MON 52276
(360 g/L glyphosate acid)

DOCUMENT M-CP, Section 9

FATE AND BEHAVIOUR IN THE ENVIRONMENT

OWNERSHIP STATEMENT

This document, the data contained in it and copyright therein are owned by one or more of the member companies of the European Glyphosate Renewal Group (GRG) with the members Bayer Agriculture BV, Barclay Chemicals Manufacturing Ltd., CIECH Sarzyna S.A., Albaugh Europe SARL, Nufarm GmbH & Co KG, SINON Corporation, Industrias Afrasa S.A., Syngenta Crop Protection AG and/or affiliated entities.

The summaries and evaluations contained in this document are based on unpublished proprietary data submitted for the purpose of the assessment undertaken by the regulatory authority. Other registration authorities should not grant, amend, or renew a registration on the basis of the summaries and evaluation of unpublished proprietary data contained in this document unless they have received the data on which the summaries and evaluation are based, either:

- From Bayer Agriculture BV or respective affiliate; or
- From Barclay Chemicals Manufacturing Ltd. or respective affiliate; or
- From CIECH Sarzyna S.A. or respective affiliate; or
- From Albaugh Europe SARL or respective affiliate; or
- From Nufarm GmbH & Co KG or respective affiliate; or
- From SINON Corporation or respective affiliate; or
- From Industrias Afrasa S.A. or respective affiliate; or
- From Syngenta Crop Protection AG or respective affiliate; or
- From other applicants once the period of data protection has expired.

Version history[1]

Date	Data points containing amendments or additions and brief description	Document identifier and version number
July 2020	CP 9: amendment of GAP table (inclusion of use in citrus) CP 9.1.3: inclusion of explanation regarding the DT_{50} used for AMPA CP 9.2.4: inclusion of explanation regarding the DT_{50} used for AMPA CP 9.2.5: inclusion of explanation of the risk envelope regarding the use in citrus; inclusion of explanation regarding the DT_{50} used for AMPA	

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

Table of Contents

CP 9 FATE AND BEHAVIOUR IN THE ENVIRONMENT

Introduction

Commission Directive 2001/99/EC included glyphosate as an active substance in Annex I to Council Directive 91/414/EEC. Following a peer review organised by the European Commission, glyphosate was included in Annex I of Council Directive 91/414/EEC with Commission Directive 2001/99/EC, entering into force on 01st July 2002. According to Regulation (EU) No 540/2011, glyphosate was deemed for approval under Regulation (EC) No 1107/2009 as well.

In agreement with Article 4 of Regulation (EC) No 1141/2010 Monsanto Europe S.A./N.V. (now Bayer Agriculture BV) on behalf of the then European Glyphosate Task Force submitted an application to Germany as RMS and Slovakia as Co-RMS notifying the intention to renew the existing approval of glyphosate on 24th March 2011 during the AIR 2 process. A collective supplementary dossier from the Glyphosate Task Force comprising 24 applicants was submitted on 25th May 2012.

On 12th November 2015, the European Food Safety Authority (EFSA) published its conclusions on the peer review of the pesticide risk assessment of the active substance glyphosate in the framework of the renewal of the approval under Commission Regulation (EU) No 1141/2010 (EFSA Journal 2015;13(11):4302)[1].

EFSA was requested by the European Commission (EC) to consider available information on the potential endocrine activity of the pesticide active substance glyphosate in accordance with Article 31 of Regulation (EC) No 178/2002. The assessment concluded that the weight of evidence indicates glyphosate does not possess endocrine disrupting properties via oestrogen, androgen, thyroid or steroidogenesis modes of action based on a comprehensive database available in the toxicology area.

On 17th March 2016, the rapporteur Member State, Germany, submitted a dossier to the European Chemical Agency for harmonised classification and labelling of the substance glyphosate. The proposal document was prepared in accordance with Article 37 of Regulation (EC) No 1272/2008 of the European Parliament and of the Council.

The Committee for Risk Assessment (RAC) assessed the hazards presented by glyphosate against the criteria in the Classification, Labelling and Packaging Regulation[2]. The RAC concluded that the available scientific evidence did not meet the criteria in the CLP Regulation and that glyphosate would not be classified as possessing STOT (specific target organ toxicity), carcinogenicity, mutagenicity or reproductive toxicity.

The AIR 2 process at EU level, concluded that it has been established with respect to one or more representative uses of at least one plant protection product containing the active substance glyphosate that the approval criteria provided for in Article 4 of Regulation (EC) No 1107/2009 are satisfied. Thus, the approval criteria of demonstrating a safe use were deemed to be satisfied. It was therefore appropriate to renew the active substance glyphosate[3]. Glyphosate was renewed (date of approval) on 16th December 2017 with the expiration of approval set up for 15th December 2022.

[1] Conclusion on the peer review of the pesticide risk assessment of the active substance glyphosate in the framework of the renewal of the approval under Commission Regulation (EU) No 1141/2010; EFSA Journal 2015;13(11):4302, 107 pp; doi:10.2903/j.efsa.2015.4302.
[2] RAC Opinion proposing harmonised classification and labelling at EU level of glyphosate (ISO); N (phosphono-methyl)glycine. CLH-O-0000001412-86-149/F. Adopted 15 Mar 2017.
[3] COMMISSION IMPLEMENTING REGULATION (EU) 2017/2324.

Bayer Agriculture BV[4] submits the dossier on behalf of the Glyphosate Renewal Group (GRG) for the AIR 5 process.

In the frame of the pre-submission meeting held between the GRG and the Assessment Group on Glyphosate (AGG) on 27th September 2019, the AGG provided a reference document to GRG on the process to be considered when summarizing studies from past submissions in the June 2020 renewal dossier[5].

In 1995, glyphosate active substance dossiers were submitted by both task force and individual companies comprising a total of 19 applicants. The majority of applicants of the 1995 submissions did not join the 2012 Glyphosate Task Force (GTF) nor the GRG submitting the AIR 5 dossier in 2020. The GRG was not able to get access to a total of 46 study reports from three companies that were part of the submissions in 1995 (for details please refer to the Document B, Doc ID: 110054-B-GRG_Jun_2020), because some of the companies involved in the submissions in 1995 have subsequently been acquired by/merged with other companies or have since exited the market. Therefore, the GRG contacted Germany as the former RMS for glyphosate to discuss options available in order for AGG to get access to all said 46 study reports. A list of all these studies was sent to BVL (letter from 03rd March 2020). BVL replied to this request on 24th March 2020, advising the AGG to send a "request for administrative assistance (Art. 39 of Regulation (EC) No. 1107/2009)" to the BVL. Then, BVL will forward the respective studies directly to the AGG. In the present AIR 5 Dossier, information on those inaccessible studies has been summarised based on the 2000 monograph documents[6] and are identified (as Category 4a and 4b) in the present AIR 5 dossier[7]. In these cases, GRG was unable to provide updated Appendix E summaries due to lack of access to these studies.

A number of new regulatory studies, generated after the previous EU renewal process and/or not previously submitted at EU level, are presented as part of the data package of this AIR 5 dossier. To date, those new studies have not been peer-reviewed at EU level (please refer to the Application document Rev 2 Dated May 2020 – Document F, Doc ID: 110054-F-GRG_Jun_2020).

A literature search for the active substance glyphosate and metabolites was performed in accordance with the provisions of the EFSA Guidance "Submission of scientific peer-reviewed open literature for the approval of pesticide active substances under Regulation (EC) 1107/2009" and according to the updated Appendix to this Guidance document[8]. The scientific literature review was performed for the period of 01st January 2010 until 31st December 2019, and total of 98 relevant and reliable articles were identified for the environmental fate section. The identified relevant and reliable articles are presented as appendix E summaries in the specific M-CA environmental fate section. For further detailed information on the Literature Review Report (LRR) and the corresponding evaluation, please refer to M-CA Section 9 "Literature". In the frame of the pre-submission meeting held on 27th September 2019, the AGG provided a reference document to GRG on the process to be considered when presenting literature in the June 2020 submission dossier[9].

During the former EU processes, public literature data was evaluated, listed and reported by the RMS. An appendix, containing information about all previously submitted and/or included public literature articles from the former EU process is presented, for sake of completeness, as Annex to the M-CA section 7 (see doc 110054-MCA7_GRG_Jun_2020).

[4] Due to the Bayer-Monsanto acquisition in 2018, the legal entity name Monsanto Europe S.A. / N.V. has been changed to Bayer Agriculture BV.
[5] AGG_Advice to GTF2_Literature search_Final Oct 2019 "HOW TO SUMMARISE STUDIES IN DOSSIERS FROM 1998 AND 2012 IN THE DOSSIER TO BE SUBMITTED JUNE 2020"
[6] Monograph and Addendum to the monograph EU 2001: Glyphosate monograph
[7] In the AIR 5 dossier, in each M document, a category has been assigned to each regulatory study included in the AIR 5 dossier (for details please refer to the Doc ID: 110054-B-GRG_Jun_2020).
[8] Administrative guidance on submission of dossiers and assessment reports for the peer-review of pesticide active substances approved 27 March 2019 (doi: 10.2903/sp.efsa.2019.EN-1612)
[9] AGG_Advice to GTF2_Literature search_Final Oct 2019 "ADVICE TO GTF2: HOW TO PRESENT THE LITERATURE SEARCH IN THE DOSSIER TO BE SUBMITTED JUNE 2020"

The representative uses are provided in the table below

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
PRE-SOWING, PRE-PLANTING												
1a	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Emerged annual weeds, emerged perennial and biennial weeds BBCH > 13	Tractor mounted broadcast spray	Pre-sowing, Pre-planting, Pre-emergence of the crop	a) 1 b) 1	a) 4 L/ha b) 4 L/ha	a) 1.44 kg as/ha b) 1.44 kg as//ha	100 - 400	N/A	Also applicable to renovation / change of land use applications. Application to 100 % of the field. Use 75 % drift reducing nozzles. Maximum application rate of 1.44 kg as/ha glyphosate in any 12 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
1b	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Emerged annual weeds, emerged perennial and biennial weeds (BBCH 13 – 21)	Tractor mounted broadcast spray	Pre-sowing, Pre-planting, Pre-emergence of the crop	a) 1 b) 1	a) 3 L/ha b) 3 L/ha	a) 1.08 kg as/ha b) 1.08 kg as//ha	100 - 400	N/A	Also applicable to renovation / change of land use applications. Application to 100 % of the field. Use 75 % drift reducing nozzles. Maximum application rate of 1.08 kg as/ha glyphosate in any 12 months period.
1c	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Emerged annual weeds	Tractor mounted broadcast spray	Pre-sowing, Pre-planting, Pre-emergence of the crop	a) 1 b) 1	a) 2 L/ha b) 2 L/ha	a) 0.72 kg as/ha b) 0.72 kg as/ha	100 - 400	N/A	Also applicable to renovation / change of land use applications. Application to 100 % of the field. Use 75 % drift reducing nozzles. Maximum application rate of 0.72 kg as/ha glyphosate in any 12 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
POST-HARVEST, PRE-SOWING, PRE-PLANTING												
2a	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Emerged annual, perennial and biennial weeds	Tractor mounted broadcast spray	Post-harvest, pre-sowing, pre-planting	a) 1 - 2 (28 days) b) 1 - 2 (28 days)	a) 3 – 4 L/ha b) 6 L/ha	a) 1.08 – 1.44 kg as/ha b) 2.16 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of remaining crop / stubble and for control of actively growing weeds and mature annual weeds with hardened-off surface Application to 100 % of the field. Use 75 % drift reducing nozzles. Maximum application rate of 2 16 kg as/ha glyphosate in any 12 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
2b	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Emerged annual, perennial and biennial weeds	Tractor mounted broadcast spray	Post-harvest, pre-sowing, pre-planting	a) 1 - 3 (28 days) b) 1 - 3 (28 days)	a) 2 - 3 L/ha b) 6 L/ha	a) 0.72 - 1.08 kg as/ha b) 2.16 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of remaining crop / stubble and for control of actively growing weeds. Application to 100 % of the field. Use 75 % drift reducing nozzles. Maximum application rate of 2 16 kg as/ha glyphosate in any 12 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
2c	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Emerged annual weeds	Tractor mounted broadcast spray	Post-harvest, pre-sowing, pre-planting	a) 1 - 3 (28 days) b) 1 - 3 (28 days)	a) 2 L/ha b) 6 L/ha	a) 0.72 kg as/ha b) 2.16 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of remaining crop / stubble and for control of actively growing annual weeds Application to 100 % of the field. Use 75 % drift reducing nozzles. Maximum application rate of 2 16 kg as/ha glyphosate in any 12 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
3a	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Cereal volunteers	Tractor mounted broadcast spray	Post-harvest, pre-sowing, pre-planting	a) 1 b) 1	a) 1.5 L/ha b) 1.5 L/ha	a) 0.54 kg as/ha b) 0.54 kg as/ha	100 – 400	N/A	Application to existing row cropland after harvest for removal of cereal volunteers. Maximum application rate of 0 54 kg as/ha glyphosate in any 12 months period.
3b	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Cereal volunteers	Tractor mounted broadcast spray	Post-harvest, pre-sowing, pre-planting	a) 1 b) 1	a) 1.5 L/ha b) 1.5 L/ha	a) 0.54 kg as/ha b) 0.54 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of cereal volunteers once every three years. Maximum application rate of 0 54 kg as/ha glyphosate in any 36 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
POST-EMERGENCE OF WEEDS												
4a	EU	Orchard crops (ci stone and pome fruits, kiwi, tree nuts, banana and table olives)	F	Emerged annual, biennial and perennial weeds	Ground directed, shielded spray, band application	Post-emergence of weeds	a) 1 - 2 (28 days) b) 1 - 2 (28 days)	a) 3 - 4 L/ha b) 8 L/ha	a) 1.08 - 1.44 kg as/ha b) 2.88 kg as/ha	100 - 400	7	Avoid crop contamination during treatment. Maximum application rate of 2.88 kg as/ha treated area glyphosate in any 12 months period. Band application in the rows below the trees or as spot treatments. The treated area represents not more than 50 % of the total orchard area. The application rate with reference to the total orchard surface area is not more than 50 % of the stated dose rate.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
4b	EU	Orchard crops (ci stone and pome fruits, kiwi, tree nuts, banana and table olives)	F	Emerged annual, biennial and perennial weeds	Ground directed, shielded spray, band application	Post-emergence of weeds	a) 1 - 3 (28 days) b) 1 - 3 (28 days)	a) 2 - 3 L/ha b) 8 L/ha	a) 0.72 - 1.08 kg as/ha b) 2.88 kg as/ha	100 - 400	7	Avoid crop contamination during treatment. Maximum application rate of 2.88 kg as/ha treated area glyphosate in any 12 months period. Band application in the rows below the trees or as spot treatments. The treated area represents not more than 50 % of the total orchard area. The application rate with reference to the total orchard surface area is not more than 50 % of the stated dose rate.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
4c	EU	Orchard crops (ci stone and pome fruits, kiwi, tree nuts, banana and table olives)	F	Emerged annual weeds	Ground directed, shielded spray, band application	Post-emergence of weeds	a) 1 - 3 (28 days) b) 1 - 3 (28 days)	a) 2 L/ha b) 6 L/ha	a) 0.72 kg as/ha b) 2.16 kg as/ha	100 - 400	7	Avoid crop contamination during treatment. Maximum application rate of 2 16 kg as/ha treated area glyphosate in any 12 months period. Band application in the rows below the trees or as spot treatments. The treated area represents not more than 50 % of the total orchard area. The application rate with reference to the total orchard surface area is not more than 50 % of the stated dose rate.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
5a	EU	Vines (table and wine grape, leaves not intended for human consumption)	F	Emerged annual, biennial and perennial weeds	Ground directed, shielded spray, band application	Post-emergence of weeds	a) 1 - 2 (28 days) b) 1 - 2 (28 days)	a) 3 - 4 L/ha b) 8 L/ha	a) 1.08 - 1.44 kg as/ha b) 2.88 kg as/ha	100 - 400	7	Avoid crop contamination during treatment. Maximum application rate of 2.88 kg as/ha treated area glyphosate in any 12 months period. Band application in the rows below the vine stock or as spot treatments. The treated area represents not more than 50 % of the total vineyard area. The application rate with reference to the total vineyard surface area is not more than 50 % of the stated dose rate.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
5b	EU	Vines (table and wine grape, leaves not intended for human consumption)	F	Emerged annual, biennial and perennial weeds	Ground directed, shielded spray, band application	Post-emergence of weeds	a) 1 - 3 (28 days) b) 1 - 3 (28 days)	a) 2 - 3 L/ha b) 8 L/ha	a) 0.72 - 1.08 kg as/ha b) 2.88 kg as/ha	100 - 400	7	Avoid crop contamination during treatment. Maximum application rate of 2.88 kg as/ha treated area glyphosate in any 12 months period. Band application in the rows below the vine stock or as spot treatments. The treated area represents not more than 50 % of the total vineyard area. The application rate with reference to the total vineyard surface area is not more than 50 % of the stated dose rate.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code)	**MON 52276**	**Formulation type:**	**SL**
active substance 1	**glyphosate as isopropylammonium salt**	**Conc. of as 1:**	**360 g/L (486 g/L isopropylammonium salt)**
safener	**-**	**Conc. of safener:**	**-**
synergist	**-**	**Conc. of synergist:**	**-**
Applicant:	**GRG**	**professional use**	☒
Zone(s):	**central, southern and northern**	**non-professional use**	☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications) a) per use b) per crop/ season**	**kg, L product/ha a) max. rate per appl. b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl. b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
5c	EU	Vines (table and wine grape, leaves not intended for human consumption)	F	Emerged annual weeds	Ground directed, shielded spray, band application	Post-emergence of weeds	a) 1 - 3 (28 days) b) 1 - 3 (28 days)	a) 2 L/ha b) 6 L/ha	a) 0.72 kg as/ha b) 2.16 kg as/ha	100 - 400	7	Avoid crop contamination during treatment. Maximum application rate of 2 16 kg as/ha treated area glyphosate in any 12 months period. Band application in the rows below the vine stock or as spot treatments. The treated area represents not more than 50 % of the total vineyard area. The application rate with reference to the total vineyard surface area is not more than 50 % of the stated dose rate.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
6a	EU	Vegetables (Root and tuber vegetables Bulb vegetables, Fruiting vegetables Legume vegetables Leafy vegetables)	F	Emerged annual, biennial and perennial weeds	Inter-row application: ground directed, shielded spray	Crop BBCH < 20	a) 1 b) 1	a) 3 L/ha b) 3 L/ha	a) 1.08 kg as/ha b) 1.08 kg as/ha	100 - 400	60	Avoid crop contamination during treatment. Maximum application rate of 1.08 kg as/ha glyphosate in any 12 months period. Applications are performed between the crop rows. The rate refers to the treated area only, which represents not more than 50 % of the total area. The application rate with reference to the total surface area is not more than 50 % of the stated dose rate

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
6b	EU	Vegetables (Root and tuber vegetables Bulb vegetables, Fruiting vegetables Legume vegetables Leafy vegetables)	F	Emerged annual weeds	Inter-row application: ground directed, shielded spray	Crop BBCH < 20	a) 1 b) 1	a) 2 L/ha b) 2 L/ha	a) 0.72 kg as/ha b) 0.72 kg as/ha	100 - 400	60	Avoid crop contamination during treatment. Maximum application rate 0.72 kg as/ha glyphosate in any 12 months period. Applications are performed between the crop rows. The rate refers to the treated area only, which represents not more than 50 % of the total area. The application rate with reference to the total surface area is not more than 50 % of the stated dose rate

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
7a	EU	Railroad tracks	F	Emerged annual, biennial and perennial weeds	Ground directed, spray	Post-emergence of weeds	a) 2 (90 days) b) 2 (90 days)	a) 5 L/ha b) 10 L/ha	a) 1.8 kg as/ha b) 3.6 kg as/ha	100 - 400	N/A	Application by spray train Maximum application rate 3.6 kg as/ha glyphosate in any 12 months period.
7b	EU	Railroad tracks	F	Emerged annual, biennial and perennial weeds	Ground directed, spray	Post-emergence of weeds	a) 1 b) 1	a) 5 L/ha b) 5 L/ha	a) 1.8 kg as/ha b) 1.8 kg as/ha	100 - 400	N/A	Application by spray train Maximum application rate 1.8 kg as/ha glyphosate in any 12 months period.
8	EU	Invasive species in agricultural and non-agricultural areas	F	Giant hogweed (*Heracleum mantegazzianum*)	Spot treatment (shielded)	Post-emergence of invasive species	a) 1 b) 1	a) 5 L/ha b) 5 L/ha	a) 1.8 kg as/ha b) 1.8 kg as/ha	5 - 400	N/A	Maximum application rate 1.8 kg as/ha glyphosate in any 12 months period.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
9	EU	Invasive species in agricultural and non-agricultural areas	F	Japanese knotweed (*Reynoutria japonica*)	Spot treatment (shielded), cut stem: spray application	Late summer, early fall	a) 1 b) 1	a) 5 L/ha b) 5 L/ha	a) 1.8 kg as/ha b) 1.8 kg as/ha	5 - 400	N/A	Maximum application rate 1.8 kg as/ha glyphosate in any 12 months period.
10a	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Couch grass (*Elymus repens*)	Spot treatment (shielded)	Post-harvest, pre-sowing, pre-planting	a) 1 b) 1	a) 3 L/ha b) 3 L/ha	a) 1.08 kg as/ha b) 1.08 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of couch grass. Maximum application rate of 1.08 kg as/ha glyphosate in any 12 months period. The treated area represents not more than 20 % of the cropland.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
10b	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Couch grass (*Elymus repens*)	Spot treatment (shielded)	Post-harvest, pre-sowing, pre-planting	a) 1 b) 1	a) 2 L/ha b) 2 L/ha	a) 0.72 kg as/ha b) 0.72 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of couch grass. Maximum application rate of 0.72 kg as/ha glyphosate in any 12 months period. The treated area represents not more than 20 % of the cropland.

Table 9-1: Good Agricultural Practice (GAP) for MON 52276

PPP (product name/code) **active substance 1**	**MON 52276** **glyphosate as isopropylammonium salt**	**Formulation type:** **Conc. of as 1:**	**SL** **360 g/L (486 g/L isopropylammonium salt)**
safener **synergist**	**-** **-**	**Conc. of safener:** **Conc. of synergist:**	**-** **-**
Applicant: **Zone(s):**	**GRG** **central, southern and northern**	**professional use** **non-professional use**	☒ ☐
Verified by MS:	**y/n**		

1	2	3	4	5	6	7	8	10	11	12	13	14
Use-No.	**Member state(s)**	**Crop and/ or situation** **(crop destination / purpose of crop)**	**F G or I**	**Pests or Group of pests controlled** **(additionally: developmental stages of the pest or pest group)**	**Application**			**Application rate**			**PHI (days)**	**Remarks:**
					Method / Kind	**Timing / Growth stage of crop & season**	**Max. number (min. interval between applications)** **a) per use** **b) per crop/ season**	**kg, L product/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**g, kg as/ha** **a) max. rate per appl.** **b) max. total rate per crop/season**	**Water L/ha** **min / max**		**e.g. safener/synergist per ha** **e.g. recommended or mandatory tank mixtures**
10c	EU	Root & tuber vegetables, Bulb vegetables, Fruiting vegetables, Brassica, Leafy vegetables, Stem vegetables, Sugar beet	F	Couch grass (*Elymus repens*)	Spot treatment (shielded)	Post-harvest, pre-sowing, pre-planting	a) 1 b) 1	a) 2 L/ha b) 2 L/ha	a) 0.72 kg as/ha b) 0.72 kg as/ha	100 - 400	N/A	Application to existing row cropland after harvest for removal of couch grass once every three years. Maximum application rate of 0.72 kg as/ha glyphosate in any 36 months period. The treated area represents not more than 20 % of the cropland.

Remarks table heading:
(a) e g wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(b) Catalogue of pesticide formulation types and international coding system CropLife International Technical Monograph n°2, 6th Edition Revised May 2008
(c) g/kg or g/L
(d) Select relevant
(e) Use number(s) in accordance with the list of all intended GAPs in Part B, Section 0 should be given in column 1
(f) No authorization possible for uses where the line is highlighted in grey, Use should be crossed out when the notifier no longer supports this use

Remarks columns:

1 Numeration necessary to allow references
2 Use official codes/nomenclatures of EU Member States
3 For crops, the EU and Codex classifications (both) should be used; when relevant, the use situation should be described (e g fumigation of a structure)
4 F: professional field use, Fn: non-professional field use, Fpn: professional and non-professional field use, G: professional greenhouse use, Gn: non-professional greenhouse use, Gpn: professional and non-professional greenhouse use, I: indoor application
5 Scientific names and EPPO-Codes of target pests/diseases/ weeds or, when relevant, the common names of the pest groups (e g biting and sucking insects, soil born insects, foliar fungi, weeds) and the developmental stages of the pests and pest groups at the moment of application must be named
6 Method, e g high volume spraying, low volume spraying, spreading, dusting, drench
Kind, e g overall, broadcast, aerial spraying, row, individual plant, between the plants - type of equipment used must be indicated
7 Growth stage at first and last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application
8 The maximum number of application possible under practical conditions of use must be provided
9 Minimum interval (in days) between applications of the same product
10 For specific uses other specifications might be possible, e g : g/m³ in case of fumigation of empty rooms See also EPPO-Guideline PP 1/239 Dose expression for plant protection products
11 The dimension (g, kg) must be clearly specified (Maximum) dose of a s per treatment (usually g, kg or L product / ha)
12 If water volume range depends on application equipments (e g ULVA or LVA) it should be mentioned under "application: method/kind"
13 PHI - minimum pre-harvest interval
14 Remarks may include: Extent of use/economic importance/restrictions

Table 9-2: Environmental compartments considered in the exposure assessment

Substance	Compartment(s)
Glyphosate (parent)	soil, groundwater, surface water, sediment
AMPA (metabolite)	soil, groundwater, surface water, sediment
HMPA (metabolite)	surface water

CP 9.1 Fate and Behaviour in Soil

CP 9.1.1 Rate of degradation in soil

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

CP 9.1.1.1 Laboratory studies

The rate of degradation of glyphosate and its metabolite AMPA in laboratory soil under aerobic conditions was evaluated during Annex I renewal (please refer to **M-CA, Section 7.1.2.1**). Endpoints derived from aerobic laboratory degradation studies were used in the evaluation of the formulation.

CP 9.1.1.2 Field studies

CP 9.1.1.2.1 Soil dissipation studies

The field dissipation rates of glyphosate were evaluated during Annex I renewal (please refer to **M-CA, Section 7.1.2.2.1**). Endpoints derived from field dissipation studies in Europe and representative locations in the USA and Canada were used in the evaluation of the formulation.

CP 9.1.1.2.2 Soil accumulation studies

Soil accumulation studies are not required for glyphosate and have not been performed.

