Draft Assessment Report

Evaluation of Active Substances

Plant Protection Products

Prepared according to **Regulation (EC) 1107/2009** as it applies in Great Britain

Bixlozone (F9600)

List of Endpoints

Great Britain

July 2022

Version History

When	What
July 2022	Initial DAR
September 2022	Updated post July 2022 Expert Committee on Pesticides (ECP) meeting Independent Scientific Advice (ISA)

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

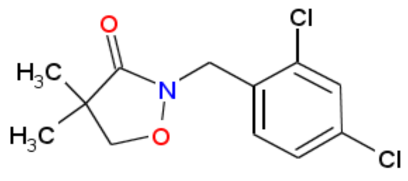
Section 1 Identity, Physical and Chemical Properties, Details of Uses, Further Information, Methods of Analysis

Identity, Physical and Chemical Properties, Details of Uses, Further Information (Regulation (EU) N° 283/2013, Annex Part A, points 1.3 and 3.2)

Active substance (ISO Common Name)	Bixlozone (ISO provisionally approved)
Function (*e.g.* fungicide)	Herbicide

Evaluator	HSE

Identity (Regulation (EU) N° 283/2013, Annex Part A, point 1)

Chemical name (IUPAC)	2-[(2,4-dichlorophenyl)methyl]-4,4-dimethyl-1,2-oxazolidin-3-one
Chemical name (CA)	2-[(2,4-dichlorophenyl)methyl]-4,4-dimethyl-3-isoxazolidinone
CIPAC No	Not assigned
CAS No	81777-95-9
EC No (EINECS or ELINCS)	Not assigned
FAO Specification (including year of publication)	No FAO Specifcation
Minimum purity of the active substance as manufactured	960 g/kg
Identity of relevant impurities (of toxicological, ecotoxicological and/or environmental concern) in the active substance as manufactured	(2,4-dichlorophenyl)methanol (CAS 1777-82-8; 2,4-dichlorobenzyl alcohol): Maximum 1.5 g/kg
Molecular formula	$C_{12}H_{13}Cl_2NO_2$
Molar mass	274.14 g/mol
Structural formula	

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 1 Identity, Physical and Chemical Properties, Details of Uses, Further Information, Methods of Analysis

Physical and chemical properties (Regulation (EU) N° 283/2013, Annex Part A, point 2)

Melting point (state purity)	81.5 °C (99.8%)
Boiling point (state purity)	Decomposes before boiling (99.8%)
Temperature of decomposition (state purity)	188 °C (99.8%)
Appearance (state purity)	Pure: White crystalline sloid (99.8%) Technical: Pale yellow crystalline solid (96.0%)
Vapour pressure (state temperature, state purity)	1.1 x 10^{-3} Pa at 20 °C (99.9%) 2.3 x 10^{-3} Pa at 25 °C (99.9%)
Henry's law constant (state temperature)	7.2 x 10^{-3} Pa m^3 mol^{-1} (at 20 °C)
Solubility in water (state temperature, state purity and pH)	42 mg/L at 20 °C (purified water) (99.9%) 42 mg/L at 20 °C (pH 4) (99.9%) 40 mg/L at 20 °C (pH 7) (99.9%) 42 mg/L at 20 °C (pH 9) (99.9%)
Solubility in organic solvents (state temperature, state purity)	Methanol: 120 g/L at 20 °C (96.0%) Acetone: >250 g/L at 20 °C (96.0%) Tolune: >250 g/L at 20 °C (96.0%) Dichloromethane: >250 g/L at 20 °C (96.0%) Ethyl acetate: >250 g/L at 20 °C (96.0%) n-Heptane: 14 g/L at 20 °C (96.0%) n-Octanol: 52 g/L at 20 °C (96.0%)
Surface tension (state concentration and temperature, state purity)	66.5 mN/m at 20 °C (90 % saturated solution) (99.8%)
Partition coefficient (state temperature, pH and purity)	log P_{OW}: 3.3 at 20 °C (pH 4) (99.9%) 3.3 at 20 °C (pH 7) (99.9%) 3.3 at 20 °C (pH 9) (99.9%)
Dissociation constant (state purity)	Bixlozone does not contain any groups that are ionisable within an environmentally relevant pH range

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 1 Identity, Physical and Chemical Properties, Details of Uses, Further Information, Methods of Analysis

UV/VIS absorption (max.) incl. ε (state purity, pH)

20.43 mg/L solution (99.8%):

	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})
Neutral	218	14100
	226	12500
	233	7050
Acidic (pH 1.1)	218	14300
	226	12700
	233	7140
Basic (pH 13.0)	226	12300
	233	6920

999.2 mg/L solution (99.8%):

	λ_{max} (nm)	ε (L mol^{-1} cm^{-1})
Neutral	261	445
	271	361
	280	259
	290	4.64
Acidic (pH 1.1)	261	444
	271	359
	280	258
	290	1.54
Basic (pH 13.0)	261	445
	271	361
	280	259
	290	1.62

Flammability (state purity)	Not highly flammable (96.0%)
Explosive properties (state purity)	No explosive properties (96.0%)
Oxidising properties (state purity)	No oxidising properties (96.0%)

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 1 Identity, Physical and Chemical Properties, Details of Uses, Further Information, Methods of Analysis

Summary of representative uses evaluated, for which all risk assessments needed to be completed (Bixlozone)
(Regulation (EU) N° 284/2013, Annex Part A, points 3, 4)

Crop and/or situation (a)	**Region**	**Product name**	**F G or I** (b)	**Pests or Group of pests controlled** (c)	**Preparation**		**Application**				**Application rate per treatment**			**PHI (days)** (m)	**Remarks**
					Type (d-f)	Conc. a.s. (i)	method kind (f-h)	range of growth stages & season (j)	number min-max (k)	Interval between application (min)	kg a.s /hL min-max (l)	Water L/ha min-max	g a.s./ha min-max (l)		
Winter wheat Winter barley	**GB**	F9600-4SC	F	Grasses and broad leaved weeds	SC	400 g/L	Broad cast soil applic ation	BBCH 00-09	1	-	-	150-400	200	-	
Winter wheat	**GB**	F9600-4SC	F	Grasses and broad leaved weeds	SC	400 g/L	Broad cast soil applic ation	BBCH 11-13	1	-	-	150-400	200	-	
Winter Oilseed rape	**GB**	F9600-4SC	F	Grasses and broad leaved weeds	SC	400 g/L	Broad cast soil applic ation	BBCH 00-09	1	-	-	150-400	200-300	-	
Maize	**GB**	F9600-4SC	F	Grasses and broad leaved weeds	SC	400 g/L	Broad cast soil applic ation	BBCH 00-09	1	-	-	150-400	250-375	-	

(a) For crops, the EU and Codex classifications (both) should be taken into account; where relevant, the use situation should be described (e.g. fumigation of a structure)
(b) Outdoor or field use (F), greenhouse application (G) or indoor application (I)
(c) *e.g.* biting and sucking insects, soil born insects, foliar fungi, weeds
(d) *e.g.* wettable powder (WP), emulsifiable concentrate (EC), granule (GR)
(e) CropLife International Technical Monograph no 2, 6th Edition. Revised May 2008. Catalogue of pesticide
(f) All abbreviations used must be explained
(g) Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench
(h) Kind, *e.g.* overall, broadcast, aerial spraying, row, individual plant, between the plant- type of equipment used must be indicated
(i) g/kg or g/L. Normally the rate should be given for the active substance (according to ISO) and not for the variant in order to compare the rate for same active substances used in different variants (e.g. fluoroxypyr). **In certain cases, where only one variant is synthesised, it is more appropriate to give the rate for the variant (e.g. benthiavalicarb-isopropyl).**
(j) Growth stage range from first to 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
(k) Indicate the minimum and maximum number of applications possible under practical conditions of use
(l) The values should be given in g or kg whatever gives the more manageable number (e.g. 200 kg/ha instead of 200 000 g/ha or 12.5 g/ha instead of 0.0125 kg/ha
(m) PHI - minimum pre-harvest interval

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 1 Identity, Physical/ Chemical Properties, Details of Uses, Further Information, Methods of Analysis

Further information, Efficacy

Effectiveness (Regulation (EU) N° 284/2013, Annex Part A, point 6.2)

The representative uses/ GAPs are supported.

Adverse effects on field crops (Regulation (EU) N° 284/2013, Annex Part A, point 6.4)

The representative uses/ GAPs are supported.

Observations on other undesirable or unintended side-effects (Regulation (EU) N° 284/2013, Annex Part A, point 6.5)

The representative uses/ GAPs are supported.

Groundwater metabolites: Screening for biological activity (SANCO/221/2000-rev.10-final Step 3 a Stage 1)

	Met1	Met2	Met3	Met4	Met5	Met6
Activity against target organism	no	n/a	n/a	n/a	n/a	n/a

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 1 Identity, Physical/ Chemical Properties, Details of Uses, Further Information, Methods of Analysis

Methods of Analysis

Analytical methods for the active substance (Regulation (EU) N° 283/2013, Annex Part A, point 4.1 and Regulation (EU) N° 284/2013, Annex Part A, point 5.2)

Technical a.s. (analytical technique)	HPLC-UV
Impurities in technical a.s. (analytical technique)	HPLC-DAD, LC-MS, GC-FID
Plant protection product (analytical technique)	Bixlozone : HPLC-DAD (2,4-dichlorophenyl)methanol: **Data required**

Analytical methods for residues (Regulation (EU) N° 283/2013, Annex Part A, point 4.2 & point 7.4.2)

Residue definitions for monitoring/enforcement purposes

Food of plant origin		Bixlozone
Food of animal origin		Bixlozone
Soil		2,4-dichlorobenzoic acid
Sediment		Bixlozone
Water	surface	Bixlozone
	drinking/ground	2,4-dichlorobenzoic acid
Air		Bixlozone
Body fluids and tissues		5-keto-hydrate-bixlozone

Monitoring/Enforcement methods

Food/feed of plant origin (analytical technique and LOQ for methods for monitoring purposes)	LC-MS/MS (bixlozone) LOQ: 0.01 mg/kg for high water, high acid, high oil and high starch crop groups **No ILV data for high water or high statrch (dry) crops** **Method not validated for high protein crops**
Food/feed of animal origin (analytical technique and LOQ for methods for monitoring purposes)	LC-MS/MS (bixlozone) LOQ: 0.01 mg/kg for all commodities
Soil (analytical technique and LOQ)	LC-MS/MS (bixlozone, 2,4- dichlorobenzoic acid) LOQ: 0.005 mg/kg
Water (analytical technique and LOQ)	LC-MS/MS (bixlozone, 2,4- dichlorobenzoic acid, bixlozone-3-OH propanamide, 4-carboxy-bixlozone, bixlozone-dimethyl malonamide) LOQ: 0.1 µg/L in drinking and surface water
Air (analytical technique and LOQ)	LC-MS/MS (bixlozone) LOQ: 0.36 $\mu g/m^3$

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 1 Identity, Physical/ Chemical Properties, Details of Uses, Further Information, Methods of Analysis

Body fluids and tissues (analytical technique and LOQ)	LC-MS/MS (5-keto-hydrate-bixlozone) LOQ: 0.01 mg/kg in urine and liver

Classification and labelling with regard to physical and chemical data (Regulation (EU) N° 283/2013, Annex Part A, point 10)

Substance	Bixlozone
Harmonised classification according to Regulation (EC) No 1272/2008 and its Adaptations to Technical Process [Table 3.1 of Annex VI of Regulation (EC) No 1272/2008 as amended][1]:	Not classified.
Peer review proposal [2] for harmonised classification according to Regulation (EC) No 1272/2008:	Not classified.

