regulation (EC) 1107/2009.

IIIA 9.3.5 Volatility - field studies

IIIA 9.4 Predicted environmental concentrations in soil, active substance

PEC_{soil} modelling approach
Calculations were based on a simple first tier approach (Excel sheet) assuming even distribution of the compound in upper 0-5 cm soil layer. A standard soil density of 1.5 g/cm$^3$ was assumed.
Crop interception data which correspond to the intended growth stages were taken from the FOCUS groundwater guidance paper (FOCUS 2010). 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. The interception rates follow the recommendations of the FOCUS groundwater guidance paper (FOCUS 2010) provided in Table 9.6-1. As hop and lettuce have not been defined in the FOCUS groundwater guidance paper, vines and cabbage were chosen as surrogate crops. As there is currently no guidance on calculation of PEC_{soil} for greenhouse crops no specific calculation was performed and it is assumed that the glasshouse use is covered by the outdoor use on lettuce.

PEC_{soil} for BYI 02960

<table>
<thead>
<tr>
<th>Report:</th>
<th>KIIIA 9.4/01, F6</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title:</td>
<td>FPF PEC_{soil} EU: Predicted environmental concentrations in soil (PEC_{soil}) of Flupyradifurone and its metabolites – use in hops and lettuce in Europe</td>
<td></td>
</tr>
<tr>
<td>Report no/</td>
<td>EnSa-12-0117</td>
<td></td>
</tr>
<tr>
<td>Document No:</td>
<td>M-428042-01-1</td>
<td></td>
</tr>
<tr>
<td>GLP:</td>
<td>No (calculation)</td>
<td></td>
</tr>
</tbody>
</table>
Methods and Materials: The predicted environmental concentrations in soil (PEC_{soil}) of BYI 02960 were estimated using a simple first tier approach (Excel sheet). Detailed application data used for simulation of PEC_{soil} are compiled in Table 9.4-1.

Substance Specific Parameters: PEC_{soil} calculations were based on the DT_{50} of 0.2 days for the fast and 462 days for the slowly degrading compartments (DFOP, worst case of field dissipation studies).

Table 9.4-1: Application pattern used for PEC_{soil} calculations of BYI 02960

<table>
<thead>
<tr>
<th>Individual Crop</th>
<th>FOCUS Crop Used for Interception</th>
<th>Rate per Season [g a.s./ha]</th>
<th>Application Interval [days]</th>
<th>Plant Interception [%]</th>
<th>BBCH Stage</th>
<th>Amount Reaching the Soil per Season application [g a.s./ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hops, GAP – identical with simulation</td>
<td>Vines</td>
<td>1 x 150</td>
<td>-</td>
<td>30</td>
<td>31,75</td>
<td>1 x 150</td>
</tr>
<tr>
<td>Lettuce (F), GAP – identical with simulation(^1)</td>
<td>Cabbage</td>
<td>1 x 125</td>
<td>-</td>
<td>60</td>
<td>12,49</td>
<td>1 x 94</td>
</tr>
</tbody>
</table>

\(^1\) First or second cropping per year
F = field use

To account for potential accumulation of BYI 02960 in soil (worst case non-normalised DFOP DT_{90} > 365 days), long-term soil concentrations were calculated.

Findings: The PEC_{soil} and the time weighted average values (TWA_{soil}) of BYI 02960 are summarised in Table 9.4-2 for hops and in Table 9.4-3 for lettuce.

Table 9.4-2: PEC_{soil} (actual) and TWA of BYI 02960 in hops in the upper 5 cm, DFOP decay

<table>
<thead>
<tr>
<th>Time [days]</th>
<th>PEC_{soil} [mg/kg]</th>
<th>TWA_{soil} [mg/kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>0</td>
<td>0.080</td>
</tr>
<tr>
<td>Short term</td>
<td>1</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>0.058</td>
</tr>
<tr>
<td>Long term</td>
<td>14</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>0.057</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>0.056</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>0.054</td>
</tr>
<tr>
<td></td>
<td>200</td>
<td>0.050</td>
</tr>
</tbody>
</table>
Table 9.4-3: PEC_{soil} (actual) and TWA of BYI 02960 in lettuce in the upper 5 cm, DFOP decay (1st or 2nd cropping per year)

<table>
<thead>
<tr>
<th>Time [days]</th>
<th>BYI 02960 Lettuce, 1 x 125 g/ha (field use)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>PEC_{soil} [mg/kg]</td>
<td>TWA_{soil} [mg/kg]</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0.125</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Short term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0.091</td>
<td>0.108</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.091</td>
<td>0.102</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.091</td>
<td>0.095</td>
<td></td>
</tr>
<tr>
<td>Long term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.090</td>
<td>0.095</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>0.089</td>
<td>0.093</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>0.088</td>
<td>0.091</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>0.085</td>
<td>0.093</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0.079</td>
<td>0.095</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accumulation in soil
The potential accumulation of BYI 02960 in soil was calculated considering the following approaches:
- Maximum soil residue in first year: maximum soil residue calculated for one season.
- Long-term plateau concentration \( C_{\text{min}} \): maximum of the lower saw tooth curve, which can be considered as background concentration after multiple year use.
- Long-term maximum concentration \( C_{\text{max}} \): maximum of the upper saw tooth curve after multiple year use.
- Background \( C_{\text{min}} + \text{max. of 1 year in 5 cm depth} \): to the long-term background concentration \( C_{\text{min}} \) in a certain depth (e.g. 5, 10 or 20 cm), the maximum residue of one year (distributed in 5 cm) will be added, to take into account a conservative shallow distribution just after an annual application.

Table 9.4-4: Long-term soil concentrations of BYI 02960 following multi-year use

<table>
<thead>
<tr>
<th>Residues distributed over... ([\text{cm}])</th>
<th>Seasonal PEC_{max} [mg/kg]</th>
<th>Long-term plateau / background conc. ( C_{\text{min}} ) [mg/kg]</th>
<th>Long-term maximum conc. ( C_{\text{max}} ) [mg/kg]</th>
<th>Background ( C_{\text{min}} + \text{max. of 1 year in 5 cm} ) [mg/kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hops 1 x 150 g/ha</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.080</td>
<td>0.080</td>
<td>0.160</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.040</td>
<td>0.040</td>
<td>0.080</td>
<td>0.120</td>
</tr>
<tr>
<td>20</td>
<td>0.020</td>
<td>0.020</td>
<td>0.040</td>
<td>0.100</td>
</tr>
<tr>
<td>Lettuce 1 x 125 g/ha</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.125</td>
<td>0.125</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.063</td>
<td>0.063</td>
<td>0.125</td>
<td>0.188</td>
</tr>
<tr>
<td>20</td>
<td>0.031</td>
<td>0.031</td>
<td>0.063</td>
<td>0.156</td>
</tr>
</tbody>
</table>

In bold: Generally, for long-term assessments the substance distribution in soil for annual crops with tillage should be assumed over a depth of 20 cm (lettuce) and for perennial crops without tillage over a depth of 5 – 10 cm (e.g. hops).

IIIA 9.4.1 Initial PECs value
Please refer to point IIIA 9.4.
IIIA1 9.4.2  Short-term PECs values - 24hours, 2 and 4 days after last application
Please refer to point IIIA 9.4.

IIIA1 9.4.3  Long-term PECs values - 7, 28, 50 and 100 days after last application
Please refer to point IIIA 9.4.

IIIA1 9.5  Predicted environmental concentrations in soil, for rel. metabolites
Predicted environmental concentrations in soil were calculated for the major soil metabolites DFA and 6-CNA. These metabolites are not automatically “relevant” with regard to their environmental, biological, eco-toxicological or toxicological properties.

Report: KIIIA1 9.5/01, 2012
Title: FPF PECsoil EU: Predicted environmental concentrations in soil (PECsoil) of Flupyradifurone and its metabolites – use in hops and lettuce in Europe
Report no. EnSa-12-0117
Document No: M-428042-01-1
GLP: No (calculation)

Methods and Materials: PECsoil for the metabolites were calculated using the approach, scenarios and application rates described for the calculations for the parent compound in Point 9.4. Compound specific parameters are summarised in Table 9.5-1.

Table 9.5-1: Input parameters for PECsoil for metabolites of BYI02960

<table>
<thead>
<tr>
<th>Compound</th>
<th>Max. DT [days]</th>
<th>Max. occurrence in soil [%]</th>
<th>Molar mass [g/mol]</th>
<th>Molar mass correction factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difluoroacetic acid</td>
<td>73.6</td>
<td>33.9</td>
<td>96.03</td>
<td>0.333</td>
</tr>
<tr>
<td>6-Chloronicotinic acid</td>
<td>36.6</td>
<td>17.1</td>
<td>157.56</td>
<td>0.546</td>
</tr>
</tbody>
</table>

Findings: The maximum PECsoil values of metabolites of BYI 02960 are summarised in Table 9.5-2.

Table 9.5-2: Hops and Lettuce: PECsoil (max) of BYI 02960 metabolites

<table>
<thead>
<tr>
<th>Crop</th>
<th>DFA  PECsoil, max [mg/kg]</th>
<th>6-CNA PECsoil, max [mg/kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hops 1 x 150 g/ha of parent</td>
<td>0.009</td>
<td>0.007</td>
</tr>
<tr>
<td>Lettuce 1 x 125 g/ha of parent</td>
<td>0.014</td>
<td>0.012</td>
</tr>
</tbody>
</table>

IIIA1 9.5.1  Initial PECs value
Please refer to point IIIA 9.5.

IIIA1 9.5.2  Short-term PECs values - 24hours, 2 and 4 days after last application
Please refer to point IIIA 9.5.
IIIA 9.5.3 Long-term PECs values - 7, 28, 50 and 100 days after last application

Please refer to point IIIA 9.5.

IIIA 9.6 Predicted environmental concentrations in ground water (PEC_{gw})

PEC_{gw} modelling approach

The predicted environmental concentrations in groundwater (PEC_{gw}) for the active substance were calculated in a stepwise approach Tier 1 standard calculations, Tier 2a using DFOP and Tier 2a using time-dependent sorption (TDS), based on the simulation models PEARL and PELMO following the recommendations of the FOCUS working group on groundwater scenarios (FOCUS 2009).

The leaching calculations were run over 26 years, as proposed for pesticides which may be applied every year. The simulation length increases to 46 and 66 years for pesticides which are applied only every second and third year, respectively. The first six years are a ‘warm up’ period; only the last 20 years were considered for the assessment of the leaching potential. The 80th percentile of the average annual groundwater concentrations in the percolate at 1 m depth under a treated plantation 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 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. The interception rates follow the FOCUS recommendations (Table 9.6-1 and Table 9.6-2).

As hop and lettuce have not been defined in the FOCUS groundwater guidance paper, vines and cabbage were chosen as surrogate crops.

Note: There are currently no European guidelines for the assessment of exposure of groundwater water from the use in glasshouses, therefore the simulation was performed, as a worst-case, using the outdoor use scenarios.

Tier 1: standard calculations following the recommendations of FOCUS (2000) with the DT_{50} values derived from SFO at the laboratory soil moisture standardised to DT_{50} values at 100% field capacity (FC)/pF 2

Tier 2a (DFOP): according to FOCUS (2009), DFOP degradation kinetics was considered in leaching modelling based on the procedure described in FOCUS (2006).

Tier 2a (TDS): following the model of et al. (1989) implemented in PEARL and PELMO FOCUS (2009), time-dependent sorption (TDS) was evaluated using the TDS parameters determined according to et al. (2010).
Table 9.6-1: FOCUS groundwater crop interception values (Hops)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop Stage interception [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vines (surrogate for hop)</td>
<td></td>
</tr>
<tr>
<td>without leaves</td>
<td>40</td>
</tr>
<tr>
<td>first leaves</td>
<td>50</td>
</tr>
<tr>
<td>leaf development</td>
<td>60</td>
</tr>
<tr>
<td>flowering</td>
<td>70</td>
</tr>
<tr>
<td>ripening</td>
<td>85</td>
</tr>
</tbody>
</table>

Table 9.6-2: FOCUS groundwater crop interception values (lettuce)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Crop Stage Interception [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bare – emergence 00 - 09</td>
</tr>
<tr>
<td></td>
<td>Leaf development 10 - 19</td>
</tr>
<tr>
<td></td>
<td>Senescence Ripening 90 - 99</td>
</tr>
<tr>
<td>Cabbage (surrogate for lettuce)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>25</td>
</tr>
</tbody>
</table>

IIIA 9.6.1 Active substance PECgw value

PECgw for BYI 02960

Use in Hops:

Tier-1:

Title: FPF PECgw EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Hops in Europe
Report no. EnSa-12-0089
Document No M-4277390-1
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 1
FOCUS 2010, version 2.0
GLP No (calculation)

Tier-2a (DFOP)

Title: Tier-2a (DFOP) FPF PECgw EU: Predicted environmental concentrations in groundwater recharge based on models Focus Pearl and Focus Pelmo - Use in hops in Europe - Flupyridifurone (BYI 02960) - Difluoroacetic acid (DFA) - 6-Chloronicotinic acid (6-CNA)
Report no. EnSa-12-0090
Document No M-427991-01-1
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 1
FOCUS 2010, version 2.0
GLP No (calculation)
Tier-2a (TDS): 

**Report:** KIIIA 9.6/03.; 2012

**Title:** Tier-2a (TDS) - FPF PECgw EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Hops in Europe

**Report no.** EnSa-12-0091

**Document No.** M-427980-01-1

**Guidelines:**
- FOCUS 2000, SANCO/321/2000, rev. 2
- FOCUS 2006, SANCO/10058/2005, rev. 2
- FOCUS 2009, SANCO/13144/2010, version 1
- FOCUS 2010, version 2.0

**GLP**

**Materials and Methods:** The predicted environmental concentrations in groundwater (PECgw) for BYI 02960 and its metabolites were calculated using the simulation models FOCUS PEARL (version 4.4.4) and FOCUS PELMO (4.4.3). Detailed application data used for simulation of PECgw are compiled in Table 9.6.1-1. Simulations were conducted for annual applications as well as applications performed every second year.