CP 9.1.2 Mobility in soil

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

CP 9.1.2.1 Laboratory studies

The mobility of glyphosate and its metabolite in laboratory soil was evaluated during Annex I renewal (please refer to **M-CA, Section 7.1.3.1**). Endpoints derived from laboratory adsorption/desorption studies are considered in the environmental risk assessment.

CP 9.1.2.2 Lysimeter studies

Lysimeter studies for glyphosate were not conducted since reliable adsorption coefficient values were obtained in laboratory soil mobility studies (please refer to **M-CA, Section 7.1.3.1**) and based on modelling results, leaching to groundwater in relevant amounts is not expected (please refer to **M-CP, Section 9.2.4**).

CP 9.1.2.3 Field leaching studies

Field leaching studies for glyphosate were not conducted since reliable adsorption coefficient values were obtained in laboratory soil mobility studies (please refer to **M-CA, Section 7.1.3.1**) and based on modelling results, leaching to groundwater in relevant amounts is not expected (please refer to **M-CP, Section 9.2.4**).

CP 9.1.3 Estimation of concentrations in soil

Table 9.1.3-1: Studies on calculation of PEC_{soil}

Annex point	Study	Study type	Substance(s)	Status	Remark
CP 9.1.3/001	[redacted], 2020	PEC_{soil} modelling assessment	Glyphosate, AMPA	Valid	

The following calculations of predicted environmental concentrations in soil (PEC_{soil}) for glyphosate and its metabolite AMPA have not previously been reviewed and are provided in support of this assessment. Detailed information on the simulated use patterns of glyphosate is presented below.

A risk envelope approach was taken in the modelling, whereby the maximum annual load was considered as a single application of the formulation MON 52276 for all GAP uses. In addition, band or spot application was not considered as a refinement for reducing the areal load in the modelling. Hence, these assumptions result in a very conservative PEC_{soil} assessment.

As glyphosate is used for weed control under soil conservation practices with reduced and no tillage, for calculation of accumulation concentrations for arable crops, a mixing depth of 5 cm was considered in addition to the default of 20 cm. The mixing depth of 5 cm is also considered representative for uses for control of invasive species like Giant hogweed (*Heracleum mantegazzianum*) and Japanese knotweed (*Reynoutria japonica*).

PEC_{soil} for the formulation MON 52276 was calculated as well.

Table 9.1.3-2: Use patterns considered in the PEC_{soil} calculations

Use No.	Application rate (g a.s./ha)	No. of appl. (-)	Frequency	Interception (%)	Soil load (g a.s./ha)	Soil depth for $PEC_{soil,plateau}$ (cm)
1c, 6b, 10b; lowest single app. of split for 2b, 2c, 4b, 4c, 5b, 5c	720	1	Every year	0	720	5/ 20
10c			Every 3rd year			
1a, 1b, 6a, 10a; highest single app. of split for 2a, 2b, 4a, 4b, 5a, 5b	1440	1	Every year	0	1440	5/ 20
3a	540	1	Every year	0	540	5/ 20
3b			Every 3rd year			
2a, 2b, 2c, 4c, 5c	2160	1	Every year	0	2160	5/ 20
4a, 4b, 5a, 5b	2880	1	Every year	0	2880	5
7a	3600	1	Every year	0	3600	5
7b, 8, 9	1800	1	Every year	0	1800	5/ 20
Models used for calculations		ESCAPE 2.0				

1. Information on the study

Data point	CP 9.1.3/001
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolite AMPA in soil following application to various crops – a modelling assessment for Europe using ESCAPE
Report No	110054-012
Guidelines followed in study	EU Commission (2000): Guidance document on persistence in soil, EU Commission Document SANCO 9188/VI/97 rev. 8, 12. July 2000. FOCUS (1997): Soil persistence models and EU Registration. The final report of the work of the Soil Modelling Work Group of FOCUS. February 1997.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	Valid
Category study in AIR 5 dossier (L docs)	Category 1

2. Full summary

Executive Summary

Predicted environmental concentrations in soil (PEC_{soil}) were calculated for the herbicidal active substance glyphosate and its metabolite AMPA following application to various crops in Europe. The model ESCAPE 2.0 was used for the calculations.

Calculations were performed for a single application of 540 to 3600 g a.s./ha, and with different frequency of application (every year or every third year). For calculation of plateau and accumulation concentrations, a mixing depth of 5 and 20 cm was assumed.

The metabolite AMPA was simulated as pseudo-parent, considering a molecular mass correction and the maximum occurrence in soil.

Worst case, non-normalised degradation endpoints were used for the calculations and 0 % foliar interception was assumed.

Maximum single year ($PEC_{soil,ini}$), background ($PEC_{soil,plateau}$) and accumulated ($PEC_{soil,accu}$) concentrations of glyphosate and AMPA were calculated as shown in the tables below. The maximum initial PEC_{soil} for glyphosate and AMPA were 4.800 and 1.986 mg/kg, respectively. Maximum accumulated PEC_{soil} were calculated to be 7.060 and 6.035 mg/kg for glyphosate and AMPA, respectively, considering a soil depth of 5 cm (no tillage).

Table 9.1.3-3: Summary of PEC_{soil} of glyphosate

Application rate (g a.s./ha)	Frequency	$PEC_{soil,ini}$ (mg/kg)	Soil depth for $PEC_{soil,plateau}$ (cm)	$PEC_{soil,plateau}$ (mg/kg)	$PEC_{soil,accu}$ (mg/kg)
720	Every year	0.960	5	0.452	1.412
			20	0.113	1.073
	Every 3rd year		5	0.151	1.111
			20	0.038	0.998
1440	Every year	1.920	5	0.904	2.824
			20	0.226	2.146
540	Every year	0.720	5	0.339	1.059
			20	0.085	0.805
	Every 3rd year		5	0.113	0.833
			20	0.028	0.748
2160	Every year	2.880	5	1.356	4.236
			20	0.339	3.219
2880	Every year	3.840	5	1.808	5.648
3600	Every year	4.800	5	2.260	7.060
1800	Every year	2.400	5	1.130	3.530
			20	0.283	2.683

Table 9.1.3-4: Summary of PEC_{soil} of AMPA

Application rate (g a.s./ha)	Frequency	$PEC_{soil,ini}$ (mg/kg)	Soil depth for $PEC_{soil,plateau}$ (cm)	$PEC_{soil,plateau}$ (mg/kg)	$PEC_{soil,accu}$ (mg/kg)
720	Every year	0.397	5	0.810	1.207
			20	0.203	0.600
	Every 3rd year		5	0.270	0.667
			20	0.068	0.465
1440	Every year	0.794	5	1.620	2.414
			20	0.405	1.199
540	Every year	0.298	5	0.607	0.905
			20	0.152	0.450
	Every 3rd year		5	0.203	0.500
			20	0.051	0.349
2160	Every year	1.191	5	2.429	3.621
			20	0.607	1.799
2880	Every year	1.589	5	3.239	4.828
3600	Every year	1.986	5	4.049	6.035
1800	Every year	0.993	5	2.025	3.017
			20	0.506	1.499

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in soil of the active substance glyphosate and its metabolite aminomethylphosphonic acid (AMPA) following application on various crops in Europe.

Single applications at rates of 540 to 3600 g a.s./ha were considered, with frequency of application being either annually or every third year.

Calculations were carried out according to recommendations of FOCUS (1997) and the EU Commission (2000) using the model ESCAPE 2.0.

1. Model input data

Degradation in soil

Under aerobic conditions, glyphosate is degraded in soil to the major metabolite AMPA, and subsequently to carbon dioxide and non-extractable residues. The maximum occurrence of AMPA of 63 % was found in a field study conducted in the US (Minnesota; [redacted], 1993. KCA 7.1.2.2.1/006) and was used to calculate the 'effective' application rate of AMPA in the ESCAPE calculations.

The aerobic degradation of glyphosate and AMPA in soil was studied in laboratory and field studies. Kinetic evaluations according to FOCUS kinetics guidance (2006, 2014) were performed by [redacted](2020, KCA 7.1.2.1.1/001, KCA 7.1.2.2.1/003) and [redacted] (2020, KCA 7.1.2.2.1/001). An evaluation based on the "EFSA DegT50 Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different (see M-CA 7.1.2). Therefore all laboratory and field DT_{50} values were considered together as one dataset, respectively for glyphosate and AMPA.

Glyphosate

The maximum non-normalised DT_{50} of all laboratory and field studies of 147 days (Iowa (USA); [redacted], 1993, KCA 7.1.2.2.1/006) was considered for the PEC_{soil} calculations. This value was evaluated using the FOMC kinetic model. Hence, the PEC_{soil} calculations were performed using the FOMC parameters: α = 0.6571 and β = 78.33.

AMPA
The maximum non-normalised DT_{50} of all laboratory and field studies of 634 days (Unzhurst (Germany); [redacted], 1992, KCA 7.1.2.2.1/013) was used in the PEC_{soil} calculations.

A summary of the relevant substance-related model input data is given in the table below.

Table 9.1.3-5: Parameters of glyphosate and AMPA used for modelling

Compound	Molar mass (g/mol)	Max. occurrence (%)	DT_{50} (d)
Glyphosate	169.10	-	147 (FOMC (α = 0.6571, β = 78.33), maximum non-normalised value from lab and field studies)
AMPA	111.04	63.0 (maximum value from lab and field studies)[1]	634 (SFO, maximum non-normalised value from lab and field studies)[2]

[1] Maximum from field study: Minnesota (USA), [redacted] (1993, KCA 7.1.2.2.1/006)
[2] The results of the study by [redacted] (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

2. Use patterns

In the EU glyphosate is intended to be used as a herbicide on various crops. A single application at different rates and application frequencies (every year or every third year) was considered. Detailed information on the simulated use patterns of glyphosate is presented in the table below.

Table 9.1.3-6: Use patterns considered in the simulations

Application rate (g a.s./ha)	No. of appl. (-)	Frequency	Interception (%)	Soil load (g a.s./ha)	Soil depth for $PEC_{soil,plateau}$ (cm)
720	1	Every year Every 3rd year	0	720	5/ 20
1440	1	Every year	0	1440	5/ 20
540	1	Every year Every 3rd year	0	540	5/ 20
2160	1	Every year	0	2160	5/ 20
2880	1	Every year	0	2880	5
3600	1	Every year	0	3600	5
1800	1	Every year	0	1800	5/ 20

3. Simulation tools and modelling strategy

The fate and exposure model ESCAPE 2.0 was used to calculate concentrations in soil for glyphosate and its major soil metabolite AMPA.

The ESCAPE standard scenario with Borstel soil and constant climate conditions at 20 °C was selected. A soil bulk density of 1.5 g/cm³ and a soil layer depth of 5 cm were selected for the calculations of initial, actual and time-weighted average PEC_{soil}.

Initial concentrations in soil were calculated for a single-year application scenario with one application. In order to account for possible accumulation of glyphosate and AMPA, background (plateau) and accumulation concentrations were calculated in addition, assuming long-term application of glyphosate.

For all but uses on railroad tracks and in perennial crops, $PEC_{soil,plateau}$ was calculated assuming a tillage depth of 20 cm, as well as with a standard 5 cm soil mixing depth (worst case: no tillage).

The metabolite AMPA was simulated as pseudo-parent, *i.e.* an 'effective' application rate was calculated considering a molecular mass correction and the maximum occurrence of the metabolite in soil.

In ESCAPE, PEC_{soil} immediately after the first application is calculated according to FOCUS guidance with the following equation:

Equation 1: $$PEC_{soil,ini} = \frac{A \times (1 - F)}{100 \times d \times bd}$$

where:

$PEC_{soil,ini}$	(mg/kg)	=	initial PEC in soil
A	(g/ha)	=	application rate
F	(-)	=	fraction intercepted by crop (0 as worst case)
d	(cm)	=	soil mixing depth (5 cm)
bd	(g/cm^3)	=	soil bulk density (1.5 g/cm^3)

The maximum accumulated soil concentration is calculated by considering the background concentration ($PEC_{soil,plateau}$) with a mixing depth of 5 or 20 cm as described above, followed by a final application with a standard mixing depth of 5 cm:

Equation 2: $PEC_{soil,accu} = PEC_{soil,ini} + PEC_{soil,plateau}$

where:

$PEC_{soil,accu}$	(mg/kg)	=	accumulated PEC in soil
$PEC_{soil,ini}$	(mg/kg)	=	initial PEC in soil
$PEC_{soil,plateau}$	(mg/kg)	=	background PEC in soil

For glyphosate, degradation was calculated using the FOMC model, while for AMPA degradation was calculated using SFO kinetics.

Time-weighted average (TWA) concentrations are calculated by ESCAPE based on a moving time frame, where always the worst case $PEC_{soil,twa,t}$ is found for a given time duration (t). Actual and time-weighted average concentrations were calculated for 1, 2, 4, 7, 14, 21, 28, 42, 50 and 100 days.

II. RESULTS AND DISCUSSION

Initial, actual and time-weighted average PEC_{soil} of glyphosate and AMPA, along with background and accumulated concentrations, are provided in the tables below.

PEC$_{soil}$ for glyphosate

Table 9.1.3-7: PEC$_{soil}$ for glyphosate, 1 × 720 g a.s./ha

PEC$_{soil}$ (mg/kg)		1 × 720 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.960	-
Short term	24 h	0.952	0.956
	2 d	0.944	0.952
	4 d	0.929	0.944
Long term	7 d	0.908	0.933
	14 d	0.862	0.909
	21 d	0.821	0.886
	28 d	0.785	0.865
	42 d	0.724	0.828
	50 d	0.694	0.809
	100 d	0.559	0.715
PEC$_{soil,plateau}$ (5 cm)		0.452	-
PEC$_{soil,accu}$ (5 cm)		1.412	-
PEC$_{soil,plateau}$ (20 cm)		0.113	-
PEC$_{soil,accu}$ (20 cm)		1.073	-
PEC$_{soil,plateau}$ (5 cm) (every 3rd year)		0.151	-
PEC$_{soil,accu}$ (5 cm) (every 3rd year)		1.111	-
PEC$_{soil,plateau}$ (20 cm) (every 3rd year)		0.038	-
PEC$_{soil,accu}$ (20 cm) (every 3rd year)		0.998	-

Table 9.1.3-8: PEC_{soil} for glyphosate, 1 × 1440 g a.s./ha

PEC_{soil} (mg/kg)		1 × 1440 g a.s./ha	
		Actual	TWA
Initial (5 cm)		1.920	-
Short term	24 h	1.904	1.912
	2 d	1.889	1.904
	4 d	1.858	1.889
Long term	7 d	1.815	1.866
	14 d	1.723	1.817
	21 d	1.643	1.772
	28 d	1.571	1.731
	42 d	1.448	1.656
	50 d	1.388	1.618
	100 d	1.118	1.430
$PEC_{soil,plateau}$ (5 cm)		0.904	-
$PEC_{soil,accu}$ (5 cm)		2.824	-
$PEC_{soil,plateau}$ (20 cm)		0.226	-
$PEC_{soil,accu}$ (20 cm)		2.146	-

Table 9.1.3-9: PEC_{soil} for glyphosate, 1 × 540 g a.s./ha

PEC_{soil} (mg/kg)		1 × 540 g a.s./ha	
		Actual	**TWA**
Initial (5 cm)		0.720	-
Short term	24 h	0.714	0.717
	2 d	0.708	0.714
	4 d	0.697	0.708
Long term	7 d	0.681	0.700
	14 d	0.646	0.682
	21 d	0.616	0.665
	28 d	0.589	0.649
	42 d	0.543	0.621
	50 d	0.521	0.607
	100 d	0.419	0.536
$PEC_{soil,plateau}$ (5 cm)		0.339	-
$PEC_{soil,accu}$ (5 cm)		1.059	-
$PEC_{soil,plateau}$ (20 cm)		0.085	-
$PEC_{soil,accu}$ (20 cm)		0.805	-
$PEC_{soil,plateau}$ (5 cm) (every 3rd year)		0.113	-
$PEC_{soil,accu}$ (5 cm) (every 3rd year)		0.833	-
$PEC_{soil,plateau}$ (20 cm) (every 3rd year)		0.028	-
$PEC_{soil,accu}$ (20 cm) (every 3rd year)		0.748	-

Table 9.1.3-10: PEC_{soil} for glyphosate, 1 × 2160 g a.s./ha

PEC_{soil} (mg/kg)		1 × 2160 g a.s./ha	
		Actual	TWA
Initial (5 cm)		2.880	-
Short term	24 h	2.856	2.868
	2 d	2.833	2.856
	4 d	2.787	2.833
Long term	7 d	2.723	2.799
	14 d	2.585	2.726
	21 d	2.464	2.658
	28 d	2.356	2.596
	42 d	2.172	2.484
	50 d	2.082	2.427
	100 d	1.677	2.144
$PEC_{soil,plateau}$ (5 cm)		1.356	-
$PEC_{soil,accu}$ (5 cm)		4.236	-
$PEC_{soil,plateau}$ (20 cm)		0.339	-
$PEC_{soil,accu}$ (20 cm)		3.219	-

Table 9.1.3-11: PEC_{soil} for glyphosate, 1 × 2880 g a.s./ha

PEC_{soil} (mg/kg)		1 × 2880 g a.s./ha	
		Actual	TWA
Initial (5 cm)		3.840	-
Short term	24 h	3.808	3.824
	2 d	3.777	3.808
	4 d	3.716	3.777
Long term	7 d	3.630	3.733
	14 d	3.447	3.635
	21 d	3.285	3.544
	28 d	3.141	3.461
	42 d	2.896	3.312
	50 d	2.776	3.236
	100 d	2.236	2.859
$PEC_{soil,plateau}$ (5 cm)		1.808	-
$PEC_{soil,accu}$ (5 cm)		5.648	-

Table 9.1.3-12: PEC_{soil} for glyphosate, 1 × 3600 g a.s./ha

PEC_{soil} (mg/kg)		1 × 3600 g a.s./ha	
		Actual	TWA
Initial (5 cm)		4.800	-
Short term	24 h	4.760	4.780
	2 d	4.721	4.760
	4 d	4.646	4.722
Long term	7 d	4.538	4.666
	14 d	4.308	4.543
	21 d	4.106	4.431
	28 d	3.927	4.327
	42 d	3.620	4.141
	50 d	3.470	4.045
	100 d	2.796	3.574
$PEC_{soil,plateau}$ (5 cm)		2.260	-
$PEC_{soil,accu}$ (5 cm)		7.060	-

Table 9.1.3-13: PEC_{soil} for glyphosate, 1 × 1800 g a.s./ha

PEC_{soil} (mg/kg)		1 × 1800 g a.s./ha	
		Actual	TWA
Initial (5 cm)		2.400	-
Short term	24 h	2.380	2.390
	2 d	2.361	2.380
	4 d	2.323	2.361
Long term	7 d	2.269	2.333
	14 d	2.154	2.272
	21 d	2.053	2.215
	28 d	1.963	2.163
	42 d	1.810	2.070
	50 d	1.735	2.023
	100 d	1.398	1.787
$PEC_{soil,plateau}$ (5 cm)		1.130	-
$PEC_{soil,accu}$ (5 cm)		3.530	-
$PEC_{soil,plateau}$ (20 cm)		0.283	-
$PEC_{soil,accu}$ (20 cm)		2.683	-

PEC_{soil} for AMPA

Table 9.1.3-14: PEC_{soil} for AMPA, 1 × 720 g a.s./ha

PEC_{soil} (mg/kg)		1 × 720 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.397	-
Short term	24 h	0.397	0.397
	2 d	0.396	0.397
	4 d	0.395	0.396
Long term	7 d	0.394	0.396
	14 d	0.391	0.394
	21 d	0.388	0.393
	28 d	0.385	0.391
	42 d	0.379	0.388
	50 d	0.376	0.387
	100 d	0.356	0.376
$PEC_{soil,plateau}$ (5 cm)		0.810	-
$PEC_{soil,accu}$ (5 cm)		1.207	-
$PEC_{soil,plateau}$ (20 cm)		0.203	-
$PEC_{soil,accu}$ (20 cm)		0.600	-
$PEC_{soil,plateau}$ (5 cm) (every 3rd year)		0.270	-
$PEC_{soil,accu}$ (5 cm) (every 3rd year)		0.667	-
$PEC_{soil,plateau}$ (20 cm) (every 3rd year)		0.068	-
$PEC_{soil,accu}$ (20 cm) (every 3rd year)		0.465	-

Table 9.1.3-15: PEC_{soil} for AMPA, 1 × 1440 g a.s./ha

PEC_{soil} (mg/kg)		1 × 1440 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.794	-
Short term	24 h	0.793	0.794
	2 d	0.793	0.793
	4 d	0.791	0.793
Long term	7 d	0.788	0.791
	14 d	0.782	0.788
	21 d	0.776	0.785
	28 d	0.770	0.782
	42 d	0.759	0.776
	50 d	0.752	0.773
	100 d	0.712	0.752
$PEC_{soil,plateau}$ (5 cm)		1.620	-
$PEC_{soil,accu}$ (5 cm)		2.414	-
$PEC_{soil,plateau}$ (20 cm)		0.405	-
$PEC_{soil,accu}$ (20 cm)		1.199	-

Table 9.1.3-16: PEC_{soil} for AMPA, 1 × 540 g a.s./ha

PEC_{soil} (mg/kg)		1 × 540 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.298	-
Short term	24 h	0.298	0.298
	2 d	0.297	0.298
	4 d	0.297	0.297
Long term	7 d	0.296	0.297
	14 d	0.293	0.296
	21 d	0.291	0.295
	28 d	0.289	0.293
	42 d	0.285	0.291
	50 d	0.282	0.290
	100 d	0.267	0.282
$PEC_{soil,plateau}$ (5 cm)		0.607	-
$PEC_{soil,accu}$ (5 cm)		0.905	-
$PEC_{soil,plateau}$ (20 cm)		0.152	-
$PEC_{soil,accu}$ (20 cm)		0.450	-
$PEC_{soil,plateau}$ (5 cm) (every 3rd year)		0.203	-
$PEC_{soil,accu}$ (5 cm) (every 3rd year)		0.500	-
$PEC_{soil,plateau}$ (20 cm) (every 3rd year)		0.051	-
$PEC_{soil,accu}$ (20 cm) (every 3rd year)		0.349	-

Table 9.1.3-17: PEC_{soil} for AMPA, 1 × 2160 g a.s./ha

PEC_{soil} (mg/kg)		1 × 2160 g a.s./ha	
		Actual	TWA
Initial (5 cm)		1.191	-
Short term	24 h	1.190	1.191
	2 d	1.189	1.190
	4 d	1.186	1.189
Long term	7 d	1.182	1.187
	14 d	1.173	1.182
	21 d	1.164	1.178
	28 d	1.156	1.173
	42 d	1.138	1.165
	50 d	1.128	1.159
	100 d	1.068	1.129
$PEC_{soil,plateau}$ (5 cm)		2.429	-
$PEC_{soil,accu}$ (5 cm)		3.621	-
$PEC_{soil,plateau}$ (20 cm)		0.607	-
$PEC_{soil,accu}$ (20 cm)		1.799	-

Table 9.1.3-18: PEC_{soil} for AMPA, 1 × 2880 g a.s./ha

PEC_{soil} (mg/kg)		1 × 2880 g a.s./ha	
		Actual	TWA
Initial (5 cm)		1.589	-
Short term	24 h	1.587	1.588
	2 d	1.585	1.587
	4 d	1.582	1.585
Long term	7 d	1.577	1.583
	14 d	1.564	1.577
	21 d	1.553	1.571
	28 d	1.541	1.565
	42 d	1.517	1.553
	50 d	1.504	1.546
	100 d	1.424	1.505
$PEC_{soil,plateau}$ (5 cm)		3.239	-
$PEC_{soil,accu}$ (5 cm)		4.828	-

Table 9.1.3-19: PEC_{soil} for AMPA, 1 × 3600 g a.s./ha

PEC_{soil} (mg/kg)		1 × 3600 g a.s./ha	
		Actual	TWA
Initial (5 cm)		1.986	-
Short term	24 h	1.984	1.985
	2 d	1.981	1.984
	4 d	1.977	1.981
Long term	7 d	1.971	1.978
	14 d	1.956	1.971
	21 d	1.941	1.963
	28 d	1.926	1.956
	42 d	1.897	1.941
	50 d	1.880	1.932
	100 d	1.780	1.881
$PEC_{soil,plateau}$ (5 cm)		4.049	-
$PEC_{soil,accu}$ (5 cm)		6.035	-

Table 9.1.3-20: PEC_{soil} for AMPA, 1 × 1800 g a.s./ha

PEC_{soil} (mg/kg)		1 × 1800 g a.s./ha	
		Actual	TWA
Initial (5 cm)		0.993	-
Short term	24 h	0.992	0.992
	2 d	0.991	0.992
	4 d	0.989	0.991
Long term	7 d	0.985	0.989
	14 d	0.978	0.985
	21 d	0.970	0.982
	28 d	0.963	0.978
	42 d	0.948	0.970
	50 d	0.940	0.966
	100 d	0.890	0.941
$PEC_{soil,plateau}$ (5 cm)		2.025	-
$PEC_{soil,accu}$ (5 cm)		3.017	-
$PEC_{soil,plateau}$ (20 cm)		0.506	-
$PEC_{soil,accu}$ (20 cm)		1.499	-

3. Assessment and conclusion

Assessment and conclusion by applicant:
The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

PEC_{soil} of MON 52276

PEC_{soil} of the formulation was calculated using Equation 1 as given above. The calculation was based on the highest single application rate from all uses in the GAP.

Table 9.1.3-21: PEC_{soil} for MON 52276

Formulation	Application rate (g MON 52276/ha)[1]	$PEC_{soil,ini}$ (mg MON 52276/kg)
MON 52276	5846.5	7.795

[1] The formulation components are considered to dissipate rapidly after application, therefore only one application is taken into consideration, based on the highest single application rate. The PEC for the formulation was based on a specific density of 1.1693 g/mL with an application of 5 L formulation/ha and an interception rate of 0 % representing the maximum use in the GAP.

CP 9.2 Fate and Behaviour in Water and Sediment

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

CP 9.2.1 Aerobic mineralisation in surface water

The aerobic mineralization in surface water of glyphosate and its metabolite AMPA was evaluated during Annex I renewal (please refer to **M-CA, Section 7.2.2.2**). The maximum occurrence of AMPA in the suspended sediment system of 45.0 % was considered for environmental risk assessment.

CP 9.2.2 Water/sediment study

Studies on the degradation of glyphosate and its metabolite AMPA in aquatic systems were evaluated during Annex I renewal (please refer to **M-CA, Section 7.2.2.3**). Endpoints derived from aquatic degradation studies were considered for environmental risk assessment.

CP 9.2.3 Irradiated water/sediment study

The route and rate of degradation of glyphosate in irradiated water/sediment systems were not studied separately.