[1] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. OJ L 353, 31.12.2008, 1-1355.

[2] It should be noted that harmonised classification and labelling is formally proposed and decided in accordance with Regulation (EC) No 1272/2008. Proposals for classification made in the context of the evaluation procedure under Regulation (EC) No 1107/2009 are not formal proposals.

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 2 Mammalian Toxicology

Impact on Human and Animal Health

Absorption, distribution, metabolism and excretion (toxicokinetics) (Regulation (EU) N° 283/2013, Annex Part A, point 5.1)

Rate and extent of oral absorption/systemic bioavailability	Estimated oral absorption (sum of radioactivity in urine & tissues excluding faeces after single low dose of 5 mg/kg bw): 70% Bioavailability (toxicokinetics study after single low dose of 5 mg/kg bw): 70%
Toxicokinetics	[^{14}C-Phenyl]-bixlozone

5 mg/kg bw (oral), single dose:

	Male	Female
C_{max} [ng/mL]	174	293
T_{max} [h]	0.25	0.25
Half-life [h]	145	221
AUC0→∞ [µg Eq*h/g]		
Bioavailability (%) total RA	70	86
Bioavailability (%) plasma	11	18

1000 mg/kg bw (oral), single dose:

	Male	Female
C_{max} [ng/mL]	9565	15060
T_{max} [h]	3.5	3.5
Half-life [h]	11	14
AUC0→∞ [ng Eq*h/mL]	$10.5x10^5$	$35.9x10^5$
Bioavailability (%) total RA	58	60
Bioavailability (%) plasma	39	100

5 mg/kg bw (oral) repeated dose:

	Male	Female
C_{max} [ng/mL]	71	166
T_{max} [h]	0.0	0.25
Half-life [h]	11	14
AUC0→∞ [ng Eq*h/mL]	65	162
Bioavailability (%) total RA	58	79
Bioavailability (%) plasma	5	13

3 mg/kg bw (i.v.) single dose:

	Male	Female
C_{max} [ng/mL]	1317	1195
T_{max} [h]	0.08	0.08
Half-life [h]	2.0	2.7
AUC0→∞	801	761

	[ng Eq*h/mL]		
	Bioavailability (%) total RA	58	60
	Bioavailability (%) plasma	39	100
Distribution	Widely distributed. Highest tissue levels in gastrointestinal (GI) tract (~58 % of administered dose (AD)), carcass (up to 24 % of AD), liver (~5 % of AD) and blood (~1% of AD))		
Potential for bioaccumulation	No		
Rate and extent of excretion	Rapid and extensive (≈ 92-99 % of the AD within 168 h), Main route: urine Males: urine 62 – 74 %; faeces: 21 – 34 % Females: urine 79 – 88 %; faeces: 10 – 13 %		
Metabolism in animals	Extensively metabolised (> 99 % of the AD) to up to 40 metabolites. Major metabolites from [^{14}C-Phenyl]-bixlozone (> 10 % of the AD in both sexes in urine after single dose at 5 mg/kg bw): 2,4-dichlorohippuric acid (12 % in M; 14.5 % in F) and 5-keto-hydrate-bixlozone (18 % in M, 24 % in F). Major metabolites from [^{14}C-Carbonyl]-bixlozone (> 10 % of the AD in both sexes in urine after single dose at 5 mg/kg bw): carbamic acid (10 % in M; 18 % in F) and 5-keto-hydrate-bixlozone (17 % in M, 23 % in F). Proposed main metabolic pathway in rats: hydroxylation leading to the formation 5-OH-F9600 and its derivatives. Other routes of metabolism included a combination of oxidation, decarboxylation and deamination followed by conjugation of oxidative derivatives.		
In vitro metabolism	Single and mixed sex rat, mouse, dog and human hepatocytes used; incubation 4 hours with [^{14}C]-bixlozone (phenyl and carbonyl) Metabolism: ≈ 100 % of the AR in dog, 72-87 % in rat, 86-92 % in mouse and 49-51 % in human hepatocytes. Common metabolic reactions in all species: oxidation (hydroxylation) and conjugation (glucuronidation); the metabolic pathways drawn from the metabolism of bixlozone in hepatocytes are similar to those identified in rats after oral administration of [^{14}C]-bixlozone. No unique or label-specific metabolite was identified in human hepatocytes however a disproportionate production of 4-OH-Me-bixlozone was observed in human hepatocytes compared to the other species, especially the rat. Evaluation of the toxicological relevance of this finding		

	showed that 4-OH-Me-bixlozone has a comparable toxicity profile that of the parent substance bixlozone.
Toxicologically relevant compounds (animals and plants)	Bixlozone, 5-hydroxy-bixlozone, 5-hydroxy-bixlozone-glucuronide and 2,4-dichlorobenzoic acid (CAS 50-84-0)
Toxicologically relevant compounds (environment)	None

Acute toxicity (Regulation (EU) N° 283/2013, Annex Part A, point 5.2)

Rat LD_{50} oral	> 2000 mg/kg bw	
Rat LD_{50} dermal	> 2000 mg/kg bw	
Rat LC_{50} inhalation	> 2.11 mg/L air /4h, nose only	
Skin irritation	Non-irritant	
Eye irritation	Non-irritant	
Skin sensitisation	Not sensitising (*LLNA*)	
Phototoxicity	Not required	

Short-term toxicity (Regulation (EU) N° 283/2013, Annex Part A, point 5.3)

Target organ / critical effect	Rat: ↓ body weight & body weight gain, liver (↑ relative weight > 15 %, hypertrophy and clinical chemistry), kidney (↑ relative weight) Mouse: ↓ body weight & body weight gain, liver (↑ relative weight > 15 %, histopathology and clinical chemistry) Dog: ↓ body weight & body weight gain (diet), liver (↑ relative weight > 15 %, hypertrophy)	
Relevant oral NOAEL	Rat: 29 (M) / 37 (F) mg/kg bw/day (90-day) Dog: 100 (M) / 30 (F) mg/kg bw/day (90-day) Mouse: 180 (M) / 257 (F) mg/kg bw/day (90-day)	
Relevant dermal NOAEL	21-day, rat: 1000 mg/kg bw/day	
Relevant inhalation NOAEL	No data - not required	

Genotoxicity (Regulation (EU) N° 283/2013, Annex Part A, point 5.4)

In vitro studies	Reverse mutation assay (Ames Test) – negative. *In vitro* chromosome aberration assay (CHO cells) -S9 negative; +S9 positive L5178Y/TK+/- Mouse Lymphoma cells	

	mutagenicity study(MLA) – negative.	
In vivo studies	*In vivo* (oral gavage) micronucleus test in rat bone marrow – negative with clear evidence of systemic exposure in bone marrow.	
Photomutagenicity	No data - not required.	
Potential for genotoxicity	bixlozone is unlikely to be genotoxic	

Long-term toxicity and carcinogenicity (Regulation (EU) N°283/2013, Annex Part A, point 5.5)

Long-term effects (target organ/critical effect)	Rat: ↓ body weight gain, liver (↑ relative weight > 15 % and hepatocellular hypertrophy (both sexes), clinical chemistry (females)) Mouse: Higher incidences of reduced epididymal sperm and inflammation of the glandular stomach	
Relevant long-term NOAEL	2-year, rat: 41 (M) / 53 (F) mg/kg bw/day 18-month, mouse: 32 (M) mg/kg bw/day	
Carcinogenicity (target organ, tumour type)	Rat: no treatment-related increase in tumour incidence Mouse: no treatment-related increase in tumour incidence Bixlozone is unlikely to be carcinogenic.	
Relevant NOAEL for carcinogenicity	2-year, rat: 167 (M) / 217 (F) mg/kg bw/day; 18-month, mouse: 647 (M) / 834 (F) mg/kg bw/day	

Reproductive toxicity (Regulation (EU) N° 283/2013, Annex Part A, point 5.6)

Reproduction toxicity

Reproduction target / critical effect	Parental toxicity (rat): ↓ body weight & body weight gain, liver (↑ relative weight > 15 %, hypertrophy and clinical chemistry), kidney (↑ weight) Reproductive toxicity: no adverse effects observed in the 2-generation rat study Offspring's toxicity: ↓ F_2 pup body weight and body weight gain during the pre-weaning period Bixlozone is unlikely to be a reproductive toxicant.	
Relevant parental NOAEL	34 (M) / 49 (F) mg/kg bw/day	
Relevant reproductive NOAEL	140 (M) / 187(F) mg/kg bw/day	
Relevant offspring NOAEL	34 (M) / 49 (F) mg/kg bw/day	

Developmental toxicity

Developmental target / critical effect	Rat: Maternal toxicity: Fur staining, ↓ food consumption and body weight gains, liver (↑ relative weight and hypertrophy) Developmental toxicity: no adverse effects Rabbit: Maternal toxicity in dose-range finding study: ↑ mortality, ↓ body weight, food consumption and defecation at 750 mg/kg bw/day Maternal toxicity in main study: ↓ body weight gain, food consumption and defecation at GD 13-20 at 400 mg/kg bw/day Developmental toxicity: no adverse effects Bixlozone is unlikely to be a developmental toxicant.	
Relevant maternal NOAEL	Rat: 75 mg/kg bw/day Rabbit: 400 mg/kg bw/day	
Relevant developmental NOAEL	Rat: 550 mg/kg bw/day (highest dose) Rabbit: 400 mg/kg bw/day (highest dose)	

Neurotoxicity (Regulation (EU) N° 283/2013, Annex Part A, point 5.7)

Acute neurotoxicity	No indications of specific neurotoxic effects up to top dose of 2000 mg/kg bw	
Repeated neurotoxicity	No indications of neurotoxicity (90 day rat study including neurotoxicity assessment)	
Additional studies (e.g. delayed neurotoxicity, developmental neurotoxicity)	Not required	

Other toxicological studies (Regulation (EU) N° 283/2013, Annex Part A, point 5.8)

Supplementary studies on the active substance	Palatability 7-days studies in mice, rats and dogs. Palatability-related issues seen in the dog, but not in the rat and mouse.
Endocrine disrupting properties	Evaluation was based on the standard regulatory studies and available data. For the EAS and T modalities bixlozone is not an ED. The ED potential has been sufficiently investigated.
Studies performed on metabolites or impurities	**Metabolites:** 2,4-dichlorobenzoic acid (2,4-DBA, CAS 50-84-0) Acute oral toxicity (mouse): LD50 of 830 mg/kg bw In vitro Salmonella typhimurium reverse mutation