**Table 9.6.1-1:** Comparison of simulated and actual use pattern

<table>
<thead>
<tr>
<th>Individual Crop</th>
<th>FOCUS Crop Used for Interception</th>
<th>Rate Per Season [g a.s./ha]</th>
<th>Application Interval [days]</th>
<th>Plant Interception [%]</th>
<th>BRCH Stage</th>
<th>Amount Reaching the Soil per Season Application [g a.s./ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hops, GAP</td>
<td>-</td>
<td>1 × 150</td>
<td>-</td>
<td>60</td>
<td>31 - 75</td>
<td>1 × 60.00</td>
</tr>
<tr>
<td>Tier 1, Tier 2a (TDS)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hops (every year), Simulation 1</td>
<td>Vines</td>
<td>1 × 150</td>
<td>-</td>
<td>60</td>
<td>31 - 75</td>
<td>1 × 60.00</td>
</tr>
<tr>
<td>Hops (every 2nd year), Simulation 2</td>
<td>Vines</td>
<td>1 × 150</td>
<td>-</td>
<td>60</td>
<td>31 - 75</td>
<td>1 × 60.00</td>
</tr>
<tr>
<td>Tier 2a (DFOP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hops (every year), Simulation 1</td>
<td>Vines</td>
<td>1 × 150</td>
<td>-</td>
<td>60</td>
<td>31 - 75</td>
<td>171 ± 129 f</td>
</tr>
<tr>
<td>Hops (every 2nd year), Simulation 2</td>
<td>Vines</td>
<td>1 × 150</td>
<td>-</td>
<td>60</td>
<td>31 - 75</td>
<td>171 ± 129 f</td>
</tr>
</tbody>
</table>

* used for fast compartment

f used for slow compartment

Application dates for the simulation runs were defined following the crop event dates of the respective crop and scenario as given by FOCUS (2009).
### Table 9.6.1- 2: First application dates and related information for BYI 02960 as used for the simulation runs (offset is relevant only for relative application dates, two sets of data are provided for crops with two seasons)

<table>
<thead>
<tr>
<th>Individual crop</th>
<th>Hops</th>
<th>Hops</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Repeat Interval for App. Events</strong></td>
<td>Every Year</td>
<td>Every 2nd Year</td>
</tr>
<tr>
<td><strong>Application Technique</strong></td>
<td>Spray</td>
<td>Spray</td>
</tr>
<tr>
<td><strong>Absolute / Relative to</strong></td>
<td>Emergence</td>
<td>Emergence</td>
</tr>
<tr>
<td><strong>Scenario</strong></td>
<td>1st App. Date (Julian day)</td>
<td>Offset to crop event</td>
</tr>
<tr>
<td>Chateaudun</td>
<td>06 May (126)</td>
<td>06 May (126)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Hamburg</td>
<td>05 Jun (156)</td>
<td>05 Jun (156)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>05 May (125)</td>
<td>05 Jun (156)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>19 Apr (109)</td>
<td>06 May (126)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Okehampton</td>
<td>06 May (126)</td>
<td>06 May (126)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Piacenza</td>
<td>19 Apr (109)</td>
<td>06 May (126)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Porto</td>
<td>05 May (125)</td>
<td>05 May (125)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Sevilla</td>
<td>19 Apr (109)</td>
<td>06 May (126)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>Thiva</td>
<td>19 Apr (109)</td>
<td>06 May (126)</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

Further input parameters for PEC gw modelling of BYI 02960 are summarised in Table 9.6.1- 3 for BYI 02960 and in Table 9.6.1- 4 for the metabolites. Parameters used for degradation pathway in PEARL and PELMO are depicted in Table 9.6.1- 5.

For **Tier 1**, a geometric mean of half-lives derived from SFO and from the slow compartment of the DFOP model was used to obtain a conservative model input.

For **Tier 2a** (DFOP) according to FOCUS (2009), DFOP degradation kinetics was considered in leaching modelling based on the procedure described in FOCUS (2006).

To obtain common DFOP parameters over all soils the following procedure was applied: Firstly, all degradation curves following SFO kinetics on Tier-1 were converted to an equivalent DFOP model where the Tier-1 SFO-DT_{50} was assigned equally (g=0.5) to the slow and fast degrading compartment.

For those soils where the slow compartment of DFOP was already used for modelling at Tier-1, the
corresponding shorter \( \text{DT}_{50} \) of the fast compartment and \( g \) (fraction of total amount applied to the compartment) of the DFOP fit were additionally considered. Finally, the DFOP parameters were calculated as mean over all soils.

For leaching modelling the application rate was doubled and assigned to both compartments according to \( g \) of 0.43. Then, two separate leaching simulations were performed: one for the fast compartment using \( \text{DT}_{50}^\text{fast} \) of 33 days and one using \( \text{DT}_{50}^\text{slow} \) of 95 days. Both \( \text{PEC}_{gw} \) values were summed up and divided by two to get the final result.

Tier 2\( a \) (TDS): Time-dependent sorption (TDS) data of \( \text{BYI 02960} \) on four soils were derived via curve fitting (see [2012; KIIA 7.4.1/04, M-42524-031]). These parameters constitute the prerequisite to adequately address TDS processes in regulatory exposure modelling. Experimental soil data were re-calculated to fit the TDS model, resulting in a geometric \( \text{DT}_{50} \) of 58 days, a \( K_{OM} \) of 46.5 L/kg and a Freundlich exponent of 0.860.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Tier 1</th>
<th>( \text{BYI 02960} )</th>
<th>Tier 2( a ) (DFOP)</th>
<th>Tier 2( a ) (TDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td></td>
<td>Tier 1</td>
<td>( \text{BYI 02960} )</td>
<td>Tier 2( a ) (DFOP)</td>
<td>Tier 2( a ) (TDS)</td>
</tr>
<tr>
<td>Molar Mass</td>
<td>[g/mol]</td>
<td>288.7</td>
<td>288.2</td>
<td>288.7</td>
<td></td>
</tr>
<tr>
<td>Solubility</td>
<td>[mg/L]</td>
<td>3200</td>
<td>3200</td>
<td>3200</td>
<td></td>
</tr>
<tr>
<td>Freundlich Exponent</td>
<td></td>
<td>0.866</td>
<td>0.866</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>Plant Uptake Factor</td>
<td></td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Walker Exponent</td>
<td></td>
<td>0.7</td>
<td>0.7</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>PEARL Parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Code</td>
<td>BUTc</td>
<td>BUTb</td>
<td>BUTf / BUTs(^b)</td>
<td>BUTk</td>
<td></td>
</tr>
<tr>
<td>( \text{DT}_{50} )</td>
<td>[days]</td>
<td>94.8</td>
<td>33 / 94.8(^a)</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Molar Activ. Energy</td>
<td>[kJ/mol]</td>
<td>57.1</td>
<td>65.4</td>
<td>65.4</td>
<td></td>
</tr>
<tr>
<td>( K_{om} )</td>
<td>[mL/g]</td>
<td>57.1</td>
<td>46.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Desorp. Rate Coeff.(^c)</td>
<td>[1/days]</td>
<td>-</td>
<td>-</td>
<td>0.031</td>
<td></td>
</tr>
<tr>
<td>Equ. Factor</td>
<td></td>
<td>-</td>
<td>-</td>
<td>0.58</td>
<td></td>
</tr>
<tr>
<td>PELMO Parameters</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Code</td>
<td>AS</td>
<td>AS</td>
<td>AS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate Constant</td>
<td>[1/day]</td>
<td>0.0073</td>
<td>0.0207 / 0.0073(^a)</td>
<td>0.01195</td>
<td></td>
</tr>
<tr>
<td>( Q_{10} )</td>
<td>[mL/g]</td>
<td>2.58</td>
<td>2.58</td>
<td>2.58</td>
<td></td>
</tr>
<tr>
<td>( K_{ec} )</td>
<td>[mL/g]</td>
<td>98.4</td>
<td>80.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) \( \text{DT}_{50} \) used for the fast compartment

\(^b\) \( \text{DT}_{50} \) used for the slow compartment

\[^2\] 2010; Proposed guidance on how aged sorption studies for pesticides should be conducted, analysed and used in regulatory assessments. The Food and Environment research Agency, York, UK and Alterra, Wageningen, The Netherlands
Table 9.6.1-4: Substance specific and model related input parameters for PEC\(_{gw}\) calculation of BYI 02960 metabolites

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Difluoroacetic acid</th>
<th>6-Chloronicotinic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molar Mass</td>
<td>[g/mol]</td>
<td>96</td>
<td>157.6 (^\text{a}))</td>
</tr>
<tr>
<td>Solubility</td>
<td>[mg/L]</td>
<td>500000</td>
<td>1430</td>
</tr>
<tr>
<td>Vapour Pressure</td>
<td>[Pa]</td>
<td>1.00E-10</td>
<td>1.00E-10</td>
</tr>
<tr>
<td>Freundlich Exponent</td>
<td></td>
<td>0.835</td>
<td>0.95</td>
</tr>
<tr>
<td>Plant Uptake Factor</td>
<td></td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Walker Exponent</td>
<td></td>
<td>0.7</td>
<td>0.7</td>
</tr>
<tr>
<td>PEARL Parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Code</td>
<td></td>
<td>DFA</td>
<td>CNA</td>
</tr>
<tr>
<td>DT(_50)</td>
<td>[days]</td>
<td>56</td>
<td>4.7</td>
</tr>
<tr>
<td>Molar Activ. Energy</td>
<td>[kJ/mol]</td>
<td>65.4</td>
<td>65.4</td>
</tr>
<tr>
<td>K(_w)</td>
<td>[mL/g]</td>
<td>3.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Desorp. Rate Coeff.</td>
<td>[1/days]</td>
<td></td>
<td>0.466</td>
</tr>
<tr>
<td>Equ. Factor</td>
<td></td>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>PELMO Parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substance Code</td>
<td></td>
<td>A1</td>
<td>B1</td>
</tr>
<tr>
<td>Rate Constant</td>
<td>[1/day]</td>
<td>0.0155070</td>
<td>0.0034660</td>
</tr>
<tr>
<td>Q(_0)</td>
<td></td>
<td>2.58</td>
<td>2.58</td>
</tr>
<tr>
<td>K(_w)</td>
<td>[mL/g]</td>
<td>88</td>
<td>88</td>
</tr>
</tbody>
</table>

\(^{a}\) The sum of formation fractions of both metabolites is > 1. In order to run the modelling with PELMO, the molar mass of 6-CNA was set to 451 g/mol, resulting from \(M_{aux}(6\text{-CNA}) = M(6\text{-CNA}) \times 0.478 / (1-0.833) = 451\text{ g/mol}\)

Table 9.6.1-5: Degradation pathway related parameters for BYI 02960 and its metabolites

<table>
<thead>
<tr>
<th>Tier 1, Tier 2a (DFOP, Tier 2a (TDS))</th>
<th>Degradation fraction from to</th>
<th>FOCUS PEARL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.83 BRA &gt;&gt; DFA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.48 BRA &gt;&gt; CNA</td>
<td></td>
</tr>
<tr>
<td>Tier 1, Tier 2a (DFOP, slow compartment)</td>
<td>Degradation rate from to</td>
<td>FOCUS PELMO</td>
</tr>
<tr>
<td></td>
<td>0.00160780 Active Substance (\rightarrow) A1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0012180 Active Substance (\rightarrow) B1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0155070 A1 (\rightarrow) &lt;BR/CO2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1474780 B1 (\rightarrow) &lt;BR/CO2</td>
<td></td>
</tr>
<tr>
<td>Tier 2a (DFOP, fast compartment)</td>
<td>Degradation rate from to</td>
<td>FOCUS PELMO</td>
</tr>
<tr>
<td></td>
<td>0.0172870 Active Substance (\rightarrow) A1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0034660 Active Substance (\rightarrow) B1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0155070 A1 (\rightarrow) &lt;BR/CO2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1474780 B1 (\rightarrow) &lt;BR/CO2</td>
<td></td>
</tr>
<tr>
<td>Tier 2a (TDS)</td>
<td>Degradation rate from to</td>
<td>FOCUS PELMO</td>
</tr>
<tr>
<td></td>
<td>0.0099550 Active Substance (\rightarrow) A1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0019960 Active Substance (\rightarrow) B1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.0155070 A1 (\rightarrow) &lt;BR/CO2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.1474780 B1 (\rightarrow) &lt;BR/CO2</td>
<td></td>
</tr>
</tbody>
</table>

Findings:

The 80th percentile groundwater concentrations of BYI 02960 in hops are given in Table 9.6.1-6 (Tier 1), Table 9.6.1-7 (Tier 2a; DFOP) and Table 9.6.1-8 (Tier 2a; TDS).
Table 9.6.1- 6:  Tier 1 - PEC<sub>gw</sub> of BYI 02960 – Use in Hops

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Hops (every year), 1 x 150 g/ha, 60 % interception</th>
<th>BYI 02960</th>
<th>Hops (every 2&lt;sup&gt;nd&lt;/sup&gt; year), 1 x 150 g/ha, 60 % interception</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td>PELMO PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td>PEARL PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.453</td>
<td>0.415</td>
<td>0.193</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.579</td>
<td>0.634</td>
<td>0.284</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.430</td>
<td>0.481</td>
<td>0.190</td>
</tr>
<tr>
<td>Piacenza</td>
<td>0.359</td>
<td>0.442</td>
<td>0.354</td>
</tr>
<tr>
<td>Porto</td>
<td>0.220</td>
<td>0.286</td>
<td>0.093</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.223</td>
<td>0.063</td>
<td>0.093</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.183</td>
<td>0.155</td>
<td>0.093</td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1 µg/L

Considering the Tier 1 simulations predicted concentrations of BYI 02960 in groundwater are below the trigger of 0.1 µg/L in the scenario Sevilla (model PELMO) when applied every year and in scenarios Sevilla and Thiva (both PEARL and PELMO) and Porto (PEARL), when applied every second year.

Higher tier calculations have additionally been performed at Tier 2a using DFOP simulations and TDS.