CP 9.2.4 Estimation of concentrations in groundwater

CP 9.2.4.1 Calculation of concentrations in groundwater

Predicted environmental concentrations in groundwater (PEC_{gw}) were calculated in line with the current FOCUS guidelines [redacted], 2020, CP 9.2.4.1/001; [redacted], 2020; CP 9.2.4.1/002).

In the scientific literature review for glyphosate (2010-2019), one article was identified to provide further information relevant to the data point ([redacted]., 2015, CP 9.2.4.1/003). The reliability of the article was assessed as "reliable with restrictions". The calculated leaching concentrations with the model are not according to FOCUS, and hence are considered as supportive information.

Table 9.2.4.1-1: Studies on calculation of PEC_{gw}

Annex point	Study	Study type	Substance(s)	Status	Remark
CP 9.2.4.1/001	[redacted], 2020	PEC_{gw} modelling assessment	Glyphosate, AMPA	Valid	FOCUS modelling
CP 9.2.4.1/002	[redacted], 2020	PEC_{gw} modelling assessment	Glyphosate, AMPA	Valid	Modelling for application on railways

Table 9.2.4.1-2: Literature articles on calculation of PEC_{gw}

Annex point	Study	Study type	Substance(s)	Status	Remark
CP 9.2.4.1/003	[redacted] 2015	PEC_{gw} modelling assessment	Glyphosate, AMPA	Reliable with restrictions	

Studies on estimation of PEC_{gw}

The following calculations of predicted environmental concentrations in groundwater (PEC_{gw}) for glyphosate and its metabolite AMPA have not previously been reviewed and are provided in support of this assessment. Detailed information on the simulated use patterns of glyphosate is presented below.

A risk envelope approach was taken in the modelling, whereby the maximum annual load was considered as a single application for all GAP uses. In addition, band or spot application was not considered as a refinement for reducing the areal load in the modelling. Hence, these assumptions result in a very conservative PEC_{gw} assessment.

Table 9.2.4.1-3: Use patterns considered in the simulations ($FOCUS_{gw}$)

Use No.	FOCUS crop	Appl. rate (g a.s./ha)	No. of appl. / interval (d)	Frequency of appl. (-)	Appl. timing (-)	Interception (%)	Soil load (g a.s./ha)
1c, 6b, 10b, 10c; lowest single app. of split for 2b, 2c	Carrots, potatoes, onions, tomatoes, cabbage, sugar beets	720	1 / -	Annual	Early, late	0	720
Lowest single app. of split for 4b, 4c	Apples, citrus						
Lowest single app. of split for 5b, 5c	Vines						
1a, 1b, 6a, 10a; highest single app. of split for 2a, 2b	Carrots, potatoes, onions, tomatoes, cabbage, sugar beets	1440	1 / -	Annual	Early, late	0	1440
Highest single app. of split for 4a, 4b	Apples, citrus						
Highest single app. of split for 5a, 5b	Vines						
3a, 3b	Carrots, potatoes, onions, tomatoes, cabbage, sugar beets	540	1 / -	Annual	Early, late	0	540
2a, 2b, 2c	Carrots, potatoes, onions, tomatoes, cabbage, sugar beets	2160	1 / -	Annual	Early, late	0	2160
4a, 4b, 4c	Apples, citrus	2880	1 / -	Annual	Early, late	0	2880
5a, 5b, 5c	Vines						
8, 9	Grass/alfalfa	1800	1 / -	Annual	Early, late	0	1800
Models used for calculations		FOCUS PEARL 4.4.4, FOCUS PELMO 5.5.3, FOCUS MACRO 5.5.4					

Table 9.2.4.1-4: Use patterns considered in the simulations (railways)

Use No.	Target	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Interception (%)
7a	Railways	3600	1	-	10[1]
7b	Railways	1800	1	-	10[1]
Model used for calculations		HardSPEC 1.4.3.2			

[1] Default interception in HardSPEC assuming heavy weed infestation

1. Information on the study

Data point	CP 9.2.4.1/001
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolite AMPA in groundwater following application to various crops – a modelling assessment for Europe using FOCUS PEARL, FOCUS PELMO and FOCUS MACRO
Report No	110054-013
Guidelines followed in study	European Commission (EC) (2014): Assessing Potential for Movement of Active Substances and their Metabolites to Ground Water in the EU. Report of the FOCUS Ground Water Work Group, EC Document Reference Sanco/13144/2010 ver. 3, 613 pp. FOCUS (2000): FOCUS groundwater scenarios in the EU review of active substances. Report of the FOCUS Groundwater Scenarios Workgroup, EC Document Reference Sanco/321/2000 rev.2, 202 pp. FOCUS (2014): Generic guidance for Tier 1 FOCUS ground water assessments, version 2.2. FOCUS groundwater scenarios working group.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	Valid
Category study in AIR 5 dossier (L docs)	Category 1

2. Full summary

Executive Summary

Predicted environmental concentrations in groundwater were calculated for the active substance glyphosate and its soil metabolite AMPA, following application to various crops in Europe. The models FOCUS PEARL 4.4.4, FOCUS PELMO 5.5.3 and FOCUS MACRO 5.5.4 were used for the simulations.

Calculations were performed for single applications of 540 to 2880 g a.s./ha, with no interception as a worst case. The FOCUS crops carrots, potatoes, onions, tomatoes, cabbage, sugar beet, apples, vines, citrus and grass/alfalfa were chosen to ensure representativeness of uses selected for modelling.

The predicted environmental concentrations of glyphosate and AMPA in groundwater (PEC_{gw}) at 1 m soil depth were calculated to be <0.001 µg/L in all scenarios with all three models.

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in groundwater (PEC_{gw}) of the active substance glyphosate and its soil metabolite AMPA following application to various crops in Europe.

Calculations were carried out according to FOCUS groundwater guidance (FOCUS, 2000, 2014; EC, 2014) using the leaching models FOCUS PEARL 4.4.4, FOCUS PELMO 5.5.3 and FOCUS MACRO 5.5.4.

1. Model input data

Degradation in soil
Under aerobic conditions, glyphosate is degraded in soil to the major metabolite AMPA, and subsequently to carbon dioxide and non-extractable soil residues.

The aerobic degradation of glyphosate and AMPA in soil was studied in laboratory and field studies. Kinetic evaluations according to FOCUS kinetics guidance (2006, 2014) were performed by [redacted] (2020, KCA 7.1.2.1.1/001, KCA 7.1.2.2.1/003) and [redacted] (2020, KCA 7.1.2.2.1/001). An evaluation based on the "EFSA $DegT_{50}$ Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different (see M-CA 7.1.2). Therefore, laboratory and field DT_{50} values were considered together as one dataset, respectively for glyphosate and AMPA.

<u>Glyphosate</u>
The Input Decision Tool 3.3 indicated a pH-dependency of the combined laboratory and field normalised DT_{50} values (see M-CA 7.1.2). Therefore, two sets of calculations were performed using: i) the geometric mean of acidic soils (pH (H_2O) < 7; DT_{50} = 26.8 days) and ii) the geometric mean of alkaline soils (pH (H_2O) ≥ 7; DT_{50} = 12.4 days).

<u>AMPA</u>
The Input Decision Tool 3.3 indicated no pH-dependency of the combined laboratory and field (see M-CA 7.1.2) normalised DT_{50} values. Therefore, the geometric mean DT_{50} of 113.3 days and the arithmetic mean formation fraction of 0.338 were used for PEC_{gw} calculations. The results of the study by Simmonds (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

Sorption behaviour

<u>Glyphosate</u>
Batch adsorption experiments were conducted with glyphosate on 10 soils (see M-CA 7.1.3.1.1). The Input Decision Tool 3.3 did not indicate pH-dependency of the K_{foc} ~~adsorption parameters~~ (see M-CA 7.1.3.1.1). Therefore, the geometric mean K_{foc} of 4243 L/kg and the arithmetic mean 1/n of 0.697 were used in the model simulations. Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

<u>AMPA</u>
Batch adsorption experiments were available with AMPA on four soils (see M-CA 7.1.3.1.2). The Input Decision Tool 3.3 did not indicate pH-dependency of the adsorption parameters (see M-CA 7.1.3.1.2). Therefore, the geometric mean K_{foc} of 3167 L/kg and the arithmetic mean 1/n of 0.690 were used in the model simulations.

Apart from the input parameters explicitly discussed here, all variables in the models were left at their default values. A summary of the relevant substance-related model input data is given in the table below.

Table 9.2.4.1-5: Input parameters related to active substance glyphosate and its metabolite AMPA for PEC_{gw} calculations

Compound	Glyphosate	AMPA
Molar mass (g/mol)	169.10	111.04
Water solubility (mg/L)	100,000 (20 °C, pH 7)	100,000 (20 °C, pH 7)[4]
Saturated vapour pressure (Pa)	1.31×10^{-5} (25 °C) / 6.81×10^{-6} (20 °C)[3]	1.31×10^{-5} (25 °C)[4]
DT_{50} in soil (d) (lab and field studies)	Acidic: 26.8 (geometric mean, pH < 7, n = 15) Alkaline: 12.4 (geometric mean, pH ≥ 7, n = 10), normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58)	113.3 (geometric mean n = 19)[6]
Transformation rate (1/d)[1]	Acidic: 0.008742 (to AMPA) 0.017122 (to CO_2) Alkaline: 0.018894 (to AMPA) 0.037005 (to CO_2)	0.006118
K_{foc} / K_{fom}[2] (L/kg)	4243 / 2461[5] (geometric mean, n = 10)	3167 / 1837 (geometric mean, n = 4)
Freundlich Exponent 1/n (-)	0.697[5] (arithmetic mean, n = 10)	0.690 (arithmetic mean, n = 4)
Plant uptake factor (-)	0 (worst case value)	0 (worst case value)
Formation fraction (-)	-	0.338 from parent (arithmetic mean of lab and field studies, n = 17)

[1] For PELMO; $(\ln(2)/DT_{50}) \times$ formation fraction
[2] $K_{fom} = K_{foc}/1.724$
[3] Re-calculated to 20 C with "EVA3rev2h" for PELMO input
[4] No available data, parent value assumed
[5] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.
[6] The results of the study by [redacted] (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

2. Use patterns

Glyphosate is intended to be used as an herbicide on various crops. The FOCUS crops carrots, potatoes, onions, tomatoes, cabbage, sugar beets, apples, vines, citrus, and grass/alfalfa were simulated.

Two possible application timings: pre-emergence/ spring ("early") and post-harvest/ autumn ("late") were considered. As a worst case, it was assumed that glyphosate is applied to bare soil by setting the interception rate to 0 %; all of the applied substance reaches the soil surface and becomes available for leaching.

The detailed use patterns considered in the simulations are presented in the table below:

Table 9.2.4.1-6: Use patterns considered in the simulations

FOCUS crop	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Application timing (-)	Interception (%)	Soil load (g a.s./ha)
Carrots[1] / vegetables, root[2]						
Potatoes						
Onions[1] / vegetables, bulb[2]						
Tomatoes[1] / vegetables, fruiting[2]	720	1	-	Early, late	0	720
Cabbage[1] / vegetables, leafy[2]						
Sugar beets						
Apples[1] / pome/stone fruit[2]						
Vines						
Citrus						
Carrots[1] / vegetables, root[2]						
Potatoes						
Onions[1] / vegetables, bulb[2]						
Tomatoes[1] / vegetables, fruiting[2]	1440	1	-	Early, late	0	1440
Cabbage[1] / vegetables, leafy[2]						
Sugar beets						
Apples[1] / pome/stone fruit[2]						
Vines						
Citrus						
Carrots[1] / vegetables, root[2]						
Potatoes						
Onions[1] / vegetables, bulb[2]						
Tomatoes[1] / vegetables, fruiting[2]	540	1	-	Early, late	0	540
Cabbage[1] / vegetables, leafy[2]						
Sugar beets						

Table 9.2.4.1-6: Use patterns considered in the simulations

FOCUS crop	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Application timing (-)	Interception (%)	Soil load (g a.s./ha)
Carrots[1] / vegetables, root[2]	2160	1	-	Early, late	0	2160
Potatoes						
Onions[1] / vegetables, bulb[2]						
Tomatoes[1] / vegetables, fruiting[2]						
Cabbage[1] / vegetables, leafy[2]						
Sugar beets						
Apples[1] / pome/stone fruit[2]	2880	1	-	Early, late	0	2880
Vines						
Citrus						
Grass/alfalfa	1800	1	-	Early, late	0	1800

[1] Representative crop in FOCUS PEARL and FOCUS PELMO
[2] Representative crop in FOCUS MACRO

3. Simulation tools and modelling strategy

The groundwater leaching models FOCUS PEARL 4.4.4, FOCUS PELMO 5.5.3 and FOCUS MACRO 5.5.4 were used for the simulations, in accordance with the latest guidance (FOCUS, 2014). All runs were performed with annual applications over a total period of 26 years. The first six years were run as a warming-up period and the results were extracted for the following 20 years.

The groundwater scenarios were used as defined in FOCUS (2000, 2014; EC, 2014). All FOCUS groundwater scenarios defined for each crop were simulated.

Application timing depends on the specific growth stage being treated. For annual field crops (carrots, potatoes, onions, tomatoes, cabbage, and sugar beet), two sets of simulations were conducted considering relative application dates according to FOCUS: i) 20 days before emergence ("early") and ii) 7 days after harvest ("late"). For perennial crops (apples, vines, citrus, and grass/alfalfa), two sets of simulations were conducted considering absolute application dates: i) 01-Apr ("early") and ii) 01-Oct ("late"). The detailed application dates used in the modelling are summarised in the table below.

Table 9.2.4.1-7: Application dates used for groundwater risk assessment

Crop	Scenario	Early application dates[1]	Late application dates[1]
Carrots[2] / vegetables, root[3]	Châteaudun (1st)	18-Feb (49)	07-Jun (158)
	Châteaudun (2nd)	20-Jun (171)	27-Sep (270)
	Hamburg (1st)	18-Feb (49)	07-Jun (158)
	Hamburg (2nd)	20-Jun (171)	27-Sep (270)
	Jokioinen	12-May (132)	12-Oct (285)
	Kremsmünster (1st)	18-Feb (49)	07-Jun (158)
	Kremsmünster (2nd)	20-Jun (171)	27-Sep (270)
	Porto (1st)	08-Feb (39)	07-Jun (158)
	Porto (2nd)	02-Jul (183)	22-Oct (295)
	Thiva (1st)	23-Feb (54)	29-May (149)
	Thiva (2nd)	26-May (146)	17-Sep (260)
Potatoes	Châteaudun	10-Apr (100)	08-Sep (251)
	Hamburg	20-Apr (110)	22-Sep (265)
	Jokioinen	16-May (136)	02-Oct (275)
	Kremsmünster	20-Apr (110)	22-Sep (265)
	Okehampton	10-Apr (100)	08-Sep (251)
	Piacenza	31-Mar (90)	17-Sep (260)
	Porto	23-Feb (54)	22-Jun (173)
	Sevilla	11-Jan (11)	07-Jun (158)
	Thiva	09-Feb (40)	06-Aug (218)
Onions[2] / vegetables, bulb[3]	Châteaudun	05-Apr (95)	08-Sep (251)
	Hamburg	05-Apr (95)	08-Sep (251)
	Jokioinen	30-Apr (120)	22-Aug (234)
	Kremsmünster	05-Apr (95)	08-Sep (251)
	Porto	08-Feb (39)	07-Jun (158)
	Thiva	21-Mar (80)	07-Jul (188)
Tomatoes[2] / vegetables, fruiting[3]	Châteaudun	20-Apr (110)	01-Sep (244)
	Piacenza	20-Apr (110)	01-Sep (244)
	Porto	23-Feb (54)	07-Sep (250)
	Sevilla	26-Mar (85)	08-Jul (189)
	Thiva	21-Mar (80)	17-Sep (260)
Cabbage[2] / vegetables, leafy[3]	Châteaudun (1st)	31-Mar (90)	22-Jul (203)
	Châteaudun (2nd)	11-Jul (192)	22-Oct (295)
	Hamburg (1st)	31-Mar (90)	22-Jul (203)
	Hamburg (2nd)	11-Jul (192)	22-Oct (295)
	Jokioinen	30-Apr (120)	27-Sep (270)
	Kremsmünster (1st)	31-Mar (90)	22-Jul (203)
	Kremsmünster (2nd)	11-Jul (192)	22-Oct (295)
	Porto (1st)	08-Feb (39)	08-Jul (189)
	Porto (2nd)	11-Jul (192)	22-Nov (326)
	Sevilla (1st)	09-Feb (40)	08-Jun (159)
	Sevilla (2nd)	26-May (146)	22-Sep (265)
	Thiva	26-Jul (207)	07-Dec (341)

Table 9.2.4.1-7: Application dates used for groundwater risk assessment

Crop	Scenario	Early application dates[1]	Late application dates[1]
Sugar beet	Châteaudun	27-Mar (86)	22-Oct (295)
	Hamburg	26-Mar (85)	15-Oct (288)
	Jokioinen	05-May (125)	22-Oct (295)
	Kremsmünster	26-Mar (85)	17-Oct (290)
	Okehampton	05-Apr (95)	01-Nov (305)
	Piacenza	28-Feb (59)	22-Sep (265)
	Porto	23-Feb (54)	08-Aug (220)
	Sevilla	21-Oct (294)	08-Jul (189)
	Thiva	11-Apr (101)	07-Oct (280)
Apples[2] / pome/stone fruit[3]	Châteaudun	01-Apr (91)	01 Oct (274)
	Hamburg	01-Apr (91)	01 Oct (274)
	Jokioinen	01-Apr (91)	01 Oct (274)
	Kremsmünster	01-Apr (91)	01 Oct (274)
	Okehampton	01-Apr (91)	01 Oct (274)
	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)
Vines	Châteaudun	01-Apr (91)	01 Oct (274)
	Hamburg	01-Apr (91)	01 Oct (274)
	Kremsmünster	01-Apr (91)	01 Oct (274)
	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)
Citrus	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)
Grass/alfalfa	Châteaudun	01-Apr (91)	01 Oct (274)
	Hamburg	01-Apr (91)	01 Oct (274)
	Jokioinen	01-Apr (91)	01 Oct (274)
	Kremsmünster	01-Apr (91)	01 Oct (274)
	Okehampton	01-Apr (91)	01 Oct (274)
	Piacenza	01-Apr (91)	01 Oct (274)
	Porto	01-Apr (91)	01 Oct (274)
	Sevilla	01-Apr (91)	01 Oct (274)
	Thiva	01-Apr (91)	01 Oct (274)

[1] Values in brackets specify 'Julian Day' as used in FOCUS MACRO simulations
[2] Representative crop in FOCUS PEARL and FOCUS PELMO
[3] Representative crop in FOCUS MACRO

II. RESULTS AND DISCUSSION

Predicted environmental concentrations of glyphosate and its metabolite AMPA in groundwater (PEC_{gw}) were calculated for use of glyphosate on various crops in Europe, in accordance with current FOCUS guidelines (FOCUS, 2000, 2014; EC, 2014). The PEC_{gw} values are given in the tables below.

Table 9.2.4.1-8: PEC_{gw} of glyphosate and AMPA (FOCUS PEARL)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT_{50} = 26.8 days	Alkaline case: DT_{50} = 12.4 days	Acidic case: parent DT_{50} = 26.8 days	Alkaline case: parent DT_{50} = 12.4 days
All relevant FOCUS crops (1 × 720 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1440 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 540 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2160 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2880 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1800 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001

Table 9.2.4.1-9: PEC_{gw} of glyphosate and AMPA (FOCUS PELMO)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT_{50} = 26.8 days	Alkaline case: DT_{50} = 12.4 days	Acidic case: parent DT_{50} = 26.8 days	Alkaline case: parent DT_{50} = 12.4 days
All relevant FOCUS crops (1 × 720 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1440 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 540 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2160 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001

Table 9.2.4.1-9: PEC_{gw} of glyphosate and AMPA (FOCUS PELMO)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT_{50} = 26.8 days	Alkaline case: DT_{50} = 12.4 days	Acidic case: parent DT_{50} = 26.8 days	Alkaline case: parent DT_{50} = 12.4 days
All relevant FOCUS crops (1 × 2880 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1800 g a.s./ha)	All relevant FOCUS scenarios	<0.001	<0.001	<0.001	<0.001

Table 9.2.4.1-10: PEC_{gw} of glyphosate and AMPA (FOCUS MACRO)

Crop	Scenario	Glyphosate (µg/L)		AMPA (µg/L)	
		Acidic case: DT_{50} = 26.8 days	Alkaline case: DT_{50} = 12.4 days	Acidic case: parent DT_{50} = 26.8 days	Alkaline case: parent DT_{50} = 12.4 days
All relevant FOCUS crops (1 × 720 g/ha)[1]	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1440 g/ha)[1]	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 540 g/ha)	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2160 g/ha)	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 2880 g/ha)[1]	Châteaudun	<0.001	<0.001	<0.001	<0.001
All relevant FOCUS crops (1 × 1800 g/ha)	Châteaudun	<0.001	<0.001	<0.001	<0.001

[1] Citrus was not simulated in FOCUS MACRO since the scenario Châteaudun is not defined for this crop

In all simulations, the PEC_{gw} of glyphosate and its metabolite AMPA in leachate at 1 m soil depth did not exceed the groundwater threshold value of 0.1 µg/L. Therefore, it can be concluded that the use of glyphosate is unlikely to pose an unacceptable risk to groundwater if the active substance is used in compliance with the label recommendations.

3. Assessment and conclusion

Assessment and conclusion by applicant:
The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

1. Information on the study

Data point	CP 9.2.4.1/002
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA in groundwater and surface water following application to railways – a modelling assessment using HardSPEC
Report No	110054-015
Guidelines followed in study	Hollis, J.M. *et al.*: HardSPEC: A First-tier Model for Estimating Surface- and Ground-Water Exposure resulting from Herbicides applied to Hard Surfaces: Updated Technical Guidance on Model Principles and Application for version 1.4.3.2. Report to the Chemicals Regulation Division of the HSE April, 2017, 121 pp + 3 Appendices.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	Valid
Category study in AIR 5 dossier (L docs)	Category 1

2. Full summary

Executive Summary

Predicted environmental concentrations in groundwater, surface water and sediment were calculated for the active substance glyphosate and its metabolites AMPA and HMPA (only relevant in surface water) following weed treatment of railways. The model HardSPEC 1.4.3.2 was used for the calculations.

Calculations were performed for a single application of 1800 and 3600 g a.s./ha.

The predicted environmental concentrations in groundwater (PEC_{gw}) were calculated to be <0.001 µg/L.

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in groundwater, surface water and sediment of the herbicidal active substance glyphosate and its metabolites AMPA and hydroxymethylphosphonic acid (HMPA) following weed treatment of railways.

Calculations were carried out using the model HardSPEC 1.4.3.2.

1. Model input data

Degradation in soil

Under aerobic conditions, glyphosate is degraded in soil to the major metabolite AMPA, and subsequently to carbon dioxide and non-extractable soil residues. The maximum occurrence of AMPA of 63 % was found in a field study conducted in the US (Minnesota; [redacted], 1993, KCA 7.1.2.2.1/006) and was used in the HardSPEC calculations.

The aerobic degradation of glyphosate and AMPA in soil was studied in laboratory and field studies. Kinetic evaluations according to FOCUS kinetics guidance (2006, 2014) were performed by [redacted] (2020, KCA 7.1.2.1.1/001, KCA 7.1.2.2.1/003) and [redacted] (2020, KCA 7.1.2.2.1/001). An evaluation based on the "EFSA DegT$_{50}$ Endpoint Selector" suggested that the normalised DT$_{50}$ values from laboratory and field studies were not significantly different (see M-CA 7.1.2). Therefore, laboratory and field DT$_{50}$ values were considered together as one dataset, respectively for glyphosate and AMPA.

Glyphosate

The Input Decision Tool 3.3 indicated a pH-dependency of the combined laboratory and field (see M-CA 7.1.2) normalised DT$_{50}$ values. The geometric mean DT$_{50}$ in acidic soils (pH < 7 (H_2O)) of 26.8 days was used in the HardSPEC calculations, which results in the worst case PEC values.

AMPA

The Input Decision Tool 3.3 did not indicate pH-dependency of the combined laboratory and field (see M-CA 7.1.2) normalised DT$_{50}$ values. Therefore the geometric mean DT$_{50}$ in all soils of 113.3 days was used in the HardSPEC calculations. The results of the study by [redacted] (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

Sorption behaviour

Glyphosate

Batch adsorption experiments were conducted with glyphosate on 10 soils (see M-CA 7.1.3.1.1). The Input Decision Tool 3.3 did not indicate pH-dependency of the adsorption parameters (see M-CA 7.1.3.1.1). Therefore the geometric mean K$_{foc}$ of 4243 L/kg was used in the HardSPEC calculations. Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

AMPA

Batch adsorption experiments were available with AMPA for 4 soils (see M-CA 7.1.3.1.2). The Input Decision Tool 3.3 did not indicate pH-dependency of the K$_{foc}$ ~~adsorption parameters~~ (see M-CA 7.1.3.1.2). Therefore the geometric mean K$_{foc}$ of 3167 L/kg was used in the HardSPEC calculations.

HMPA

No sorption data are required for HMPA, since HMPA is only relevant in water. Maximum PEC$_{sw}$ was calculated based on the maximum PEC$_{sw}$ of the parent substance.

Degradation in aquatic systems

Glyphosate degrades to the major aquatic metabolites AMPA and HMPA. The maximum occurrence of AMPA in aquatic systems (45 %) was found in an OECD 309 study ([redacted], 2020, KCA 7.2.2.2/001). However, since the maximum occurrence in soil was greater, this value was not used in the modelling.

For HMPA (only relevant in water), the maximum occurrence of 10 % was observed in the water phase of a water/sediment study ([redacted], 1993, KCA 7.2.2.3/005); this value was used in the modelling.

Glyphosate

The degradation and dissipation of glyphosate was investigated in two laboratory water/sediment studies (total of four systems). The studies were evaluated by [redacted] (2020, KCA 7.2.2.3/001) in accordance with FOCUS guidance on degradation kinetics (FOCUS, 2006, 2014). In the HardSPEC calculations, the geometric mean DT_{50} in the total system of 143.3 days was used for glyphosate in the sediment phase, while a conservative default value of 1000 days was used for the water phase.

AMPA

The degradation and dissipation of AMPA was investigated in four metabolite-dosed laboratory water/sediment studies and two parent-dosed studies. The studies were evaluated by [redacted] (2020, KCA 7.2.2.3/001) in accordance with FOCUS guidance on degradation kinetics (FOCUS, 2006, 2014). In the HardSPEC calculations, the geometric mean DT_{50} in the total system of 102.5 days was used for AMPA in the sediment phase, while a conservative default value of 1000 days was used for the water phase.

HMPA

Since HMPA is only relevant in water, only maximum PEC_{sw} was calculated based on the maximum PEC_{sw} of the parent substance.