	(Ames) test: Negative In vitro micronucleus assay: Negative Hprt gene mutation assay in CHO-K1cells: Negative. Metabolites occurring at significant levels in plant and livestock metabolism studies: 5'-hydroxy-bixlozone, 5-hydroxy-bixlozone, 5-hydroxy-bixlozone-glucuronide, bixlozone-3-OH-propanamide, bixlozone-3-OH-propanamide-sulfate, 2,2-dimethyl-3-hydroxy propionic acid, 2,4-dichlorobenzoic acid, bixlozone-dimethyl-malonamide and dimethyl-malonic acid. The metabolite 5'-hydroxy-bixlozone is not a major metabolite in rats. Although it is structurally very similar to bixlozone (it only differs from it by the presence of an additional hydroxy group on the phenyl ring) as confirmed by the comparative *in silico* analysis, it would be more prudent not to assume equivalence with the parent in relation to general toxicity as the reliability of QSAR predictions for complex endpoints is generally low. Having excluded genotoxicity by QSAR analysis, if a risk assessment were to be required for **5'-hydroxy-bixlozone, the Cramer class III TTC chronic value of 1.5 µg/kg bw/day and acute value of 5 µg/kg bw**[3] could be used in a conservative first-tier assessment. The metabolite 5-hydroxy-bixlozone is a putative major rat metabolite considered to be covered via its downstream metabolite 5-keto-hydrate-bixlozone. On this basis, its toxicity profile could be considered 'covered' by the parent. It is structurally very similar to bixlozone since it only differs from it by the presence of an additional hydroxy group on the isoxazolidinone ring. No additional *in silico* alerts were flagged for this metabolite for genotoxicity or general toxicity hazards compared to bixlozone. In addition, the conjugated form of 5-hydroxy-bixlozone (5-hydroxy-bixlozone-glucuronide) is expected to have a comparable or less severe toxicity profile than 5-hydroxy-bixlozone. Overall, the toxicological properties of **5-hydroxy-bixlozone** and **5-hydroxy-bixlozone-glucuronide**, as major rat metabolites, can be considered to have been intrinsically tested in the toxicological studies undertaken with bixlozone and thus these metabolites can be considered of **equivalent toxicity to the parent substance** and potential candidates for inclusion in the Residue Definition from a toxicological perspective. If a risk assessment were to be required for 5-hydroxy-bixlozone and 5-hydroxy-bixlozone-glucuronide, the **dietary reference values of bixlozone** could be used. The metabolite bixlozone-3-OH-propanamide shares some structural similarity to bixlozone; however

[3] EFSA (2012) Scientific Opinion on Evaluation of the Toxicological Relevance of Pesticide Metabolites for Dietary Risk Assessment, EFSA Journal 2012;10(07):2799

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

	additional alcohol and carboxylic acid amide functional groups are formed when the isoxazolidinone ring of bixlozone is opened up. Although no additional *in silico* alerts were flagged for this metabolite for genotoxicity or general toxicity compared to bixlozone, the reliability of QSAR predictions for complex general toxicity endpoints is low. Its conjugate form, bixlozone-3-OH-propanamide-sulfate is expected to have a comparable or less severe toxicity. Its downstream metabolite bixlozone-dimethyl-malonamide is structurally close to bixlozone-3-OH-propanamide; both shared the same comparative *in silico* findings. None of these metabolites is a major rat metabolite. However, having excluded genotoxicity by QSAR analysis, if a risk assessment were to be required for **bixlozone-3-OH-propanamide, bixlozone-3-OH-propanamide-sulfate and bixlozone-dimethyl-malonamide, the Cramer class III TTC chronic value of 1.5 µg/kg bw/day and acute value of 5 µg/kg bw** could be used in a conservative first-tier assessment. Given their close structural similarity, a combined risk assessment of these three metabolites against the TTC values should be performed, if required. The metabolite 2,4-dichlorobenzoic acid (2,4-DBA) is a putative major rat metabolite considered to be covered via its downstream glycine conjugate 2,4-dichlorohippuric acid, the latter being recovered in rat urine at levels > 10 % of the AD in both sexes following single low dose oral exposure. On this basis, its toxicity profile could be considered 'covered' by the parent. However, specific data are available on this metabolite. These data take precedence on the kinetic prediction and indicate that 2,4-dichlorobenzoic acid may be approximately 2-fold more toxic than bixlozone. On this basis, it is concluded that **2,4-dichlorobenzoic acid is more toxic than the parent** and a likely candidate for inclusion in the Residue Definition from a toxicological perspective. If a risk assessment were to be required, **the dietary acute and chronic reference values of bixlozone should be used**, adjusting the residue estimate of 2,4-dichlorobenzoic acid for a relative potency factor of 2. In addition, a modifying factor of 1.435 should also be applied to account for the molecular weight conversion between the parent and the metabolite. This will allow to express 2,4-dichlorobenzoic acid into parent bixlozone equivalents. The two metabolites 2,2-dimethyl-3-hydroxy propionic acid and dimethyl-malonic acid are not structurally similar to bixlozone but are closely related to each other. Both substances are not major rat metabolites. No additional *in silico* alerts were flagged for these metabolites for genotoxicity compared to bixlozone; they both have classification notifications indicating a more

	severe toxicity profile compared to bixlozone however these general toxicity hazards (local irritant effects on skin, eye and respiratory tract) are of no relevance to the dietary route of exposure. Having excluded genotoxicity by QSAR analysis, if a risk assessment were to be required for **2-dimethyl-3-hydroxy propionic acid and dimethyl-malonic acid, the Cramer class I TTC chronic value of 30 µg/kg bw/day** could be used in a conservative first-tier assessment. This TTC value can also be used for the acute exposure assessment for these metabolites (when performing an initial 'screen' versus the TTC (CCI)). Given their close structural similarity, a combined risk assessment of these two metabolites against the TTC values should be performed, if required. **<u>Relevant impurities</u>** Following the toxicological assessment of the relevance of impurities present in bixlozone technical, including theoretical impurities, the proposed reference specification contains only one toxicologically relevant impurity: (2,4-dichlorophenyl)methanol (CAS 1777-82-8), specified at 0.15 % w/w (15 g/kg)

Medical data (Regulation (EU) N° 283/2013, Annex Part A, point 5.9)

	Limited; new active substance. No reports of diseases or adverse health effects attributed to exposure associated with the handling, testing or manufacture of bixlozone technical and formulations. No reports of clinical cases and poisoning.

Summary[4] (Regulation (EU) N°1107/2009, Annex II, point 3.1 and 3.6)	Value (mg/kg bw (per day))	Study	Uncertainty factor
Acceptable Daily Intake (ADI)	0.3	Rat (oral), 90-day	100
Acute Reference Dose (ARfD)	0.75	Rat (oral gavage), developmental toxicity study	100
Acceptable Operator Exposure Level (AOEL)	0.2	rat, 90-day	100 70 % oral bioavailability
Acute Acceptable Operator Exposure Level (AAOEL)	Not suitable data available		

[4] If available include also reference values for metabolites

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 2 Mammalian Toxicology

Dermal absorption (Regulation (EU) N° 284/2013, Annex Part A, point 7.3)

Representative formulation (*F9600-4SC, SC formulation, bixlozone 364 g/L)*	Concentrate (364 g/L): 0.4 % Spray dilution A (*3.36 g/L*): 6 % Spray dilution B (*0.251 g/L*): 24 % *Based on an in vitro human study - representative formulation tested*

Exposure scenarios (Regulation (EU) N° 284/2013, Annex Part A, point 7.2)

Operators	**'F9600-4SC'** Model: EFSA Calculator (version: 30 March 2015) Use: Outdoor application to cereals via tractor mounted boom sprayer, application rate 0.375 kg a.s./ha Exposure estimates (model): % of AOEL Without PPE: 7.5
Workers	**'F9600-4SC'** Use: Outdoor application to cereals, application rate 1 x 0.375 kg a.s./ha, exposure during inspection/irrigation Model: EFSA Calculator (version: 30 March 2015) % of AOEL No PPE (with workwear) 6
Bystanders and residents	**'F9600-4SC'** Use: Cereals, tractor mounted equipment, application rate 1 x 0.375 kg a.s./ha, 150 L water/ha Model: EFSA Calculator (version: 30 March 2015) Child Resident (and bystander)* % AOEL Spray Drift 8 Vapour 1 Surface Deposits 1 Entry into Treated Crops 8 All pathways (mean) 12 Adult Resident (and bystander)* Spray Drift 2 Vapour <1 Surface Deposits <1 Entry into Treated Crops 4 All pathways (mean) 5 * Bixlozone does not have an assigned AAOEL. Therefore, the exposure risk assessment for residents also covers bystander exposure.

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 2 Mammalian Toxicology

Classification with regard to toxicological data (Regulation (EU) N° 283/2013, Annex Part A, Section 10)

Substance :	Bixlozone technical
Harmonised classification according to Regulation (EC) No 1272/2008 and its Adaptations to Technical Process [Table 3.1 of Annex VI of Regulation (EC) No 1272/2008 as amended][5] :	No current harmonised classification.
Peer review proposal [6] for harmonised classification according to Regulation (EC) No 1272/2008:	Not classified

[5] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. OJ L 353, 31.12.2008, 1-1355.

[6] It should be noted that harmonised classification and labelling is formally proposed and decided in accordance with Regulation (EC) No 1272/2008. Proposals for classification made in the context of the evaluation procedure under Regulation (EC) No 1107/2009 are not formal proposals.

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Residues in or on treated products food and feed

Metabolism in plants (Regulation (EU) N° 283/2013, Annex Part A, points 6.2.1, 6.5.1, 6.6.1 and 6.7.1)

	Crop groups	**Crop(s)**	**Application(s)**	**DAT** (days)
Primary crops (Plant groups covered) **OECD Guideline 501**	Fruit crops	-	-	-
	Root crops	Sugar beet	C 1 x 293 g as/ha P 1 x 298 g as/ha	28 (immature tops) 173 (mature tops and roots)
	Leafy crops	-	-	-
	Cereals/grass crops	Wheat	C 1 x 288 g as/ha P 1 x 307 g as/ha	28 (forage) 48 (hay) ca. 60 (grain and straw)
		Rice	Dry land rice C 1 x 348 g as/ha P 1 x 348 g as/ha Paddy rice C 1 x 350 g as/ha P 1 x 344 g as/ha	151-153 (grain and straw)
	Pulses/Oilseeds	Canola (oilseed rape)	C 1 x 276 g as/ha P 1 x 287 g as/ha	36 (forage) 70-71 (seed and straw)
	Miscellaneous	-	-	-
	Studies conducted outdoors in USA Two labels (C=carbonyl labelled; P= phenyl labelled) studied in each crop; metabolism pathways are broadly comparable across the three crop groups.			

	Crop groups	**Crop(s)**	**PBI** (days)	**Comments**
Rotational crops (metabolic pattern) **OECD Guideline 502**	Root/tuber crops	Radish	30 (C/P), 120 (C/P), 310 (C/P)	1 × 269-281g a.s./ha to bare soil (P)
	Leafy crops	Lettuce	63 (C/P), 153 (C/P), 310 (C/P)	1 × 278-288 g a.s./ha to bare soil (C)
	Cereal (small grain)	Wheat	30 (C/P), 120 (C/P), 310 (C/P)	Two radiolabels (P-phenyl, C- carbonyl). Immature lettuce for the

	Other	-	-	phenyl label was collected from a low rate (circa 100 g as/ha applied to bare soil) application as phytotoxicity was observed in the high rate (circa 300 g /ha applied to bare soil) lettuce 30 DAT plots

Rotational crop and primary crop metabolism similar?	Broad comparability of metabolic pathways (primary compared to rotational crops) noted. Bixlozone is extensively metabolised in rotational crops. Main rotational crop metabolites were tested in follow on field trials – further to these data it is not expected that residues of metabolites will be present in rotational crops as a result of the intended uses. Parent bixlozone was the only component found (at low levels in leafy crops) in the follow on rotational crop field trials. Parent was found in the rotational crop metabolism (radish and lettuce, but not wheat samples)

Processed commodities (standard hydrolysis study) **OECD Guideline 507**	**Conditions**	Bixlozone	2,4-DBA	
	20 min, 90°C, pH 4	stable	}	
	60 min, 100°C, pH 5	stable	} Not investigated	
	20 min, 120°C, pH 6	stable	}	

Residue pattern in processed commodities similar to residue pattern in raw commodities?	Residues of bixlozone are stable (tested using P and C labelled bixlozone). Low residues of bixlozone are found in some rotational crops. For the current GAP intended uses, residues of parent bixlozone are not expected to be found (above the LOQ). In primary crops, there was a low infrequent finding of 2,4-dichlorobenzoic acid (2,4-DBA) in cereals. A hydrolysis study for 2,4-dichlorobenzoic acid (2,4-DBA), which is in the proposed RD-RA is not available.
Plant residue definition for enforcement (RD-Enf) **OECD Guidance, series on pesticides No 31**	bixlozone