Table 9.6.1- 7:  Tier 2a (DFOP) – PEC<sub>gw</sub> of BYI 02960 – Use in Hops

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Hops (every year), 1 x 150 g/ha</th>
<th>BYI 02960</th>
<th>Hops (every 2&lt;sup&gt;nd&lt;/sup&gt; year), 1 x 150 g/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td>PELMO PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td>PEARL PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.274</td>
<td>0.251</td>
<td>0.116</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.375</td>
<td>0.330</td>
<td>0.367</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.275</td>
<td>0.287</td>
<td>0.172</td>
</tr>
<tr>
<td>Piacenza</td>
<td>0.213</td>
<td>0.203</td>
<td>0.093</td>
</tr>
<tr>
<td>Porto</td>
<td>0.133</td>
<td>0.071</td>
<td>0.056</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.147</td>
<td>0.039</td>
<td>0.056</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.111</td>
<td>0.095</td>
<td>0.045</td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1 µg/L

When considering the use of DFOP kinetics predicted concentrations of BYI 02960 in groundwater are below the trigger of 0.1 µg/L in the scenario Sevilla and Thiva (model PELMO) when applied every year and in scenarios Porto, Sevilla and Thiva (both PEARL and PELMO) and Piacenza (PEARL), when applied every second year.
Table 9.6.1-8: Tier 2a (TDS) - PECgw of BYI 02960 – Use in Hops

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960</th>
<th>Hops (every year), 1 x 150 g/ha, 60 % interception</th>
<th>BYI 02960</th>
<th>Hops (every 2nd year), 1 x 150 g/ha, 60 % interception</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
<td>PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td></td>
<td>PECgw</td>
<td>PECgw</td>
<td>PECgw</td>
<td>PECgw</td>
</tr>
<tr>
<td></td>
<td>[µg/L]</td>
<td>[µg/L]</td>
<td>[µg/L]</td>
<td>[µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.116</td>
<td>0.100</td>
<td>0.044</td>
<td>0.045</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.175</td>
<td>0.175</td>
<td>0.060</td>
<td>0.065</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.135</td>
<td>0.157</td>
<td>0.055</td>
<td>0.056</td>
</tr>
<tr>
<td>Piacenza</td>
<td>0.118</td>
<td>0.157</td>
<td>0.041</td>
<td>0.056</td>
</tr>
<tr>
<td>Porto</td>
<td>0.056</td>
<td>0.087</td>
<td>0.020</td>
<td>0.030</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.042</td>
<td>0.007</td>
<td>0.014</td>
<td>0.002</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.030</td>
<td>0.023</td>
<td>0.015</td>
<td>0.006</td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1µg/L.

When considering TDS behaviour the predicted concentrations of BYI 02960 in groundwater are below the trigger of 0.1 µg/L in the scenario Porto, Sevilla and Thiva (models PEARL and PELMO) when applied every year and in all scenarios (both PEARL and PELMO), when applied every second year.

**Conclusion:** A safe use has been demonstrated as the trigger of 0.1 µg/L is met at tier 1, considering application every year, for the scenario Sevilla (PELMO). For the higher tier calculations applying DFOP the trigger was met in Sevilla and Thiva for annual applications. When considering higher tier calculations with TDS the trigger was also met in several scenarios for annual uses and all scenarios for use every second year.

**Use in Lettuce:**

**Tier-1:**

- **Report:** KUBA! 9.6.0/04, 2012
- **Title:** FOP PECPEC:EUR, Predicted Environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe
- **Report no.** EnSa-12-0097
- **Document No** MEZ7736-001
- **Guidelines:** FOCUS 2000, SANCO/321/2000, rev. 2
  FOCUS 2006, SANCO/10058/2005, rev. 2
  FOCUS 2009, SANCO/13144/2010, version 1
  FOCUS 2010, version 2.0
- **GLP** No (calculation)
Tier-2a (DFOP):

Report: KIIIA 9.6.1/05; 2012
Title: Tier-2a (DFOP) - FPF PEC\textsubscript{gw} EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe - Flupyradifurone (BYI 02960) - Difluoroacetic acid (DFA) - 6-Chloronicotinic acid (6-CNA)

Tier-2a (TDS):

Report: KIIIA 9.6.1/06; 2012
Title: Tier-2a (TDS) - FPF PEC\textsubscript{gw} EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe

Materials and Methods: The predicted environmental concentrations in groundwater (PEC\textsubscript{gw}) for BYI 02960 were calculated using the simulation model FOCUS PEARL (version 4.4.4) and FOCUS PELMO (4.4.3). Detailed application data used for simulation of PEC\textsubscript{gw} are compiled in Table 9.6.1-9.

Although there is no currently agreed model for simulating groundwater concentrations following the use in greenhouses as a conservative approach the simulation was performed as an outdoor application considering two applications in accordance with the GAP.

Table 9.6.1-9: Comparison of simulated and actual use pattern (outdoor use)

<table>
<thead>
<tr>
<th>Individual Crop</th>
<th>F or G</th>
<th>FOCUS Crop Used for Intercalation</th>
<th>Rate per Season [g a.s./ha]</th>
<th>Application Interval [days]</th>
<th>Plant Intercalation [%]</th>
<th>BBCH Stage</th>
<th>Amount Reaching the Soil per Season application [g a.s./ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce 1 (GAP)</td>
<td>-</td>
<td>1 × 125</td>
<td>25</td>
<td>12 - 49</td>
<td>1 × 93.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce 1 (every year), Simulation 1</td>
<td>F</td>
<td>Cabbage 1 × 125</td>
<td>-</td>
<td>142.5² / 107.5¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce 1 (every 2\textsuperscript{nd} year), Simulation 2</td>
<td>F</td>
<td>Cabbage 1 × 125</td>
<td>-</td>
<td>142.5² / 107.5¹</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GLP No (calculation)

Materials and Methods: The predicted environmental concentrations in groundwater (PEC\textsubscript{gw}) for BYI 02960 were calculated using the simulation model FOCUS PEARL (version 4.4.4) and FOCUS PELMO (4.4.3). Detailed application data used for simulation of PEC\textsubscript{gw} are compiled in Table 9.6.1-9.

Although there is no currently agreed model for simulating groundwater concentrations following the use in greenhouses as a conservative approach the simulation was performed as an outdoor application considering two applications in accordance with the GAP.

Table 9.6.1-9: Comparison of simulated and actual use pattern (outdoor use)

<table>
<thead>
<tr>
<th>Individual Crop</th>
<th>F or G</th>
<th>FOCUS Crop Used for Intercalation</th>
<th>Rate per Season [g a.s./ha]</th>
<th>Application Interval [days]</th>
<th>Plant Intercalation [%]</th>
<th>BBCH Stage</th>
<th>Amount Reaching the Soil per Season application [g a.s./ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce 1 (GAP)</td>
<td>-</td>
<td>1 × 125</td>
<td>25</td>
<td>12 - 49</td>
<td>1 × 93.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce 1 (every year), Simulation 1</td>
<td>F</td>
<td>Cabbage 1 × 125</td>
<td>-</td>
<td>142.5² / 107.5¹</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce 1 (every 2\textsuperscript{nd} year), Simulation 2</td>
<td>F</td>
<td>Cabbage 1 × 125</td>
<td>-</td>
<td>142.5² / 107.5¹</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9.6.1-10: Comparison of simulated and actual use pattern (glasshouse use)

<table>
<thead>
<tr>
<th>Individual Crop</th>
<th>F or G</th>
<th>FOCUS Crop Used for Interception</th>
<th>Rate per Season [g a.s./ha]</th>
<th>Application Interval [days]</th>
<th>Plant Interception [%]</th>
<th>BBCH Stage</th>
<th>Amount Reaching the Soil per Season Application [g a.s./ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lettuce 1 (every 2nd year), Simulation 2</td>
<td>Cabbage</td>
<td>1 × 125</td>
<td>25</td>
<td>12 - 49</td>
<td>142.5f / 107.5f</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

F = Field use (GAP: “Lettuce 1” = 1 x 125 g/ha
f used for the fast compartment
s used for the slow compartment

Application dates for the simulation runs were defined following the crop event dates of the respective crop and scenario as given by FOCUS (2009). In this assessment the first and the second cropping per year of lettuce were calculated separately.
Table 9.6.1-11: First application dates and related information for BYI 02960 as used for the simulation runs (offset is relevant only for relative application dates, two sets of data are provided for crops with two seasons)

<table>
<thead>
<tr>
<th>Individual crop</th>
<th>lettuce, 1st cropping</th>
<th>lettuce, 2nd cropping</th>
<th>lettuce, 1st cropping</th>
<th>lettuce, 2nd cropping</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeat Interval for App. Events</td>
<td>Every Year</td>
<td>Every Year</td>
<td>Every 2nd Year</td>
<td>Every 2nd Year</td>
</tr>
<tr>
<td>Application Technique</td>
<td>Spray</td>
<td>Spray</td>
<td>Spray</td>
<td>Spray</td>
</tr>
<tr>
<td>Absolute / Relative to</td>
<td>Emergence</td>
<td>Emergence</td>
<td>Emergence</td>
<td>Emergence</td>
</tr>
<tr>
<td>Scenario</td>
<td>1st App. Date (Julian day) Offset to crop event</td>
<td>1st App. Date (Julian day) Offset to crop event</td>
<td>1st App. Date (Julian day) Offset to crop event</td>
<td>1st App. Date (Julian day) Offset to crop event</td>
</tr>
<tr>
<td>Chateaudun</td>
<td>25 Apr (115) 5</td>
<td>05 Aug (217) 5</td>
<td>23 Apr (115) 5</td>
<td>05 Aug (217) 5</td>
</tr>
<tr>
<td>Hamburg</td>
<td>25 Apr (115) 5</td>
<td>05 Apr (217) 5</td>
<td>25 Apr (115) 5</td>
<td>05 May (145) 5</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>25 May (145) 5</td>
<td>05 May (145) 5</td>
<td>25 May (145) 5</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>25 Apr (115) 5</td>
<td>05 Apr (217) 5</td>
<td>25 Apr (117) 5</td>
<td>05 Aug (217) 5</td>
</tr>
<tr>
<td>Okehampton</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Piacenza</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Porto</td>
<td>05 Mar (64) 5</td>
<td>05 Aug (217) 5</td>
<td>05 Mar (64) 5</td>
<td>05 Aug (217) 5</td>
</tr>
<tr>
<td>Sevilla</td>
<td>06 Mar (65) 5</td>
<td>20 Jun (171) 5</td>
<td>06 Mar (65) 5</td>
<td>20 Jun (171) 5</td>
</tr>
<tr>
<td>Thiva</td>
<td>20 Aug (232) 5</td>
<td>-</td>
<td>20 Aug (232) 5</td>
<td>-</td>
</tr>
</tbody>
</table>

Further input parameters for PEC modelling of BYI 02960 are summarised above in Table 9.6.1-3 for BYI 02960 and in Table 9.6.1-4 for the metabolites. Parameters used for degradation pathway in PEARL and PELMO are depicted in Table 9.6.1-5.

Findings: The 80th percentile concentrations of BYI 02960 for the field and glasshouse uses in lettuce are given in the following tables.
Tier 1: Field Uses (single application)

Table 9.6.1-12: Tier 1 PECgw of BYI 02960 – Use in Lettuce, single application (field use), every year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Lettuce, 1st cropping, every year, 1 x 125 g/ha</th>
<th>Lettuce, 2nd cropping, every year, 1 x 125 g/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL PECgw [µg/L]</td>
<td>PELMO PECgw [µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.413</td>
<td>0.298</td>
</tr>
<tr>
<td></td>
<td>0.456</td>
<td>0.377</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.809</td>
<td>0.724</td>
</tr>
<tr>
<td></td>
<td>1.081</td>
<td>0.983</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.325</td>
<td>0.269</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.595</td>
<td>0.517</td>
</tr>
<tr>
<td></td>
<td>0.698</td>
<td>0.637</td>
</tr>
<tr>
<td>Porto</td>
<td>0.327</td>
<td>0.412</td>
</tr>
<tr>
<td></td>
<td>0.643</td>
<td>0.712</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.018</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>0.025</td>
<td>0.026</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.313</td>
<td>0.201</td>
</tr>
</tbody>
</table>

*In italics:* values pass the trigger of 0.1µg/L

Table 9.6.1-13: Tier 1 PECgw of BYI 02960 – Use in Lettuce, single application (field use), every 2nd year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Lettuce, 1st cropping, every 2nd year, 1 x 125 g/ha</th>
<th>Lettuce, 2nd cropping, every 2nd year, 1 x 125 g/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL PECgw [µg/L]</td>
<td>PELMO PECgw [µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.154</td>
<td>0.111</td>
</tr>
<tr>
<td></td>
<td>0.207</td>
<td>0.142</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.379</td>
<td>0.298</td>
</tr>
<tr>
<td></td>
<td>0.443</td>
<td>0.401</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.106</td>
<td>0.082</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.042</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>0.291</td>
<td>0.255</td>
</tr>
<tr>
<td>Porto</td>
<td>0.137</td>
<td>0.040</td>
</tr>
<tr>
<td></td>
<td>0.253</td>
<td>0.305</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.006</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>0.009</td>
<td>0.002</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.106</td>
<td>0.069</td>
</tr>
</tbody>
</table>

*In italics:* values pass the trigger of 0.1µg/L

For the field use, considering the tier 1 approach, the trigger value of 0.1µg/L is met for the scenario Sevilla for both seasons and models for annual and uses every second year.
## Tier 2 (DFOP): Single application (field use)

### Table 9.6.1-14: Tier 2 (DFOP) PEC<sub>gw</sub> of BYI 02960 – Use in Lettuce, single application (field use), every year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PEARL PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
<th>PELMO PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châteaudun</td>
<td>0.269</td>
<td>0.194</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.630</td>
<td>0.462</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.213</td>
<td>0.175</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.382</td>
<td>0.342</td>
</tr>
<tr>
<td>Porto</td>
<td>0.216</td>
<td>0.255</td>
</tr>
<tr>
<td>Sevilla</td>
<td><strong>0.016</strong></td>
<td><strong>0.005</strong></td>
</tr>
<tr>
<td>Thiva</td>
<td>0.224</td>
<td>0.149</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1µg/L*