A summary of the relevant substance-related model input data is given below.

Table 9.2.4.1-11: Input parameters related to active substance glyphosate and its metabolites for HardSPEC calculations

Compound	Glyphosate	AMPA	HMPA
Molar mass (g/mol)	169.10	111.04	112.02
Soil K_{oc} (mL/g)	4243[6] (geometric mean, n = 10)	3167 (geometric mean, n = 4)	n r.
Water solubility (g/mol):	100,000 (20 °C)	100,000 (20 °C)[1]	n r.
DT_{50} in soil (d)	26.8 (geometric mean of acidic soils, combined lab and field, normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 15)	113.3 (geometric mean, combined lab and field, normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 19)[7]	n r.
DT_{50} on hard surfaces (d)	Not known[2]	Not known[2]	n r.
DT_{50} in sediment (d)	143.3 (geometric mean, total system, n = 4)	102.5 (geometric mean, total system, n = 7)	n r.
DT_{50} in water (d)	1000 (conservative default)	1000 (conservative default)	n r.
Maximum occurrence in soil (-)	-	0.63[3]	n r.
Maximum occurrence in water (-)	-	0.45[4]	0.10[5]

n.r. = not relevant; PEC_{sw} of HMPA was calculated based on the maximum PEC_{sw} of the parent substance
[1] No available data, parent value assumed
[2] Default entry in HardSPEC when no data is available
[3] Maximum from a US field study: Minnesota, USA ([redacted], 1993, KCA 7.1.2.2.1/006)
[4] Value only included for completeness (from OECD 309 study: [redacted], 2020, KCA 7.2.2.2/001), but since the maximum occurrence in soil is higher, that value (0.63) was used to derive a worst case 'effective' application rate for the HardSPEC modelling
[5] Maximum from a water/sediment study ([redacted], 1993, KCA 7.2.2.3/005)
[6] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.
[7] The results of the study by [redacted] (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

2. Use patterns

Glyphosate is intended to be used as an herbicide on railways. The detailed use patterns considered in the HardSPEC calculations are presented below.

Table 9.2.4.1-12: Use patterns considered in the simulations

Target	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Interception (%)
Railways	1800	1	-	10[1]
Railways	3600	1	-	10[1]

[1] Default interception in HardSPEC assuming heavy weed infestation

3. Simulation tools and modelling strategy

The spreadsheet model HardSPEC 1.4.3.2 was used to calculate PEC_{gw} below the railway, and PEC_{sw} and PEC_{sed} for leaching and runoff into a railway ditch in combination with spray drift entry.

The metabolite AMPA was modelled as though it had been applied as active substance, taking into account a molecular mass correction and the maximum occurrence in soil/ water. Since the overall maximum occurrence was for soil (0.63), this value was used to derive a worst case 'effective' application rate for AMPA where:

Effective appl. rate = appl. rate of a.s. × molecular mass correction × maximum occurrence

and

Molecular mass correction = molecular mass (metabolite) / molecular mass (parent)

For HMPA, only PEC_{sw} was calculated based on the maximum PEC_{sw} of the parent substance, taking into account a molecular mass correction and the maximum occurrence of the metabolite in water.

Table 9.2.4.1-13: Consideration of application by substance

Compound	Application rate (g a.s./ha)	Molecular mass correction (-)	Maximum occurrence (-)	Effective application rate (g/ha)
Glyphosate	1800	-	-	1800
	3600	-	-	3600
AMPA	1800	0.6567	0.63	744.6
	3600	0.6567	0.63	1489.3
HMPA	1800	0.6624	0.10	-[1]
	3600	0.6624	0.10	-[1]

[1] PEC_{sw} calculated based on maximum PEC_{sw} of parent substance

II. RESULTS AND DISCUSSION

Predicted environmental concentrations of glyphosate and its metabolite AMPA were calculated in groundwater (PEC_{gw}) for uses on railways using HardSPEC 1.4.3.2. Results are shown below.

Table 9.2.4.1-14: PEC_{gw} of glyphosate following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			<0.001
	Exposure at the abstraction well-head		
	Chalk	Limestone	Sandstone
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 9.2.4.1-15: PEC_{gw} of glyphosate following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			<0.001
	Exposure at the abstraction well-head		
	Chalk	Limestone	Sandstone
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 9.2.4.1-16: PEC_{gw} of AMPA following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			<0.001
	Exposure at the abstraction well-head		
	Chalk	**Limestone**	**Sandstone**
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

Table 9.2.4.1-17: PEC_{gw} of AMPA following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Average annual concentration at the base of the railway formation (µg/L)			0.01
	Exposure at the abstraction well-head		
	Chalk	**Limestone**	**Sandstone**
Max. concentration in well (µg/L)	<0.001	<0.001	<0.001
Period when plume in well >0.1 µg/L (d)	0	0	0

3. Assessment and conclusion

Assessment and conclusion by applicant:
The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

Relevant articles from literature search

1. Information on the study

Data point:	CP 9.2.4/3
Report author	[redacted]
Report year	2015
Report title	Effects of Single Rainfall Events on Leaching of Glyphosate and Bentazone on Two Different Soil Types, using the DAISY Model
Document No	Vadose Zone Journal; Advancing Critical Zone Science; Published November 13, 2015
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability:	Reliable with restrictions (Modelling exercise)

2. Full summary

The purpose of the present modeling study was to contribute to an improved understanding of the mechanisms involved in pesticide leaching during a single rainfall event with temporal variability. Rainfall intensity of the first event after pesticide application has great effect on the amount of pesticide transported to groundwater and subsurface drains, especially in soils containing preferential flow pathways. One way to improve the understanding of single event properties on pesticide leaching is to use a transport model. The soil–plant–atmosphere model Daisy was used to simulate pesticide leaching during and after single rainfall events of different durations and intensities. Designed temporally variable single rainfall events based on the Chicago Design Rain were inserted in the original weather file. A combination of different intensities (13, 20, 24, 28, 34, and 39 mm/h) at different event durations (1, 3, 5, and 9 h) where the intensity peak was placed in the middle of the event ware applied, resulting in 24 different design events. The model setup included two different soil types: a coarse sandy soil and a sandy loam containing macropores and subsurface drains. The fates of the herbicides bentazone [3-isopropyl-1*H*-2,1,3-benzothiadiazin-4(3*H*)-one 2,2-dioxide] and glyphosate [*N*-(phosphonomethyl) glycine] were simulated. The leaching dynamics of both pesticides showed high variability at the hourly level, illustrating the importance of high model resolution when estimating pesticide leaching. For the coarse sandy soil different intensities did not appear to have an effect, as pesticide leaching was controlled by event volume. In contrast, results for the sandy loam showed an effect of intensity, especially for glyphosate, at initially wet soil conditions. Short intense events (1 h) resulted in high leaching to drains (1.7 % of matrix infiltration) compared to events of longer duration (up to 0.4 % of matrix infiltration). This indicates that it might be more prudent to view leaching as a risk that occurs under certain conditions, rather than something that can be averaged.

Materials and Methods

Soils

Two different agricultural soils from Denmark were chosen as model soils—a coarse sandy soil and a sandy loam. The DAISY (deterministic and dynamical two-dimensional soil–plant–atmosphere model developed for simulating agrohydrological systems) parameterization of this location (Jutland, Denmark) originates from Jacobsen (1989), and selected soil properties are illustrated Table 9.2.4.1-18. Because the coarse sandy soil is considered completely homogeneous in the Ap and C horizons and contains no biopores or subsurface drains, it is modelled in 1D. The sandy loam is a heterogeneous soil developed in a glacial till in the eastern part of Zealand, Denmark. It shows signs of long-term agricultural use with the development of a plow pan that has a lower hydraulic conductivity than the surrounding soil layers (Petersen et al., 2001).

Table 9.2.4.1-18: Selected soil characteristics of the two locations, coarse sand and sandy loam, used in the DAISY simulations. Data originate from Jacobsen (1989) and Hansen et al. (2012b).

Soil type	Horizon	Soil depth	Clay	Silt	Sand	Humus	K_{sat}
		cm	%				cm h^{-1}
Coarse sand	Ap	0–30	3.8	7.2	86.7	2.3	21.7
	C	30–200	2.8	2.3	94.5	0.4	92.5
Sandy loam	Ap	0–25	10.4	21.6	65.1	2.9	0.174
	Bplow	25–33	14.6	21.1	62.8	1.6	0.046
	Bt	33–120	21.9	19.2	57.4	1.6	0.269
	C	120–200	20.5	23.3	55.2	1.0	1.500

The sandy loam contains biopores and subsurface tile drains. The drains are placed in a depth of 1.1 m, and 16 m apart, and the biopores are divided into classes according to the depth at which they begin and end in the soil profile. Selected soil properties for this location, which originates from Hansen et al. (2012b) are illustrated in Table 9.2.4.1-18.

Pesticide Management
Bentazone was applied on 17 June with a rate of 960 g/ha, on grass for cutting. Hence, bentazone is located in the crop canopy and will there be mixed with the first rainfall and washed off the plants when the interception capacity is exceeded. Glyphosate was applied on 30 October at a rate of 1440 g/ha on bare soil (stub after harvesting of maize, *Zea mays* L.) (Table 9.2.4.1-19). Glyphosate will therefore be located at the soil surface, from where it will enter the soil system together with the first rainfall. The fate of both pesticides was simulated for 4 yr, and their leaching at 2 m depth was logged. For the sandy loam, transport of pesticides into drains was included in the leaching assessment.

Table 9.2.4.1-19 Pesticide management plan used in the DAISY simulations.

Rotation year	Crop	Pesticide	Application date	Dosage
Warm-up	Spring barley			
Warm-up	Spring barley			
Warm-up	Spring barley			
Warm-up	Spring barley w. grass			
1	Grass	Bentazone	17 June	960 g ha^{-1}
2	Grass			
3	Grass			
4	Maize	Glyphosate	30 October	1440 g ha^{-1}
5	Spring barley			
6	Spring barley			
7	Spring barley			
8	Spring barley			

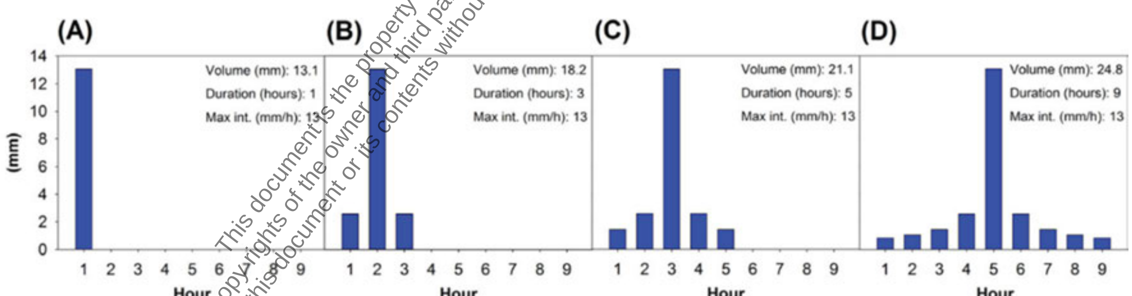
Weather Data
The weather file used in the DAISY simulations was provided by University of Copenhagen and originated from Taastrup, Denmark. It contains hourly values of precipitation, temperature, relative humidity, wind speed, and global radiation and covers the period 1999 to 2008 (8 yr). The weather data covered the 8 yr of pesticide tracking in the model simulations (Table 9.2.4.1-19). To initiate the soil water content in the model, 4 yr of weather data (1999–2003) and a simple spring barley (*Hordeum vulgare* L.) crop rotation were used as a warm-up period before the first pesticide application. The weather record was then reset as the 8 yr of pesticide simulations began (Table 9.2.4.1-19). The weather of the warm-up period was kept constant, while the weather of the 8 yr of pesticide simulations were permutated.

Artificial Rainfall Events
A single artificial rainfall event was inserted in the weather file 4 d after application of the pesticide. Intermittent rain that occurred between pesticide application and the artificial rainfall event were removed. The artificial event originates from the CDS rain, developed in the 1950s, for the use in city sewage planning. The durations of the events studied were 1, 3, 5, and 9 h combined with six different levels of maximum intensities of 13, 20, 24, 28, 34, and 39 mm/h (Table 9.2.4.1-20). When the duration increases, the maximum intensity of the event will be displaced to the middle of the event, and small pre- and post-tails of rain will be added to the event compared to a 1-h event (Figure 9.2.4.1-1). Hence, the event volume is connected to the event duration, as increased duration results in increased volume.

Table 9.2.4.1-20 Characteristics of the inserted Chicago Design Storm rain (CDS rain. All combinations of maximum intensities and durations were investigated at eight different initial conditions, and with different post-event weather.

Max. intensity	Duration	Volume	Repeat interval
mm h^{-1}	h	mm	yr
13	1	13	1
13	3	18	1
13	5	21	1
13	9	25	1
20	1	20	5
20	3	28	5
20	5	33	5
20	9	39	5
24	1	24	10
24	3	33	10
24	5	39	10
24	9	46	10
28	1	28	20
28	3	39	20
28	5	45	20
28	9	53	20
34	1	34	50
34	3	48	50
34	5	55	50
34	9	65	50
39	1	39	100
39	3	55	100
39	5	64	100

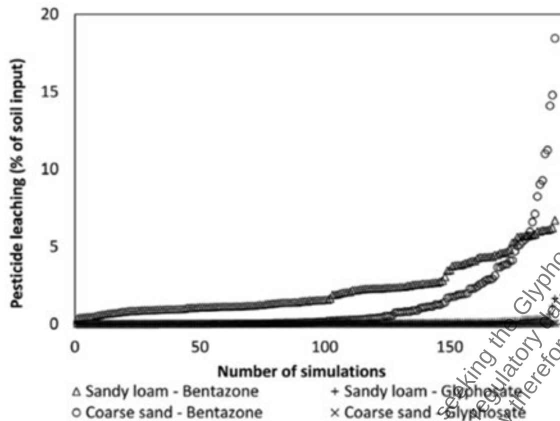
Figure 9.2.4.1-1 Examples of Chicago Design Storm rain (CDS-rain) (Kiefer and Chu, 1957), modified by Madsen et al. (2002) and Arnbjerg-Nielsen et al. (2006), inserted in the weather files used in the DAISY simulations. (A) to (D) illustrate the range of event durations investigated and the differences in rain distribution pattern and consequently the differences in total volumes at different durations, with the same maximum intensity.



Results and Discussion

The complete set of total leaching (leaching after 4 yr as percentage of soil input) from the 192 DAISY simulations is illustrated in Figure 9.2.4.1-2. A quick overview of the dataset is supplied, as the leaching percentages are shown in a sorted sequence from lowest to highest leaching. It is seen that there is an effect of soil type on leaching of both pesticides and that bentazone leaching is substantially larger than glyphosate leaching. In the following responsible processes and mechanisms will be described, and where feasible, related to field or laboratory findings. For each of the two soil types, a description of pesticide leaching during the 4-yr simulations (leaching dynamics) will be followed by a clarification of the effects of CDS event structure (event characteristics) and completed with a description of the importance of initial soil water conditions and post-event weather (rotated weather).

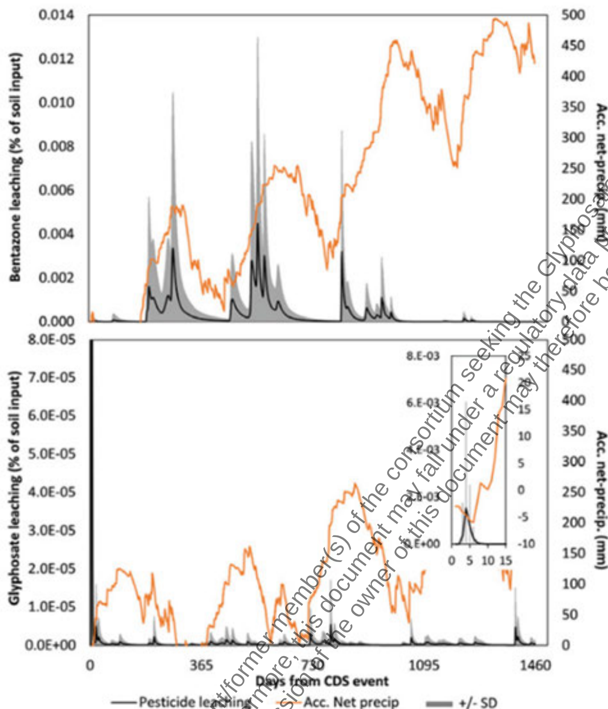
Figure 9.2.4.1-2 Overview of all pesticide fate simulations made by the DAISY model. Total bentazone and glyphosate leaching as percentage of soil input (matrix and biopore infiltration), at the coarse sandy and sandy loam soils. The 192 simulations for each pesticide, at each soil type, are sorted from smallest to largest.



Pesticide Leaching in the Coarse Sand—Leaching Dynamics

The pesticides entered the soil with the first rainfall after application and were thereafter transported vertically through the soil profile with the water. Figure 9.2.4.1-3 illustrates bentazone and glyphosate leaching (daily values) during 4 yr after pesticide application. The amount of pesticide leaching is calculated at the soil depth of 2 m and is given as the percentage of input to the soil. The average ± SD of all 24 investigated CDS events are shown together with accumulated net precipitation (precipitation minus evapotranspiration) (Figure 9.2.4.1-3). The inserted figure illustrates the negative values of accumulated net precipitation during the first 10 d and the importance of glyphosate leaching the first 5 to 10 d. A seasonality in rainfall is seen, as increased accumulated net-precipitation occurs during autumn and winter.

Figure 9.2.4.1-3. Four-year pesticide leaching as percentage of soil input (matrix and biopore infiltration) in the coarse sandy soil (daily values). Pesticide leaching is given as an average ± SD of the 24 different events investigated within Weather Rotation 8. The second *y* axis shows the accumulated net precipitation (precipitation minus evapotranspiration), with negative values only shown in the inserted figure. The inserted figure also illustrates the full magnitude of glyphosate leaching.



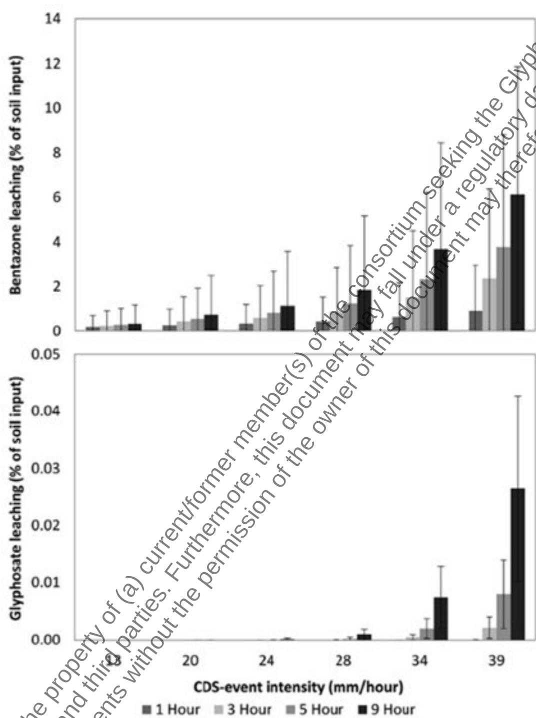
It can be seen that bentazone leaching took place over a 3-yr period, with the highest leaching occurring during winter. Within the first 10 d after the CDS event only 2.7 x 10^{-5} % of total leached bentazone had reached the 2-m depth, which indicate a limited direct effect of the 24 CDS events. Bentazone was applied 17 June (Table 9.2.4.1-19), where evapotranspiration most often exceeds the rainfall volume, resulting in dry soil water conditions. The CDS event transports bentazone into the soil profile, but not below the depth of 1 m, where biodegradation is zero in the model. Hence, under these conditions the first rainfall after bentazone application appears of minor importance at the two layered homogeneous coarse sandy soil. In contrast, the direct response of the CDS event on glyphosate leaching (Figure 9.2.4.1-3, illustrating variation of the 24 events and effect of WR 8), was found to be substantially larger. Within 10 d after the CDS event 86 % of total leached glyphosate had been transported to the 2-m depth. However, total glyphosate leaching (3.5 x 10^{-3} % of soil input) is two magnitudes smaller than total bentazone leaching (4.5 x 10^{-1} % of soil input), which is a result of the higher sorption properties of glyphosate. Glyphosate was applied 30 October, which is a time of year where the net rainfall is substantially larger than at the time of bentazone application (17 June), resulting in wetter soil water conditions, especially at the top 0.5 m. This means that smaller amounts of rainfall is needed to facilitate the transport of glyphosate, and a direct and visible effect of the CDS events is possible (Figure 9.2.4.1-3).

Pesticide Leaching in the Coarse Sand—Effect of Single Event Characteristics

Even though the immediate effect of the CDS events were small (Figure 9.2.4.1-3), total bentazone leaching at the coarse sandy soil, showed a systematic response to the 24 investigated CDS events. Bentazone leaching increased with increased duration (1, 3, 5 and 9 h) and maximum intensity (13, 20, 24, 28, 34, and

39 mm/h) of the CDS event. This is illustrated in Figure 9.2.4.1-4, where the average ± SD of total bentazone leaching of all 8 WRs are shown, but divided into event durations and maximum intensities. This was to be expected, as a higher rainfall volume has a higher potential of transporting pesticides. With increased CDS event volume, the pesticide was transported faster through the degradation zone (upper 1 m), which left less time for degradation. These results also indicate that higher intensities will result in increased leaching percentages. Glyphosate leaching at the coarse sandy soil showed the same pattern as the one found for bentazone, although only small amounts of glyphosate were leached (<0.025 % of soil input).

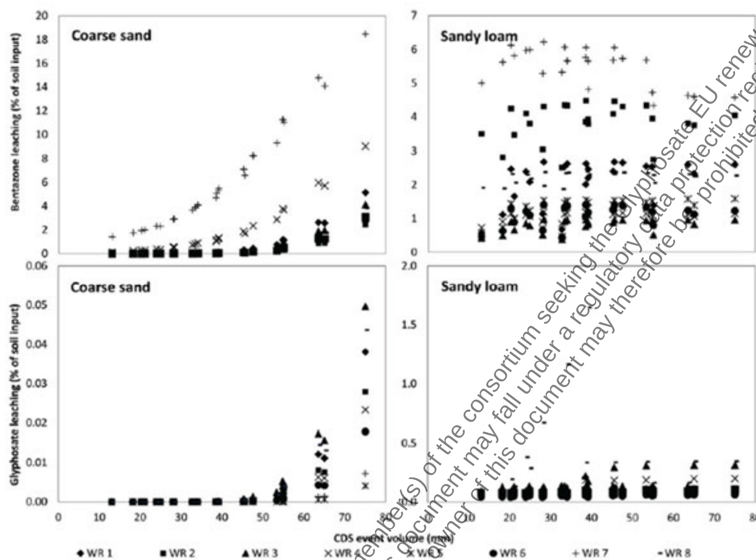
Figure 9.2.4.1-4 Average ± SD of 4 yr accumulated pesticide leaching, based on results from all eight weather rotations, shown as percentage of soil input (matrix and biopore infiltration), in the coarse sandy soil, and as a function of Chicago Design Storm (CDS) event intensity and duration.



Pesticide Leaching in the Coarse Sand—Effect of Rotated Weather
The rotated weather produced different soil water conditions at the time of pesticide application, and different post-CDS event weather, which all may influence the pesticide fate. Figure 9.2.4.1-5 illustrates these effects on pesticide leaching, where daily values of leaching are given as a function of CDS event volume, for all 8 WRs. These results indicate that the leaching pattern can be explained by the volume of the CDS event, as the accumulated leaching of especially bentazone produced smooth curves at the coarse sandy soil and showed almost no effect of increased intensity. In the case where intensity had an effect, the curves would be irregular, showing a spread of leaching results. This indicates that the effect of intensity shown in Figure 9.2.4.1-4 is solely explained by the increase in volume, as intensity increases. The leached amounts of glyphosate were smaller than those of bentazone and showed a steeper curve. This is due to the high number of low leaching percentages even at relatively high CDS event volumes (up to 50 mm). When event volume exceeds 50 mm, a steep increase in leaching percentages was observed (Figure 9.2.4.1-5). The difference between the leaching caused by the different WRs in Figure 9.2.4.1-5 is either due to the initial soil water conditions (water conditions at the time of pesticide spraying), the post-event rainfall, or a combination thereof. Bentazone leaching at the coarse sandy soil appeared to be mostly affected by CDS

event volume. In the case of glyphosate leaching at the coarse sandy soil, no connection to initial soil water conditions or P_{10} was found, except at WR 3 which had the highest P_{10} and the highest leaching.

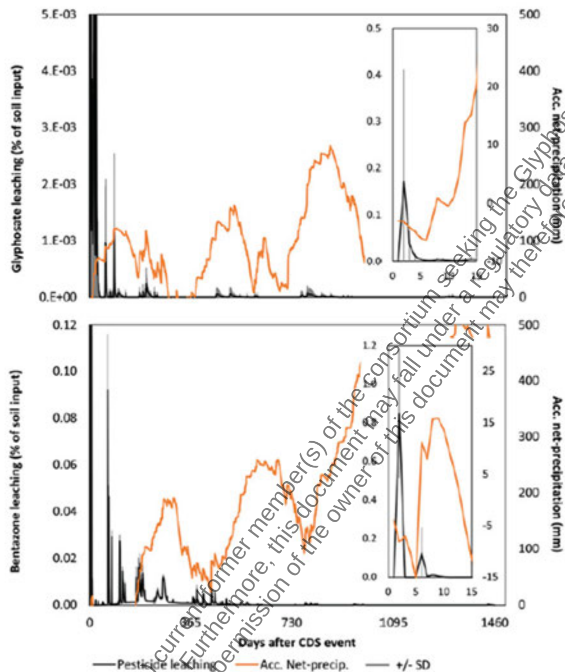
Figure 9.2.4.1-5 Four-year cumulative pesticide leaching shown as percentage of soil input (matrix and biopore infiltration), and as a function of Chicago Design Storm (CDS) event volume. Each of the eight weather rotations (WRs) represents a new set of initial soil water conditions and post-CDS event weather conditions. Please note the different scales on the *y* axis.