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Plant residue definition for risk assessment (RD-RA)	For the intended (early application) uses on oilseed rape, wheat, barley and maize: RD-RA (plants): Sum of residues of bixlozone and 2 x 2,4-dichlorobenzoic acid expressed as bixlozone Molecular weight conversion to express 2,4-dichlorobenzoic acid as bixlozone equivalence is 1.435 [the 2 x factor is to account for the relative toxicological potency compared to parent bixlozone. To express 2,4-dichlorobenzoic acid as bixlozone equivalence a molecular weight conversion of 1.435 also has to be applied. This then gives an overall factor of 2.87 to be applied to the level of 2,4-dichlorobenzoic acid]. For other crops and use patterns, no conclusion can be currently reached on a suitable residue definition (an updated TTC exposure assessment for 2,2-dimethyl-3-hydroxy propionic acid (M118/1) and dimethyl malonic acid (M132/1) will be required for future extensions of uses). For the currently intended uses, the exposures to residues of M118/1 and M132/1 are below the TTC (for CCI).
Conversion factor (enforcement to risk assessment)	It is not possible to propose a conversion factor as mostly <LOQ residues of each analyte were observed in trials. [OECD 2016 Guidance on Crop Field Trials states that, for the calculation of CFs, residue trials resulting in residue levels below the LOQ should not be taken into account.] *(Furthermore there is the complexity of the higher toxicity (2 x) of 2,4-DBA compared to parent bixlozone (see above comment box)).*

Metabolism in livestock (Regulation (EU) N° 283/2013, Annex Part A, points 6.2.2, 6.2.3, 6.2.4, 6.2.5 6.7.1)

OECD Guideline 503 and **SANCO/11187/2013 rev. 3** (fish)	**Animal**	**Dose** (mg/kg bw/d)	**Duration** (days)	**N rate/comment**
Animals covered	Laying hen	P- 1.15 C- 1.08	13 13	Dietary burden is not significant for the proposed uses (study represents 540-575 N).

	Goat	P- 0.41 C- 0.49	7 7	Dietary burden is not significant for the proposed uses (study represents 101-123 N).
	Pig	No study available (or needed)		
	Fish	No study available (or needed currently)		
	Goat and hen studies with two radiolabels studied each species (P- Phenyl labelled, and C – Carbonyl label). These studies do not need to be currently relied upon as dietary burden is not exceeding the trigger of 0.004 mg/kg bw/day.			

Time needed to reach a plateau concentration in milk and eggs (days)	Eggs (7-9 days) Milk (around 2 days)
Animal residue definition for enforcement (RD-Enf) **OECD Guidance, series on pesticides No 31**	Bixlozone This residue definition will need to be reconsidered if there are extensions of use.
Animal residue definition for risk assessment (RD-RA)	Currently not needed for the early application proposed uses on oilseed rape, wheat, barley and maize, so a RD-RA is not currently proposed for products of animal origin. A further consideration would be needed, if residues become more prominent in animal feed items for any additional/new crop uses or further extensions of uses on oilseed rape, wheat, barley and maize.
Conversion factor (enforcement to risk assessment)	Currently not needed for the proposed uses on oilseed rape, wheat, barley and maize (a RD-RA is not currently proposed for products of animal origin therefore a conversion factor cannot be calculated). A further consideration would be needed, if residues become more prominent in animal feed items for any additional/new crop uses or further extension of uses on oilseed rape, wheat, barley and maize.
Metabolism in rat and ruminant similar (Yes/No)	Yes (based on dosing with bixlozone)
Fat soluble residues (Yes/No) **(FAO, 2009)**	No (the main residues in livestock/rat are not parent bixlozone, but metabolites with lesser potential to be fat soluble), as supported by the findings in animal metabolism studies (levels of residues in fat in livestock and rat were not high).

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Residues in succeeding crops (Regulation (EU) N° 283/2013, Annex Part A, point 6.6.2)

Confined rotational crop study (Quantitative aspect) **OECD Guideline 502**	TRRs in edible commodities (lettuce, radish roots and tops) were ≤ 0.21 mg/kg at a PBI of 30 d – 153 d and declined to max 0.017 mg/kg at a PBI of 310 d. TRRs in wheat grain up to 0.037 mg/kg (30 DAT) declined over time (up to 0.033mg/kg 120 DAT and up to 0.009mg/kg 310 DAT). TRRs in wheat feed items (wheat forage, hay and straw) up to 0.59 mg/kg (max in wheat hay) and declined markedly in 310 DAT timing. Parent bixlozone present at or below 0.054 mg/kg or 76% TRR. Metabolites >10%TRR and >0.01 mg/kg observed were: M190/1, M289/3, M132/1, M289/2, M289/4, and M261/1. Nearly all of these were tested in the follow on field trials (see below).
Field rotational crop study **OECD Guideline 504**	Representatives of cereals, root/tuber and leafy vegetables grown following treatment at 300 g a.s./ha. Residue levels of bixlozone metabolites : 2,4-dichlorobenzoic acid (M190/1), 5'-hydroxy-bixlozone (M289/3), bixlozone-dimethyl-malonamide (M289/2), bixlozone -hydroxy-isobutyramide (M261/1) and 4-hydroxymethyl-bixlozone (M289/4), in samples from the treated plots were <0.01 mg/kg at all plant back intervals. Residue levels of bixlozone were <0.01 mg/kg, with the exception of two low positive residues of bixlozone detected in the 229 day PBI samples for radish tops and immature lettuce leaves (0.013 and 0.011 mg/kg respectively). A label re-plant restriction has been proposed (leafy crops and above ground vegetables must not be planted until at least 10 months after application of bixlozone) with the aim of ensuring residues of bixlozone are below 0.01 mg/kg.

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Stability of residues (Regulation (EU) N° 283/2013, Annex Part A, point 6.1)
OECD Guideline 506

Plant products (Category)	**Commodity**	**T** (°C)	**Stability** (Months)							
			Bixlozone (A/B)	2,4-dichlorobenzoic acid (A/B)	5-hydroxy-bixlozone (A)	2,2-dimethyl-3-hydroxy propionic acid (A)	5'-hydroxy-bixlozone (A/B)	Bixlozone-dimethyl-malonamide (B)	Bixlozone-OH-isobutyramide (B)	4-hydroxymethyl-bixlozone (B)
High acid content	Grapes	≤-18	24	24	18	24	24	-	-	-
High oil content	Oilseed rape seed	≤-18	24	24	18	24	24	-	-	-
High starch content	Potato tuber	≤-18	24	24	18	24	24	-	-	-
None specified	Wheat straw	≤-18	24	24	18	24	24	24	24	24
High starch content	Radish root	≤-18	-	-	-	-	-	24	24	24
High water content	Leaf lettuce	≤-18	-	-	-	-	-	24	24	24
High starch content	Wheat grain	≤-18	-	-	-	-	-	24	24	24

A= analytes included in primary crop field trials
B= analytes included in rotational crop field trials

All analytes were sufficiently stable for at least 24 months (18 months for 5-hydroxy-bixlozone) in the matrices tested.

Data on stability of residues in cereal grain are not available for the analytes relevant to the requested cereal primary crops (see Vol 1, section 2.7.1).

Animal	**Animal commodity**	**T** (°C)	**Stability** (Month/Year)							
	Muscle									
	Liver									
	Kidney									
	Milk									
	Egg									

Not applicable; no data provided.

Summary of residues data from the supervised residue trials (Regulation (EU) N° 283/2013, Annex Part A, point 6.3) OECD Guideline 509, OECD Guidance, series on pesticides No 66 and OECD MRL calculator

Crop	**Outdoor/ Indoor** (a)	**Residue levels** (mg/kg) **observed in the supervised residue trials relevant to the supported GAPs** (b)	**Recommendations/comments** (OECD calculations)	**MRL** proposals (mg/kg)	**HR** (mg/kg) (c)	**STMR** (mg/kg) (d)
Representative uses						
Oilseed rape	Outdoor	Enf: 7 x <0.01 RA: 7 x <0.039 (human exposure assessment) [7 x <0.024 (livestock dietary intake assessment)]	The 2 x factor is to account for the relative toxicological potency compared to parent bixlozone. To express 2,4-dichlorobenzoic acid as bixlozone equivalence a molecular weight conversion of 1.435 also has to be applied. This then gives an overall factor of 2.87 to be applied to the level of 2,4-dichlorobenzoic acid. It should be noted that this 2 x factor is only required in assessments comparing to the toxicological endpoints for bixlozone, i.e., this additional 2 x factor has not been used in the animal dietary burden estimate of exposure as this is an estimate of livestock dietary intakes, rather than comparison with a toxicological endpoint. Hence, results of <0.024 mg/kg have been taken forward into the animal dietary burden calculation (<0.01 mg/kg bixlozone + <0.01 mg/kg 2,4-dichlorobenzoic acid x 1.435 MW conversion).	0.01*	<0.039 (HR$_{Enf}$ <0.01)	<0.039 (STMR$_{Enf}$ <0.01)
Wheat and barley grain	Outdoor	Enf: 13 x <0.01 RA: 12 x <0.039, 0.039 (human exposure assessment) [12 x <0.024, 0.024 (livestock dietary intake assessment)]		0.01*	0.039 (HR$_{Enf}$ <0.01)	<0.039 (STMR$_{Enf}$ <0.01)
Wheat and barley straw	Outdoor	Enf: 13 x <0.01 RA: 12 x <0.024, 0.05 (livestock dietary intake assessment)		Not currently set for animal feed items	0.05	<0.024
Maize grain	Outdoor	Enf: 4 x <0.01 RA: 4 x <0.039 (human exposure assessment) [4 x <0.024 (livestock dietary intake assessment)]		0.01*	<0.039 (HR$_{Enf}$ <0.01)	<0.039 (STMR$_{Enf}$ <0.01)
Maize straw	Outdoor	Enf: 4 x <0.01 RA: 4 x <0.024 (livestock dietary intake assessment)		Not currently set for animal feed items	<0.024	<0.024

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Crop	**Outdoor/ Indoor** (a)	**Residue levels** (mg/kg) **observed in the supervised residue trials relevant to the supported GAPs** (b)	**Recommendations/comments** (OECD calculations)	**MRL** proposals (mg/kg)	**HR** (mg/kg) (c)	**STMR** (mg/kg) (d)
Summary of the data on formulation equivalence Representative uses are early in the growing season. For a full consideration of the trials performed with a 'CS' formulation, see Volume 1. No further consideration required.						
Summary of data on residues in pollen and bee products (Regulation (EU) No 283/2013, Annex Part A, point 6.10.1) Not required at the point of submission.						

(a): Residues trials data relevant to the agricultural practices and climatic conditions in the UK, Indoor for glasshouse/protected crops.

(b): Residue levels in trials conducted according to GAP reported in ascending order (*e.g.* 3x <0.01, 0.01, 6x 0.02, 0.04, 0.08, 3x 0.10, 2x 0.15, 0.17). When residue definition for enforcement and risk assessment differs, use **Enf/RA** to differentiate data expressed according to the residue definition for **Enf**orcement and **R**isk **A**ssessment.

(c): **HR**: Highest residue. When residue definition for enforcement and risk assessment differs, HR according to residue definition for enforcement reported in brackets (HR_{Enf}).

(d): **STMR:** Supervised Trials Median Residue. When residue definition for enforcement and risk assessment differs, STMR according to definition for enforcement reported in brackets ($STMR_{Enf}$).