### Table 9.6.1-15: Tier 2 (DFOP) PEC<sub>gw</sub> of BYI 02960 – Use in Lettuce, single application (field use), every 2nd year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PEARL PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
<th>PELMO PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châteaudun</td>
<td><strong>0.049</strong></td>
<td><strong>0.068</strong></td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.068</td>
<td>0.068</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.146</td>
<td>0.146</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td><strong>0.004</strong></td>
<td><strong>0.006</strong></td>
</tr>
<tr>
<td>Porto</td>
<td>0.006</td>
<td>0.006</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.006</td>
<td>0.006</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1µg/L*

For the outdoor use in lettuce, using the Tier 2 approach (DFOP) the trigger is met for the scenario Sevilla for annual applications and the scenarios Châteaudun, Jokioinen, Porto, Sevilla and Thiva considering applications every second year.
Tier-2a (TDS): Single application (field use)

Table 9.6.1-16: Tier-2a (TDS) PEC$_{gw}$ of BYI 02960 – Use in Lettuce, single application (field use), every year (TDS)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960 (field use / every year / TDS)</th>
<th>PEARL PEC$_{gw}$ [µg/L]</th>
<th>PELMO PEC$_{gw}$ [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lettuce, 1$^{st}$ cropping, every year, 1 x 125 g/ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.085</td>
<td>0.053</td>
<td>0.111</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.263</td>
<td>0.194</td>
<td>0.329</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.055</td>
<td>0.046</td>
<td></td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.181</td>
<td>0.153</td>
<td>0.216</td>
</tr>
<tr>
<td>Porto</td>
<td>0.090</td>
<td>0.153</td>
<td>0.176</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.047</td>
<td>0.036</td>
<td></td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1µg/L

Table 9.6.1-17: Tier-2a (TDS) PEC$_{gw}$ of BYI 02960 – Use in Lettuce, single application (field use), every 2$^{nd}$ year (TDS)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960 (field use / every 2$^{nd}$ year / TDS)</th>
<th>PEARL PEC$_{gw}$ [µg/L]</th>
<th>PELMO PEC$_{gw}$ [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lettuce, 1$^{st}$ cropping, every 2$^{nd}$ year, 1 x 125 g/ha</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.023</td>
<td>0.015</td>
<td>0.034</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.099</td>
<td>0.079</td>
<td>0.132</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.014</td>
<td>0.014</td>
<td></td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.061</td>
<td>0.052</td>
<td>0.075</td>
</tr>
<tr>
<td>Porto</td>
<td>0.063</td>
<td>0.052</td>
<td>0.061</td>
</tr>
<tr>
<td>Sevilla</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.014</td>
<td>0.009</td>
<td></td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1µg/L

For the outdoor use in lettuce, using the Tier 2 approach (TDS) the trigger is met for the scenarios Châteaudun, Jokioinen, Porto, Sevilla and Thiva considering annual applications and for all scenarios except Hamburg late season for the application every second year.
Tier 1: Glasshouse Uses (multiple Applications)

Table 9.6.1-18: Tier 1 PEC\textsubscript{gw} of BYI 02960 – Use in Lettuce, multiple applications (glasshouse use), every year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960 (glasshouse use / every year)</th>
<th>Lettuce, 1\textsuperscript{st} cropping, every year, 2 x 125 g/ha</th>
<th>PEARL PEC\textsubscript{gw} [\mu g/L]</th>
<th>PELMO PEC\textsubscript{gw} [\mu g/L]</th>
<th>Lettuce, 2\textsuperscript{nd} cropping, every year, 2 x 125 g/ha</th>
<th>PEARL PEC\textsubscript{gw} [\mu g/L]</th>
<th>PELMO PEC\textsubscript{gw} [\mu g/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châteaudun</td>
<td></td>
<td></td>
<td>1.131</td>
<td>0.820</td>
<td></td>
<td>1.543</td>
<td>1.122</td>
</tr>
<tr>
<td>Hamburg</td>
<td></td>
<td></td>
<td>2.178</td>
<td>1.937</td>
<td></td>
<td>2.843</td>
<td>2.618</td>
</tr>
<tr>
<td>Jokioinen</td>
<td></td>
<td></td>
<td>0.982</td>
<td>0.796</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td></td>
<td></td>
<td>1.502</td>
<td>1.372</td>
<td></td>
<td>2.618</td>
<td>1.702</td>
</tr>
<tr>
<td>Porto</td>
<td></td>
<td></td>
<td>0.873</td>
<td>1.093</td>
<td></td>
<td>1.691</td>
<td>1.338</td>
</tr>
<tr>
<td>Sevilla</td>
<td></td>
<td></td>
<td>0.078</td>
<td>0.106</td>
<td></td>
<td>-</td>
<td>0.225</td>
</tr>
<tr>
<td>Thiva</td>
<td></td>
<td></td>
<td>0.986</td>
<td>0.749</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1\mu g/L

Table 9.6.1-19: Tier 1 PEC\textsubscript{gw} of BYI 02960 – Use in Lettuce, multiple applications (glasshouse use), every 2\textsuperscript{nd} year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960 (glasshouse use / every 2\textsuperscript{nd} year)</th>
<th>Lettuce, 1\textsuperscript{st} cropping, every 2\textsuperscript{nd} year, 2 x 125 g/ha</th>
<th>PEARL PEC\textsubscript{gw} [\mu g/L]</th>
<th>PELMO PEC\textsubscript{gw} [\mu g/L]</th>
<th>Lettuce, 2\textsuperscript{nd} cropping, every 2\textsuperscript{nd} year, 2 x 125 g/ha</th>
<th>PEARL PEC\textsubscript{gw} [\mu g/L]</th>
<th>PELMO PEC\textsubscript{gw} [\mu g/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châteaudun</td>
<td></td>
<td></td>
<td>0.444</td>
<td>0.318</td>
<td></td>
<td>0.586</td>
<td>0.422</td>
</tr>
<tr>
<td>Hamburg</td>
<td></td>
<td></td>
<td>0.042</td>
<td>0.116</td>
<td></td>
<td>0.586</td>
<td>1.170</td>
</tr>
<tr>
<td>Jokioinen</td>
<td></td>
<td></td>
<td>0.349</td>
<td>0.283</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td></td>
<td></td>
<td>0.632</td>
<td>0.576</td>
<td></td>
<td>0.755</td>
<td>0.696</td>
</tr>
<tr>
<td>Porto</td>
<td></td>
<td></td>
<td>0.002</td>
<td>0.424</td>
<td></td>
<td>0.719</td>
<td>0.771</td>
</tr>
<tr>
<td>Sevilla</td>
<td></td>
<td></td>
<td>0.025</td>
<td>0.018</td>
<td></td>
<td>0.038</td>
<td>0.009</td>
</tr>
<tr>
<td>Thiva</td>
<td></td>
<td></td>
<td>0.363</td>
<td>0.230</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1\mu g/L

For the greenhouse uses, considering the tier 1 approach the trigger value of 0.1\mu g/L is met for the scenario Sevilla for both seasons and models even considering the conservative approach for the greenhouse uses.
Tier 2a (DFOP): Multiple Applications (glasshouse use)

Table 9.6.1-20: Tier 2a (DFOP) PECgw of BYI 02960 – Use in Lettuce, multiple applications (glasshouse use), every year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960 (glasshouse use / every year / DFOP)</th>
<th>Lettuce, 1st cropping, every year, 2 x 125 g/ha</th>
<th>PEARL PECgw [µg/L]</th>
<th>PELMO PECgw [µg/L]</th>
<th>Lettuce, 2nd cropping, every year, 2 x 125 g/ha</th>
<th>PEARL PECgw [µg/L]</th>
<th>PELMO PECgw [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châteaudun</td>
<td></td>
<td></td>
<td>0.682</td>
<td>0.494</td>
<td></td>
<td>0.927</td>
<td>0.696</td>
</tr>
<tr>
<td>Hamburg</td>
<td></td>
<td></td>
<td>1.310</td>
<td>1.159</td>
<td></td>
<td>1.706</td>
<td>1.582</td>
</tr>
<tr>
<td>Jokioinen</td>
<td></td>
<td></td>
<td>0.597</td>
<td>0.488</td>
<td></td>
<td>0.716</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td></td>
<td></td>
<td>0.898</td>
<td>0.822</td>
<td></td>
<td>0.898</td>
<td>1.023</td>
</tr>
<tr>
<td>Porto</td>
<td></td>
<td></td>
<td>0.520</td>
<td>0.562</td>
<td></td>
<td>0.508</td>
<td>1.490</td>
</tr>
<tr>
<td>Sevilla</td>
<td></td>
<td></td>
<td><strong>0.050</strong></td>
<td><strong>0.043</strong></td>
<td></td>
<td><strong>0.076</strong></td>
<td><strong>0.017</strong></td>
</tr>
<tr>
<td>Thiva</td>
<td></td>
<td></td>
<td>0.600</td>
<td>0.458</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1µg/L*

Table 9.6.1-21: Tier 2a (DFOP) PECgw of BYI 02960 – Use in Lettuce, multiple applications (glasshouse use), every 2nd year

<table>
<thead>
<tr>
<th>Scenario</th>
<th>BYI 02960 (glasshouse use / every 2nd year / DFOP)</th>
<th>Lettuce, 1st cropping, every 2nd year, 2 x 125 g/ha</th>
<th>PEARL PECgw [µg/L]</th>
<th>PELMO PECgw [µg/L]</th>
<th>Lettuce, 2nd cropping, every 2nd year, 2 x 125 g/ha</th>
<th>PEARL PECgw [µg/L]</th>
<th>PELMO PECgw [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Châteaudun</td>
<td></td>
<td></td>
<td>0.251</td>
<td>0.180</td>
<td></td>
<td>0.338</td>
<td>0.241</td>
</tr>
<tr>
<td>Hamburg</td>
<td></td>
<td></td>
<td>0.489</td>
<td>0.438</td>
<td></td>
<td>0.656</td>
<td>0.592</td>
</tr>
<tr>
<td>Jokioinen</td>
<td></td>
<td></td>
<td>0.200</td>
<td>0.165</td>
<td></td>
<td>0.224</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td></td>
<td></td>
<td>0.354</td>
<td>0.311</td>
<td></td>
<td>0.421</td>
<td>0.387</td>
</tr>
<tr>
<td>Porto</td>
<td></td>
<td></td>
<td>0.193</td>
<td>0.164</td>
<td></td>
<td>0.245</td>
<td>0.246</td>
</tr>
<tr>
<td>Sevilla</td>
<td></td>
<td></td>
<td><strong>0.012</strong></td>
<td><strong>0.009</strong></td>
<td></td>
<td><strong>0.017</strong></td>
<td><strong>0.004</strong></td>
</tr>
<tr>
<td>Thiva</td>
<td></td>
<td></td>
<td>0.092</td>
<td>0.083</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1µg/L*

For the greenhouse use in lettuce, using the Tier 2 approach (DFOP) the trigger is met for the scenario Sevilla for annual and bi-annual applications even considering the conservative use of the outdoor model.
Tier-2a (TDS): Multiple Applications (glasshouse use)

Table 9.6.1- 22: Tier-2a (TDS) PEC_{gw} of BYI 02960 – Use in Lettuce, multiple applications (glasshouse use), every year (TDS)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>LETTUCE, 1st cropping, every year, 2 x 125 g/ha</th>
<th>LETTUCE, 2nd cropping, every year, 2 x 125 g/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL PEC_{gw} [µg/L]</td>
<td>PELMO PEC_{gw} [µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.267</td>
<td>0.182</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.726</td>
<td>0.597</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.208</td>
<td>0.171</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.509</td>
<td>0.458</td>
</tr>
<tr>
<td>Porto</td>
<td>0.276</td>
<td>0.238</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.007</td>
<td>0.002</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.199</td>
<td>0.145</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1µg/L*

Table 9.6.1- 23: Tier-2a (TDS) PEC_{gw} of BYI 02960 – Use in Lettuce, multiple applications (glasshouse use), every 2nd year (TDS)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>LETTUCE, 1st cropping, every 2nd year, 2 x 125 g/ha</th>
<th>LETTUCE, 2nd cropping, every 2nd year, 2 x 125 g/ha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEARL PEC_{gw} [µg/L]</td>
<td>PELMO PEC_{gw} [µg/L]</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.085</td>
<td>0.055</td>
</tr>
<tr>
<td>Hamburg</td>
<td>0.266</td>
<td>0.228</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>0.058</td>
<td>0.044</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.182</td>
<td>0.156</td>
</tr>
<tr>
<td>Porto</td>
<td>0.141</td>
<td>0.152</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.002</td>
<td>0.003</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.061</td>
<td>0.068</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1µg/L*

For the greenhouse use in lettuce, using the Tier 2 approach (TDS) the trigger is met for the scenario Sevilla for annual applications and for the scenarios Châteaudun, Jokioinen, Porto, Sevilla and Thiva for the early season uses every second year, even considering the conservative use of the outdoor model.

**Conclusion**

For all the uses considered safe use can be demonstrated in at least 1 scenario even considering tier 1 calculations. When higher tier (Tier 2) simulations are considered the calculated PEC_{gw} is less than the trigger in several scenarios.
IIIA1 9.6.2 Relevant metabolites, degradation and reaction products PEC\(_{gw}\) values

PEC\(_{gw}\) for BYI 02960 metabolites

For BYI 02960, the metabolites difluoroacetic acid (DFA) and 6-chloronicotinic acid (6-CNA) were assessed.