Pesticide Leaching in the Sandy Loam—Leaching Dynamics

Figure 9.2.4.1-6 constitutes an example of how daily values of pesticide leaching (to drain plus leaching at 2 m depth) evolved over the 4 yr period of which the pesticides were tracked. Average ± SD of the 24 CDS events from WR 8 is shown. Compared to similar graphs for the coarse sandy soil (Figure 9.2.4.1-2), it can be seen that the largest proportion of both pesticides were leached during or shortly after the CDS event, as was the case for glyphosate at the coarse sandy soil. On average, 87 % of total bentazone leaching and 75 % of total glyphosate leaching occurred within 24 h from the beginning of the CDS event. Hence, the first single rainfall event after pesticide leaching is of considerable importance on the sandy loam, compared to the coarse sandy soil. Even though both pesticides were affected by the CDS event (Figure 9.2.4.1-6), it was found that different processes control the leaching of the two pesticides. It was found that a substantial part of drain leached bentazone was transported via biopores leading directly from the surface to the tile drain. A total of 51 % of drain leached bentazone (average of the 24 CDS event in WR 8) completely bypassed the soil matrix where sorption would have occurred. The second way of entering biopores via the soil matrix is how glyphosate predominantly migrated. Only 23 % of drain leached glyphosate, was transported directly from the soil surface into the biopores, completely bypassing the soil matrix. Further investigation into the transport mechanisms revealed that the agricultural practice was important, in particular the presence of a plant cover in the model setup. Bentazone was applied on grass for cutting, and thus had to be washed off the crop canopy before getting into contact with the soil surface. The CDS event is the first rainfall after pesticide application and is heavy enough to wash bentazone off the canopy and *at the same time* activate the preferential flow pathways where some led directly to the drain. Glyphosate was applied directly to the soil surface and the main fraction entered the soil matrix together with the very first water that hit the surface. When the pesticide had entered the soil matrix it either sorbed to soil particles or followed the water route in dissolved form through the soil matrix into the biopores and from here to the drain pipe. Despite high sorption of glyphosate a small fraction was present as dissolved glyphosate, which was subject to leaching through transport route B. This explains the dependence of amount of water that comes after the maximum intensity in the CDS event: the hour of maximum intensity does not result in relatively higher transport of glyphosate, since the majority of this water is led directly into macropores and thereby bypassing the soil matrix where glyphosate is located.

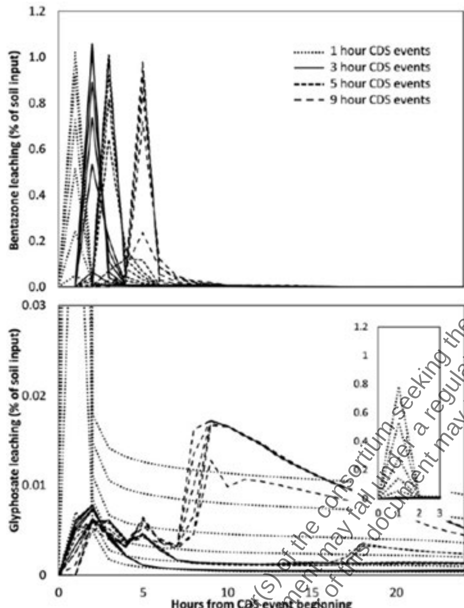
Figure 9.2.4.1-6 Four-year pesticide leaching shown as percentage of soil input (matrix and biopore infiltration) in the sandy loam soil (daily values). Pesticide leaching is given as an average ± SD of the 24 different events investigated within Weather Rotation 8. The second *y* axis shows the accumulated net precipitation (precipitation minus evapotranspiration), with negative values only shown in the inserted figures.



Pesticide Leaching in the Sandy Loam—Effect of Single Event Characteristics

Bentazone leaching was found to increase as CDS event volume increased. The CDS events of 3, 5, and 9 h caused leaching that tended to level out as CDS event volumes increased. This trend represents the prevailing leaching patterns, but some WRs showed limited effect of CDS event volume. The differences in leaching dynamics between bentazone and glyphosate in the sandy loam (Figure 9.2.4.1-7) were also observed at the 4-yr cumulated leaching (Figure 9.2.4.1-8). The applied glyphosate was protected against soil infiltration by small rainfall events when located in a litter layer, and a substantial amount of glyphosate was transported via the biopores to the drains during a heavy event that generated preferential flow. Long CDS event durations resulted in high leaching percentages of glyphosate.

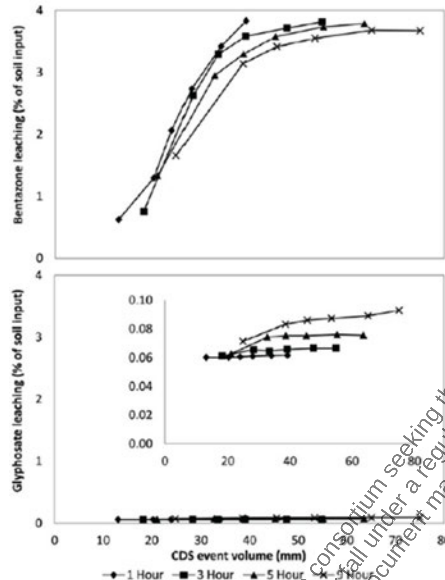
Figure 9.2.4.1-7 Four-year pesticide leaching shown as percentage of soil input (matrix and biopore infiltration) in the sandy loam soil (hourly values). Pesticide leaching is shown for each of the 24 different events investigated within Weather Rotation 8, but divided into groups according to the respective Chicago Design Storm (CDS) event duration.



Pesticide Leaching in the Sandy Loam—Effect of Rotated Weather

The smooth curves produced at the coarse sandy soil (Figure 9.2.4.1-5) were not reproduced, indicating that CDS event volume alone did not explain the leaching in the sandy loam. The increased bentazone leaching caused by increased CDS event volume (Figure 9.2.4.1-8) is not repeated by all WRs, and the effect of CDS event characteristics appear of less importance compared to the effect of initial soil water conditions and post-event weather. Glyphosate leaching appeared to be affected by CDS event intensity to a higher degree than bentazone.

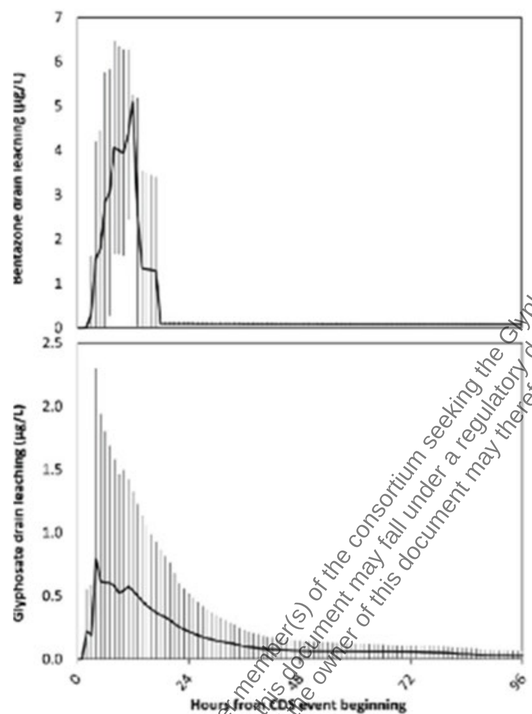
Figure 9.2.4.1-8. Four-year accumulated pesticide leaching shown as the percentage of soil input (matrix and biopore infiltration) in the sandy loam and as a function of the Chicago Design Storm (CDS) event volume, Weather Rotation 1.



Simulated Pesticide Concentrations in the Sandy Loam

The simulated concentrations of bentazone and glyphosate in drainage water at WR 8 are shown in Figure 9.2.4.1-9. Both pesticide concentrations are seen to peak shortly after the CDS event beginning. Previous studies strongly indicate that glyphosate leaching is highly event driven, where especially rainfall intensity affects the leaching dynamics. High intensity rainfall events occurred as the first rainfall after application at initially wet soil conditions, which supports the findings of this work.

Figure 9.2.4.1-9 Pesticide leaching (µg/L), during the first 4 d after the Chicago Design Storm (CDS) event in the sandy loam soil. Pesticide leaching is given as an average ± SD of the 24 different events investigated within Weather Rotation 8. Negative SD values are not shown.



Conclusions

Based on the 192 model simulations, testing the effect on pesticide leaching of duration and intensity of the first rainfall event after pesticide application at an hourly temporal resolution, the following trends were observed: The importance of the first single rainfall event after pesticide application depended highly on soil types. On average, 87 % of total bentazone leaching and 75 % of total glyphosate leaching occurred within 24 h from the CDS event beginning in the sandy loam. Hence, the first single rainfall event after pesticide leaching is of considerable importance in the sandy loam. Preferential flow transport in the biopores was responsible for this immediate transport of both pesticides. In the coarse sandy soil, the first rainfall event was of minor importance, and the effect was only visible if the soil was relatively wet at the time of application. The influence of rainfall characteristics on pesticide leaching depends on the hydrological conditions of the investigated soil types. In the coarse-textured soil, where non-threshold matrix flow dominates, solute leaching was found to increase with increased rainfall volume, whereas in the sandy loam, varying rainfall intensity also affected pesticide leaching, especially for the strongly sorbing pesticide glyphosate. For strongly sorbing pesticides like glyphosate it might be more prudent to view leaching as a risk that occurs under certain conditions, rather than something that can be averaged. Under most initial conditions glyphosate leaching did not vary much (up to 0.4 % of soil input), but at specific initial wet surface conditions glyphosate leaching greatly increased (1.7 % of soil input). It may therefore be equally important to have knowledge of the weather preceding the pesticide application, as knowledge of the weather following the pesticide application.

3. Assessment and conclusion

Assessment and conclusion by applicant:
The article describes a modelling assessment for the leaching of glyphosate through two different soil types. The effect of single rainfall events is analysed. The modelling approach is not in line with current FOCUS guidelines.
Therefore, the article is classified as reliable with restrictions.

Assessment and conclusion by RMS:

CP 9.2.4.2 Additional field tests

No additional field tests were necessary.

CP 9.2.5 Estimation of concentrations in surface water and sediment

Table 9.2.5-1: PEC_{sw} and PEC_{sed} studies

Annex point	Study	Study type	Substance(s)	Status	Remark
CP 9.2.5/001	[redacted], 2020	PEC_{sw} and PEC_{sed} modelling assessment	Glyphosate, AMPA, HMPA	Valid	FOCUS modelling
CP 9.2.5/002	[redacted], 2020	PEC_{sw} and PEC_{sed} modelling assessment	Glyphosate, AMPA, HMPA	Valid	Modelling for application on railways

The following calculations of predicted environmental concentrations in surface water (PEC_{sw}) and sediment (PEC_{sed}) for glyphosate and its metabolites AMPA and HMPA, have not previously been reviewed and are provided in support of this assessment. Detailed information on the simulated use patterns of glyphosate is presented below.

A risk envelope approach was taken in the modelling, whereby split application uses from the GAP were covered with simulations at the maximum allowable rates (per application). In addition, band or spot application was not considered as a refinement for reducing the areal load, and also drift reducing techniques were excluded (e.g. drift reducing nozzles) from the modelling. Since these mitigations are pre-defined in the GAP for certain uses, the exclusion of these mitigations result in a very conservative PEC_{sw}/PEC_{sed} assessment.

In addition, PEC_{puddle} for glyphosate was calculated (shown below) and used in the risk assessment for pollinators, considering the consumption of contaminated water (guttation water, surface water and puddles).

PEC_{sw} for the formulation MON 52276 was also calculated.

Table 9.2.5-2: Use patterns considered in the simulations (FOCUS$_{sw}$)

Use No.	FOCUS crop	Appl. rate (g a.s./ha)	No. of appl. (-)	Min. appl interval (d)	Appl. method (-)	Appl. timing (-)
1c, 6b, 10b, 10c; lowest single app. of split for 2b, 2c	Vegetables, root; potatoes; vegetables, bulb; vegetables, fruiting; vegetables, leafy; sugar beets	720	1	-	Ground spray	Early, late
Lowest single app. of split for 4b, 4c	Pome/stone fruit, olives [2]				Ground spray[1]	
Lowest single app. of split for 5b, 5c	Vines					
2b, 2c	Vegetables, root; potatoes; vegetables, bulb; vegetables, fruiting; vegetables, leafy; sugar beets	720	3	28	Ground spray	Early, late
4c	Pome/stone fruit, olives [2]				Ground spray[1]	Early, late
5c	Vines					
1a; highest single app. of split for 2a	Vegetables, root; potatoes; vegetables, bulb; vegetables, fruiting; vegetables, leafy; sugar beets	1440	1	-	Ground spray	Early, late
Highest single app. of split for 4a	Pome/stone fruit, olives [2]				Ground spray[1]	
Highest single app. of split for 5a	Vines					
4a, 4b	Pome/stone fruit, olives [2]	1440	2	28	Ground spray[1]	Early, late
5a, 5b	Vines					
3a, 3b	Vegetables, root; potatoes; vegetables, bulb; vegetables, fruiting; vegetables, leafy; sugar beets	540	1	-	Ground spray	Early, late
1b, 6a, 10a; lowest single	Vegetables, root; potatoes;	1080	1	-	Ground spray	Early, late

Table 9.2.5-2: Use patterns considered in the simulations ($FOCUS_{sw}$)

Use No.	FOCUS crop	Appl. rate (g a.s./ha)	No. of appl. (-)	Min. appl interval (d)	Appl. method (-)	Appl. timing (-)
app. of split for 2a; highest single app. of split for 2b	vegetables, bulb; vegetables, fruiting; vegetables, leafy; sugar beets					
2a, 2b	Vegetables, root; potatoes; vegetables, bulb; vegetables, fruiting; vegetables, leafy; sugar beets	1080	2	28	Ground spray	Early, late
8, 9	Grass/alfalfa	1800	1	-	Ground spray	Early, late
Models used for calculations		STEPS 1-2 in FOCUS 3.2, FOCUS SWASH 5.3				

[1] Since the standard method of applicaton for this crop is 'air blast' in the $FOCUS_{sw}$ models, the drift rate was manually adjusted to reflect ground spray application to weeds around tree base

[2] The FOCUS crop 'citrus' was not included in the representative model crops for 'orchards'. It is assumed that the use in citrus is sufficiently represented by the calculations for the FOCUS crop 'olives'. At Step 2, PEC_{sw} and PEC_{sed} would be equivalent for the two crops, since the FOCUS crop 'grass/alfalfa' was used as a surrogate model crop for all orchard crops (treatment of weeds at tree base), and the risk assessment is already safe at Step 2. At Step 3, olives and citrus share the same FOCUS scenarios (D6, R4), and since a worst case interception rate of 0 % was assumed in the modelling, it is expected that the respective PEC would only differ marginally.

Table 9.2.5-3: Use patterns considered in the simulations (railways)

Use No.	Target	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Interception (%)
7a	Railways	3600	1	-	10[1]
7b	Railways	1800	1	-	10[1]
Model used for calculations		HardSPEC 1.4.3.2			

[1] Default interception in HardSPEC assuming heavy weed infestation

1. Information on the study

Data point	CP 9.2.5/001
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA in surface water and sediment following application to various crops – a modelling assessment for Europe using the FOCUS surface water scenarios at Steps 1 - 3
Report No	110054-014
Guidelines followed in study	FOCUS (2001): FOCUS Surface Water Scenarios in the EU Evaluation Process under 91/414/EEC. Report of the FOCUS Working Group on Surface Water Scenarios. EC Document Reference SANCO/4802/2001 rev. 2. FOCUS (2015): Generic guidance for FOCUS surface water Scenarios, version 1.4.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	Valid
Category study in AIR 5 dossier (L docs)	Category 1

2. Full summary

Executive Summary
Predicted environmental concentrations in surface water (PEC_{sw}) and sediment (PEC_{sed}) were calculated for the active substance glyphosate and its relevant metabolites AMPA and HMPA, following application to various crops in Europe. Calculations were carried out at FOCUS Steps 1 and 2 using STEPS 1-2 in FOCUS 3.2, and at FOCUS Step 3 using FOCUS SWASH 5.3.

Single and multiple applications were considered, with timing either early or late, and with a maximum annual application rate of 2880 g a.s./ha. The FOCUS crops ‘vegetables, root’, ‘potatoes’, ‘vegetables, bulb’, ‘vegetables, fruiting’, ‘vegetables, leafy’, ‘sugar beets’, ‘pome/stone fruit’, ‘olives’, ‘vines’ and ‘grass/alfalfa’ were chosen to ensure representativeness of uses selected for modelling.

The overall maximum PEC_{sw} and PEC_{sed} of glyphosate at Step 3 are 11.410 µg/L and 1622.3 µg/kg, respectively.

For AMPA, the overall maximum PEC_{sw} and PEC_{sed} at Step 2 are 53.986 µg/L and 1690.0 µg/kg, respectively.

For HMPA, the overall maximum PEC_{sw} and PEC_{sed} at Step 2 are 22.523 µg/L and 2.250 µg/kg, respectively.

I. MATERIALS AND METHODS

The purpose of this modelling assessment was to obtain predicted environmental concentrations in surface water (PEC_{sw}) and sediment (PEC_{sed}) of the active substance glyphosate and its metabolites AMPA and

HMPA, following application to various crops in Europe.

Calculations were carried out at FOCUS Steps 1 to 3 according to FOCUS surface water guidance (FOCUS, 2001, 2015). The models STEPS 1-2 in FOCUS 3.2 and FOCUS SWASH 5.3 (including the Substance Plug-In database (SPIN 2.2), and operational models FOCUS MACRO 5.5.4, FOCUS PRZM 4.3.1 and FOCUS TOXSWA 5.5.3) were used.

1. Model input data

Degradation in aquatic systems

Glyphosate degrades to the major aquatic metabolites AMPA and HMPA. The maximum occurrence of AMPA in aquatic systems (45 %) found in an OECD 309 study ([redacted], 2020, KCA 7.2.2.2/001) was used in the modelling. For HMPA (only relevant in water), the maximum occurrence of 10 % was observed in the water phase of a water/sediment study ([redacted], 1993, KCA 7.2.2.3/005); this value was used in the modelling.

Glyphosate

The degradation and dissipation of glyphosate was investigated in two laboratory water/sediment studies (total of four systems). The studies were evaluated by [redacted] (2020, KCA 7.2.2.3/001) in accordance with FOCUS guidance on degradation kinetics (FOCUS; 2006, 2014). At Steps 1 and 2, the geometric mean DT_{50} in the total system of 143.3 days was used for glyphosate in both the water and sediment phases. At Step 3, the $DT_{50,water}$ was set to the conservative FOCUS default value of 1000 days, while the $DT_{50,sediment}$ was set to the geometric mean DT_{50} in the total system of 143.3 days in accordance with recommendations by FOCUS kinetics guidance for the degrading compartment (FOCUS, 2006, 2014).

AMPA

The degradation and dissipation of AMPA was investigated in four metabolite-dosed laboratory water/sediment studies and two parent-dosed studies. The studies were evaluated by [redacted] (2020, KCA 7.2.2.3/001) in accordance with FOCUS guidance on degradation kinetics (FOCUS, 2006, 2014). In the calculations at Steps 1 and 2, the geometric mean DT_{50} in the total system of 102.5 days was used for AMPA in both the water and sediment phases.

HMPA

HMPA was detected in a single parent-dosed water/sediment study ([redacted], 1993, KCA 7.2.2.3/005). The study was evaluated by [redacted] (2020, KCA 7.2.2.3/001) in accordance with FOCUS guidance (FOCUS, 2006, 2014). Only one reliable DT_{50} for the total system was derived based on a decline fit; hence a default DT_{50} of 1000 days was used for both the water and sediment phases at Steps 1 and 2.

Degradation in soil

Under aerobic conditions, glyphosate is degraded in soil to the major metabolite AMPA, and subsequently to carbon dioxide and non-extractable soil residues. The maximum occurrence of AMPA of 63 % was found in a field study conducted in the US (Minnesota; [redacted], 1993, KCA 7.1.2.2.1/006) and was used in the calculations at Steps 1 and 2.

The aerobic degradation of glyphosate and AMPA in soil was studied in laboratory and field studies. Kinetic evaluations according to FOCUS kinetics guidance (2006, 2014) were performed by [redacted] (2020, KCA 7.1.2.1.1/001, KCA 7.1.2.2.1/003) and [redacted] (2020, KCA 7.1.2.2.1/001). An evaluation based on the "EFSA DegT50 Endpoint Selector" suggested that the normalised DT_{50} values from laboratory and field studies are not significantly different (see M-CA 7.1.2). Therefore laboratory and field DT_{50} values were considered together as one dataset, respectively for glyphosate and AMPA.

Glyphosate
The Input Decision Tool 3.3 indicated a pH-dependency of the combined laboratory and field normalised DT_{50} values (see M-CA 7.1.2). The geometric mean DT_{50} in acidic soils (pH < 7 (H_2O)) of 26.8 days was used in the modelling at Steps 1-3, which results in the worst case PEC values.

AMPA
The Input Decision Tool 3.3 indicated no pH-dependency of the combined laboratory and field normalised DT_{50} values (see M-CA 7.1.2). Therefore, the geometric mean DT_{50} in all soils of 113.3 days was used in the modelling at Steps 1 and 2. The results of the study by [redacted] (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

HMPA
Since HMPA is not a soil metabolite, the FOCUS default DT_{50} of 1000 days was used for the calculations at Steps 1 and 2.

Sorption behaviour

Glyphosate
Batch adsorption experiments were conducted with glyphosate on 10 soils (see M-CA 7.1.3.1.1). The Input Decision Tool 3.3 did not indicate pH-dependency of the K_{foc} ~~adsorption parameters~~ (see M-CA 7.1.3.1.1). Therefore, the geometric mean K_{foc} of 4243 L/kg and the arithmetic mean 1/n of 0.697 were used in the model simulations. Adsorption parameters were based on preliminary data as final report was not available at time of calculations.

AMPA
Batch adsorption experiments were available with AMPA on four soils (see M-CA 7.1.3.1.2). The Input Decision Tool 3.3 did not indicate pH-dependency of the adsorption parameters (see M-CA 7.1.3.1.2). Therefore, the geometric mean K_{foc} of 3167 L/kg was used in the calculations at Steps 1 and 2.

HMPA
No batch adsorption experiments were conducted with HMPA. Since HMPA is only relevant in water, a default K_{foc} of 10 L/kg was considered appropriate for use in the simulations.

A summary of the relevant substance-related model input data is given in the table below. Apart from the input parameters explicitly discussed here, all variables in the models were left at their default values.

Table 9.2.5-4: Input parameters related to active substance glyphosate and metabolites for $PEC_{sw/sed}$ calculations

Compound	Glyphosate	AMPA	HMPA
Molar mass (g/mol)	169.10	111.04	112.02
Water solubility (mg/L)	100,000 (20 °C, pH 7)	100,000 (20 °C, pH 7)[2]	769,000 (20 °C, pH 7)
Saturated vapour pressure (Pa)	1.31×10^{-5} (25 °C)	n r.	n r.
Diffusion coefficient in water (m^2/d)	4.3×10^{-5} (default value)	n r.	n r.
Diffusion coefficient in air (m^2/d)	0.43 (default value)	n r.	n r.
K_{foc} / K_{fom}[1] (L/kg)	4243 / 2461[7] (geometric mean, n = 10)	3167 / 1837 (geometric mean, n = 4)	10 (default value)

Table 9.2.5-4: Input parameters related to active substance glyphosate and metabolites for $PEC_{sw/sed}$ calculations

Compound	Glyphosate	AMPA	HMPA
Freundlich Exponent 1/n (-)	0.697[7] (arithmetic mean, n = 10)	n r.	n r.
Plant uptake factor (-)	0 (worst case value)	n r.	n r.
Wash-off factor from Crop (1/m)	50 (FOCUS default value)	n r.	n r.
$DT_{50,soil}$ (d) (lab and field studies)	26.8 (geometric mean of acidic soils (pH < 7), normalisation to 10 kPa/pF 2, 20 °C with Q_{10} of 2.58, n = 15)	113.3 (geometric mean, n = 19)[8]	1000 (FOCUS default)
$DT_{50,water}$ (d)	143.3 (total system, geometric mean, n = 4) (Steps 1-2) / 1000 (FOCUS default) (Step 3)	102.5 (total system, geometric mean, n = 7)	1000 (FOCUS default)
$DT_{50,sed}$ (d)	143.3 (total system, geometric mean, n = 4)	102.5 (total system, geometric mean, n = 7)	1000 (FOCUS default)
$DT_{50,whole\ system}$ (d)	143.3 (total system, geometric mean, n = 4)	102.5 (total system, geometric mean, n = 7)	1000 (FOCUS default)
Maximum occurrence observed (% molar basis with respect to the parent)	-	Soil: 63.0[4] Water/sediment system: 45.0[5]	Soil: - Water/sediment system: 10.0[6]

[1] $K_{fom} = K_{foc}/1.724$
[2] No available data, parent value assumed
[3] n.r. = not relevant (for Steps 1-2)
[4] Maximum from a US field study: Minnesota, USA ([redacted], 1993, KCA 7.1.2.2.1/006)
[5] Maximum total system value from an OECD 309 study ([redacted], 2020, KCA 7.2.2.2/001)
[6] Maximum from a water/sediment study ([redacted], 1993, KCA 7.2.2.3/005)
[7] Adsorption parameters were based on preliminary data as final report was not available at time of calculations.
[8] The results of the study by [redacted] (2020, CA 7.1.2.1.2/002 & CA 7.1.2.1.2/004) were not included in the data set as results from final sampling were not available at time of calculations.

2. Use patterns

Glyphosate is intended to be used as an herbicide on various crops. The FOCUS crops ‘vegetables, root’, ‘potatoes’, ‘vegetables, bulb’, ‘vegetables, fruiting’, ‘vegetables, leafy’, ‘sugar beets’, ‘pome/stone fruit’, ‘olives’, ‘vines’ and ‘grass/alfalfa’ were simulated.

Two possible application timings were considered: pre-emergence/ spring (“early”) and post-harvest/ autumn (“late”). The detailed use patterns considered in the simulations are presented in the table below.

Table 9.2.5-5: Use patterns considered in the simulations

FOCUS crop	Application rate (g a.s./ha)	No. of appl. (-)	Min. appl. interval (d)	Application method	Application timing (-)
Vegetables, root	720	1 / 3	- / 28	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Pome/stone fruit				Ground spray[1]	
Olives					
Vines					
Vegetables, root	1440	1	-	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Pome/stone fruit				Ground spray[1]	
Olives					
Vines					
Pome/stone fruit	1440	2	28	Ground spray[1]	Early / late
Olives					
Vines					
Vegetables, root	540	1	-	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Vegetables, root	1080	1 / 2	- / 28	Ground spray	Early / late
Potatoes					
Vegetables, bulb					
Vegetables, fruiting					
Vegetables, leafy					
Sugar beets					
Grass/alfalfa	1800	1	-	Ground spray	Early / late

[1] Since the standard method of applicaton for this crop is 'air blast' in the FOCUS$_{sw}$ models, the drift rate was manually adjusted to reflect ground spray application to weeds around tree base

3. Simulation tools and modelling strategy

Calculations were carried out according to FOCUS surface water guidance (FOCUS, 2001, 2015) at FOCUS Steps 1 and 2 using STEPS 1-2 in FOCUS 3.2 and at Step 3 (parent only) using FOCUS SWASH 5.3, which includes the Substance Plug-In database (SPIN 2.2), and operational models FOCUS MACRO 5.5.4, FOCUS PRZM 4.3.1 and FOCUS TOXSWA 5.5.3.