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Inputs for animal burden calculations

Feed commodity	Median dietary burden		Maximum dietary burden	
	(mg/kg)	**Comment**	(mg/kg)	**Comment**
Representative uses Primary crop oilseed rape, maize, wheat and barley: Sum of bixlozone and 2,4-dichlorobenzoic acid, expressed as bixlozone.$ Rotational crops (RC): bixlozone.				
Alfalfa forage, hay, meal, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Barley forage, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Barley straw	0.024	STMR	0.05	HR
Bean vines	0.01	STMR *(RC)*	0.028	HR *(RC)*
Beet, mangel fodder	0.01	STMR *(RC)*	0.028	HR *(RC)*
Beet, sugar	0.01	STMR *(RC)*	0.028	HR *(RC)*
Cabbage heads, leaves	0.01	STMR *(RC)*	0.028	HR *(RC)*
Clover forage, hay, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Corn, field, forage/silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Corn, field (maize), pop, stover	0.024	STMR	0.024	HR
Cowpea, forage, hay	0.01	STMR *(RC)*	0.028	HR *(RC)*
Grass, forage (fresh), hay, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Kale, leaves	0.01	STMR *(RC)*	0.028	HR *(RC)*
Lespedeza, forage, hay	0.01	STMR *(RC)*	0.028	HR *(RC)*
Millet, forage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Oat forage, hay	0.01	STMR *(RC)*	0.028	HR *(RC)*
Pea vines, hay, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Rape forage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Rye forage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Sorghum forage, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Soybean forage, hay, silage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Trefoil forage	0.01	STMR *(RC)*	0.028	HR *(RC)*
Triticale forage, hay	0.01	STMR *(RC)*	0.028	HR *(RC)*
Turnip tops, leaves	0.01	STMR *(RC)*	0.028	HR *(RC)*
Vetch forage, hay	0.01	STMR *(RC)*	0.028	HR *(RC)*
Wheat forage, hay	0.01	STMR *(RC)*	0.028	HR *(RC)*
Wheat straw	0.024	STMR	0.05	HR
Barley grain	0.024	STMR	-	-
Corn, field (maize), pop, grain	0.024	STMR	-	-

Feed commodity	Median dietary burden		Maximum dietary burden	
	(mg/kg)	**Comment**	(mg/kg)	**Comment**
Wheat grain	0.024	STMR	-	-
Brewer’s grain (dried)	0.024	STMR (barley grain) x PF†	-	-
Canola (rape seed) meal	0.024	STMR (rape meal) x PF†	-	-
Corn, field, milled by-products, hominy meal, gluten feed, gluten meal	0.024	STMR (maize grain) x PF†	-	-
Distiller’s grain (dried)	0.024	STMR (wheat grain) x PF†	-	-
Rape meal	0.024	STMR (rape seed) x PF†	-	-
Wheat gluten (meal)	0.024	STMR (wheat grain) x PF†	-	-
Wheat (milled by-products)	0.024	STMR (wheat grain) x PF†	-	-

† PF = 1; As residues in the RAC are < LOQ, concentration in the processed fraction is unlikely and the default processing factor (Pf) has not been applied. It is noted that the processing factors derived as part of the evaluation are uncertain and tentative only and do not show a marked (not above x 1.5) concentration for oilseed rape fractions.
[Considering cereals for completeness, there is an indication of concentration in wheat bran and barley malt sprouts but these are not animal feed items].

$ The 2 x factor is to account for the relative toxicological potency compared to parent bixlozone. To express 2,4-dichlorobenzoic acid as bixlozone equivalence a molecular weight conversion of 1.435 also has to be applied. This then gives an overall factor of 2.87 to be applied to the level of 2,4-dichlorobenzoic acid.

It should be noted that this 2 x factor is only required in assessments comparing to the toxicological endpoints for bixlozone, i.e., this additional 2 x factor has not been used in the animal dietary burden estimate of exposure as this is an estimate of livestock dietary intakes, rather than comparison with a toxicological endpoint.

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Residues from livestock feeding studies (Regulation (EU) N° 283/2013, Annex Part A, points 6.4.1, 6.4.2, 6.4.3 and 6.4.4)

OECD Guideline 505 and OECD Guidance, series on pesticides No 73

MRL calculations	**Ruminant**				**Pig/Swine**		**Poultry**		**Fish**	
Highest expected intake (mg/kg bw/d) (mg/kg DM for fish)	Beef cattle	0.003	Ram/Ewe	0.004	Breeding	0.001	Broiler	0.002	Carp	-
	Dairy cattle	0.003	Lamb	0.004	Finishing	0.001	Layer	0.002	Trout	-
							Turkey	0.002	Fish intake >0.1 mg/kg DM	
Intake >0.004 mg/kg bw	No		No		No		No		N/A	
Feeding study submitted	No		No		No		No		No	
Representative feeding level (mg/kg bw/d, mg/kg DM for fish) and **N rates**	Level	Beef: N Dairy: N	Level	Lamb: N Ewe: N	Level	N rate Breed/Finish	Level	B or T: N Layer: N	Level	N rate Carp/Trout
	Estimated HR(a) at 1N	**MRL** proposals	Estimated HR(a) at 1N	**MRL** proposals	Estimated HR(a) at 1N	**MRL** proposals	Estimated HR(a) at 1N	**MRL** proposals	Estimated HR(a) at 1N	**MRL** proposals
Muscle										
Fat										
Meat(b)										
Liver										
Kidney										
Milk(a)										
Eggs										
Method of calculation(c)										

(a): Estimated HR calculated at 1N level (**estimated mean level for milk**).
(b): HR in meat calculated for mammalian on the basis of 20% fat + 80% muscle and 10% fat + 90% muscle for poultry
(c): The OECD guidance document on residues in livestock (series on pesticides 73) recommends three different approaches to derive MRLs for animal products; by applying a transfer factor (Tf), by intrapolation (It) or by linear regression (Ln). Fill in method(s) considered to derive the MRL proposals.

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Conversion Factors (CF) for enforcement to risk assessment

Animal products

N/A – significant residues not expected in animal products as a result of the proposed uses.

Plant products

Mean Conversion Factors (CF) calculated at the different PHIs in the supervised residues trials[(a)]
No conversion factor (enforcement to risk assessment) has been set as virtually all of the trials (oilseed rape and cereals) contained residues of parent and 2,4-dichlorobenzoic acid at a level of <LOQ of <0.01 mg/kg [OECD 2016 Guidance on Crop Field Trials states that, for the calculation of CFs, residue trials resulting in residue levels below the LOQ should not be taken into account.]

[(a)]: CF calculated at the supported PHI are underlined.
[(b)]: 0-/0+ for samples collected just before/after the last application

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Processing factors (Regulation (EU) N° 283/2013, Annex Part A, points 6.5.2 and 6.5.3)

OECD Guideline 508 and OECD Guidance, series on testing and assessment No 96

Crop (RAC)/Edible part or Crop (RAC)/Processed product	**Number of studies**[(a)]	**Processing Factor** (PF)		**Conversion Factor** (CF_P) **for RA**[(b)]
		Individual values	Median PF	
Wheat Based on a RD-RA (sum of bixlozone and 2 x 2,4-dichlorobenzoic acid, expressed as bixlozone) in each trial (2 studies), at least one of the analytes was <LOQ in grain, making estimation of all processing factors, including those for bran below, uncertain (UC). Processing factors are listed for bran where a concentration can be seen.				Not proposed as a number of analytes having <0.01 mg/kg residues. (all the PF are uncertain)
Fine bran	1	0.17 (UC) RD-RA	0.21 (UC)	
Coarse bran	1	1.58 (UC) RD-RA	1.58 (UC)	
Total bran	2	1.13, 0.93 (UC) RD-RA	1.03 (UC)	
Total bran	1	0.82 RD-enf (bixlozone)	0.82 (n=1)	
All other processing factors are not listed in the LoEP as there was not a concentration in residues (see Vol 1 for further information) and estimation of all PFs is uncertain.				
Barley One study was provided. Based on a RD-RA (sum of bixlozone and 2 x 2,4-dichlorobenzoic acid, expressed as bixlozone), at least one of the analytes was <LOQ in grain, making estimation of all processing factors, including those for malt sprouts below, uncertain (UC). Processing factors are listed for malt sprouts where a concentration can be seen.				Not proposed as a number of analytes having <0.01 mg/kg residues. (all the PF are uncertain)
Malt sprouts	1	1.49 (UC) RD-RA RD-enf (bixlozone)-cannot be derived	1.49 (UC)	
All other processing factors are not listed in the LoEP as there was not a				

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Processing factors (Regulation (EU) N° 283/2013, Annex Part A, points 6.5.2 and 6.5.3)

OECD Guideline 508 and OECD Guidance, series on testing and assessment No 96

Crop (RAC)/Edible part or Crop (RAC)/Processed product	**Number of studies**[(a)]	**Processing Factor** (PF)		**Conversion Factor** (CF_P) **for RA**[(b)]
		Individual values	Median PF	
concentration in residues (see Vol 1 for further information) and estimation of all PFs is uncertain.				
Oilseed rape Based on the RD-RA (sum of bixlozone and 2 x 2,4-dichlorobenzoic acid, expressed as bixlozone), in each trial (2 studies), at least one of the analytes was <LOQ in the raw seed, <u>making estimation of all processing factors, including those for oil below, uncertain (UC).</u> Processing factors are listed for oil and press cake where a concentration can be seen. Crude oil Press cake Refined oil All other processing factors are not listed in the LoEP as there was not a concentration in residues (see Vol 1 for further information) and estimation of all PFs is uncertain.	1 1 1 1 1 1	1.28 (UC) RD-RA 1.63 RD-enf (bixlozone) 1.42 (UC) RD-RA 1.41 RD-enf (bixlozone) 1.19 (UC) RD-RA 1.44 RD-enf (bixlozone)	1.28 (UC) 1.63 (n=1) 1.42 (UC) 1.41 (n=1) 1.19 (UC) 1.44 (n=1)	Not proposed as a number of analytes having <0.01 mg/kg residues. (<u>all the PF are uncertain</u>)
Maize- one study provided but residues were all < LOQ in the grain RAC				
MRL application				
It is noted that processing factors are not needed for the MRL proposals for the active substance (for the proposed use on OSR the proposed MRL is 0.01*)				

[(a)]: Studies with residues in the RAC at or close to the LOQ should be disregarded (unless concentration)
[(b)]: When the residue definition for risk assessment differs from the residue definition for enforcement

List of end points

Evaluator	Month and year	Active Substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 3 Residues

Consumer risk assessment (Regulation (EU) N° 283/2013, Annex Part A, point 6.9)
Consumer risk assessment limited to the representative uses

ADI	0.3 mg/kg bw per day- $
TMDI according to UK model	Highest TMDI: <1 % ADI (UK, toddler)
TMDI according to EFSA PRIMo	Highest TMDI: 0.2 % ADI (GEMS Food G06)
NEDI (% ADI), according to UK model	Highest NEDI: <1 % ADI (UK, 4-6 year olds)
IEDI (% ADI), according to EFSA PRIMo	Highest IEDI: 0.2 % ADI (NL, toddler)
Factors included in the calculations	None- $
ARfD	0.75 mg/kg bw- $
NESTI (% ARfD), according to UK model	Highest NESTI: 0.3 % ARfD (Melon, UK, 4-6 year old)
IESTI (% ARfD), according to EFSA PRIMo	Highest IESTI: 0.6 % ARfD (Melon, BE, toddler)
Factors included in IESTI and NESTI	None- $

$- It is noted that the RD-RA includes the metabolite 2,4-dichlorobenzoic acid. This metabolite is currently proposed as twice as toxic as parent, and this is accounted for in the expression of the RD-RA: Sum of residues of bixlozone and 2 x 2,4-dichlorobenzoic acid expressed as bixlozone

[The 2 x factor is to account for the relative toxicological potency compared to parent bixlozone. To express 2,4-dichlorobenzoic acid as bixlozone equivalence a molecular weight conversion of 1.435 also has to be applied. This then gives an overall factor of 2.87 to be applied to the level of 2,4-dichlorobenzoic acid.]. The residue levels, expressed in this way, are then compared to the ADI and ARfD for parent bixlozone.