**Use in Hops:**

**Tier-1:**

**Report:** KIIIA1 9.6.2/01.

**Title:** FPF PEC\(_{gw}\) EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Hops in Europe

**Report no.** EnSa-12-0089

**Document No** M-427737-01-1

**Guidelines:** FOCUS 2000, SANCO/321/2000, rev. 2
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 1
FOCUS 2010, version 2.0

**GLP:** No (calculation)

**Tier-2a (DFOP):**

**Report:** KIIIA1 9.6.2/02.

**Title:** Tier 2a (DFOP) FPF PEC\(_{gw}\) EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO - Flupyradifurone (BYI 02960) - Difluoroacetic acid (DFA) - 6-Chloronicotinic acid (6-CNA)

**Report no.** EnSa-12-0090

**Document No** M-427992-01-1

**Guidelines:** FOCUS 2000, SANCO/321/2000, rev. 2
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 1
FOCUS 2010, version 2.0

**GLP:** No (calculation)

**Tier-2a (TDS):**

**Report:** KIIIA1 9.6.2/03.

**Title:** Tier 2a (TDS) FPF PEC\(_{gw}\) EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Hops in Europe

**Report no.** EnSa-12-0091

**Document No** M-427980-01-1

**Guidelines:** FOCUS 2000, SANCO/321/2000, rev. 2
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 1
FOCUS 2010, version 2.0

**GLP:** No (calculation)

**Materials and Methods:** PEC\(_{gw}\) for the metabolites were calculated using the approach, scenarios and application described for the calculations for the parent compound in Point 9.6.1.

Compound specific input data for the metabolites are summarised together with the data of the parent compound in Table 9.6.1-4.
**Findings:** The 80th percentile concentrations for BYI 02960 metabolites for the different EU scenarios are presented in Table 9.6.2-1 for Tier 1.

**Tier 1:**

### Table 9.6.2-1: Tier 1 PEC_{gw} of BYI 02960 metabolites (after application of 150 g BYI 02960/ha in hops)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Difluoroacetic acid (DFA) PEC_{gw} [µg/L]</th>
<th>6-Chloronicotinic acid (6-CNA) PEC_{gw} [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year PEARL</td>
<td>every 2nd year PEARL</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>1.074</td>
<td>0.939</td>
</tr>
<tr>
<td>Hamburg</td>
<td>1.423</td>
<td>1.395</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.941</td>
<td>0.953</td>
</tr>
<tr>
<td>Piacenza</td>
<td>0.753</td>
<td>0.709</td>
</tr>
<tr>
<td>Porto</td>
<td>0.597</td>
<td>0.581</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.635</td>
<td>0.477</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.596</td>
<td>0.602</td>
</tr>
</tbody>
</table>

*In italics:* values pass the trigger of 0.1µg/L

PEC_{gw} values for the metabolite DFA are above 0.1 µg/L for all scenarios (both PEARL and PELMO), and for applications taking place every year or every 2nd year, respectively.

PEC_{gw} values for the metabolite 6-CNA are below 0.1 µg/L for all scenarios (both PEARL and PELMO) for applications taking place every year or every 2nd year, respectively. There are no concerns for groundwater for this metabolite.

Additionally, for difluoroacetic acid (DFA), higher tier have been performed, the results are summarized below.

**Tier 2a (DFOP):**

### Table 9.6.2-2: Tier 2a (DFOP): PEC_{gw} of difluoroacetic acid (DFA) in hops (1 x 150 g/ha of parent)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PEC_{gw} [µg/L]</th>
<th>PEC_{gw} [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year PEARL</td>
<td>every 2nd year PEARL</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>0.008</td>
<td>0.875</td>
</tr>
<tr>
<td>Hamburg</td>
<td>1.386</td>
<td>1.335</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.903</td>
<td>0.931</td>
</tr>
<tr>
<td>Piacenza</td>
<td>0.667</td>
<td>0.655</td>
</tr>
<tr>
<td>Porto</td>
<td>0.513</td>
<td>0.500</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.565</td>
<td>0.407</td>
</tr>
<tr>
<td>Thiva</td>
<td>0.523</td>
<td>0.504</td>
</tr>
</tbody>
</table>
Tier 2a (TDS):

Table 9.6.2-3: Tier 2a (TDS): PEC<sub>gw</sub> of difluoroacetic acid (DFA) in hops (1 x 150 g/ha of parent)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year</td>
<td>every 2nd year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
<td>PEARL</td>
<td>PELMO</td>
<td></td>
</tr>
<tr>
<td>Châteaudun</td>
<td>1.007</td>
<td>0.895</td>
<td>0.510</td>
<td>0.450</td>
<td></td>
</tr>
<tr>
<td>Hamburg</td>
<td>1.388</td>
<td>1.335</td>
<td>0.650</td>
<td>0.642</td>
<td></td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>0.912</td>
<td>0.893</td>
<td>0.430</td>
<td>0.398</td>
<td></td>
</tr>
<tr>
<td>Piacenza</td>
<td>0.701</td>
<td>0.671</td>
<td>0.364</td>
<td>0.343</td>
<td></td>
</tr>
<tr>
<td>Porto</td>
<td>0.541</td>
<td>0.538</td>
<td>0.261</td>
<td>0.263</td>
<td></td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.572</td>
<td>0.520</td>
<td>0.298</td>
<td>0.234</td>
<td></td>
</tr>
<tr>
<td>Thiva</td>
<td>0.514</td>
<td>0.525</td>
<td>0.259</td>
<td>0.250</td>
<td></td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1µg/L
In bold: values pass the trigger of 0.75 µg/L

Conclusion:
The groundwater concentration of the metabolite 6-CNA did not exceed the trigger in any scenario at Tier 1.
The PEC in groundwater for the metabolite DFA may exceed the 0.1 µg/L and also the 0.75 µg/L trigger, the concentration was < 10 µg/L in all scenarios. The relevance of the metabolite has been assessed in accordance with Sanco/221/2000 – rev.10 (2003): "Guidance Document on the Assessment of the Relevance of Metabolites in Groundwater", and the metabolite was not relevant in terms of efficacy (see KIIA 8.14.1, M-386333-01-1), genotoxicity and toxicity (see KIIA 5.8/01 - 05) and has also been considered in the dietary risk assessment (see KIIA 5.9).
Please note: DFA was considered in the dietary risk assessment since it is a constituent of the plant residue definition.

Use in Lettuce:

Tier-1:

Report: KIIA 9.6.2-04; 2012
Title: FPF: PEC<sub>gw</sub> EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe
Report no. EnSa-12-0097
Document No M-427736-01-1
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 1
FOCUS 2010, version 2.0
GLP: No (calculation)
Tier-2a (DFOP):

Report: 
Tier-2a (DFOP) - FPF PECgw EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe - Flupyradifurone (BYI 02960) - Difluoroacetic acid (DFA) - 6-Chloronicotinic acid (6-CNA)

Title:
Tier-2a (DFOP) - FPFP ECgw EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe - Flupyradifurone (BYI 02960) - Difluoroacetic acid (DFA) - 6-Chloronicotinic acid (6-CNA)

Guidelines:
FOCUS 2000, SANCO/321/2000, rev. 2
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 4
FOCUS 2010, version 2.0

GLP
No (calculation)

Tier-2a (TDS):

Report: 
Tier-2a (TDS) - FPF PECgw EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe

Title:
Tier-2a (TDS) - FPF PECgw EUR: Predicted environmental concentrations in groundwater recharge based on models FOCUS PEARL and FOCUS PELMO – Use in Lettuce in Europe

Guidelines:
FOCUS 2000, SANCO/321/2000, rev. 2
FOCUS 2006, SANCO/10058/2005, rev. 2
FOCUS 2009, SANCO/13144/2010, version 4
FOCUS 2010, version 2.0

GLP
No (calculation)

Materials and Methods:
PECgw for the metabolites were calculated using the approach, scenarios and application described for the calculations for the parent compound in Point 9.6.1. Compound specific input data for the metabolites are summarised together with the data of the parent compound in Point 9.6.1.

Findings:
The PECgw values for the metabolites for the different EU scenarios are presented for field and glasshouse uses in the following tables.
Tier 1: Single Application (field use)

Table 9.6.2-4: Tier 1 PEC<sub>sw</sub> of BYI 02960 metabolites (field use in lettuce, 1<sup>st</sup> cropping)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Field use</th>
<th>Difluoroacetic acid (DFA) PEC&lt;sub&gt;sw&lt;/sub&gt; [µg/L]</th>
<th>6-chloronicotinic acid (6-CNA) PEC&lt;sub&gt;sw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year</td>
<td>every 2&lt;sup&gt;nd&lt;/sup&gt; year</td>
<td>every year</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
<td>PEARL</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>1.476</td>
<td>1.085</td>
<td>0.687</td>
</tr>
<tr>
<td></td>
<td>0.009</td>
<td>0.009</td>
<td>0.009</td>
</tr>
<tr>
<td>Hamburg</td>
<td>2.382</td>
<td>1.815</td>
<td>1.110</td>
</tr>
<tr>
<td></td>
<td>0.015</td>
<td>0.012</td>
<td>0.001</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>2.733</td>
<td>2.013</td>
<td>1.106</td>
</tr>
<tr>
<td></td>
<td>0.001</td>
<td>0.000</td>
<td>0.001</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>1.461</td>
<td>1.261</td>
<td>0.712</td>
</tr>
<tr>
<td></td>
<td>0.011</td>
<td>0.005</td>
<td>0.057</td>
</tr>
<tr>
<td>Porto</td>
<td>0.760</td>
<td>0.715</td>
<td>0.361</td>
</tr>
<tr>
<td></td>
<td>0.008</td>
<td>0.011</td>
<td>0.003</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.383</td>
<td>0.289</td>
<td>0.193</td>
</tr>
<tr>
<td></td>
<td>0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Thiva</td>
<td>1.056</td>
<td>0.875</td>
<td>0.519</td>
</tr>
<tr>
<td></td>
<td>0.007</td>
<td>0.005</td>
<td>0.003</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1 µg/L.*

Table 9.6.2-5: Tier 1 PEC<sub>sw</sub> of BYI 02960 metabolites (field use in lettuce 2<sup>nd</sup> cropping)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Field use</th>
<th>Difluoroacetic acid (DFA) PEC&lt;sub&gt;sw&lt;/sub&gt; [µg/L]</th>
<th>6-chloronicotinic acid (6-CNA) PEC&lt;sub&gt;sw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year</td>
<td>every 2&lt;sup&gt;nd&lt;/sup&gt; year</td>
<td>every year</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
<td>PEARL</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>1.701</td>
<td>1.725</td>
<td>0.793</td>
</tr>
<tr>
<td></td>
<td>0.012</td>
<td>0.009</td>
<td>0.008</td>
</tr>
<tr>
<td>Hamburg</td>
<td>2.632</td>
<td>2.322</td>
<td>1.250</td>
</tr>
<tr>
<td></td>
<td>0.020</td>
<td>0.019</td>
<td>0.009</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>1.583</td>
<td>1.445</td>
<td>0.759</td>
</tr>
<tr>
<td></td>
<td>0.016</td>
<td>0.013</td>
<td>0.010</td>
</tr>
<tr>
<td>Porto</td>
<td>1.155</td>
<td>1.042</td>
<td>0.589</td>
</tr>
<tr>
<td></td>
<td>0.008</td>
<td>0.006</td>
<td>0.006</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.837</td>
<td>0.761</td>
<td>0.373</td>
</tr>
<tr>
<td></td>
<td>0.001</td>
<td>&lt;0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1 µg/L.*

Tier-2a (DFOP):
Single Application (field use)

Table 9.6.2-6: Tier 2a (DFOP) PEC<sub>sw</sub> of difluoroacetic acid (DFA) (field use in lettuce)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Field use</th>
<th>Difluoroacetic acid (DFA) PEC&lt;sub&gt;sw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year</td>
<td>every 2&lt;sup&gt;nd&lt;/sup&gt; year</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>1.377</td>
<td>1.025</td>
</tr>
<tr>
<td></td>
<td>0.633</td>
<td>0.473</td>
</tr>
<tr>
<td></td>
<td>1.761</td>
<td>1.369</td>
</tr>
<tr>
<td></td>
<td>0.807</td>
<td>0.616</td>
</tr>
<tr>
<td>Hamburg</td>
<td>2.305</td>
<td>1.769</td>
</tr>
<tr>
<td></td>
<td>1.075</td>
<td>0.828</td>
</tr>
<tr>
<td></td>
<td>2.728</td>
<td>2.473</td>
</tr>
<tr>
<td></td>
<td>1.282</td>
<td>1.127</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>2.448</td>
<td>2.014</td>
</tr>
<tr>
<td></td>
<td>1.098</td>
<td>0.935</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>1.493</td>
<td>1.245</td>
</tr>
<tr>
<td></td>
<td>0.687</td>
<td>0.581</td>
</tr>
<tr>
<td></td>
<td>1.658</td>
<td>1.573</td>
</tr>
<tr>
<td></td>
<td>0.761</td>
<td>0.724</td>
</tr>
<tr>
<td>Porto</td>
<td>0.620</td>
<td>0.590</td>
</tr>
<tr>
<td></td>
<td>0.296</td>
<td>0.276</td>
</tr>
<tr>
<td></td>
<td>1.298</td>
<td>1.212</td>
</tr>
<tr>
<td></td>
<td>0.598</td>
<td>0.564</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.336</td>
<td>0.240</td>
</tr>
<tr>
<td></td>
<td>0.150</td>
<td>0.108</td>
</tr>
<tr>
<td></td>
<td>0.567</td>
<td>0.373</td>
</tr>
<tr>
<td></td>
<td>0.241</td>
<td>0.164</td>
</tr>
<tr>
<td>Thiva</td>
<td>1.219</td>
<td>0.955</td>
</tr>
<tr>
<td></td>
<td>0.537</td>
<td>0.414</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1 µg/L.*

*In bold: values pass the trigger of 0.75 µg/L.*
Table 9.6.2- 7: Tier 2a (TDS): PEC<sub>gw</sub> of BYI 02960 metabolites (field use in lettuce)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Field use Lettuce, 1&lt;sup&gt;st&lt;/sup&gt; cropping, 1 x 125 g/ha of parent (TDS)</th>
<th></th>
<th>Field use Lettuce, 2&lt;sup&gt;nd&lt;/sup&gt; cropping, 1 x 125 g/ha of parent (TDS)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Difluoroacetic acid (DFA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td></td>
<td>Difluoroacetic acid (DFA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td></td>
</tr>
<tr>
<td>Châteaudun</td>
<td>1.363, 0.994, 0.628, 0.469</td>
<td></td>
<td>6.003, 1.236, 0.223, 0.561</td>
<td></td>
</tr>
<tr>
<td>Hamburg</td>
<td>2.289, 1.744, 1.067, 0.865</td>
<td></td>
<td>2.578, 2.412, 0.212, 1.072</td>
<td></td>
</tr>
<tr>
<td>Jokioinen</td>
<td>2.278, 1.930, 1.049, 0.926</td>
<td></td>
<td>1.584, 1.417, 0.721, 0.676</td>
<td></td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>1.377, 1.208, 0.675, 0.572</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Porto</td>
<td>0.698, 0.668, 0.330, 0.286</td>
<td></td>
<td>0.083, 1.038, 0.534, 0.515</td>
<td></td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.351, 0.257, 0.171, 0.119</td>
<td></td>
<td>0.517, 0.383, 0.246, 0.164</td>
<td></td>
</tr>
<tr>
<td>Thiva</td>
<td>0.957, 0.808, 0.449, 0.347</td>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1 µg/L
In bold: values pass the trigger of 0.75 µg/L

Considering the use in the field PEC<sub>gw</sub> values for the metabolite DFA are above 0.1 µg/L for all scenarios (both PEARL and PELMO), and for applications taking place every year or every 2<sup>nd</sup> year, at Tier 1 and Tier 2.