Simulations for glyphosate were carried out for Steps 1 to 3. For the metabolites AMPA and HMPA, only Steps 1 and 2 were calculated.

In STEPS 1-2 calculations, both regions (South and North Europe) and all application periods (March – May, June – September and Oct – Feb) were simulated to cover the use patterns given above. In STEPS 1-2, the crops pome/stone fruit, olives, and vines were calculated with FOCUS crop 'grass/alfalfa' as a surrogate crop, because the drift rate for field crops is more representative for a herbicide sprayed on weeds at ground level and not to the crop canopy. As a worst case, 'no interception' was selected in the model.

Crop interception at Step 3 is calculated internally by the model on the basis of the maximum interception capacity and the actual leaf area index. For annual field crops, simulations were conducted with the standard application type 'ground spray' and the Chemical Application Method (CAM) was set to '2' (foliar linear; with 4 cm standard application depth). Since the application window was defined pre-emergence or post-harvest, crop interception can be discounted. For perennial crops (pome/stone fruit, olives, vines and grass/alfalfa), CAM 1 (application direct to soil) was selected to eliminate interception (worst case) in FOCUS PRZM for the runoff scenarios. For the drainage scenarios (FOCUS MACRO), the interception parameter ('ZFINT') was manually set to '0' in the input ('*.par') files.

At Step 3 drift is calculated internally by the model. For the crops pome/stone fruit, olives and vines, the default application method is 'air blast'. Since application of a herbicide is to weeds at ground level, the drift deposition rates for these crops had to be adapted manually in the TOXSWA input files ('*.txw'). Therefore, the selection of 'early' or 'late' variation of FOCUS crop for pome/stone fruit and vines had no consequence on the drift loadings ('pome/stone fruit, early' and 'vines, early' with modified drift loadings were simulated). The drift mass loadings were calculated using the 'Drift Calculator' as implemented in SWASH 5.3. Adjusted drift loadings were based on a representative FOCUS field crop ('grass/alfalfa'), but with default buffer distances (between crop and water's edge) at Step 3 relevant for tree crops (3.5 m, 4 m and 6 m for ditch, stream and pond FOCUS scenarios, respectively).

Table 9.2.5-6: Drift loadings for glyphosate application to weeds in pome/stone fruit, olives and vines (based on the crop 'grass/alfalfa' using the SWASH Drift Calculator)

Application rate (g a.s./ha)	No. of appl. (-)	Mass loading per drift event (mg/m²)		
		Ditch	Pond	Stream[1]
720	1	0.5875	0.1260	0.5500
	3	0.4216	0.0881	0.3929
1440	1	1.1750	0.2519	1.0999
	2	0.9973	0.2041	0.9259

[1] Including a factor of 1.2 to account for pesticide input from the upstream catchment (FOCUS 2001, 2015)

At Step 3, application timing depends on the specific growth stage being treated. For annual field crops ('vegetables, root', 'potatoes', 'vegetables, bulb', 'vegetables, fruiting', 'vegetables, leafy', and 'sugar beets'), two sets of simulations were conducted considering relative application dates according to FOCUS: i) application window ends 20 days before emergence ("early application") and ii) application window starts 7 days after harvest ("late application"). For perennial crops ('pome/stone fruit', 'olives' 'vines' and 'grass/alfalfa'), two sets of simulations were conducted considering absolute application dates:

i) application window starts 15-Mar ("early application") and ii) application starts 15-Sep ("late application"). The actual date of application within the windows was determined by the Pesticide Application Timer (PAT) incorporated in FOCUS SWASH 5.3. The PAT calculator eliminates a significant number of potential application dates due to the requirement that at least 10 mm of precipitation be received within 10 days following application. The length of the application window was determined according to FOCUS (2001, 2015), considering the number of applications and the minimum application interval.

A summary of the application dates used in the modelling at Step 3 is presented below.

Table 9.2.5-7: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
Vegetables, root (1 × application)	D3	06-Mar (65) - 05-Apr (95)	22-Aug (234) - 21-Sep (264)
	D6	06-Jan (6) - 05-Feb (36)	20-May (140) - 19-Jun (170)
	R1	01-Mar (60) - 31-Mar (90)	17-Aug (229) - 16-Sep (259)
	R2 (1st)	09-Jan (9) - 08-Feb (39)	07-Jun (158) - 07-Jul (188)
	R2 (2nd)	02-Jun (153) - 02-Jul (183)	22-Oct (295) - 21-Nov (325)
	R3	07-Jan (7) - 06-Feb (37)	20-May (140) - 19-Jun (170)
	R4	07-Jan (7) - 06-Feb (37)	20-May (140) - 19-Jun (170)
Vegetables, root (2 × application)	D3	06-Feb (37) - 05-Apr (95)	22-Aug (234) - 19-Oct (292)
	D6	09-Dec (343) - 05-Feb (36)	20-May (140) - 17-Jul (198)
	R1	01-Feb (32) - 31-Mar (90)	17-Aug (229) - 14-Oct (287)
	R2 (1st)	12-Dec (346) - 08-Feb (39)	07-Jun (158) - 04-Aug (216)
	R2 (2nd)	05-May (125) - 02-Jul (183)	22-Oct (295) - 19-Dec (353)
	R3	10-Dec (344) - 06-Feb (37)	20-May (140) - 17-Jul (198)
	R4	10-Dec (344) - 06-Feb (37)	20-May (140) - 17-Jul (198)
Vegetables, root (3 × application)	D3	09-Jan (9) - 05-Apr (95)	22-Aug (234) - 16-Nov (320)
	D6	11-Nov (315) - 05-Feb (36)	20-May (140) - 14-Aug (226)
	R1	04-Jan (4) - 31-Mar (90)	17-Aug (229) - 11-Nov (315)
	R2 (1st)	14-Nov (318) - 08-Feb (39)	07-Jun (158) - 01-Sep (244)
	R2 (2nd)	07-Apr (97) - 02-Jul (183)	22-Oct (295) - 16-Jan (16)
	R3	12-Nov (316) - 06-Feb (37)	20-May (140) - 14-Aug (226)
	R4	12-Nov (316) - 06-Feb (37)	20-May (140) - 14-Aug (226)
Potatoes (1 × application)	D3	21-Mar (80) - 20-Apr (110)	22-Sep (265) - 22-Oct (295)
	D4	02-Apr (92) - 02-May (122)	30-Sep (273) - 30-Oct (303)
	D6 (1st)	19-Feb (50) - 21-Mar (80)	22-Jul (203) - 21-Aug (233)
	D6 (2nd)	16-Jun (167) - 16-Jul (197)	02-Dec (336) - 01-Jan (1)
	R1	16-Mar (75) - 15-Apr (105)	15-Sep (258) - 15-Oct (288)
	R2	24-Jan (24) - 23-Feb (54)	22-Jun (173) - 22-Jul (203)
	R3	19-Feb (50) - 21-Mar (80)	08-Sep (251) - 08-Oct (281)
Potatoes (2 × application)	D3	21-Feb (52) - 20-Apr (110)	22-Sep (265) - 19-Nov (323)
	D4	05-Mar (64) - 02-May (122)	30-Sep (273) - 27-Nov (331)
	D6 (1st)	22-Jan (22) - 21-Mar (80)	22-Jul (203) - 18-Sep (261)
	D6 (2nd)	19-May (139) - 16-Jul (197)	02-Dec (336) - 29-Jan (29)
	R1	16-Feb (47) - 15-Apr (105)	15-Sep (258) - 12-Nov (316)
	R2	27-Dec (361) - 23-Feb (54)	22-Jun (173) - 19-Aug (231)
	R3	22-Jan (22) - 21-Mar (80)	08-Sep (251) - 05-Nov (309)

Table 9.2.5-7: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
Potatoes (3 × application)	D3	24-Jan (24) - 20-Apr (110)	22-Sep (265) - 17-Dec (351)
	D4	05-Feb (36) - 02-May (122)	30-Sep (273) - 25-Dec (359)
	D6 (1st)	25-Dec (359) - 21-Mar (80)	22-Jul (203) - 16-Oct (289)
	D6 (2nd)	21-Apr (111) - 16-Jul (197)	02-Dec (336) - 26-Feb (57)
	R1	19-Jan (19) - 15-Apr (105)	15-Sep (258) - 10-Dec (344)
	R2	29-Nov (333) - 23-Feb (54)	22-Jun (173) - 16-Sep (259)
	R3	25-Dec (359) - 21-Mar (80)	08-Sep (251) - 03-Dec (337)
Vegetables, bulb (1 × application)	D3	06-Mar (65) - 05-Apr (95)	08-Sep (251) - 08-Oct (281)
	D4	04-Mar (63) - 03-Apr (93)	20-Sep (263) - 20-Oct (293)
	D6 (1st)	21-Mar (80) - 20-Apr (110)	07-Aug (219) - 06-Sep (249)
	D6 (2nd)	31-Aug (243) - 30-Sep (273)	17-Apr (107) - 17-May (137)
	R1	01-Mar (60) - 31-Mar (90)	01-Sep (244) - 01-Oct (274)
	R2	09-Jan (9) - 08-Feb (39)	07-Jun (158) - 07-Jul (188)
	R3	10-Jan (10) - 09-Feb (40)	07-Jun (158) - 07-Jul (188)
	R4	10-Jan (10) - 09-Feb (40)	07-Jun (158) - 07-Jul (188)
Vegetables, bulb (2 × application)	D3	06-Feb (37) - 05-Apr (95)	08-Sep (251) - 05-Nov (309)
	D4	04-Feb (35) - 03-Apr (93)	20-Sep (263) - 17-Nov (321)
	D6 (1st)	21-Feb (52) - 20-Apr (110)	07-Aug (219) - 04-Oct (277)
	D6 (2nd)	03-Aug (215) - 30-Sep (273)	17-Apr (107) - 14-Jun (165)
	R1	01-Feb (32) - 31-Mar (90)	01-Sep (244) - 29-Oct (302)
	R2	12-Dec (346) - 08-Feb (39)	07-Jun (158) - 04-Aug (216)
	R3	13-Dec (347) - 09-Feb (40)	07-Jun (158) - 04-Aug (216)
	R4	13-Dec (347) - 09-Feb (40)	07-Jun (158) - 04-Aug (216)
Vegetables, bulb (3 × application)	D3	09-Jan (9) - 05-Apr (95)	08-Sep (251) - 03-Dec (337)
	D4	07-Jan (7) - 03-Apr (93)	20-Sep (263) - 15-Dec (349)
	D6 (1st)	24-Jan (24) - 20-Apr (110)	07-Aug (219) - 01-Nov (305)
	D6 (2nd)	06-Jul (187) - 30-Sep (273)	17-Apr (107) - 12-Jul (193)
	R1	04-Jan (4) - 31-Mar (90)	01-Sep (244) - 26-Nov (330)
	R2	14-Nov (318) - 08-Feb (39)	07-Jun (158) - 01-Sep (244)
	R3	15-Nov (319) - 09-Feb (40)	07-Jun (158) - 01-Sep (244)
	R4	15-Nov (319) - 09-Feb (40)	07-Jun (158) - 01-Sep (244)
Vegetables, fruiting (1 × application)	D6	19-Feb (50) - 21-Mar (80)	17-Aug (229) - 16-Sep (259)
	R2	24-Jan (24) - 23-Feb (54)	07-Sep (250) - 07-Oct (280)
	R3	21-Mar (80) - 20-Apr (110)	01-Sep (244) - 01-Oct (274)
	R4	01-Mar (60) - 31-Mar (90)	22-Jul (203) - 21-Aug (233)
Vegetables, fruiting (2 × application)	D6	22-Jan (22) - 21-Mar (80)	17-Aug (229) - 14-Oct (287)
	R2	27-Dec (361) - 23-Feb (54)	07-Sep (250) - 04-Nov (308)
	R3	21-Feb (52) - 20-Apr (110)	01-Sep (244) - 29-Oct (302)
	R4	01-Feb (32) - 31-Mar (90)	22-Jul (203) - 18-Sep (261)
Vegetables, fruiting (3 × application)	D6	25-Dec (359) - 21-Mar (80)	17-Aug (229) - 11-Nov (315)
	R2	29-Nov (333) - 23-Feb (54)	07-Sep (250) - 02-Dec (336)
	R3	24-Jan (24) - 20-Apr (110)	01-Sep (244) - 26-Nov (330)
	R4	04-Jan (4) - 31-Mar (90)	22-Jul (203) - 16-Oct (289)

Table 9.2.5-7: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
Vegetables, leafy (1 × application)	D3 (1st)	06-Mar (65) - 05-Apr (95)	27-Jul (208) - 26-Aug (238)
	D3 (2nd)	16-Jun (167) - 16-Jul (197)	27-Oct (300) - 26-Nov (330)
	D4	21-Mar (80) - 20-Apr (110)	03-Oct (276) - 02-Nov (306)
	D6	26-Jun (177) - 26-Jul (207)	07-Dec (341) - 06-Jan (6)
	R1 (1st)	01-Mar (60) - 31-Mar (90)	22-Jul (203) - 21-Aug (233)
	R1 (2nd)	11-Jun (162) - 11-Jul (192)	22-Oct (295) - 21-Nov (325)
	R2 (1st)	09-Jan (9) - 08-Feb (39)	08-Jul (189) - 07-Aug (219)
	R2 (2nd)	11-Jun (162) - 11-Jul (192)	22-Nov (326) - 22-Dec (356)
	R3 (1st)	10-Jan (10) - 09-Feb (40)	08-Jun (159) - 08-Jul (189)
	R3 (2nd)	26-Apr (116) - 26-May (146)	22-Sep (265) - 22-Oct (295)
	R4 (1st)	10-Jan (10) - 09-Feb (40)	08-Jun (159) - 08-Jul (189)
	R4 (2nd)	26-Apr (116) - 26-May (146)	22-Sep (265) - 22-Oct (295)
Vegetables, leafy (2 × application)	D3 (1st)	06-Feb (37) - 05-Apr (95)	27-Jul (208) - 23-Sep (266)
	D3 (2nd)	19-May (139) - 16-Jul (197)	27-Oct (300) - 24-Dec (358)
	D4	21-Feb (52) - 20-Apr (110)	03-Oct (276) - 30-Nov (334)
	D6	29-May (149) - 26-Jul (207)	07-Dec (341) - 03-Feb (34)
	R1 (1st)	01-Feb (32) - 31-Mar (90)	22-Jul (203) - 18-Sep (261)
	R1 (2nd)	14-May (134) - 11-Jul (192)	22-Oct (295) - 19-Dec (353)
	R2 (1st)	12-Dec (346) - 08-Feb (39)	08-Jul (189) - 04-Sep (247)
	R2 (2nd)	14-May (134) - 11-Jul (192)	22-Nov (326) - 19-Jan (19)
	R3 (1st)	13-Dec (347) - 09-Feb (40)	08-Jun (159) - 05-Aug (217)
	R3 (2nd)	29-Mar (88) - 26-May (146)	22-Sep (265) - 19-Nov (323)
	R4 (1st)	13-Dec (347) - 09-Feb (40)	08-Jun (159) - 05-Aug (217)
	R4 (2nd)	29-Mar (88) - 26-May (146)	22-Sep (265) - 19-Nov (323)
Vegetables, leafy (3 × application)	D3 (1st)	09-Jan (9) - 05-Apr (95)	27-Jul (208) - 21-Oct (294)
	D3 (2nd)	21-Apr (111) - 16-Jul (197)	27-Oct (300) - 21-Jan (21)
	D4	24-Jan (24) - 20-Apr (110)	03-Oct (276) - 28-Dec (362)
	D6	01-May (121) - 26-Jul (207)	07-Dec (341) - 03-Mar (62)
	R1 (1st)	04-Jan (4) - 31-Mar (90)	22-Jul (203) - 16-Oct (289)
	R1 (2nd)	16-Apr (106) - 11-Jul (192)	22-Oct (295) - 16-Jan (16)
	R2 (1st)	14-Nov (318) - 08-Feb (39)	08-Jul (189) - 02-Oct (275)
	R2 (2nd)	16-Apr (106) - 11-Jul (192)	22-Nov (326) - 16-Feb (47)
	R3 (1st)	15-Nov (319) - 09-Feb (40)	08-Jun (159) - 02-Sep (245)
	R3 (2nd)	01-Mar (60) - 26-May (146)	22-Sep (265) - 17-Dec (351)
	R4 (1st)	15-Nov (319) - 09-Feb (40)	08-Jun (159) - 02-Sep (245)
	R4 (2nd)	01-Mar (60) - 26-May (146)	22-Sep (265) - 17-Dec (351)
Sugar beets (1 × application)	D3	06-Mar (65) - 05-Apr (95)	25-Oct (298) - 24-Nov (328)
	D4	15-Mar (74) - 14-Apr (104)	01-Nov (305) - 01-Dec (335)
	R1	25-Feb (56) - 27-Mar (86)	17-Oct (290) - 16-Nov (320)
	R3	29-Jan (29) - 28-Feb (59)	10-Sep (253) - 10-Oct (283)

Table 9.2.5-7: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
Sugar beets (2 × application)	D3	06-Feb (37) - 05-Apr (95)	25-Oct (298) - 22-Dec (356)
	D4	15-Feb (46) - 14-Apr (104)	01-Nov (305) - 29-Dec (363)
	R1	28-Jan (28) - 27-Mar (86)	17-Oct (290) - 14-Dec (348)
	R3	01-Jan (1) - 28-Feb (59)	10-Sep (253) - 07-Nov (311)
Sugar beets (3 × application)	D3	09-Jan (9) - 05-Apr (95)	25-Oct (298) - 19-Jan (19)
	D4	18-Jan (18) - 14-Apr (104)	01-Nov (305) - 26-Jan (26)
	R1	31-Dec (365) - 27-Mar (86)	17-Oct (290) - 11-Jan (11)
	R3	04-Dec (338) - 28-Feb (59)	10-Sep (253) - 05-Dec (339)
Pome/stone fruit (1 × application)	D3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D5	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R1	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
Pome/stone fruit (2 × application)	D3	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	D4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	D5	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R1	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R2	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R3	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
Pome/stone fruit (3 × application)	D3	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	D4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	D5	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R1	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R2	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R3	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
Olives (1 × application)	D6	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
Olives (2 × application)	D6	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
Olives (3 × application)	D6	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
Vines (1 × application)	D6	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R1	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)

Table 9.2.5-7: Application dates used in modelling at Step 3

Crop (use)	FOCUS scenario	Application window (early)[1]	Application window (late)[1]
Vines (2 × application)	D6	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R1	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R2	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R3	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
	R4	15-Mar (74) - 12-May (132)	15-Sep (258) - 12-Nov (316)
Vines (3 × application)	D6	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R1	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R2	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R3	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
	R4	15-Mar (74) - 09-Jun (160)	15-Sep (258) - 10-Dec (344)
Grass/alfalfa (1 × application)	D1	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D4	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	D5	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R2	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)
	R3	15-Mar (74) - 14-Apr (104)	15-Sep (258) - 15-Oct (288)

[1] Values in brackets specify 'Julian Day'

II. RESULTS AND DISCUSSION

Predicted environmental concentrations of glyphosate (Steps 1 to 3) and its metabolites AMPA and HMPA (for both Steps 1 and 2 only) in surface water (PEC_{sw}) and sediment (PEC_{sed}) were calculated for use on various crops in Europe. Maximum concentrations by use and scenario are given for glyphosate, AMPA and HMPA in the tables below. Since runoff/drainage and drift loadings of active substance and metabolites are equivalent at Steps 1 and 2 for all crops selected for modelling, results for metabolites are presented in a single table for each simulated use pattern.

PEC_{sw} and PEC_{sed} for glyphosate

Table 9.2.5-8: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246

Table 9.2.5-8: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	4.479	Drift	2.919
D6	Ditch	4.444	Drift	1.726
R1	Pond	0.150	Drift	4.955
R1	Stream	2.960	Drift	36.340
R2	Stream	3.875	Drift	513.500
R2	Stream 2nd	3.976	Drift	105.500
R3	Stream	4.182	Drift	14.380
R4	Stream	2.924	Drift	17.380

Table 9.2.5-9: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	3.263	Drift	4.606
D6	Ditch	3.292	Drift	10.430
R1	Pond	0.490	Runoff	22.350
R1	Stream	2.422	Runoff	214.600
R2	Stream	2.840	Drift	1353.600
R2	Stream 2nd	2.884	Drift	314.000

Table 9.2.5-9: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R3	Stream	3.041	Drift	296.300
R4	Stream	3.495	Runoff	85.490

Table 9.2.5-10: FOCUS Step 1, 2and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	4.495	Drift	4.151
D6	Ditch	4.507	Drift	6.978
R1	Pond	0.152	Drift	6.540
R1	Stream	2.962	Drift	68.110
R2	Stream	3.976	Drift	30.640
R2	Stream 2nd	3.931	Drift	396.100
R3	Stream	4.183	Drift	2.729
R4	Stream	2.911	Drift	11.790

Table 9.2.5-11: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	3.272	Drift	4.775
D6	Ditch	3.354	Drift	21.890
R1	Pond	0.705	Runoff	30.830
R1	Stream	2.145	Drift	271.200
R2	Stream	2.880	Drift	196.100
R2	Stream 2nd	2.847	Drift	1370.300
R3	Stream	3.030	Drift	23.890
R4	Stream	2.144	Drift	173.000

Table 9.2.5-12: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246

Table 9.2.5-12: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.704	Drift	2.559
D4	Pond	0.146	Drift	2.239
D4	Stream	2.965	Drift	0.108
D6	Ditch	3.664	Drift	1.237
D6	Ditch 2nd	3.685	Drift	1.693
R1	Pond	0.146	Drift	4.351
R1	Stream	2.567	Drift	30.110
R2	Stream	3.316	Drift	613.100
R3	Stream	3.626	Drift	19.820

Table 9.2.5-13: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	2.686	Drift	3.823
D4	Pond	0.159	Drift	4.458
D4	Stream	2.248	Drift	0.236
D6	Ditch	2.692	Drift	3.831
D6	Ditch 2nd	2.673	Drift	2.543
R1	Pond	0.482	Runoff	20.410
R1	Stream	1.847	Drift	208.200
R2	Stream	2.427	Drift	1280.700
R3	Stream	2.704	Drift	47.340

Table 9.2.5-14: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	3.702	Drift	2.419
D4	Pond	0.146	Drift	2.375
D4	Stream	3.151	Drift	0.197
D6	Ditch	3.729	Drift	7.716
D6	Ditch 2nd	3.741	Drift	13.680
R1	Pond	0.160	Runoff	10.110
R1	Stream	2.568	Drift	107.400
R2	Stream	3.448	Drift	49.660
R3	Stream	3.621	Drift	200.500

Table 9.2.5-15: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756

Table 9.2.5-15: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	2.684	Drift	3.460
D4	Pond	0.162	Drift	4.376
D4	Stream	2.321	Drift	0.412
D6	Ditch	2.704	Drift	5.626
D6	Ditch 2nd	2.713	Drift	10.010
R1	Pond	1.017	Runoff	41.600
R1	Stream	2.140	Runoff	365.700
R2	Stream	2.489	Drift	370.800
R3	Stream	2.614	Drift	684.700

Table 9.2.5-16: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	4.479	Drift	2.921
D4	Pond	0.150	Drift	2.300
D4	Stream	3.272	Drift	0.091
D6	Ditch	4.473	Drift	2.565

Table 9.2.5-16: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D6	Ditch 2nd	4.526	Drift	15.930
R1	Pond	0.150	Drift	4.424
R1	Stream	2.960	Drift	30.440
R2	Stream	3.874	Drift	513.400
R3	Stream	4.182	Drift	9.843
R4	Stream	2.923	Drift	17.420

Table 9.2.5-17: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	3.263	Drift	4.608
D4	Pond	0.153	Drift	4.681
D4	Stream	2.512	Drift	0.215
D6	Ditch	3.256	Drift	3.088
D6	Ditch 2nd	3.371	Drift	24.750
R1	Pond	0.492	Runoff	22.520
R1	Stream	2.426	Runoff	215.100
R2	Stream	2.839	Drift	1352.800
R3	Stream	3.041	Drift	317.000
R4	Stream	3.503	Runoff	86.140

Table 9.2.5-18: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	4.477	Drift	2.767
D4	Pond	0.150	Drift	2.431
D4	Stream	3.541	Drift	0.169
D6	Ditch	4.526	Drift	15.750
D6	Ditch 2nd	4.390	Drift	0.931
R1	Pond	0.156	Runoff	9.841
R1	Stream	2.962	Drift	106.800
R2	Stream	3.976	Drift	30.650
R3	Stream	4.176	Drift	1.563
R4	Stream	2.961	Drift	5.874

Table 9.2.5-19: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000

Table 9.2.5-19: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	3.259	Drift	4.173
D4	Pond	0.173	Drift	4.581
D4	Stream	2.661	Drift	0.401
D6	Ditch	3.340	Drift	20.250
D6	Ditch 2nd	3.311	Drift	15.520
R1	Pond	1.006	Runoff	40.690
R1	Stream	2.145	Drift	366.300
R2	Stream	2.880	Drift	171.800
R3	Stream	3.029	Drift	143.900
R4	Stream	2.144	Drift	102.500

Table 9.2.5-20: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D6	Ditch	4.433	Drift	1.497
R2	Stream	3.825	Drift	613.800
R3	Stream	4.163	Drift	86.160
R4	Stream	2.950	Drift	50.180

Table 9.2.5-21: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D6	Ditch	3.270	Drift	4.605
R2	Stream	2.808	Drift	1282.400
R3	Stream	3.030	Drift	70.930
R4	Stream	3.780	Runoff	366.500

Table 9.2.5-22: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D6	Ditch	4.517	Drift	11.910
R2	Stream	3.976	Drift	414.500
R3	Stream	4.183	Drift	201.100
R4	Stream	2.961	Drift	30.620

Table 9.2.5-23: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D6	Ditch	3.341	Drift	20.410
R2	Stream	2.880	Drift	1622.300
R3	Stream	3.029	Drift	686.200
R4	Stream	2.145	Drift	236.900

Table 9.2.5-24: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	4.479	Drift	2.891
D3	Ditch 2nd	4.491	Drift	3.719

Table 9.2.5-24: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Pond	0.150	Drift	2.309
D4	Stream	3.419	Drift	0.124
D6	Ditch	4.526	Drift	15.860
R1	Pond	0.150	Drift	4.984
R1	Pond 2nd	0.321	Runoff	16.570
R1	Stream	2.960	Drift	53.560
R1	Stream 2nd	2.937	Drift	357.400
R2	Stream	3.875	Drift	513.600
R2	Stream 2nd	3.976	Drift	118.000
R3	Stream	4.182	Drift	27.560
R3	Stream 2nd	4.183	Drift	84.400
R4	Stream	2.925	Drift	23.970
R4	Stream 2nd	2.908	Drift	264.300