Additional contribution to the consumer intakes through drinking water resulting from groundwater metabolite(s) expected to be present above 0.75 µg/L

Metabolite(s)	[$]2,4-dichlorobenzoic acid (after step 5 of the assessment (consumer risk assessment) it is concluded that2,4-dichlorobenzoic acid is not a relevant metabolite in groundwater).
ADI (mg/kg bw per day)	0.3 mg/kg bw/day (bixlozone [$])
Intake of groundwater metabolites (% ADI) **WHO Guideline (WHO, 2009)**	Adult WHO (60 kg bw, 2 L): 0.1 % ADI Child WHO (10 kg bw, 1 L): 0.4 % ADI Infant WHO (5 kg bw, 0.75 L): 0.6 % ADI Infant EFSA(2018) and UK approach (260 g/kg bw/day formula based on 33 g/kg bw powder and 227 ml water/kg bw/day): 0.9 % ADI

[$] Residues of 2,4-dichlorobenzoic acid doubled to account for this substance being twice as toxic as parent bixlozone. By doubling the residue levels for this metabolite, a risk assessment can be performed using the toxicological endpoints for parent bixlozone. (2,4-dichlorobenzoic acid residue 4.048 µg/L x 1.435 MW conversion x 2 to account for relative toxicological potency compared to parent bixlozone = 11.62 µg/L). It should be noted that although this value is >10 µg/L, this is due to the exposure being doubled to account for higher toxicity and enabling comparison to the parent toxicological end point. Additionally, this is due to the application of a MW conversion factor. The actual level of 2,4-dichlorobenzoic acid expected in ground water is 4.048 µg/L which is below the limit of 10 µg/L outlined in SANCO/221/2000 –rev.10.

Proposed MRLs (Regulation (EU) No 283/2013, Annex Part A, points 6.7.2 and 6.7.3)

Code[(a)]	**Commodity/Group**	**MRL/Import tolerance**[(b)] (mg/kg) **and Comments**	
Plant commodities			
Representative uses			
401060	Oilseed rape seed	0.01*	
500010	Barley	0.01*	
500030	Maize/corn	0.01*	
500090	Wheat	0.01*	
Animal commodities			
1040000	Honey	0.05*	

(a): Commodity code number, as listed in Annex I of Regulation (EC) No 396/2005
(b): MRLs proposed at the LOQ, should be annotated by an asterisk (*) after the figure.

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Environmental fate and behaviour

Route of degradation (aerobic) in soil (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.1.1)

Mineralisation after 100 days	11.64 – 54.36 % after 120 d, [^{14}C-carbonyl]-label (n[7]= 7) 10.40 – 47.41 % after 120 d, [^{14}C-phenyl]-label (n= 7)
Non-extractable residues after 100 days	3.30 – 11.64 % after 120 d, [^{14}C-carbonyl]-label (n= 7) 3.78 – 18.18 % after 120 d, [^{14}C-phenyl]-label (n= 7)
Metabolites requiring further consideration - name and/or code, % of applied (range and maximum)	No major metabolites detected in laboratory studies. One major metabolite, 2,4-dichlorobenzoic acid (2,4-DBA), detected in soil dissipation studies. Max formation 69.4% (soil GE02 mass basis, 99.53% molar basis).

Route of degradation (anaerobic) in soil (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.1.2)

Mineralisation after 100 days	9.83 – 20.53 % after 122 d, [^{14}C-carbonyl]-label (n= 4) 0.89 – 10.87 % after 122 d, [^{14}C-phenyl]-label (n= 4)
Non-extractable residues after 100 days	2.83 – 7.86 % after 122 d, [^{14}C-carbonyl]-label (n= 4) 4.58 – 9.24 % after 122 d, [^{14}C-phenyl]-label (n= 4)
Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	3-OH-propanamide (3-OH) – max 14.76 % at 122 d (n = 4) 2,4-dichlorobenzoic acid (2,4-DBA) – max 5.8 % at 122 d (n= 4) Justification was provided and accepted for excluding 3-OH from the exposure calculations due to the prolonged period of anaerobic conditions required for 3-OH to form in significant levels. 2,4-DBA was detected at greater quantities in the soil dissipation studies and so the anaerobic results are not considered further.

Route of degradation (photolysis) on soil (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.1.3)

Metabolites that may require further consideration for risk assessment - name and/or code, % of applied (range and maximum)	No major metabolites
Mineralisation at study end	2.46 – 3.26 % after 15 d (continuous irradiation), [^{14}C-carbonyl]-label (n= 2) 1.09 – 1.17 % after 15 d (continuous irradiation), [^{14}C-phenyl]-label (n= 2)
Non-extractable residues at study end	3.38 – 7.41 % after 15 d (continuous irradiation), [^{14}C-

[7] n corresponds to the number of soils.

	carbonyl]-label (n= 2) 5.10 – 7.22 % after 15 d (continuous irradiation), [^{14}C-phenyl]-label (n= 2)

Rate of degradation in soil (aerobic) laboratory studies active substance (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.2.1.1 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.1.1)

Modelling endpoints						
Parent	Dark aerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} /DT_{90} (d)	DT_{50} (d) 20 °C pF2/10kPa[b)]	St. (χ^2)	Method of calculation
Clay	6.9	20 / 26.5	131 / 433	117.4	1.1	SFO
Sandy loam	7.2	20 / 18.0	115 / 384	103.8	1.6	SFO
Loamy sand	5.4	20 / 11.5	330 / >1000	330	1.0	SFO
Silt loam	6.1	20 / 27.8	225 / 749	184.3	2.6	SFO
Loamy sand	6.9	20 / 11.5	154 / 512	138.3	1.0	SFO
Silt loam	6.8	20 / 31.8	64.1 / 213	52.5	1.2	SFO
Clay	8.0	20 / 29.7	176 / 584	140.7	1.1	SFO
Geometric mean (if not pH dependent)				134		
pH dependence				No		

a) Measured in calcium chloride solution
b) Normalised using a Q10 of 2.58 and Walker equation coefficient of 0.7

Triggering/persistence endpoints						
Parent	Dark aerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} (d)	DT_{90} (d)	St. (χ^2)	Method of calculation
Clay	6.9	20 / 26.5	136	869	0.8	FOMC
Sandy loam	7.2	20 / 18.0	115	384	1.0	SFO
Loamy sand	5.4	20 / 11.5	1000	>1000	0.6	FOMC
Silt loam	6.1	20 / 27.8	358	>1000	1.0	DFOP
Loamy sand	6.9	20 / 11.5	154	512	1.0	SFO
Silt loam	6.8	20 / 31.8	64.1	213	1.2	SFO
Clay	8.0	20 / 29.7	176	584	1.1	SFO

a) Measured in calcium chloride solution

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Rate of degradation in soil (aerobic) laboratory studies transformation products (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.2.1.2 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.1.1)

Modelling endpoints						
3-OH-propanamide	Dark aerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} /DT_{90} (hours)	DT_{50} (hours) 20 °C pF2/10kPa[b)]	St. (χ^2)	Method of calculation
Loamy sand	4.84	20 / 15.8	12.0 / 39.7	12.0	3.64	SFO
Loam	7.41	20 / 24.6	9.3 / 30.9	9.2	5.73	SFO
Silty clay	7.53	20 / 23.2	10.0 / 33.1	6.8	5.89	SFO
Geometric mean (if not pH dependent)				9.1		
pH dependence				No		

a) Measured in [medium to be stated, usually calcium chloride solution or water]
b) Normalised using a Q10 of 2.58 and Walker equation coefficient of 0.7

Triggering/persistence endpoints						
3-OH-propanamide	Dark aerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} (hours)	DT_{90} (hours)	St. (χ^2)	Method of calculation
Loamy sand	4.84	20 / 15.8	12.0	39.7	3.64	SFO
Loam	7.41	20 / 24.6	9.3	30.9	5.73	SFO
Silty clay	7.53	20 / 23.2	9.96	33.1	5.89	SFO

a) Measured in calcium chloride solution

Modelling endpoints						
2,4-DBA	Dark aerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} /DT_{90} (d)	DT_{50} (d) 20 °C pF2/10kPa[b)]	St. (χ^2)	Method of calculation
Loamy sand	4.84	20 / 15.8	8.9 / 29.7	8.9	9.11	SFO
Loam	7.41	20 / 24.6	3.5 / 11.6	3.5	7.72	SFO
Silty clay	7.53	20 / 23.2	7.6 / 25.4	7.6	8.54	SFO
Geometric mean (if not pH dependent)				5.4		
pH dependence				No		

a) Measured in calcium chloride solution
b) Normalised using a Q10 of 2.58 and Walker equation coefficient of 0.7

Triggering/persistence endpoints						
2,4-DBA	Dark aerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} (d)	DT_{90} (d)	St. (χ^2)	Method of calculation
Loamy sand	4.84	20 / 15.8	7.5	38.8	6.79	HS
Loam	7.41	20 / 24.6	3.5	11.6	7.72	SFO

Silty clay	7.53	20 / 23.2	6.5	33.6	6.01	HS

[a)] Measured in calcium chloride solution

Rate of degradation field soil dissipation studies (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.2.2.1 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.1.2.1)

Modelling endpoints								
Bixlozone	Aerobic conditions							
Soil type (indicate if bare or cropped soil was used).	Location (trial code).	Form-ulation	pH[a)]	Depth (cm)	DT_{50} (d) Norm[b)].	DT_{90} (d) Norm[b)].	St. (χ^2)	Method of calculation
Sandy loam (bare)	France (FR01)	SC	5.9	0-30	43.5	145	9.12	SFO
Sandy loam (incorp)	France (FR01)	SC	5.9	0-30	53.9	179	19.2	SFO
Sandy loam (bare)	France (FR01)	CS	5.9	0-30	59.1	196	6.24	SFO
Sandy loam (incorp)	France (FR01)	CS	5.9	0-30	152	504	15.8	SFO
Loam (bare)	Italy (IT01)	SC	6.7	0-30	57.8	192	9.72	SFO
Loam (incorp)	Italy (IT01)	SC	6.7	0-30	187	619	24.8	SFO
Loam (bare)	Italy (IT01)	CS	6.7	0-30	98	326	23.5	SFO
Loam (incorp)	Italy (IT01)	CS	6.7	0-30	195	646	17.6	SFO
Loam (incorp)	Italy (IT02)	SC	6.7	0-30	9.38	31.2	19.3	SFO
Loamy sand (bare)	Germany (GE01)	SC	5.9	0-30	49.3	164	9.0	SFO
Loamy sand (incorp)	Germany (GE01)	SC	5.9	0-30	68.9	229	15.5	SFO
Loamy sand (bare)	Germany (GE01)	CS	5.9	0-30	50.5	168	8.78	SFO
Loamy sand (incorp)	Germany (GE01)	CS	5.9	0-30	105	350	17.8	SFO
Sandy loam (bare)	France (FR02)	SC	5.1	0-30	23.1	76.7	2.73	SFO
Sandy loam (incorp)	France (FR02)	SC	5.1	0-30	47.9	159	6.45	SFO
Sandy loam (bare)	France (FR02)	CS	5.1	0-30	33.0	110	12.4	SFO
Sandy loam (incorp)	France (FR02)	CS	5.1	0-30	106	351	10.6	SFO
Loamy sand (incorp)	Germany (GE02)	SC	5.2	0-30	103	343	20.6	SFO
Loamy sand (bare)	Germany (GE02)	SC	5.2	0-30	72.6	241	18.9	SFO
Loam (incorp)	UK (UK01)	SC	7.1	0-30	78.8	262	9.4	SFO
Loam (bare)	UK (UK01)	SC	7.1	0-30	69.2	230	12.2	SFO
Geometric mean (if not pH dependent)					48.0[c)]			
pH dependence					No			