PEC<sub>gw</sub> values for the metabolite 6-CNA are below 0.1 µg/L for all scenarios (both PEARL and PELMO) at tier 1, for applications taking place every year or every 2<sup>nd</sup> year, respectively. There are no concerns for groundwater for this metabolite.

Tier 1: Multiple Applications (glasshouse use)

Table 9.6.2- 8: Tier 1 PEC<sub>gw</sub> of BYI 02960 metabolites (glasshouse use in lettuce, 1<sup>st</sup> cropping)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Glasshouse use Lettuce, 1&lt;sup&gt;st&lt;/sup&gt; cropping, 2 x 125 g/ha of parent</th>
<th></th>
<th>Glasshouse use Lettuce, 2&lt;sup&gt;nd&lt;/sup&gt; cropping, 2 x 125 g/ha of parent</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Difluoroacetic acid (DFA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td></td>
<td>6-chloronicotinic acid (6-CNA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</td>
<td></td>
</tr>
<tr>
<td>Châteaudun</td>
<td>3.155, 3.326, 1.498, 1.116</td>
<td></td>
<td>0.022, 0.016, 0.009, 0.007</td>
<td></td>
</tr>
<tr>
<td>Hamburg</td>
<td>5.048, 3.857, 2.483, 1.923</td>
<td></td>
<td>0.038, 0.037, 0.019, 0.015</td>
<td></td>
</tr>
<tr>
<td>Jokioinen</td>
<td>5.179, 4.370, 2.496, 2.043</td>
<td></td>
<td>0.021, 0.018, 0.008, 0.007</td>
<td></td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>3.144, 2.873, 1.560, 1.313</td>
<td></td>
<td>0.028, 0.027, 0.013, 0.012</td>
<td></td>
</tr>
<tr>
<td>Porto</td>
<td>1.609, 1.481, 0.753, 0.673</td>
<td></td>
<td>0.020, 0.022, 0.009, 0.010</td>
<td></td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.832, 0.637, 0.438, 0.302</td>
<td></td>
<td>0.002, 0.001, &lt;0.001, &lt;0.001</td>
<td></td>
</tr>
<tr>
<td>Thiva</td>
<td>2.355, 1.921, 1.181, 0.948</td>
<td></td>
<td>0.019, 0.015, 0.008, 0.006</td>
<td></td>
</tr>
</tbody>
</table>

In italics: values pass the trigger of 0.1 µg/L
Table 9.6.2- 9: Tier 1 PEC<sub>gw</sub> of BYI 02960 metabolites (glasshouse use in lettuce, 2<sup>nd</sup> cropping)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Glasshouse use Lettuce, 2&lt;sup&gt;nd&lt;/sup&gt; cropping, 2 x 125 g/ha of parent Difluoroacetic acid (DFA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
<th>6-chloronicotinic acid (6-CNA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year</td>
<td>every 2&lt;sup&gt;nd&lt;/sup&gt; year</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>3.625</td>
<td>2.864</td>
</tr>
<tr>
<td></td>
<td>1.726</td>
<td>1.332</td>
</tr>
<tr>
<td></td>
<td>0.030</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>0.012</td>
<td>0.016</td>
</tr>
<tr>
<td>Hamburg</td>
<td>5.568</td>
<td>5.020</td>
</tr>
<tr>
<td></td>
<td>2.653</td>
<td>2.409</td>
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<td></td>
<td>0.050</td>
<td>0.044</td>
</tr>
<tr>
<td></td>
<td>0.024</td>
<td>0.014</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>3.377</td>
<td>3.043</td>
</tr>
<tr>
<td></td>
<td>1.619</td>
<td>1.536</td>
</tr>
<tr>
<td></td>
<td>0.034</td>
<td>0.035</td>
</tr>
<tr>
<td></td>
<td>0.014</td>
<td>0.014</td>
</tr>
<tr>
<td>Porto</td>
<td>2.493</td>
<td>2.353</td>
</tr>
<tr>
<td></td>
<td>1.269</td>
<td>1.181</td>
</tr>
<tr>
<td></td>
<td>0.033</td>
<td>0.039</td>
</tr>
<tr>
<td></td>
<td>0.016</td>
<td>0.017</td>
</tr>
<tr>
<td>Sevilla</td>
<td>1.297</td>
<td>0.911</td>
</tr>
<tr>
<td></td>
<td>0.637</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
<td>0.003</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>0.001</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1 µg/L*

Tier 2 a (DFOP): Multiple Applications (glasshouse use)

Table 9.6.2- 10: Tier 2a (DFOP) PEC<sub>gw</sub> of difluoroacetic acid (DFA) (glasshouse use in lettuce)

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Glasshouse use Lettuce, 1&lt;sup&gt;st&lt;/sup&gt; cropping, 2 x 125 g/ha of parent (DFOP) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
<th>Glasshouse use Lettuce, 2&lt;sup&gt;nd&lt;/sup&gt; cropping, 2 x 125 g/ha of parent (DFOP) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year</td>
<td>every 2&lt;sup&gt;nd&lt;/sup&gt; year</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td></td>
<td>PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>2.832</td>
<td>2.987</td>
</tr>
<tr>
<td></td>
<td>2.320</td>
<td>0.933</td>
</tr>
<tr>
<td></td>
<td>0.872</td>
<td>0.865</td>
</tr>
<tr>
<td></td>
<td>1.676</td>
<td>1.319</td>
</tr>
<tr>
<td>Hamburg</td>
<td>4.797</td>
<td>4.492</td>
</tr>
<tr>
<td></td>
<td>2.211</td>
<td>1.452</td>
</tr>
<tr>
<td></td>
<td>0.602</td>
<td>0.507</td>
</tr>
<tr>
<td></td>
<td>2.615</td>
<td>2.312</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>4.977</td>
<td>4.180</td>
</tr>
<tr>
<td></td>
<td>2.271</td>
<td>1.621</td>
</tr>
<tr>
<td></td>
<td>0.621</td>
<td>0.551</td>
</tr>
<tr>
<td></td>
<td>2.615</td>
<td>2.312</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>2.961</td>
<td>2.487</td>
</tr>
<tr>
<td></td>
<td>2.271</td>
<td>1.621</td>
</tr>
<tr>
<td></td>
<td>0.621</td>
<td>0.551</td>
</tr>
<tr>
<td></td>
<td>2.615</td>
<td>2.312</td>
</tr>
<tr>
<td>Porto</td>
<td>1.318</td>
<td>1.174</td>
</tr>
<tr>
<td></td>
<td>0.618</td>
<td>0.605</td>
</tr>
<tr>
<td></td>
<td>0.287</td>
<td>0.267</td>
</tr>
<tr>
<td></td>
<td>1.443</td>
<td>1.086</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.630</td>
<td>0.469</td>
</tr>
<tr>
<td></td>
<td>0.209</td>
<td>0.214</td>
</tr>
<tr>
<td></td>
<td>0.038</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td>0.500</td>
<td>0.341</td>
</tr>
<tr>
<td>Thiva</td>
<td>1.527</td>
<td>1.200</td>
</tr>
<tr>
<td></td>
<td>0.963</td>
<td>0.603</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*In italics: values pass the trigger of 0.1 µg/L*

**In bold:** values pass the trigger of 0.75 µg/L
**Tier-2a (TDS): Multiple Applications (glasshouse use)**

**Table 9.6.2- 11: Tier 2a (TDS): PEC<sub>gw</sub> of BYI 02960 metabolites (glasshouse use in lettuce)**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Glasshouse use Lettuce, 1&lt;sup&gt;st&lt;/sup&gt; cropping, 2 x 125 g/ha of parent (TDS)</th>
<th>Difluoroacetic acid (DFA) PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
<th>Glasshouse use Lettuce, 2&lt;sup&gt;nd&lt;/sup&gt; cropping, 2 x 125 g/ha of parent (TDS)</th>
<th>PEC&lt;sub&gt;gw&lt;/sub&gt; [µg/L]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>every year PEARL</td>
<td>PELMO</td>
<td>every 2&lt;sup&gt;nd&lt;/sup&gt; year PEARL</td>
<td>PELMO</td>
</tr>
<tr>
<td>Châteaudun</td>
<td>2.944</td>
<td>2.143</td>
<td>1.370</td>
<td>1.027</td>
</tr>
<tr>
<td>Jokioinen</td>
<td>4.968</td>
<td>4.194</td>
<td>2.383</td>
<td>1.980</td>
</tr>
<tr>
<td>Kremsmuenster</td>
<td>3.001</td>
<td>2.581</td>
<td>1.473</td>
<td>1.240</td>
</tr>
<tr>
<td>Porto</td>
<td>1.479</td>
<td>1.393</td>
<td>0.687</td>
<td>0.639</td>
</tr>
<tr>
<td>Sevilla</td>
<td>0.764</td>
<td>0.561</td>
<td>0.392</td>
<td>0.270</td>
</tr>
<tr>
<td>Thiva</td>
<td>2.172</td>
<td>1.819</td>
<td>1.102</td>
<td>0.806</td>
</tr>
</tbody>
</table>

*In italics*: values pass the trigger of 0.1 µg/L  
*In bold*: values pass the trigger of 0.75 µg/L

Considering the use in the glasshouses the PEC<sub>gw</sub> values for the metabolite DFA are above 0.1 µg/L for all scenarios (both PEARL and PELMO), and for applications taking place every year or every 2<sup>nd</sup> year, at Tier 1 and Tier 2.

PEC<sub>gw</sub> values for the metabolite 6-CNA are below 0.1 µg/L for all scenarios (both PEARL and PELMO) at tier 1, and for applications taking place every year or every 2<sup>nd</sup> year, respectively. There are no concerns for groundwater for this metabolite.

**Conclusion:**
The groundwater concentration of the metabolite 6-CNA did not exceed the trigger in any scenario. The PEC in groundwater for the metabolite DFA may exceed the 0.1 µg/L and also the 0.75 µg/L trigger, the concentration was < 10 µg/L in all scenarios. The relevance of the metabolite has been assessed in accordance with SANCO/221/2000 – rev.10 (2003): “Guidance Document on the Assessment of the Relevance of Metabolites in Groundwater”, and the metabolite was not relevant in terms of efficacy (see KIIA 8.14, KOM-38333-01-4), genotoxicity and toxicity (see KIIA 5.8/01 - 05) and has also been considered in the dietary risk assessment (see KIIA 6.9).

Please note: DFA was considered in the dietary risk assessment since it is a constituent of the plant residue definition.

**IIIA1 9.6.3 Additional field testing**
No additional field testing was required.

**IIIA1 9.6.4 Information on impact on water treatment procedure**
The compound would not be expected to reach water treatment plants in sufficient concentrations to have any impact on water treatment procedure.
IIIA 9.7 Predicted environmental concentrations in surface water (PECsw)

No specific information is available for the preparation, however the information on the active substance submitted in the relevant Annex II, Section 7 documents is also applicable. A summary of this information is presented below.

Summary of fate and behaviour of BYI 02960 in water

BYI 02960 was stable to hydrolysis at all pHs but was very rapidly degraded under the influence of photolysis (buffer and sterile natural water) to produce two major transformation products BYI 02960-succinamide and BYI 02960-azabicyclosuccinamide. The half-life was calculated to be equivalent to 2.7 days calculated for Athens, Greece.

In aerobic water/sediment systems it was concluded that BYI 02960 dissipated rapidly from the water phase and was slowly degraded, the half-life in the total system ranged from 190 to 250 days. DFA was formed at a maximum of ca. 6% in one water system, mineralisation to $^{14}$CO$_2$ was also significant (maximum 8.5% after 120 days). Non-extractable residues remained at relatively low levels throughout the studies increasing to a maximum of 25% in one sediment system with the PYR label. An additional study showed that if present in water the metabolite DFA would be more slowly degraded systems with the formation of CO$_2$ (max. 25%) and low levels of non-extractable residues (max.. 16%).

A proposed degradation pathway is given in Figure 9.7-1.
Figure 9.7-1: Proposed degradation pathway in aquatic systems

![Degradation Pathway Diagram](image)

**Tier 2, IIIA, Sec. 5, Point 9: BYI 02960 SL 200 G**

**PEC<sub>sw</sub> modelling approach**

**Calculation of PEC values for the active substance and metabolites according to FOCUS**

FOCUS<sub>sw</sub> is a four tiered approach:

**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<sub>sw</sub> and PEC<sub>sed</sub> is calculated.

**Step 2:** A refinement is made whereby 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.

Note: The degradates to be observed as well as the given maximum values are highly dependent on radiolabel and kind of study considered; Ph = photo-transformation.
Note: There are currently no European guidelines for the assessment of exposure of surface water from the use in glasshouses, therefore it was assumed that the use in glasshouses on lettuce is covered by the outdoor field use even considering the different use pattern.