Table 9.2.5-25: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	3.263	Drift	4.564
D3	Ditch 2nd	3.270	Drift	5.999
D4	Pond	0.142	Drift	4.626
D4	Stream	2.556	Drift	0.268

Table 9.2.5-25: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D6	Ditch	3.344	Drift	20.770
R1	Pond	0.489	Runoff	22.310
R1	Pond 2nd	0.381	Drift	27.110
R1	Stream	2.419	Runoff	214.300
R1	Stream 2nd	2.157	Drift	486.800
R2	Stream	2.840	Drift	1353.700
R2	Stream 2nd	2.884	Drift	313.900
R3	Stream	3.041	Drift	316.700
R3	Stream 2nd	3.042	Drift	292.000
R4	Stream	3.371	Runoff	84.360
R4	Stream 2nd	3.120	Runoff	581.900

Table 9.2.5-26: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	4.494	Drift	4.072
D3	Ditch 2nd	4.456	Drift	1.915
D4	Pond	0.150	Drift	2.440
D4	Stream	3.612	Drift	0.212
D6	Ditch	4.526	Drift	16.430
R1	Pond	0.152	Drift	5.981

Table 9.2.5-26: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Pond 2nd	0.280	Runoff	15.130
R1	Stream	2.914	Drift	67.390
R1	Stream 2nd	2.959	Drift	176.200
R2	Stream	3.976	Drift	99.180
R2	Stream 2nd	3.916	Drift	548.900
R3	Stream	4.183	Drift	208.400
R3	Stream 2nd	4.172	Drift	201.000
R4	Stream	2.961	Drift	143.800
R4	Stream 2nd	2.961	Drift	168.500

Table 9.2.5-27: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	3.271	Drift	4.962
D3	Ditch 2nd	3.254	Drift	3.815
D4	Pond	0.172	Drift	4.504
D4	Stream	2.685	Drift	0.481
D6	Ditch	3.295	Drift	12.060
R1	Pond	0.492	Runoff	27.790
R1	Pond 2nd	1.243	Runoff	48.270
R1	Stream	2.147	Drift	267.100

Table 9.2.5-27: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Stream 2nd	2.255	Runoff	462.000
R2	Stream	2.880	Drift	483.000
R2	Stream 2nd	2.836	Drift	1300.300
R3	Stream	3.044	Drift	542.600
R3	Stream 2nd	3.022	Drift	686.100
R4	Stream	2.151	Drift	383.000
R4	Stream 2nd	3.555	Runoff	739.300

Table 9.2.5-28: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	3.704	Drift	2.538
D4	Pond	0.145	Drift	2.233
D4	Stream	2.837	Drift	0.079
R1	Pond	0.146	Drift	4.158
R1	Stream	2.487	Drift	25.610
R3	Stream	3.626	Drift	19.100

Table 9.2.5-29: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	2.688	Drift	4.056
D4	Pond	0.148	Drift	4.542
D4	Stream	2.171	Drift	0.187
R1	Pond	0.431	Runoff	18.480
R1	Stream	2.452	Runoff	161.000
R3	Stream	2.619	Drift	67.010

Table 9.2.5-30: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	3.702	Drift	2.415

Table 9.2.5-30: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Pond	0.146	Drift	2.306
D4	Stream	3.246	Drift	0.314
R1	Pond	0.235	Runoff	13.340
R1	Stream	2.568	Drift	156.200
R3	Stream	3.617	Drift	200.500

Table 9.2.5-31: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	2.685	Drift	4.033
D4	Pond	0.145	Drift	4.299
D4	Stream	2.380	Drift	0.516
R1	Pond	1.230	Runoff	46.500
R1	Stream	2.236	Runoff	459.800
R3	Stream	2.611	Drift	684.800

Table 9.2.5-32: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	1.889	Drift	1.384
D4	Pond	0.120	Drift	1.858
D4	Stream	1.449	Drift	0.040
D5	Pond	0.120	Drift	1.926
D5	Stream	1.599	Drift	0.049
R1	Pond	0.120	Drift	1.893
R1	Stream	1.311	Drift	0.569
R2	Stream	1.727	Drift	2.663
R3	Stream	1.837	Drift	1.290
R4	Stream	1.302	Drift	2.976

Table 9.2.5-33: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000

Table 9.2.5-33: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	1.357	Drift	2.845
D4	Pond	0.120	Drift	3.630
D4	Stream	1.171	Drift	0.156
D5	Pond	0.137	Drift	3.772
D5	Stream	1.321	Drift	0.496
R1	Pond	0.127	Drift	3.635
R1	Stream	0.934	Drift	1.872
R2	Stream	1.253	Drift	6.319
R3	Stream	1.321	Drift	1.609
R4	Stream	1.280	Runoff	6.753

Table 9.2.5-34: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D3	Ditch	1.899	Drift	2.537
D4	Pond	0.120	Drift	2.037
D4	Stream	1.679	Drift	0.203
D5	Pond	0.120	Drift	2.081

Table 9.2.5-34: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D5	Stream	1.854	Drift	0.541
R1	Pond	0.120	Drift	2.024
R1	Stream	1.312	Drift	1.358
R2	Stream	1.762	Drift	13.100
R3	Stream	1.853	Drift	23.140
R4	Stream	1.311	Drift	7.161

Table 9.2.5-35: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D3	Ditch	1.360	Drift	3.362
D4	Pond	0.138	Drift	3.778
D4	Stream	1.196	Drift	0.337
D5	Pond	0.140	Drift	4.165
D5	Stream	1.322	Drift	1.010
R1	Pond	0.134	Drift	4.958
R1	Stream	1.388	Runoff	4.428
R2	Stream	1.255	Drift	46.210
R3	Stream	1.321	Drift	29.010
R4	Stream	2.397	Runoff	23.020

Table 9.2.5-36: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D6	Ditch	1.905	Drift	5.792
R4	Stream	1.303	Drift	3.647

Table 9.2.5-37: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D6	Ditch	1.392	Drift	11.100
R4	Stream	1.710	Runoff	9.308

Table 9.2.5-38: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D6	Ditch	1.907	Drift	6.973
R4	Stream	1.311	Drift	9.064

Table 9.2.5-39: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D6	Ditch	1.395	Drift	12.080
R4	Stream	2.733	Runoff	27.420

Table 9.2.5-40: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D6	Ditch	1.898	Drift	2.523
R1	Pond	0.120	Drift	1.897
R1	Stream	1.310	Drift	0.796
R2	Stream	1.726	Drift	2.970
R3	Stream	1.834	Drift	1.216
R4	Stream	1.299	Drift	3.314

Table 9.2.5-41: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D6	Ditch	1.386	Drift	9.822
R1	Pond	0.128	Drift	3.726

Table 9.2.5-41: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Stream	0.934	Drift	2.843
R2	Stream	1.251	Drift	7.826
R3	Stream	1.321	Drift	1.536
R4	Stream	1.658	Runoff	8.677

Table 9.2.5-42: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (1 × 720 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	42.672	-	1560.000
Step 2				
Northern Europe	Mar-May	7.896	-	315.720
Northern Europe	Jun-Sep	7.896	-	315.720
Northern Europe	Oct-Feb	17.648	-	727.897
Southern Europe	Mar-May	14.397	-	590.246
Southern Europe	Jun-Sep	11.146	-	452.983
Southern Europe	Oct-Feb	14.397	-	590.246
Step 3				
D6	Ditch	1.907	Drift	6.973
R1	Pond	0.120	Drift	2.017
R1	Stream	1.312	Drift	1.343
R2	Stream	1.762	Drift	13.070
R3	Stream	1.853	Drift	22.850
R4	Stream	1.311	Drift	8.137

Table 9.2.5-43: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (3 × 720 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	13.837	-	551.756
Northern Europe	Jun-Sep	13.837	-	551.756
Northern Europe	Oct-Feb	30.607	-	1260.000
Southern Europe	Mar-May	25.017	-	1020.000
Southern Europe	Jun-Sep	19.427	-	787.803
Southern Europe	Oct-Feb	25.017	-	1020.000
Step 3				
D6	Ditch	1.395	Drift	12.080
R1	Pond	0.134	Drift	4.933
R1	Stream	1.353	Runoff	4.386
R2	Stream	1.255	Drift	46.280
R3	Stream	1.321	Drift	28.620
R4	Stream	2.775	Runoff	25.340

Table 9.2.5-44: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	8.987	Drift	5.836
D6	Ditch	8.916	Drift	3.457

Table 9.2.5-44: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Pond	0.303	Drift	10.430
R1	Stream	5.942	Drift	67.730
R2	Stream	7.775	Drift	973.300
R2	Stream 2nd	7.979	Drift	208.600
R3	Stream	8.392	Drift	25.250
R4	Stream	5.870	Drift	29.270

Table 9.2.5-45: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	9.019	Drift	8.284
D6	Ditch	9.043	Drift	13.850
R1	Pond	0.307	Drift	13.290
R1	Stream	5.945	Drift	114.900
R2	Stream	7.979	Drift	60.760
R2	Stream 2nd	7.888	Drift	736.800
R3	Stream	8.393	Drift	5.228
R4	Stream	5.843	Drift	20.770

Table 9.2.5-46: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	7.433	Drift	5.117
D4	Pond	0.294	Drift	4.346
D4	Stream	5.951	Drift	0.216
D6	Ditch	7.353	Drift	2.480
D6	Ditch 2nd	7.396	Drift	3.391
R1	Pond	0.294	Drift	9.086
R1	Stream	5.153	Drift	56.510
R2	Stream	6.656	Drift	1185.300
R3	Stream	7.277	Drift	36.370

Table 9.2.5-47: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000

Table 9.2.5-47: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	7.428	Drift	4.840
D4	Pond	0.294	Drift	4.603
D4	Stream	6.324	Drift	0.396
D6	Ditch	7.484	Drift	15.270
D6	Ditch 2^{nd}	7.507	Drift	26.820
R1	Pond	0.419	Runoff	20.880
R1	Stream	5.156	Drift	181.900
R2	Stream	6.920	Drift	96.060
R3	Stream	7.266	Drift	346.200

Table 9.2.5-48: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	8.987	Drift	5.840
D4	Pond	0.303	Drift	4.457
D4	Stream	6.567	Drift	0.183
D6	Ditch	8.975	Drift	5.133
D6	Ditch 2^{nd}	9.082	Drift	31.250
R1	Pond	0.303	Drift	9.224
R1	Stream	5.942	Drift	57.140
R2	Stream	7.775	Drift	972.900

Table 9.2.5-48: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R3	Stream	8.391	Drift	17.410
R4	Stream	5.867	Drift	29.180

Table 9.2.5-49: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	8.982	Drift	5.534
D4	Pond	0.303	Drift	4.709
D4	Stream	7.106	Drift	0.339
D6	Ditch	9.082	Drift	30.900
D6	Ditch 2nd	8.810	Drift	1.868
R1	Pond	0.408	Runoff	20.320
R1	Stream	5.945	Drift	181.000
R2	Stream	7.979	Drift	60.760
R3	Stream	8.379	Drift	2.986
R4	Stream	5.944	Drift	10.300

Table 9.2.5-50: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D6	Ditch	8.896	Drift	2.999
R2	Stream	7.676	Drift	1186.900
R3	Stream	8.354	Drift	163.600
R4	Stream	5.921	Drift	85.970

Table 9.2.5-51: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D6	Ditch	9.064	Drift	23.440
R2	Stream	7.979	Drift	774.700
R3	Stream	8.393	Drift	347.100
R4	Stream	5.944	Drift	52.510

Table 9.2.5-52: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	8.986	Drift	5.781
D3	Ditch 2nd	9.010	Drift	7.427
D4	Pond	0.303	Drift	4.481
D4	Stream	6.862	Drift	0.249
D6	Ditch	9.082	Drift	31.110
R1	Pond	0.303	Drift	10.070
R1	Pond 2nd	0.801	Runoff	33.560
R1	Stream	5.942	Drift	91.630
R1	Stream 2nd	5.895	Drift	672.800
R2	Stream	7.776	Drift	973.500
R2	Stream 2nd	7.979	Drift	234.300
R3	Stream	8.392	Drift	47.570
R3	Stream 2nd	8.393	Drift	155.300
R4	Stream	5.870	Drift	36.710
R4	Stream 2nd	5.838	Drift	472.800

Table 9.2.5-53: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	9.017	Drift	8.127
D3	Ditch 2nd	8.941	Drift	3.835
D4	Pond	0.303	Drift	4.727
D4	Stream	7.249	Drift	0.425
D6	Ditch	9.082	Drift	32.200
R1	Pond	0.308	Drift	12.140
R1	Pond 2nd	0.729	Runoff	31.810
R1	Stream	5.849	Drift	117.100
R1	Stream 2nd	5.939	Drift	311.800
R2	Stream	7.979	Drift	191.400
R2	Stream 2nd	7.857	Drift	1026.000
R3	Stream	8.393	Drift	400.100
R3	Stream 2nd	8.372	Drift	346.800
R4	Stream	5.944	Drift	256.900
R4	Stream 2nd	5.944	Drift	281.600

Table 9.2.5-54: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	7.432	Drift	5.076
D4	Pond	0.294	Drift	4.327
D4	Stream	5.695	Drift	0.159
R1	Pond	0.296	Drift	8.662
R1	Stream	4.993	Drift	48.080
R3	Stream	7.277	Drift	35.180

Table 9.2.5-55: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	7.429	Drift	4.831
D4	Pond	0.294	Drift	4.461

Table 9.2.5-55: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Stream	6.516	Drift	0.630
R1	Pond	0.617	Runoff	27.950
R1	Stream	5.155	Drift	273.900
R3	Stream	7.259	Drift	346.000

Table 9.2.5-56: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	3.795	Drift	2.772
D4	Pond	0.241	Drift	3.607
D4	Stream	2.911	Drift	0.081
D5	Pond	0.241	Drift	3.746
D5	Stream	3.211	Drift	0.099
R1	Pond	0.241	Drift	3.673
R1	Stream	2.633	Drift	1.100
R2	Stream	3.469	Drift	5.149
R3	Stream	3.688	Drift	2.694
R4	Stream	2.615	Drift	5.369

Table 9.2.5-57: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000
Step 3				
D3	Ditch	3.222	Drift	4.453
D4	Pond	0.266	Drift	5.680
D4	Stream	2.557	Drift	0.156
D5	Pond	0.269	Drift	5.852
D5	Stream	2.960	Drift	0.299
R1	Pond	0.252	Drift	5.707
R1	Stream	2.214	Drift	2.609
R2	Stream	2.922	Drift	7.911
R3	Stream	3.117	Drift	3.294
R4	Stream	3.225	Runoff	12.540

Table 9.2.5-58: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000

Table 9.2.5-58: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D3	Ditch	3.814	Drift	5.064
D4	Pond	0.242	Drift	3.951
D4	Stream	3.372	Drift	0.408
D5	Pond	0.242	Drift	4.040
D5	Stream	3.724	Drift	1.086
R1	Pond	0.242	Drift	3.983
R1	Stream	2.635	Drift	2.348
R2	Stream	3.538	Drift	23.880
R3	Stream	3.721	Drift	41.680
R4	Stream	2.635	Drift	12.200

Table 9.2.5-59: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000
Step 3				
D3	Ditch	3.234	Drift	6.511
D4	Pond	0.278	Drift	6.084
D4	Stream	2.835	Drift	0.522
D5	Pond	0.283	Drift	6.473

Table 9.2.5-59: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to pome/stone fruit, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D5	Stream	3.132	Drift	1.686
R1	Pond	0.267	Drift	7.076
R1	Stream	2.216	Drift	4.937
R2	Stream	2.975	Drift	54.810
R3	Stream	3.130	Drift	41.540
R4	Stream	2.279	Runoff	23.160

Table 9.2.5-60: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D6	Ditch	3.825	Drift	11.430
R4	Stream	2.619	Drift	6.651

Table 9.2.5-61: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000
Step 3				
D6	Ditch	3.276	Drift	18.240
R4	Stream	4.511	Runoff	17.730

Table 9.2.5-62: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D6	Ditch	3.830	Drift	13.750
R4	Stream	2.635	Drift	15.620

Table 9.2.5-63: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to olives, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000
Step 3				
D6	Ditch	3.295	Drift	20.590
R4	Stream	2.954	Runoff	30.420

Table 9.2.5-64: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D6	Ditch	3.813	Drift	5.038
R1	Pond	0.241	Drift	3.680
R1	Stream	2.632	Drift	1.505
R2	Stream	3.465	Drift	5.726
R3	Stream	3.683	Drift	2.538
R4	Stream	2.609	Drift	5.952

Table 9.2.5-65: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, early application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000
Step 3				
D6	Ditch	3.257	Drift	14.520
R1	Pond	0.252	Drift	5.791
R1	Stream	2.214	Drift	3.598
R2	Stream	2.921	Drift	9.351
R3	Stream	3.112	Drift	3.099
R4	Stream	4.363	Runoff	16.390

Table 9.2.5-66: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	85.344	-	3130.000
Step 2				
Northern Europe	Mar-May	15.791	-	631.440
Northern Europe	Jun-Sep	15.791	-	631.440
Northern Europe	Oct-Feb	35.296	-	1460.000
Southern Europe	Mar-May	28.794	-	1180.000
Southern Europe	Jun-Sep	22.293	-	905.966
Southern Europe	Oct-Feb	28.794	-	1180.000
Step 3				
D6	Ditch	3.830	Drift	13.750

Table 9.2.5-66: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (1 × 1440 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Pond	0.242	Drift	3.967
R1	Stream	2.635	Drift	2.318
R2	Stream	3.538	Drift	23.830
R3	Stream	3.721	Drift	41.180
R4	Stream	2.635	Drift	14.000

Table 9.2.5-67: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vines, late application (2 × 1440 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	170.688	-	6260.000
Step 2				
Northern Europe	Mar-May	23.871	-	951.571
Northern Europe	Jun-Sep	23.871	-	951.571
Northern Europe	Oct-Feb	52.829	-	2170.000
Southern Europe	Mar-May	43.176	-	1770.000
Southern Europe	Jun-Sep	33.523	-	1360.000
Southern Europe	Oct-Feb	43.176	-	1770.000
Step 3				
D6	Ditch	3.295	Drift	20.590
R1	Pond	0.267	Drift	7.041
R1	Stream	2.216	Drift	4.889
R2	Stream	2.975	Drift	54.840
R3	Stream	3.130	Drift	41.040
R4	Stream	2.994	Runoff	27.890

Table 9.2.5-68: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	3.354	Drift	2.189
D6	Ditch	3.328	Drift	1.293
R1	Pond	0.112	Drift	3.649
R1	Stream	2.216	Drift	27.950
R2	Stream	2.901	Drift	392.400
R2	Stream 2nd	2.978	Drift	79.450
R3	Stream	3.132	Drift	11.300
R4	Stream	2.189	Drift	13.950

Table 9.2.5-69: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684

Table 9.2.5-69: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	3.366	Drift	3.114
D6	Ditch	3.375	Drift	5.245
R1	Pond	0.113	Drift	4.885
R1	Stream	2.218	Drift	54.310
R2	Stream	2.978	Drift	23.050
R2	Stream 2nd	2.944	Drift	304.700
R3	Stream	3.132	Drift	2.077
R4	Stream	2.179	Drift	9.244

Table 9.2.5-70: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	2.773	Drift	1.918
D4	Pond	0.109	Drift	1.697
D4	Stream	2.220	Drift	0.081
D6	Ditch	2.743	Drift	0.927
D6	Ditch 2nd	2.759	Drift	1.268
R1	Pond	0.109	Drift	3.216
R1	Stream	1.921	Drift	23.100
R2	Stream	2.483	Drift	465.200
R3	Stream	2.715	Drift	15.340

Table 9.2.5-71: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	2.772	Drift	1.813
D4	Pond	0.109	Drift	1.802
D4	Stream	2.359	Drift	0.148
D6	Ditch	2.792	Drift	5.806
D6	Ditch 2nd	2.801	Drift	10.330
R1	Pond	0.110	Drift	7.503
R1	Stream	1.922	Drift	85.520
R2	Stream	2.582	Drift	37.680
R3	Stream	2.711	Drift	158.600

Table 9.2.5-72: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737

Table 9.2.5-72: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	3.354	Drift	2.190
D4	Pond	0.112	Drift	1.745
D4	Stream	2.450	Drift	0.068
D6	Ditch	3.350	Drift	1.923
D6	Ditch 2nd	3.390	Drift	12.030
R1	Pond	0.112	Drift	3.270
R1	Stream	2.216	Drift	23.340
R2	Stream	2.901	Drift	392.300
R3	Stream	3.132	Drift	7.717
R4	Stream	2.188	Drift	13.990

Table 9.2.5-73: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	3.352	Drift	2.074
D4	Pond	0.112	Drift	1.844
D4	Stream	2.651	Drift	0.127
D6	Ditch	3.390	Drift	11.890
D6	Ditch 2nd	3.288	Drift	0.697
R1	Pond	0.113	Drift	7.301

Table 9.2.5-73: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Stream	2.218	Drift	84.970
R2	Stream	2.978	Drift	23.060
R3	Stream	3.127	Drift	1.192
R4	Stream	2.217	Drift	4.615

Table 9.2.5-74: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D6	Ditch	3.320	Drift	1.121
R2	Stream	2.864	Drift	465.800
R3	Stream	3.118	Drift	65.820
R4	Stream	2.208	Drift	39.820

Table 9.2.5-75: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790

Table 9.2.5-75: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D6	Ditch	3.383	Drift	8.982
R2	Stream	2.978	Drift	318.400
R3	Stream	3.132	Drift	159.100
R4	Stream	2.217	Drift	24.270

Table 9.2.5-76: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	3.354	Drift	2.168
D3	Ditch 2nd	3.363	Drift	2.789
D4	Pond	0.112	Drift	1.750
D4	Stream	2.560	Drift	0.093
D6	Ditch	3.390	Drift	11.970
R1	Pond	0.112	Drift	3.732
R1	Pond 2nd	0.221	Runoff	12.370
R1	Stream	2.216	Drift	42.520
R1	Stream 2nd	2.199	Drift	273.800

Table 9.2.5-76: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R2	Stream	2.901	Drift	392.400
R2	Stream 2nd	2.978	Drift	88.770
R3	Stream	3.132	Drift	21.790
R3	Stream 2nd	3.132	Drift	65.150
R4	Stream	2.190	Drift	19.990
R4	Stream 2nd	2.177	Drift	206.300

Table 9.2.5-77: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	3.366	Drift	3.055
D3	Ditch 2nd	3.337	Drift	1.435
D4	Pond	0.112	Drift	1.851
D4	Stream	2.705	Drift	0.159
D6	Ditch	3.390	Drift	12.400
R1	Pond	0.113	Drift	4.468
R1	Pond 2nd	0.188	Runoff	11.150
R1	Stream	2.182	Drift	53.170
R1	Stream 2nd	2.215	Drift	138.000
R2	Stream	2.978	Drift	75.300
R2	Stream 2nd	2.932	Drift	421.600
R3	Stream	3.132	Drift	158.600

Table 9.2.5-77: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R3	Stream 2nd	3.124	Drift	159.000
R4	Stream	2.217	Drift	112.300
R4	Stream 2nd	2.217	Drift	135.000

Table 9.2.5-78: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	2.773	Drift	1.903
D4	Pond	0.109	Drift	1.693
D4	Stream	2.124	Drift	0.059
R1	Pond	0.109	Drift	3.073
R1	Stream	1.862	Drift	19.670
R3	Stream	2.715	Drift	14.760

Table 9.2.5-79: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.004	-	1170.000
Step 2				
Northern Europe	Mar-May	5.922	-	236.790

Table 9.2.5-79: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 540 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Northern Europe	Jun-Sep	5.922	-	236.790
Northern Europe	Oct-Feb	13.236	-	545.923
Southern Europe	Mar-May	10.798	-	442.684
Southern Europe	Jun-Sep	8.360	-	339.737
Southern Europe	Oct-Feb	10.798	-	442.684
Step 3				
D3	Ditch	2.772	Drift	1.810
D4	Pond	0.109	Drift	1.751
D4	Stream	2.431	Drift	0.235
R1	Pond	0.157	Runoff	9.834
R1	Stream	1.922	Drift	122.800
R3	Stream	2.708	Drift	158.600

Table 9.2.5-80: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	6.732	Drift	4.379
D6	Ditch	6.679	Drift	2.591
R1	Pond	0.227	Drift	7.649
R1	Stream	4.450	Drift	52.400
R2	Stream	5.824	Drift	747.600
R2	Stream 2nd	5.977	Drift	157.300

Table 9.2.5-80: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R3	Stream	6.286	Drift	20.050
R4	Stream	4.396	Drift	23.610

Table 9.2.5-81: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	5.880	Drift	6.019
D6	Ditch	5.938	Drift	19.860
R1	Pond	0.452	Runoff	19.360
R1	Stream	3.790	Drift	192.500
R2	Stream	5.035	Drift	1316.700
R2	Stream 2nd	5.166	Drift	488.600
R3	Stream	5.435	Drift	77.270
R4	Stream	3.811	Drift	97.080

Table 9.2.5-82: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	6.756	Drift	6.220
D6	Ditch	6.774	Drift	10.430
R1	Pond	0.229	Drift	9.890
R1	Stream	4.453	Drift	92.860
R2	Stream	5.977	Drift	45.750
R2	Stream 2nd	5.909	Drift	570.600
R3	Stream	6.287	Drift	3.997
R4	Stream	4.376	Drift	16.470

Table 9.2.5-83: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000

Table 9.2.5-83: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, root, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 3				
D3	Ditch	5.900	Drift	7.557
D6	Ditch	5.970	Drift	26.450
R1	Pond	0.542	Runoff	25.090
R1	Stream	3.848	Drift	203.100
R2	Stream	5.165	Drift	159.500
R2	Stream 2nd	5.106	Drift	1275.000
R3	Stream	5.433	Drift	15.760
R4	Stream	3.847	Drift	79.130

Table 9.2.5-84: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	5.567	Drift	3.839
D4	Pond	0.219	Drift	3.303
D4	Stream	4.457	Drift	0.162
D6	Ditch	5.507	Drift	1.858
D6	Ditch 2nd	5.539	Drift	2.542
R1	Pond	0.219	Drift	6.685
R1	Stream	3.859	Drift	43.580
R2	Stream	4.985	Drift	902.600
R3	Stream	5.451	Drift	28.320

Table 9.2.5-85: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	4.828	Drift	5.402
D4	Pond	0.243	Drift	5.204
D4	Stream	3.833	Drift	0.233
D6	Ditch	4.775	Drift	2.275
D6	Ditch 2nd	4.803	Drift	3.756
R1	Pond	0.499	Runoff	16.440
R1	Stream	3.306	Drift	149.500
R2	Stream	4.345	Drift	1156.400
R3	Stream	4.690	Drift	42.490