[a)] Measured in water
[b)] Normalised using a Q10 of 2.58 and Walker equation coefficient of 0.7, values are DegT50matrix
[c)] Geometric mean relates to SC formulation values only (with geometric mean calculations undertaken on the SC DT_{50} values for each trial site prior to determining the overall geometric mean) – see 'combined lab and field' section below for further information

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Triggering/PECsoil endpoints – DT_{50} highlighted in bold used in PEC_{soil} calculations								
Bixlozone	Aerobic conditions							
Soil type (indicate if bare or cropped soil was used).	Location (trial code).	Formulation	pH	Depth (cm)	DT_{50} (d) actual	DT_{90} (d) actual	St. (χ^2)	Method of calculation
Sandy loam (bare)	France (FR01)	SC	5.9	0-30	19.6	108	9.13	DFOP
Sandy loam (incorp)	France (FR01)	SC	5.9	0-30	53.2	177	20.1	SFO
Sandy loam (bare)	France (FR01)	CS	5.9	0-30	0.20	108	8.04	DFOP
Sandy loam (incorp)	France (FR01)	CS	5.9	0-30	216	719	17.3	SFO
Loam (bare)	Italy (IT01)	SC	6.7	0-30	28.5	94.6	13.9	SFO
Loam (incorp)	Italy (IT01)	SC	6.7	0-30	**247**	819	20.7	SFO
Loam (bare)	Italy (IT01)	CS	6.7	0-30	7.36	219	19.7	DFOP
Loam (incorp)	Italy (IT01)	CS	6.7	0-30	292	971	19.7	SFO
Loam (incorp)	Italy (IT02)	SC	6.7	0-30	6.90	157	8.30	SFO
Loamy sand (bare)	Germany (GE01)	SC	5.9	0-30	181	601	16.5	SFO
Loamy sand (incorp)	Germany (GE01)	SC	5.9	0-30	193	642	17.2	SFO
Loamy sand (bare)	Germany (GE01)	CS	5.9	0-30	194	643	16.3	SFO
Loamy sand (incorp)	Germany (GE01)	CS	5.9	0-30	300	997	19.5	SFO
Sandy loam (bare)	France (FR02)	SC	5.1	0-30	57.8	192	6.69	SFO
Sandy loam (incorp)	France (FR02)	SC	5.1	0-30	106	352	7.12	SFO
Sandy loam (bare)	France (FR02)	CS	5.1	0-30	74.7	248	13.3	SFO
Sandy loam (incorp)	France (FR02)	CS	5.1	0-30	213	708	10.9	SFO
Loamy sand (incorp)	Germany (GE02)	SC	5.2	0-30	22.6	>1000	13.3	DFOP
Loamy sand (bare)	Germany (GE02)	SC	5.2	0-30	24.7	571	7.69	DFOP
Loam (incorp)	UK (UK01)	SC	7.1	0-30	105	873	6.74	DFOP
Loam (bare)	UK (UK01)	SC	7.1	0-30	51.8	333	11.8	SFO

Triggering/PECsoil endpoints								
2,4-DBA	Aerobic conditions							
Soil type (indicate if bare or cropped soil was used).	Location (trial code).	Formulation	pH	Depth (cm)	DT_{50} (d) actual	DT_{90} (d) actual	St. (χ^2)	Method of calculation
Sandy loam (bare)	France (FR01)	SC	5.9	0-30	2.77	9.22	35.5	SFO
Sandy loam (bare)	France (FR01)	CS	5.9	0-30	6.40	21.3	27.1	SFO
Loam (bare)	Italy (IT01)	SC	6.7	0-30	4.98	16.5	37.0	SFO
Loam (bare)	Italy (IT01)	CS	6.7	0-30	15.7	52.1	13.7	SFO

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Persistence (for PBT assessment) endpoints								
Bixlozone	Aerobic conditions							
Soil type (indicate if bare or cropped soil was used).	Location (trial code).	Formulation	pH	Depth (cm)	DT_{50} (d) actual	DT_{90} (d) actual	St. (χ^2)	Method of calculation
Sandy loam (bare)	France (FR01)	SC	5.9	0-30	41.9	139	11.5	SFO
Sandy loam (incorp)	France (FR01)	SC	5.9	0-30	53.2	177	20.1	SFO
Sandy loam (bare)	France (FR01)	CS	5.9	0-30	59.4	197	11.7	SFO
Sandy loam (incorp)	France (FR01)	CS	5.9	0-30	216	719	17.3	SFO
Loam (bare)	Italy (IT01)	SC	6.7	0-30	70.9	236	12.5	SFO
Loam (incorp)	Italy (IT01)	SC	6.7	0-30	247	819	20.7	SFO
Loam (bare)	Italy (IT01)	CS	6.7	0-30	135	447	19.3	SFO
Loam (incorp)	Italy (IT01)	CS	6.7	0-30	292	971	19.7	SFO
Loam (incorp)	Italy (IT02)	SC	6.7	0-30	6.90	157	8.30	SFO
Loamy sand (bare)	Germany (GE01)	SC	5.9	0-30	144	477	9.39	SFO
Loamy sand (incorp)	Germany (GE01)	SC	5.9	0-30	193	642	17.2	SFO
Loamy sand (bare)	Germany (GE01)	CS	5.9	0-30	151	500	9.28	SFO
Loamy sand (incorp)	Germany (GE01)	CS	5.9	0-30	300	997	19.5	SFO
Sandy loam (bare)	France (FR02)	SC	5.1	0-30	58.9	196	4.80	SFO
Sandy loam (incorp)	France (FR02)	SC	5.1	0-30	106	352	7.12	SFO
Sandy loam (bare)	France (FR02)	CS	5.1	0-30	82.1	273	10.1	SFO
Sandy loam (incorp)	France (FR02)	CS	5.1	0-30	213	708	10.9	SFO
Loamy sand (incorp)	Germany (GE02)	SC	5.2	0-30	22.6	>1000	13.3	DFOP
Loamy sand (bare)	Germany (GE02)	SC	5.2	0-30	7.03	318	7.37	DFOP
Loam (incorp)	UK (UK01)	SC	7.1	0-30	105	873	6.74	DFOP
Loam (bare)	UK (UK01)	SC	7.1	0-30	146	486	10.5	SFO

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Combined laboratory and field kinetic endpoints for modelling (when not from different populations)

Rate of degradation in soil active substance, normalised geometric mean (if not pH dependent)	Statistical analysis concluded the CS formulation incorporated soil dissipation studies resulted in significantly longer DT_{50} values than the SC formulation for them not to be classed as from the same population. As such, only the SC formulation soil dissipation endpoints were considered further for combination with the laboratory endpoints. The analysis of the SC formulation endpoints confirmed the hypothesis that they showed statistically shorter DT_{50} than the laboratory studies. Therefore, the geomean value of the SC formulation field trials (each field trial results averaged prior to calculating overall geomean) of 48.0 days is appropriate for consideration in the exposure calculations performed for the representative SC product. If a CS formulation use is sought, the Vol. 3CA should be consulted for further information on the derivation of an appropriate DT_{50} value.
Rate of degradation in soil transformation products, normalised geometric mean (if not pH dependent)	2,4-DBA: Geomean DT_{50} from laboratory aerobic degradation study appropriate for PEC_{GW} calculations – 5.4 d
Kinetic formation fraction (f. f. k_f / k_{dp}) of transformation products, arithmetic mean	2,4-DBA: Detected in soil dissipation studies at a maximum occurrence of 69.4% on a mass basis, equivalent to 99.53% on a molar basis. Formation fraction of 1.0 used in the PEC_{GW} calculations.

Soil accumulation (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.2.2.2 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.1.2.2)

Soil accumulation and plateau concentration	Plateau concentration of 0.280 mg/kg reached after 8 years (based on maize calculation – see PEC_{soil} section for further info)

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Rate of degradation in soil (anaerobic) laboratory studies active substance (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.2.1.3 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.1.1)

Parent	Dark anaerobic conditions					
Soil type	pH[a)]	t. ºC / % MWHC	DT_{50} / DT_{90} (d)	DT_{50} (d) 20 °C[b)]	St. (χ^2)	Method of calculation
Clay	6.9	20 / 26.5	206 / 685	206	5.78	SFO
Sandy loam	7.3	20 / 17.5	528 / >1000	528	1.39	SFO
Loamy sand	6.9	20 / 12.2	867 / >1000	867	1.75	SFO
Silt loam	6.8	20 / 31.0	516 / >1000	516	0.85	SFO
Geometric mean (if not pH dependent)				470		

a) Measured in [medium to be stated, usually calcium chloride solution or water]
b) Normalised using a Q10 of 2.58

Rate of degradation on soil (photolysis) laboratory active substance (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.1.3

Parent	Soil photolysis						
Soil type	Label	pH[a)]	t. ºC	DT_{50} / DT_{90} (d)	DT_{50} (d) calculated at 30-50ºN	St. (χ^2)	Method of calculation
Sandy loam	Carbonyl	6.2	20	41 / 137	93	1.44	SFO
Sandy loam	Phenyl	6.2	20	31 /103	71	2.72	SFO
Clay loam	Carbonyl	7.3	20	50 / 166	108	1.01	SFO
Clay loam	Phenyl	7.3	20	67 / 221	142	1.31	SFO

a) Measured in calcium chloride solution

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Soil adsorption active substance (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.3.1.1 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.2.1)

Parent					
Soil Type	OC %	Soil pH[a)]	K_F (mL/g)	K_{Foc} (mL/g)	1/n
Clay	2.1	6.9	7.43	352.9	0.885
Sandy loam	1.3	7.2	4.19	334.2	0.846
Loamy sand	1.5	5.4	7.12	464.9	0.864
Silt loam	1.2	6.1	4.37	364.1	0.879
Loamy sand	0.3	6.9	1.57	458.4	0.885
Silt loam	2.1	6.8	8.31	397.0	0.848
Clay	1.0	8.0	3.62	354.8	0.949
Sand	1.2	7.4	4.26	348.1	0.832
Geometric mean (if not pH dependent)			4.58	381.5	
Arithmetic mean (if not pH dependent)					0.874
pH dependence			No		

[a)] Measured in calcium chloride solution

Soil adsorption transformation products (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.3.1.2 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.2.1)

3-OH-propanamide					
Soil Type	OC %	Soil pH[a)]	K_F (mL/g)	K_{Foc} (mL/g)	1/n
Loamy sand	0.68	4.84	0.73	107	0.924
Loam	1.89	7.41	1.3	68	0.908
Silty clay	2.10	7.53	1.4	65	0.916
Clay	2.62	7.34	2.5	94	0.951
Geometric mean (if not pH dependent)			1.35	81.7	
Arithmetic mean (if not pH dependent)					0.925
pH dependence			No		

[a)] Measured in calcium chloride solution

2,4-DBA: No acceptable values were derived from the study and so default K_{OC} and 1/n values of 0 and 1.0 respectively to be used in the PEC_{GW} calculations.

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Mobility in soil column leaching active substance (Regulation (EU) N° 283/2013, Annex Part A, point 7.1.4.1.1 and Regulation (EU) N° 284/2013, Annex Part A, point 9.1.2.1)

Column leaching	No study submitted or required.