**PEC\_sw for BYI 02960**

**Report:**  KIIIA1 9.7/01, [512x789]: 2012
**Title:** FPF PEC\_sw FOCUS EU: Predicted environmental concentrations in surface water and sediment - Use in Hops and Lettuce in Europe
**Report no:** EnSa-12-0071
**Document No:** M-427646-01-1
**Guidelines:**
- FOCUS 2000, SANCO/321/2000-rev.2
- FOCUS 2003, SANCO/4802/2001-rev.2
- FOCUS 2006, SANCO/10058/2005 version 2.0
- FOCUS 2007, SANCO 10422/2005 version 2.0
**GLP:** No (calculation)

**Materials and Methods:** Predicted environmental concentrations in surface water and sediment (PEC\_sw and PEC\_sed) of BYI02960 have been calculated for the use in hop and lettuce 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.

Details of the parameters used in the calculations are summarised in Table 9.7-1.

As there is currently no established model for the assessment of exposure of surface water following application in greenhouses the use is assumed to be covered by the field application even considering the higher use rate in greenhouses as the route of entry into surface water would be expected to be much lower following the use in greenhouses.

**Table 9.7-1 Comparison of actual and calculated use pattern (for FOCUS step 1&2)**

<table>
<thead>
<tr>
<th>Individual Crop</th>
<th>FOCUS Crop Used for Interception</th>
<th>Rate per Season g a.i./ha</th>
<th>Application Interval Plant Interception [%]</th>
<th>Growth Stage</th>
<th>Amount Reaching the Soil per Season application [g a.i./ha]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hops, GAP</td>
<td>hops</td>
<td>1 x 150</td>
<td>-</td>
<td>31-75</td>
<td>-</td>
</tr>
<tr>
<td>Hops, simulation</td>
<td>1 x 150</td>
<td>-</td>
<td>50 (average crop cover)</td>
<td>31-75</td>
<td>1 x 75</td>
</tr>
<tr>
<td>Lettuce (F), GAP</td>
<td>leafy vegetables</td>
<td>1 x 125</td>
<td>-</td>
<td>12-49</td>
<td>-</td>
</tr>
<tr>
<td>Lettuce (F), simulation 1)</td>
<td>1 x 125</td>
<td>-</td>
<td>25 (minimal crop cover)</td>
<td>12-49</td>
<td>1 x 93.75</td>
</tr>
</tbody>
</table>

1) First or second cropping per year
F = field use

At FOCUS step 3 actual application dates were determined by the PAT (pesticide application timer) included within SWASH. Details on application timing are summarised in Table 9.7-2.
## Table 9.7- 2 Application dates of BYI 02960 (FOCUS Step 3)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Hops</th>
<th>Lettuce</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAT start date</td>
<td>Absolute</td>
<td>Absolute</td>
</tr>
<tr>
<td>rel./absolute</td>
<td>ground spray</td>
<td>ground spray</td>
</tr>
<tr>
<td>Appl. method</td>
<td>(CAM 2)</td>
<td>(CAM 2)</td>
</tr>
<tr>
<td>(appl. type)</td>
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<td>2</td>
</tr>
<tr>
<td>No of appl. range</td>
<td>98</td>
<td>var. Range</td>
</tr>
<tr>
<td>Appl. interval</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Application Details</td>
<td>PAT Start Date</td>
<td>PAT Start Date</td>
</tr>
<tr>
<td>(Julian Day)</td>
<td>Appl. Date</td>
<td>(Julian Day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Appl. Date</td>
</tr>
<tr>
<td>D1 (1st)</td>
<td></td>
<td>01-May</td>
</tr>
<tr>
<td>D2 (1st)</td>
<td></td>
<td>04-May</td>
</tr>
<tr>
<td>D3 (1st)</td>
<td>02-Apr</td>
<td>04-May</td>
</tr>
<tr>
<td>D3 (2nd)</td>
<td>09-Aug</td>
<td>18-May</td>
</tr>
<tr>
<td>D4 (1st)</td>
<td>19-May</td>
<td>18-May</td>
</tr>
<tr>
<td>D5 (1st)</td>
<td>26-Apr</td>
<td>23-Apr</td>
</tr>
<tr>
<td>D6 (1st)</td>
<td>01-Mar</td>
<td>06-Mar</td>
</tr>
<tr>
<td>D6 (2nd)</td>
<td>20-Jun</td>
<td>25-Jun</td>
</tr>
<tr>
<td>R1 (1st)</td>
<td>01-Mar (122)</td>
<td>09-Mar (121)</td>
</tr>
<tr>
<td>R1 (2nd)</td>
<td>04-Aug</td>
<td>20-Aug</td>
</tr>
<tr>
<td>R2 (1st)</td>
<td>01-Mar (67)</td>
<td>22-Mar</td>
</tr>
<tr>
<td>R2 (2nd)</td>
<td>06-Aug</td>
<td>06-Aug</td>
</tr>
<tr>
<td>R3 (1st)</td>
<td>06-Mar</td>
<td>10-Mar</td>
</tr>
<tr>
<td>R3 (2nd)</td>
<td>20-Jun</td>
<td>25-Jun</td>
</tr>
<tr>
<td>R4 (1st)</td>
<td>06-Mar (172)</td>
<td>06-Mar</td>
</tr>
<tr>
<td>R4 (2nd)</td>
<td>20-Jun</td>
<td>23-Jun</td>
</tr>
</tbody>
</table>

Compound specific input data are summarised in Table 9.7- 3.
Table 9.7- 3  Substance specific and model related input parameter for PEC_{sw} calculation of BYI 02960

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>BYI 02960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molar Mass</td>
<td>g/mol</td>
<td>288.7</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>mg/L</td>
<td>3200</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>Pa</td>
<td>9.1 x 10^{-7}</td>
</tr>
<tr>
<td>K_{oc}</td>
<td>mL/g</td>
<td>98.4</td>
</tr>
<tr>
<td>Freundlich Exponent</td>
<td></td>
<td>0.866</td>
</tr>
<tr>
<td>Degradation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil</td>
<td>days</td>
<td>94.8</td>
</tr>
<tr>
<td>Total System</td>
<td>days</td>
<td>228</td>
</tr>
<tr>
<td>Water</td>
<td>days</td>
<td>228</td>
</tr>
<tr>
<td>Sediment</td>
<td>days</td>
<td>228</td>
</tr>
<tr>
<td>Max Occurrence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water / Sediment</td>
<td>%</td>
<td>100</td>
</tr>
<tr>
<td>Soil</td>
<td>%</td>
<td>100</td>
</tr>
</tbody>
</table>

Findings:

**Step 1 and 2:** The maximum PEC values for Steps 1 and 2 are given in Table 9.7- 4.

Table 9.7- 4 Maximum PEC_{sw} and PEC_{sed} values for BYI 02960 at Step 1 & 2

<table>
<thead>
<tr>
<th>Crop Appl. rate</th>
<th>FOCUS Step</th>
<th>PEC_{sw, max}</th>
<th>PEC_{sed, max}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>[µg/L]</td>
<td>[µg/kg]</td>
</tr>
<tr>
<td>Hops</td>
<td>1 (N-GE)</td>
<td>53.36</td>
<td>43.49</td>
</tr>
<tr>
<td>1 x 150 g/ha</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (S-EU)</td>
<td>12.49</td>
<td>16.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lettuce</td>
<td>1 (F)</td>
<td>3.410.4</td>
<td>6.249</td>
</tr>
<tr>
<td>1 x 125 g/ha (F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 (S-EU)</td>
<td>11.78</td>
<td>11.51</td>
</tr>
</tbody>
</table>

**Step 3:** The maximum PEC_{sw} and PEC_{sed} values for relevant FOCUS Step 3 scenarios are given in Table 9.7- 5. Time dependent PEC values or time weighted average concentrations are not included in this summary, because they were not used in the risk assessment. However, all values are given in the report.

Table 9.7- 5 Maximum PEC_{sw} and PEC_{sed} of BYI 02960 for relevant scenarios at Step 3 following application to hops

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Entry route</th>
<th>BYI 02960: Hops, 1 x 150 g/ha</th>
<th>PEC_{sw, max}</th>
<th>PEC_{sed, max}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>[µg/L]</td>
<td>[µg/kg]</td>
</tr>
<tr>
<td>R1, pond</td>
<td>Spray drift</td>
<td>0.394</td>
<td>0.795</td>
<td></td>
</tr>
<tr>
<td>R1, stream</td>
<td>Spray drift</td>
<td>5.531</td>
<td>0.362</td>
<td></td>
</tr>
</tbody>
</table>
### Table 9.7-6: Maximum PEC_{sw} and PEC_{sed} values of BYI 02960 for relevant scenarios at Step 3 following application to lettuce, field applications

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Entry route</th>
<th>PEC_{sw, max} [µg/L]</th>
<th>PEC_{sed, max} [µg/kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>D3 (ditch, 1st)</td>
<td>S</td>
<td>0.830</td>
<td>0.380</td>
</tr>
<tr>
<td>D3 (ditch, 2nd)</td>
<td>S</td>
<td>0.840</td>
<td>0.460</td>
</tr>
<tr>
<td>D4 (pond, 1st)</td>
<td>D</td>
<td>1.035</td>
<td>4.545</td>
</tr>
<tr>
<td>D4 (stream, 1st)</td>
<td>S</td>
<td>0.794</td>
<td>1.792</td>
</tr>
<tr>
<td>D6 (ditch, 1st)</td>
<td>D</td>
<td>1.088</td>
<td>0.766</td>
</tr>
<tr>
<td>R1 (pond, 1st)</td>
<td>R</td>
<td>0.060</td>
<td>0.162</td>
</tr>
<tr>
<td>R1 (stream, 1st)</td>
<td>R</td>
<td>0.858</td>
<td>0.221</td>
</tr>
<tr>
<td>R1 (pond, 2nd)</td>
<td>R</td>
<td>0.060</td>
<td>0.024</td>
</tr>
<tr>
<td>R1 (stream, 2nd)</td>
<td>R</td>
<td>2.186</td>
<td>0.334</td>
</tr>
<tr>
<td>R2 (stream, 1st)</td>
<td>R</td>
<td>1.586</td>
<td>0.521</td>
</tr>
<tr>
<td>R2 (stream, 2nd)</td>
<td>R</td>
<td>0.940</td>
<td>0.342</td>
</tr>
<tr>
<td>R3 (stream, 1st)</td>
<td>R</td>
<td>0.262</td>
<td>0.111</td>
</tr>
<tr>
<td>R3 (stream, 2nd)</td>
<td>R</td>
<td>0.252</td>
<td>0.054</td>
</tr>
<tr>
<td>R4 (stream, 1st)</td>
<td>S</td>
<td>0.152</td>
<td>0.048</td>
</tr>
<tr>
<td>R4 (stream, 2nd)</td>
<td>R</td>
<td>4.808</td>
<td>1.255</td>
</tr>
</tbody>
</table>

* S = spray drift, R = run-off, D = drainage
F = Field use

### Step 4: The maximum PEC_{sw} and PEC_{sed} values for relevant FOCUS Step 4 Scenarios with mitigation options are given in the following tables.

<table>
<thead>
<tr>
<th>Buffer Width &amp; Type</th>
<th>FOCUS Scenarios</th>
<th>PEC_{sw, max} [µg/L]</th>
<th>PEC_{sed, max} [µg/kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drift Reduction</td>
<td>25%</td>
<td>50%</td>
</tr>
<tr>
<td>0m (drift)</td>
<td>R1 (pond, 1st)</td>
<td>0.296</td>
<td>0.115</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 2nd)</td>
<td>4.149</td>
<td>2.020</td>
</tr>
</tbody>
</table>
Table 9.7-8: Maximum PEC$_{sw}$ and PEC$_{sed}$ values of BYI 02960 at Step 4 including buffer zones and drift reduction – Hops (1 x 150 g/ha)

| Step 4 Buffer Width & Type | FOCUS Scenario | BYI 02960: Hops, 1 x 150 g/ha PEC$_{sw}$ [µg/L] | | | | | PEC$_{sed}$ [µg/kg] | | | | | | Drift Reduction | 0% | 50% | 75% | 90% | | Drift Reduction | 0% | 50% | 75% | 90% |
| 5m (drift) | R1 (pond, 1st) | 0.445 | 0.223 | 0.111 | 0.045 | 0.891 | 0.065 | 0.244 | 0.105 |
| 10m (drift & run-off) | R1 (pond, 1st) | 4.515 | 2.258 | 1.129 | 0.452 | 0.297 | 0.151 | 0.076 | 0.071 |
| 15m (drift & run-off) | R1 (stream, 1st) | 2.354 | 1.777 | 0.589 | 0.235 | 0.152 | 0.089 | 0.452 | 0.301 |
| 20m (drift & run-off) | R1 (stream, 1st) | 0.141 | 0.071 | 0.035 | 0.035 | 0.302 | 0.183 | 0.406 | 0.136 |

The mitigation from 10 m onwards includes spray drift and concurrent run-off buffer. However, as can be seen from the linear decrease of PEC$_{sw}$ values with increasing drift reduction, the PEC$_{sw}$ is always drift dominated and the run-off buffer does not drive the PEC$_{sw}$.

The step 4 PEC$_{sw}$ for the pond scenario with 5 m buffer and 0% drift reduction is higher compared to the step 3 value. This is due to the default buffer width of 6 m already included in step 3 calculations resulting in a lower drift percentage of 2.63% compared to 2.97% in step 4.