Table 9.2.5-86: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474

Table 9.2.5-86: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	5.564	Drift	3.630
D4	Pond	0.220	Drift	3.500
D4	Stream	4.736	Drift	0.297
D6	Ditch	5.605	Drift	11.510
D6	Ditch 2nd	5.622	Drift	20.290
R1	Pond	0.282	Runoff	15.430
R1	Stream	3.861	Drift	146.700
R2	Stream	5.183	Drift	73.120
R3	Stream	5.442	Drift	276.900

Table 9.2.5-87: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	4.824	Drift	4.701
D4	Pond	0.252	Drift	5.458
D4	Stream	4.075	Drift	0.440
D6	Ditch	4.860	Drift	10.010
D6	Ditch 2nd	4.875	Drift	17.680
R1	Pond	0.902	Runoff	38.010
R1	Stream	3.322	Drift	320.200

Table 9.2.5-87: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to potatoes, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R2	Stream	4.459	Drift	221.200
R3	Stream	4.682	Drift	585.200

Table 9.2.5-88: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	6.732	Drift	4.381
D4	Pond	0.227	Drift	3.389
D4	Stream	4.919	Drift	0.137
D6	Ditch	6.723	Drift	3.850
D6	Ditch 2nd	6.803	Drift	23.640
R1	Pond	0.227	Drift	6.790
R1	Stream	4.450	Drift	44.060
R2	Stream	5.823	Drift	747.400
R3	Stream	6.286	Drift	13.780
R4	Stream	4.394	Drift	23.590

Table 9.2.5-89: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	5.880	Drift	6.022
D4	Pond	0.240	Drift	5.454
D4	Stream	4.505	Drift	0.250
D6	Ditch	5.872	Drift	4.884
D6	Ditch 2nd	6.031	Drift	34.130
R1	Pond	0.453	Runoff	19.540
R1	Stream	3.791	Drift	193.000
R2	Stream	5.035	Drift	1316.200
R3	Stream	5.434	Drift	70.680
R4	Stream	3.810	Drift	38.280

Table 9.2.5-90: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369

Table 9.2.5-90: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	6.728	Drift	4.151
D4	Pond	0.227	Drift	3.582
D4	Stream	5.323	Drift	0.254
D6	Ditch	6.803	Drift	23.370
D6	Ditch 2nd	6.599	Drift	1.399
R1	Pond	0.274	Runoff	15.020
R1	Stream	4.453	Drift	146.000
R2	Stream	5.977	Drift	45.760
R3	Stream	6.276	Drift	2.285
R4	Stream	4.452	Drift	8.187

Table 9.2.5-91: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	5.876	Drift	5.768
D4	Pond	0.260	Drift	5.620
D4	Stream	4.600	Drift	0.411
D6	Ditch	6.032	Drift	34.230

Table 9.2.5-91: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, bulb, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D6	Ditch 2nd	5.918	Drift	10.410
R1	Pond	0.888	Runoff	37.120
R1	Stream	3.848	Drift	320.200
R2	Stream	5.165	Drift	141.100
R3	Stream	5.433	Drift	43.940
R4	Stream	3.847	Drift	46.370

Table 9.2.5-92: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D6	Ditch	6.664	Drift	2.248
R2	Stream	5.749	Drift	903.900
R3	Stream	6.258	Drift	125.600
R4	Stream	4.434	Drift	68.980

Table 9.2.5-93: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D6	Ditch	5.820	Drift	2.765
R2	Stream	5.033	Drift	1157.700
R3	Stream	5.433	Drift	61.780
R4	Stream	4.346	Runoff	418.300

Table 9.2.5-94: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D6	Ditch	6.789	Drift	17.710
R2	Stream	5.977	Drift	598.800
R3	Stream	6.287	Drift	277.700
R4	Stream	4.452	Drift	42.130

Table 9.2.5-95: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, fruiting, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D6	Ditch	6.039	Drift	35.550
R2	Stream	5.165	Drift	1478.500
R3	Stream	5.433	Drift	586.500
R4	Stream	3.847	Drift	135.800

Table 9.2.5-96: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	6.731	Drift	4.337
D3	Ditch 2nd	6.750	Drift	5.575
D4	Pond	0.227	Drift	3.406

Table 9.2.5-96: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Stream	5.140	Drift	0.187
D6	Ditch	6.803	Drift	23.530
R1	Pond	0.227	Drift	7.511
R1	Pond 2nd	0.548	Runoff	25.030
R1	Stream	4.451	Drift	73.560
R1	Stream 2nd	4.415	Drift	518.400
R2	Stream	5.824	Drift	747.800
R2	Stream 2nd	5.977	Drift	176.300
R3	Stream	6.286	Drift	38.070
R3	Stream 2nd	6.287	Drift	120.900
R4	Stream	4.397	Drift	30.810
R4	Stream 2nd	4.372	Drift	372.500

Table 9.2.5-97: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	5.880	Drift	5.962
D3	Ditch 2nd	5.896	Drift	8.348
D4	Pond	0.224	Drift	5.399
D4	Stream	4.505	Drift	0.315
D6	Ditch	6.015	Drift	32.370

Table 9.2.5-97: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Pond	0.451	Runoff	19.310
R1	Pond 2nd	0.690	Runoff	37.930
R1	Stream	3.788	Drift	192.200
R1	Stream 2nd	3.860	Drift	655.200
R2	Stream	5.035	Drift	1317.100
R2	Stream 2nd	5.169	Drift	291.500
R3	Stream	5.435	Drift	96.400
R3	Stream 2nd	5.442	Drift	280.900
R4	Stream	3.812	Drift	44.330
R4	Stream 2nd	3.897	Runoff	670.800

Table 9.2.5-98: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	6.755	Drift	6.102
D3	Ditch 2nd	6.697	Drift	2.875
D4	Pond	0.227	Drift	3.595
D4	Stream	5.430	Drift	0.318
D6	Ditch	6.803	Drift	24.370
R1	Pond	0.230	Drift	9.038
R1	Pond 2nd	0.490	Runoff	23.340

Table 9.2.5-98: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R1	Stream	4.381	Drift	93.410
R1	Stream 2nd	4.448	Drift	246.800
R2	Stream	5.977	Drift	145.800
R2	Stream 2nd	5.886	Drift	792.900
R3	Stream	6.287	Drift	305.600
R3	Stream 2nd	6.271	Drift	277.500
R4	Stream	4.452	Drift	202.500
R4	Stream 2nd	4.452	Drift	228.400

Table 9.2.5-99: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	5.899	Drift	6.211
D3	Ditch 2nd	5.856	Drift	4.688
D4	Pond	0.260	Drift	5.596
D4	Stream	4.692	Drift	0.515
D6	Ditch	5.941	Drift	21.380
R1	Pond	0.435	Runoff	24.620
R1	Pond 2nd	1.201	Runoff	47.090
R1	Stream	3.848	Drift	233.300
R1	Stream 2nd	3.848	Drift	416.400

Table 9.2.5-99: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to vegetables, leafy, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
R2	Stream	5.165	Drift	254.600
R2	Stream 2nd	5.086	Drift	1501.400
R3	Stream	5.457	Drift	599.200
R3	Stream 2nd	5.420	Drift	586.400
R4	Stream	3.853	Drift	374.800
R4	Stream 2nd	3.849	Drift	597.300

Table 9.2.5-100: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	5.567	Drift	3.808
D4	Pond	0.219	Drift	3.290
D4	Stream	4.265	Drift	0.119
R1	Pond	0.221	Drift	6.381
R1	Stream	3.739	Drift	37.070
R3	Stream	5.451	Drift	27.350

Table 9.2.5-101: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, early application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	4.827	Drift	5.255
D4	Pond	0.232	Drift	5.289
D4	Stream	3.889	Drift	0.217
R1	Pond	0.457	Runoff	20.140
R1	Stream	3.279	Drift	181.400
R3	Stream	4.690	Drift	48.920

Table 9.2.5-102: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.008	-	2350.000
Step 2				
Northern Europe	Mar-May	11.844	-	473.580
Northern Europe	Jun-Sep	11.844	-	473.580
Northern Europe	Oct-Feb	26.472	-	1090.000
Southern Europe	Mar-May	21.596	-	885.369
Southern Europe	Jun-Sep	16.720	-	679.474
Southern Europe	Oct-Feb	21.596	-	885.369
Step 3				
D3	Ditch	5.564	Drift	3.624

Table 9.2.5-102: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (1 × 1080 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
D4	Pond	0.220	Drift	3.395
D4	Stream	4.880	Drift	0.472
R1	Pond	0.413	Runoff	20.540
R1	Stream	3.861	Drift	217.700
R3	Stream	5.437	Drift	276.800

Table 9.2.5-103: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to sugar beets, late application (2 × 1080 g a.s./ha, with application interval of 28 days)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	128.016	-	4690.000
Step 2				
Northern Europe	Mar-May	17.903	-	713.678
Northern Europe	Jun-Sep	17.903	-	713.678
Northern Europe	Oct-Feb	39.622	-	1630.000
Southern Europe	Mar-May	32.382	-	1330.000
Southern Europe	Jun-Sep	25.143	-	1020.000
Southern Europe	Oct-Feb	32.382	-	1330.000
Step 3				
D3	Ditch	4.824	Drift	5.220
D4	Pond	0.256	Drift	4.975
D4	Stream	4.264	Drift	0.918
R1	Pond	1.165	Runoff	45.150
R1	Stream	3.322	Drift	408.600
R3	Stream	4.678	Drift	585.100

Table 9.2.5-104: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to grass/alfalfa, early application (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	106.680	-	3910.000
Step 2				
Northern Europe	Mar-May	19.739	-	789.300
Northern Europe	Jun-Sep	19.739	-	789.300
Northern Europe	Oct-Feb	44.120	-	1820.000
Southern Europe	Mar-May	35.993	-	1480.000
Southern Europe	Jun-Sep	27.866	-	1130.000
Southern Europe	Oct-Feb	35.993	-	1480.000
Step 3				
D1	Ditch	11.310	Drift	16.230
D1	Stream	8.847	Drift	0.403
D2	Ditch	11.410	Drift	44.090
D2	Stream	10.150	Drift	39.060
D3	Ditch	11.260	Drift	8.772
D4	Pond	0.380	Drift	5.649
D4	Stream	8.606	Drift	0.317
D5	Pond	0.380	Drift	5.860
D5	Stream	9.289	Drift	0.344
R2	Stream	9.805	Drift	1.550
R3	Stream	10.440	Drift	3.330

Table 9.2.5-105: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to grass/alfalfa, late application (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	106.680	-	3910.000
Step 2				
Northern Europe	Mar-May	19.739	-	789.300
Northern Europe	Jun-Sep	19.739	-	789.300
Northern Europe	Oct-Feb	44.120	-	1820.000
Southern Europe	Mar-May	35.993	-	1480.000

Table 9.2.5-105: FOCUS Step 1, 2, and 3 PEC_{sw} and PEC_{sed} for glyphosate following application to grass/alfalfa, late application (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Southern Europe	Jun-Sep	27.866	-	1130.000
Southern Europe	Oct-Feb	35.993	-	1480.000
Step 3				
D1	Ditch	11.400	Drift	63.590
D1	Stream	9.964	Drift	6.604
D2	Ditch	11.410	Drift	61.080
D2	Stream	10.150	Drift	47.820
D3	Ditch	11.300	Drift	12.530
D4	Pond	0.380	Drift	6.245
D4	Stream	9.736	Drift	2.160
D5	Pond	0.380	Drift	6.190
D5	Stream	10.510	Drift	3.062
R2	Stream	9.938	Drift	5.558
R3	Stream	10.480	Drift	11.630

PEC_{sw} and PEC_{sed} for AMPA

Table 9.2.5-106: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops, orchards and vines (1 × 720 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	34.546	-	1040.000
Step 2				
Northern Europe	Mar-May	6.666	-	205.542
Northern Europe	Jun-Sep	6.666	-	205.542
Northern Europe	Oct-Feb	15.904	-	498.129
Southern Europe	Mar-May	12.825	-	400.600
Southern Europe	Jun-Sep	9.745	-	303.071
Southern Europe	Oct-Feb	12.825	-	400.600

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-107: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops, orchards and vines (3 × 720 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	103.639	-	3110.000
Step 2				
Northern Europe	Mar-May	14.607	-	452.678
Northern Europe	Jun-Sep	14.607	-	452.678
Northern Europe	Oct-Feb	35.129	-	1100.000
Southern Europe	Mar-May	28.289	-	885.972
Southern Europe	Jun-Sep	21.448	-	669.325
Southern Europe	Oct-Feb	28.289	-	885.972

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-108: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops, orchards and vines (1 × 1440 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	69.092	-	2070.000
Step 2				
Northern Europe	Mar-May	13.331	-	411.084
Northern Europe	Jun-Sep	13.331	-	411.084
Northern Europe	Oct-Feb	31.809	-	996.258
Southern Europe	Mar-May	25.650	-	801.200
Southern Europe	Jun-Sep	19.490	-	606.142
Southern Europe	Oct-Feb	25.650	-	801.200

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-109: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to orchards and vines (2 × 1440 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	138.185	-	4150.000
Step 2				
Northern Europe	Mar-May	22.570	-	697.251
Northern Europe	Jun-Sep	22.570	-	697.251
Northern Europe	Oct-Feb	53.986	-	1690.000
Southern Europe	Mar-May	43.514	-	1360.000
Southern Europe	Jun-Sep	33.042	-	1030.000
Southern Europe	Oct-Feb	43.514	-	1360.000

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-110: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (1 × 540 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	25.910	-	777.705
Step 2				
Northern Europe	Mar-May	4.999	-	154.156
Northern Europe	Jun-Sep	4.999	-	154.156
Northern Europe	Oct-Feb	11.928	-	373.597
Southern Europe	Mar-May	9.619	-	300.450
Southern Europe	Jun-Sep	7.309	-	227.303
Southern Europe	Oct-Feb	9.619	-	300.450

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-111: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (1 × 1080 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	51.819	-	1560.000
Step 2				
Northern Europe	Mar-May	9.999	-	308.313
Northern Europe	Jun-Sep	9.999	-	308.313
Northern Europe	Oct-Feb	23.856	-	747.194
Southern Europe	Mar-May	19.237	-	600.900
Southern Europe	Jun-Sep	14.618	-	454.606
Southern Europe	Oct-Feb	19.237	-	600.900

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-112: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to field crops (2 × 1080 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	103.639	-	3110.000
Step 2				
Northern Europe	Mar-May	16.927	-	522.938
Northern Europe	Jun-Sep	16.927	-	522.938
Northern Europe	Oct-Feb	40.490	-	1270.000
Southern Europe	Mar-May	32.636	-	1020.000
Southern Europe	Jun-Sep	24.782	-	771.679
Southern Europe	Oct-Feb	32.636	-	1020.000

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-113: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for AMPA following application to grass/alfalfa (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	86.366	-	2590.000
Step 2				
Northern Europe	Mar-May	16.664	-	513.855
Northern Europe	Jun-Sep	16.664	-	513.855
Northern Europe	Oct-Feb	39.761	-	1250.000
Southern Europe	Mar-May	32.062	-	1000.000
Southern Europe	Jun-Sep	24.363	-	757.677
Southern Europe	Oct-Feb	32.062	-	1000.000

PEC_{sw} and PEC_{sed} for HMPA

Table 9.2.5-114: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (1 × 720 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	16.128	-	1.611
Step 2				
Northern Europe	Mar-May	3.263	-	0.326
Northern Europe	Jun-Sep	3.263	-	0.326
Northern Europe	Oct-Feb	7.507	-	0.750
Southern Europe	Mar-May	6.093	-	0.609
Southern Europe	Jun-Sep	4.678	-	0.467
Southern Europe	Oct-Feb	6.093	-	0.609

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-115: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (3 × 720 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	48.385	-	4.833
Step 2				
Northern Europe	Mar-May	5.802	-	0.579
Northern Europe	Jun-Sep	5.802	-	0.579
Northern Europe	Oct-Feb	13.101	-	1.309
Southern Europe	Mar-May	10.668	-	1.066
Southern Europe	Jun-Sep	8.235	-	0.823
Southern Europe	Oct-Feb	10.668	-	1.066

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-116: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops, orchards and vines (1 × 1440 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	32.256	-	3.222
Step 2				
Northern Europe	Mar-May	6.526	-	0.652
Northern Europe	Jun-Sep	6.526	-	0.652
Northern Europe	Oct-Feb	15.015	-	1.500
Southern Europe	Mar-May	12.185	-	1.217
Southern Europe	Jun-Sep	9.356	-	0.935
Southern Europe	Oct-Feb	12.185	-	1.217

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-117: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to orchards and vines (2 × 1440 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	64.513	-	6.445
Step 2				
Northern Europe	Mar-May	9.920	-	0.991
Northern Europe	Jun-Sep	9.920	-	0.991
Northern Europe	Oct-Feb	22.523	-	2.250
Southern Europe	Mar-May	18.322	-	1.830
Southern Europe	Jun-Sep	14.121	-	1.410
Southern Europe	Oct-Feb	18.322	-	1.830

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-118: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops (1 × 540 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	12.096	-	1.208
Step 2				
Northern Europe	Mar-May	2.447	-	0.244
Northern Europe	Jun-Sep	2.447	-	0.244
Northern Europe	Oct-Feb	5.631	-	0.563
Southern Europe	Mar-May	4.569	-	0.457
Southern Europe	Jun-Sep	3.508	-	0.351
Southern Europe	Oct-Feb	4.569	-	0.457

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-119: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops (1 × 1080 g a.s./ha)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	24.192	-	2.417
Step 2				
Northern Europe	Mar-May	4.895	-	0.489
Northern Europe	Jun-Sep	4.895	-	0.489
Northern Europe	Oct-Feb	11.261	-	1.125
Southern Europe	Mar-May	9.139	-	0.913
Southern Europe	Jun-Sep	7.017	-	0.701
Southern Europe	Oct-Feb	9.139	-	0.913

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-120: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to field crops (2 × 1080 g a.s./ha, with application interval of 28 days)[1]

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	48.385	-	4.833
Step 2				
Northern Europe	Mar-May	7.440	-	0.743
Northern Europe	Jun-Sep	7.440	-	0.743
Northern Europe	Oct-Feb	16.892	-	1.688
Southern Europe	Mar-May	13.741	-	1.373
Southern Europe	Jun-Sep	10.591	-	1.058
Southern Europe	Oct-Feb	13.741	-	1.373

[1] Since application is to weeds *via* ground spray, runoff/drainage and drift loadings of active substance and metabolites are equivalent for all crops selected for modelling

Table 9.2.5-121: FOCUS Step 1 and 2 PEC_{sw} and PEC_{sed} for HMPA following application to grass/alfalfa (1 × 1800 g a.s./ha)

Scenario FOCUS	Period/ Waterbody	Max PEC_{sw} (µg/L)	Dominant entry route	Max PEC_{sed} (µg/kg)
Step 1				
-	-	40.321	-	4.028
Step 2				
Northern Europe	Mar-May	8.158	-	0.815
Northern Europe	Jun-Sep	8.158	-	0.815
Northern Europe	Oct-Feb	18.768	-	1.875
Southern Europe	Mar-May	15.232	-	1.522
Southern Europe	Jun-Sep	11.695	-	1.168
Southern Europe	Oct-Feb	15.232	-	1.522

3. Assessment and conclusion

Assessment and conclusion by applicant:
The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

1. Information on the study

Data point	CP 9.2.5/002
Report author	[redacted]
Report year	2020
Report title	Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA in groundwater and surface water following application to railways – a modelling assessment using HardSPEC
Report No	110054-015
Guidelines followed in study	Hollis, J.M. *et al.*: HardSPEC: A First-tier Model for Estimating Surface- and Ground-Water Exposure resulting from Herbicides applied to Hard Surfaces: Updated Technical Guidance on Model Principles and Application for version 1.4.3.2. Report to the Chemicals Regulation Division of the HSE April, 2017, 121 pp + 3 Appendices.
Deviations from current test guideline	None
Previous evaluation	No, not previously submitted
GLP/Officially recognised testing facilities	No, not applicable for this study type
Acceptability/Reliability	Valid

Category study in AIR 5 dossier (L docs)	Category 1

2. Full summary

Executive Summary
Predicted environmental concentrations in groundwater, surface water and sediment were calculated for the active substance glyphosate and its metabolites AMPA and HMPA (only relevant in surface water) following weed treatment of railways. The model HardSPEC 1.4.3.2 was used for the calculations.

Calculations were performed for a single application of 1800 and 3600 g a.s./ha

In surface water, drift was shown to be the dominant entry pathway. Maximum predicted concentrations in surface water (PEC_{sw}) were 9.458 µg/L, 3.913 µg/L and 0.627 µg/L for glyphosate, AMPA and HMPA, respectively.

I. MATERIALS AND METHODS

Input parameters are the same as for assessment of PEC_{gw}. Please refer to CP 9.2.4.1.

II. RESULTS AND DISCUSSION

Predicted environmental concentrations of glyphosate and its metabolites AMPA and HMPA were calculated in surface water (PEC_{sw}) and sediment (PEC_{sed}) for uses on railways using HardSPEC 1.4.3.2. Results are presented in the tables below.

Table 9.2.5-122: $PEC_{sw/sed}$ of glyphosate following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	4.729	16.992	4.729
Railway ditch runoff	4.729	17.000	4.729

Table 9.2.5-123: $PEC_{sw/sed}$ of glyphosate following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	9.458	33.984	9.458
Railway ditch runoff	9.458	34.000	9.458

Table 9.2.5-124: $PEC_{sw/sed}$ of AMPA following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	1.956	6.352	1.956
Railway ditch runoff	1.956	6.494	1.956

Table 9.2.5-125: $PEC_{sw/sed}$ of AMPA following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)
	Water phase (µg/L)	Sediment phase (µg/kg)	
Railway ditch leaching	3.913	12.705	3.913
Railway ditch runoff	3.913	12.989	3.913

Table 9.2.5-126: $PEC_{sw/sed}$ of HMPA following application to railways, 1 × 1800 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)[1]
	Water phase (µg/L)[1]	Sediment phase (µg/kg)	
Railway ditch leaching	0.313	-[2]	0.313
Railway ditch runoff	0.313	-[2]	0.313

[1] Calculated based on parent maximum PEC_{sw}, taking into account molar mass and max. occurrence in water
[2] Metabolite not relevant in sediment

Table 9.2.5-127: $PEC_{sw/sed}$ of HMPA following application to railways, 1 × 3600 g a.s./ha (HardSPEC 1.4.3.2)

Scenario	Acute (24 hrs) concentration		Application day PEC_{sw} from spray drift (µg/L)[1]
	Water phase (µg/L)[1]	Sediment phase (µg/kg)	
Railway ditch leaching	0.627	-[2]	0.627
Railway ditch runoff	0.627	-[2]	0.627

[1] Calculated based on parent maximum PEC_{sw}, taking into account molar mass and max. occurrence in water
[2] Metabolite not relevant in sediment

3. Assessment and conclusion

<u>Assessment and conclusion by applicant</u>:
The modelling study was conducted according to current guidance and was therefore considered to be valid.

Assessment and conclusion by RMS:

PEC$_{puddle}$ of glyphosate

The predicted environmental concentration of glyphosate in puddle water (PEC$_{puddle}$) is required for the assessment for pollinators (honey bees) considering the consumption of contaminated water (guttation water, surface water and puddles). PEC$_{puddle}$ was estimated by calculating the concentration of glyphosate in runoff water, based on the results of the calculations for runoff scenarios at Step 3 of the FOCUS assessment presented above. For this purpose, the output files (*.p2t) of the FOCUS-PRZM model from FOCUS PEC$_{sw}$ calculations were used ([redacted], 2020, CP 9.2.5/001). The hourly concentration of glyphosate in runoff water (unit: mg/L) was calculated by dividing the variable "runoff flux" (unit: mg a.s./m^2/h) by the variable "runoff volume" (unit: mm/h). The concentration was then multiplied by the factor of 1000, resulting in hourly concentrations in units of µg/L.

For each simulated FOCUS runoff scenario, PEC$_{puddle}$ was obtained by selecting the maximum hourly concentration of glyphosate in runoff water over the entire simulation time.

The maximum PEC$_{puddle}$ across all modelled uses at Step 3 is 32.34 µg/L (from R4 scenario of pome/stone fruit, early applications, 2 × 1440 g a.s./ha, with application interval of 28 days).

PEC$_{sw}$ of MON 52276

PEC$_{sw}$ of the formulation was calculated using the Drift Calculator 1.1 implemented in FOCUS SWASH 5.3. The FOCUS crop 'grass/alfalfa' was selected to represent the GAP use with the maximum single application rate of 5846.5 g/ha (use no. 8/9). Since the application method is ground spray to weeds for all uses from the GAP, and the FOCUS default buffers are the minimum for grass/alfalfa, this selection results in a set of maximum PEC values for the formulation.

Table 9.2.5-128: PEC$_{sw}$ of MON 52276 following single application to grass/alfalfa

Formulation	Number of applications	Maximum application rate (g MON 52276/ha)[1]	FOCUS water body	FOCUS default buffer (m)	Drift rate[2] (%)	PEC$_{sw}$ (µg MON 52276/L)
MON 52276	1	5846.5	Ditch	1.0	1.9274	37.562
			Pond	3.5	0.2191	1.281
			Stream	1.5	1.4304	27.875

[1] The formulation components are considered to dissipate rapidly after application, therefore only one application is taken into consideration, based on the highest single application rate. The PEC for the formulation was based on a specific density of 1.1693 g/mL with an application of 5 L formulation/ha representing the maximum use in the GAP.
[2] Areic mean drift rates according to Rautmann *et al.* (2001) as implemented in FOCUS drift calculator.

CP 9.3 Fate and Behaviour in Air

Studies on fate and behaviour in air with the formulation were not performed, since it is possible to extrapolate from data obtained with the active substance.

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

The fate and behaviour in air of glyphosate was evaluated during Annex I renewal (please refer to **M-CA, Section 7.3**).

With a Henry´s law constant of glyphosate of <2.21×10^{-8} Pa m^3/mol and a vapour pressure of 1.31×10^{-5} Pa at 25 °C (corresponding to 6.81×10^{-6} at 20 °C, calculated with the German tool EVA3rev2h) glyphosate is regarded as non-volatile (volatilisation from soil and plant surfaces). Therefore, exposure of adjacent surface waters and terrestrial ecosystems by glyphosate due to volatilisation with subsequent deposition is not relevant and was not considered.

Predicted environmental concentrations from airborne transport

Due to the negligible volatilisation potential and the fast degradation of glyphosate in air, glyphosate is not expected to be subject of atmospheric long-range transport. Therefore, calculations of concentrations from airborne transport are not required and were not performed.

CP 9.4 Estimation of Concentrations for Other Routes of Exposure

Calculations of concentrations from other routes of exposure are not required and were not performed.