Table 9.7-9: Maximum PEC$_{sw}$ and PEC$_{sed}$ values of BYI 02960 at Step 4 including drift reduction (without buffer) – Lettuce (1 x 125 g/ha, field use)

| Step 4 Buffer Width & Type | FOCUS Scenario | BYI 02960: Lettuce, 1 x 125 g/ha (field use) PEC$_{sw}$ [µg/L] | | | | | PEC$_{sed}$ [µg/kg] | | | | | | Drift Reduction | 25% | 50% | 75% | 90% | | Drift Reduction | 25% | 50% | 75% | 90% |
| 0m (drift) | D3 (ditch, 1st) | 0.626 | 0.344 | 0.235 | 0.117 | 0.335 | 0.334 | 0.333 | 0.332 |
| | D3 (ditch, 2nd) | 0.624 | 0.446 | 0.249 | 0.130 | 0.419 | 0.399 | 0.398 | 0.397 |
| | D4 (pond, 1st) | 0.345 | 0.034 | 1.033 | 1.035 | 4.538 | 4.531 | 4.524 | 4.520 |
| | D4 (stream, 1st) | 0.725 | 0.726 | 0.726 | 0.726 | 1.771 | 1.771 | 1.771 | 1.771 |
| | D6 (ditch, 1st) | 1.256 | 0.029 | 0.035 | 0.035 | 1.766 | 1.765 | 1.765 | 1.764 |
| | R1 (pond, 1st) | 0.073 | 0.085 | 0.085 | 0.085 | 0.043 | 0.148 | 0.134 | 0.119 | 0.111 |
| | R1 (stream, 1st) | 0.658 | 0.858 | 0.858 | 0.858 | 0.210 | 0.208 | 0.207 | 0.206 |
| | R1 (pond, 2nd) | 0.092 | 0.085 | 0.085 | 0.085 | 0.079 | 0.240 | 0.225 | 0.210 | 0.201 |
| | R1 (stream, 2nd) | 1.186 | 1.186 | 1.186 | 1.186 | 0.333 | 0.332 | 0.330 | 0.330 |
| | R2 (stream, 1st) | 1.250 | 1.586 | 1.586 | 1.586 | 0.520 | 0.520 | 0.519 | 0.518 |
| | R2 (stream, 2nd) | 0.940 | 0.940 | 0.940 | 0.940 | 0.342 | 0.341 | 0.341 | 0.340 |
| | R3 (stream, 1st) | 2.226 | 2.226 | 2.226 | 2.226 | 0.466 | 0.462 | 0.459 | 0.456 |
| | R3 (stream, 2nd) | 3.570 | 3.570 | 3.570 | 3.570 | 1.006 | 1.000 | 0.995 | 0.991 |
| | R4 (stream, 1st) | 0.393 | 0.260 | 0.131 | 0.074 | 0.041 | 0.027 | 0.025 | 0.024 |
| | R4 (stream, 2nd) | 4.808 | 4.808 | 4.808 | 4.808 | 1.253 | 1.251 | 1.249 | 1.248 |
Table 9.7- 10: Maximum PEC<sub>sw</sub> and PEC<sub>sed</sub> values of BYI 02960 at Step 4 including buffer zones and drift reduction – Lettuce (1 x 125 g/ha, field use, 5 and 10m buffer zones)

<table>
<thead>
<tr>
<th>Step 4 Buffer Width &amp; Type</th>
<th>FOCUS Scenario</th>
<th>BYI 02960: Lettuce, 1 x 125 g/ha (field use)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PEC&lt;sub&gt;sw&lt;/sub&gt; [μg/L]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>5m (drift)</td>
<td>D3 (ditch, 1st)</td>
<td>0.252</td>
</tr>
<tr>
<td></td>
<td>D3 (ditch, 2nd)</td>
<td>0.265</td>
</tr>
<tr>
<td></td>
<td>D4 (pond, 1st)</td>
<td>1.035</td>
</tr>
<tr>
<td></td>
<td>D4 (stream, 1st)</td>
<td>0.721</td>
</tr>
<tr>
<td></td>
<td>D6 (ditch, 1st)</td>
<td>1.268</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 1st)</td>
<td>0.057</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 1st)</td>
<td>0.858</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 2nd)</td>
<td>0.094</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 2nd)</td>
<td>1.186</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 1st)</td>
<td>1.586</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 2nd)</td>
<td>0.940</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 1st)</td>
<td>2.226</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 2nd)</td>
<td>3.570</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 1st)</td>
<td>0.191</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 2nd)</td>
<td>4.808</td>
</tr>
<tr>
<td>10m (drift and run-off)</td>
<td>D3 (ditch, 1st)</td>
<td>0.151</td>
</tr>
<tr>
<td></td>
<td>D3 (ditch, 2nd)</td>
<td>0.165</td>
</tr>
<tr>
<td></td>
<td>D4 (pond, 1st)</td>
<td>1.034</td>
</tr>
<tr>
<td></td>
<td>D4 (stream, 1st)</td>
<td>0.721</td>
</tr>
<tr>
<td></td>
<td>D6 (ditch, 1st)</td>
<td>1.268</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 1st)</td>
<td>0.057</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 1st)</td>
<td>0.858</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 2nd)</td>
<td>0.094</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 2nd)</td>
<td>1.186</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 1st)</td>
<td>1.586</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 2nd)</td>
<td>0.940</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 1st)</td>
<td>2.226</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 2nd)</td>
<td>3.570</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 1st)</td>
<td>0.191</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 2nd)</td>
<td>4.808</td>
</tr>
</tbody>
</table>
Table 9.7- 11: Maximum PEC_{cw} and PEC_{sed} values of BYI 02960 at Step 4 including buffer zones and drift reduction – Lettuce (1 x 125 g/ha, field use, 15 and 20m buffer zones)

<table>
<thead>
<tr>
<th>Step 4 Buffer Width &amp; Type</th>
<th>FOCUS Scenario</th>
<th>BYI 02960: Lettuce, 1 x 125 g/ha (field use)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PEC_{cw} [µg/L]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>15m (drift and run-off)</td>
<td>D3 (ditch, 1st)</td>
<td>0.115</td>
</tr>
<tr>
<td></td>
<td>D3 (ditch, 2nd)</td>
<td>0.129</td>
</tr>
<tr>
<td></td>
<td>D4 (pond, 1st)</td>
<td>1.034</td>
</tr>
<tr>
<td></td>
<td>D4 (stream, 1st)</td>
<td>0.721</td>
</tr>
<tr>
<td></td>
<td>D6 (ditch, 1st)</td>
<td>1.268</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 1st)</td>
<td>0.018</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 1st)</td>
<td>0.204</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 2nd)</td>
<td>0.025</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 2nd)</td>
<td>0.283</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 1st)</td>
<td>0.375</td>
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<tr>
<td></td>
<td>R2 (stream, 2nd)</td>
<td>0.220</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 1st)</td>
<td>0.528</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 2nd)</td>
<td>0.856</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 1st)</td>
<td>0.069</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 2nd)</td>
<td>1.144</td>
</tr>
<tr>
<td>20m (drift and run-off)</td>
<td>D3 (ditch, 1st)</td>
<td>0.097</td>
</tr>
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<td></td>
<td>D3 (ditch, 2nd)</td>
<td>0.110</td>
</tr>
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<td>D4 (pond, 1st)</td>
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<td>D4 (stream, 1st)</td>
<td>0.721</td>
</tr>
<tr>
<td></td>
<td>D6 (ditch, 1st)</td>
<td>1.268</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 1st)</td>
<td>0.047</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 1st)</td>
<td>0.204</td>
</tr>
<tr>
<td></td>
<td>R1 (pond, 2nd)</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>R1 (stream, 2nd)</td>
<td>0.283</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 1st)</td>
<td>0.375</td>
</tr>
<tr>
<td></td>
<td>R2 (stream, 2nd)</td>
<td>0.220</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 1st)</td>
<td>0.528</td>
</tr>
<tr>
<td></td>
<td>R3 (stream, 2nd)</td>
<td>0.856</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 1st)</td>
<td>0.069</td>
</tr>
<tr>
<td></td>
<td>R4 (stream, 2nd)</td>
<td>1.144</td>
</tr>
</tbody>
</table>

**IIIA1 9.7.1 Initial PEC_{cw} value for static water bodies**

Please refer to point IIIA 9.7.

**IIIA1 9.7.2 Initial PEC_{sw} value for slow moving water bodies**

Please refer to point IIIA 9.7.

**IIIA1 9.7.3 Short-term PEC_{sw} values for static water bodies**

Please refer to point IIIA 9.7.

**IIIA1 9.7.4 Short-term PEC_{sw} values for slow moving water bodies**

Please refer to point IIIA 9.7.

**IIIA1 9.7.5 Long-term PEC_{sw} values for static water bodies**

Please refer to point IIIA 9.7.
IIIA 9.7.6  Long-term PECsw values for slow moving water bodies

Please refer to point IIIA 9.7.

IIIA 9.8  PECsw for relevant metabolites

PECsw for BYI 02960 metabolites

For BYI 02960, the metabolites difluoracetic acid (DFA), 6-chloronicotinic acid (6-CNA) and BYI 02960-succinamide and BYI 02960-azabicyclosuccinamide were assessed.

Materials and Methods: PECsw for the metabolites were calculated using the approach, scenarios and application rates described for the calculations for the parent compound in Point 9.7. Input parameters for the metabolites are described in Table 9-1.

Table 9-1: Substance specific and model related input parameters for PECsw calculation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>DFA</th>
<th>6-CNA</th>
<th>BYI 02960- succinamide</th>
<th>BYI 02960-azabicyclo- succinamide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molar Mass</td>
<td>g/mol</td>
<td>96.03</td>
<td>157.6</td>
<td>306.7</td>
<td>288.3</td>
</tr>
<tr>
<td>Water Solubility</td>
<td>mg/L</td>
<td>500000</td>
<td>1430</td>
<td>120000</td>
<td>180000</td>
</tr>
<tr>
<td>Koc</td>
<td>mL/g</td>
<td>6.8</td>
<td>88</td>
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<td>Soil</td>
<td>days</td>
<td>44.7</td>
<td>4.7</td>
<td>0.1*</td>
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<td>1000</td>
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</tr>
<tr>
<td>Water</td>
<td>days</td>
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<td>1000</td>
<td>1000</td>
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<tr>
<td>Sediment</td>
<td>days</td>
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<tr>
<td>Max Occurrence</td>
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<td>Water / Sediment</td>
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<td>Soil</td>
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<td>33.3</td>
<td>17.1</td>
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* The DT_{50} soil was set to 0.1 d as the model STEP2 does not accept 0 d.
Findings:

Step 1 and 2: The maximum PEC values for the metabolites of BYI 02960 at Step 1 and Step 2 are given in Table 9.8-2. Time dependent PEC values or time-weighted average concentrations are not included in this summary, because they were not used in the risk assessment. However, all values are given in the report.

Table 9.8-2: Maximum PEC_{sw} and PEC_{sed} values for metabolites of BYI 02960

<table>
<thead>
<tr>
<th>Crop</th>
<th>FOCUS</th>
<th>Diffuorooacetic acid</th>
<th>6-Chloronicotinic acid</th>
<th>BYI 02960 Succinamide</th>
<th>BYI 02960 Azabicyclo Succinamide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>PEC_{sw} [µg/L]</td>
<td>PEC_{sed} [µg/kg]</td>
<td>PEC_{sw} [µg/L]</td>
<td>PEC_{sed} [µg/kg]</td>
</tr>
<tr>
<td>Hops 1 x 150 g/ha</td>
<td>Step 1</td>
<td>5.810</td>
<td>0.380</td>
<td>4.177</td>
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<td>Step 2</td>
<td>0.743</td>
<td>0.050</td>
<td>0.232</td>
<td>0.204</td>
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<tr>
<td></td>
<td>Step 2</td>
<td>1.268</td>
<td>0.086</td>
<td>0.463</td>
<td>0.408</td>
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<tr>
<td>Lettuce 1 x 125 g/ha (F)</td>
<td>Step 2</td>
<td>0.682</td>
<td>0.046</td>
<td>0.239</td>
<td>0.255</td>
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<td></td>
<td>Step 2</td>
<td>1.339</td>
<td>0.091</td>
<td>0.579</td>
<td>0.509</td>
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</tbody>
</table>

F = Field use

IIIA1 9.8.1 Initial PEC_{sw} value for static water bodies
Please refer to point IIIA 9.8.

IIIA1 9.8.2 Initial PEC_{sw} value for slow moving water bodies
Please refer to point IIIA 9.8.

IIIA1 9.8.3 Short-term PEC_{sw} values for static water bodies
Please refer to point IIIA 9.8.

IIIA1 9.8.4 Short-term PEC_{sw} values for slow moving water bodies
Please refer to point IIIA 9.8.

IIIA1 9.8.5 Long-term PEC_{sw} values for static water bodies
Please refer to point IIIA 9.8.

IIIA1 9.8.6 Long-term PEC_{sw} values for slow moving water bodies
Please refer to point IIIA 9.8.

IIIA1 9.8.7 Additional field studies
Please refer to point IIIA 9.8.
IIIA1 9.9  Fate and behaviour in air
Based on the results of vapour pressure and Henry’s law constant determination it is concluded that significant volatilization of BYI 02960 in the environment is not expected. If BYI 02960 enters the atmosphere it would be rapidly degraded with a half-life of 13.1 hours (long-term scenario).

IIIA1 9.9.1  Spray droplet size spectrum - laboratory studies
Not required by current regulations.

IIIA1 9.9.2  Drift - field evaluation
Not required by current regulations.

IIIA1 9.10  Other/special studies

IIIA1 9.10.1  Other/special studies - laboratory studies
Not required by current regulations.

IIIA1 9.10.2  Other/special studies - field studies
Not required by current regulations.
List of BYI 02960 metabolites mentioned in this Section

<table>
<thead>
<tr>
<th>No.</th>
<th>Name used in current Section name, Structure</th>
<th>Molecular formula</th>
<th>Molar mass</th>
<th>Other names / codes</th>
<th>Occurrence / considered in</th>
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<tr>
<td>M27</td>
<td>6-CNA</td>
<td>C&lt;sub&gt;6&lt;/sub&gt;H&lt;sub&gt;4&lt;/sub&gt;Cl N O&lt;sub&gt;2&lt;/sub&gt;</td>
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<td>IC-0 (reports of Nippon Soda Co. Ltd)</td>
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<td>BYI 02960-6-CNA</td>
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<td>M44</td>
<td>DFA</td>
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<td>96.03 g/mol</td>
<td>difluoroacetic acid</td>
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The following are minor metabolites in environmental matrices and are not considered in PEC calculations

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<th>No.</th>
<th>Name used in current Section name, Structure</th>
<th>Molecular formula</th>
<th>Molar mass</th>
<th>Other names / codes</th>
<th>Occurrence / considered in</th>
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* refers to number in Document N