Lysimeter / field leaching studies (Regulation (EU) N° 283/2013, Annex Part A, points 7.1.4.2 / 7.1.4.3 and Regulation (EU) N° 284/2013, Annex Part A, points 9.1.2.2 / 9.1.2.3)

Lysimeter/ field leaching studies	No study submitted or required.

Hydrolytic degradation (Regulation (EU) N° 283/2013, Annex Part A, point 7.2.1.1

Hydrolytic degradation of the active substance and metabolites > 10 %	pH 5: Bixlozone stable at 50 °C
	pH 7: Bixlozone stable at 50 °C
	pH 9: [^{14}C-carbonyl]-label 446 d at 25 °C (SFO, χ^2=1.01) [^{14}C-phenyl]-label 742 d (at 25 °C (SFO, χ^2=1.01) No major metabolites at environmentally relevant conditions

Aqueous photochemical degradation (Regulation (EU) N° 283/2013, Annex Part A, points 7.2.1.2 / 7.2.1.3)

Photolytic degradation of active substance and metabolites above 10 %	[^{14}C-carbonyl]-label DT_{50} : 417 h Natural light, 30-50°N; DT_{50} 44.0 days [^{14}C-phenyl]-label DT_{50} : 515 h Natural light, 30-50°N; DT_{50} 54.4 days No major metabolites detected
Quantum yield of direct phototransformation in water at Σ > 290 nm	Not determined

'Ready biodegradability' (Regulation (EU) N° 283/2013, Annex Part A, point 7.2.2.1)

Readily biodegradable (yes/no)	No

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Aerobic mineralisation in surface water (Regulation (EU) N° 283/2013, Annex Part A, point 7.2.2.2 and Regulation (EU) N° 284/2013, Annex Part A, point 9.2.1)

Parent										
System identifier	pH water phase	pH sed	t. °C[a)]	DT_{50} /DT_{90} whole sys. (suspended sediment test)		St. (χ^2)	DT_{50} /DT_{90} Water (pelagic test)		St. (χ^2)	Method of calculation
				At study temp	Normalised		At study temp	Normalised to x °C[c)]		
Fresh water	7.60	n.p.[b)]	20	n.c.[c)]	n.c.[c)]	n/a	n/a	n/a	n/a	n/a

[a)] Temperature of incubation=temperature that the environmental media was collected or std temperature of 20°C
[b)] Data not provided due to being a 'pelagic' study
[c)] Kinetic evaluation not performed due to <10% degradation observed in the study period

Mineralisation and non-extractable residues (for parent dosed experiments)				
System identifier (indicate fresh, estuarine or marine)	pH water phase	pH sed	Mineralisation % after 62 d. (end of the study).	Non-extractable residues % after 62 d. (end of the study).
Fresh water	7.60	n.p.[a)]	10 µg/L dose: 1.7 100 µg/L dose: 1.0	n.p.[a)]

[a)] Data not provided due to being a 'pelagic' study

Water / sediment study (Regulation (EU) N° 283/2013, Annex Part A, point 7.2.2.3 and Regulation (EU) N° 284/2013, Annex Part A, point 9.2.2)

Parent	Distribution (Max. sed 23.07% after 30 d)									
Water / sediment system	pH water phase	pH sed[a)]	t. °C	$DegT_{50}$ /$DegT_{90}$ whole sys.	St. (χ^2)	$DissT_{50}$ /$DissT_{90}$ water	St. (χ^2)	$DissT_{50}$ /$DissT_{90}$ Sed	St. (χ^2)	Method of calculation
Calwich Abbey	n.p.[b)]	7.1	20	23.3 / 77.6	1.9	13.6 / 45.3	3.0	35.2 / 117	4.9	SFO
Swiss Lake	n.p.[b)]	6.1	20	24.8 / 177	4.75	16.0 / 53.1	6.7	n.c.[c)]	n.c	HS (whole system) SFO (water phase)

[a)] Measured in calcium chloride solution
[b)] Data not provided
[c)] Not calculated due to no clear decline phase

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Metabolites	2,4-DBA[a)]: Max in water 30.36% after 100 d. Max in sediment 10.51% after 100 d. Max in total system 40.87% after 100 d. 3-OH[b)]: Max in water 3.59% after 7 d. Max in sediment 9.92% after 63 d. Max in total system 10.31% after 7 d. Bixlozone-DMM[c)]: Max in water 12.36% after 30 d. Max in sediment 5.70% after 63 d. Max in total system 16.72% after 30 d. 4-COOH-bixlozone[d)]: Max in water 17.60% after 100 d. Max in sediment 6.85% after 100 d. Max in total system 24.45% after 100 d.									
Water / sediment system	pH water phase	pH sed	t. ºC	DT_{50} / DT_{90} whole sys.	St. (χ^2)	DT_{50} / DT_{90} water	St. (χ^2)	DT_{50} / DT_{90} sed	St. (χ^2)	Method of calculation
Calwich Abbey	n.p.[e)]	7.1	20	Calculations not undertaken						
Swiss Lake	n.p.[e)]	6.1	20	Calculations not undertaken						

[a)] 2,4-dichlorobenzoic acid
[b)] 3-OH-propanamide
[c)] Bixlozone-dimethyl malonamide
[d)] 4-carboxy-bixlozone
[e)] Data not provided

Mineralisation and non-extractable residues (from parent dosed experiments)					
Water / sediment system	pH water phase	pH sed	Mineralisation x % after 100 d. (end of the study).	Non-extractable residues in sed. max x % after n d	Non-extractable residues in sed. max x % after 100 d (end of the study)
Calwich Abbey	n.p.[e)]	7.1	Phenyl: 6.67 Carbonyl: 51.55	Phenyl: 14.21(100 d) Carbonyl: 11.80 (100 d)	Phenyl: 14.21 Carbonyl: 11.80
Swiss Lake	n.p.[e)]	6.1	Phenyl: 8.73 Carbonyl: 30.20	Phenyl: 8.78 (30 d) Carbonyl: 9.64 (30 d)	Phenyl: 8.24 Carbonyl: 7.73

Fate and behaviour in air (Regulation (EU) N° 283/2013, Annex Part A, point 7.3.1)

Direct photolysis in air	Not studied
Photochemical oxidative degradation in air	DT_{50} of 5.974 hours derived by the Atkinson model (AOPWIN version 1.92).
Volatilisation	A wind tunnel study determined that relatively low levels of bixlozone deposition occurred. Highest deposition was measured at the 48 h and 72 h sampling at the 1 m distance and corresponded to 0.42% of applied substance. For lindane the maximum deposition corresponded to about 2.2% of the applied amount (1 m, 48 hours), which was about 5 times higher compared to the relative bixlozone deposition. The deposition following volatilisation results are to be added to the exposure assessment where drift mitigation measures are required. The maximum (72 hours after treatment) results are summarised as follows:

Distance (m)	**Max deposition (%)**

1	0.42
3	0.20
5	0.14
10	0.08
15	0.04
20	0.03

Metabolites	No major metabolites

Residues requiring further assessment (Regulation (EU) N° 283/2013, Annex Part A, point 7.4.1)

Environmental occurring residues requiring further assessment by other disciplines (toxicology and ecotoxicology) and or requiring consideration for groundwater exposure	Soil: Bixlozone, 2,4-DBA Surface water: Bixlozone, 2,4-DBA, 3-OH, bixlozone-DMM, 4-COOH-bixlozone Sediment: Bixlozone, 2,4-DBA, 3-OH, bixlozone-DMM, 4-COOH-bixlozone Groundwater: Bixlozone, 2,4-DBA Air: n/a

Definition of the residue for monitoring (Regulation (EU) N° 283/2013, Annex Part A, point 7.4.2)

	See section 5, Ecotoxicology

Monitoring data, if available (Regulation (EU) N° 283/2013, Annex Part A, point 7.5

Soil (indicate location and type of study)	No monitoring data available
Surface water (indicate location and type of study)	No monitoring data available
Ground water (indicate location and type of study)	No monitoring data available
Air (indicate location and type of study)	No monitoring data available

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

PECsoil (Regulation (EU) N° 284/2013, Annex Part A, points 9.1.3 / 9.3.1)

Parent Method of calculation	DT_{50} (d): 247 days[a)] Kinetics: SFO Field or Lab: representative worst case from SC formulation field studies.
Application data	Crop: Maize Depth of soil layer: 5cm Soil bulk density: 1.5g/cm^3 % plant interception: 0 Number of applications: 1 Application rate(s): 375 g a.s./ha Crop: Winter oilseed rape Depth of soil layer: 5cm Soil bulk density: 1.5g/cm^3 % plant interception: 0 Number of applications: 1 Application rate(s): 300 g a.s./ha Crop: Winter cereals Depth of soil layer: 5cm Soil bulk density: 1.5g/cm^3 % plant interception: 0 Number of applications: 1 Application rate(s): 200 g a.s./ha

a) DT_{50} based on SC formulation values. If a CS formulation use is sought, see the conclusion in the Vol 3 CA, section CA.B.8.1.2.3.22.

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

$PEC_{(s)}$ (mg/kg)	**Maize**		**Winter oilseed rape**		**Winter cereals**	
	Actual	**TWA**	**Actual**	**TWA**	**Actual**	**TWA**
Initial	0.500		0.400		0.267	
Short term 24h	0.499	0.499	0.399	0.399	0.266	0.266
2d	0.497	0.499	0.398	0.399	0.265	0.266
4d	0.494	0.497	0.396	0.398	0.264	0.265
Long term 7d	0.490	0.495	0.392	0.396	0.261	0.264
14d	0.481	0.490	0.385	0.392	0.256	0.261
21d	0.471	0.486	0.377	0.388	0.251	0.259
28d	0.462	0.481	0.370	0.385	0.247	0.256
48d	0.437	0.468	0.350	0.374	0.233	0.249
100d	0.378	0.436	0.302	0.349	0.201	0.233
Plateau concentration	0.280 mg/kg after 8 yr		0.224 mg/kg after 7 yr		0.149 mg/kg after 8 yr	
$PEC_{accumulation}$ (PEC_{actual} + $PEC_{plateau}$)	0.780		0.624		0.416	

Metabolite: 2,4-dichlorobenzoic acid (2,4-DBA) Method of calculation	Molecular weight relative to the parent: 0.697 (191.01 / 274.14) DT_{50} (d): n/a
Application data	Tier 1 $PEC_{soil,initial}$ calculated from bixlozone $PEC_{soil,accumulation}$ values, based on the molecular weight correction factor and a maximum molar formation in soil of 100%. Tier 2 $PEC_{soil,initial}$ calculated from bixlozone $PEC_{soil,inital}$ values, based on the molecular weight correction factor and a maximum molar formation in soil of 100%.

$PEC_{(s)}$ (mg/kg)	**Maize**		**Winter oilseed rape**		**Winter cereals**	
	Actual	**TWA**	**Actual**	**TWA**	**Actual**	**TWA**
Tier 1						
Initial	0.544		0.435		0.290	
Tier 2						
Initial	0.349		0.279		0.186	

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Formulation: F9600-4 SC Application data	Application rate calculated using a formulation density of 1.1214 g/cm^3: Maize – 0.9375 L product/ha (= 1051 g product/ha) Winter oilseed rape – 0.75 L product/ha (= 841 g product/ha) Winter cereals – 0.50 L product/ha (= 561 g product/ha)

PEC$_{(s)}$ (mg formulation/kg)	**Maize**		**Winter oilseed rape**		**Winter cereals**	
	Actual	**TWA**	**Actual**	**TWA**	**Actual**	**TWA**
Initial	1.402		1.121		0.748	

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

PEC ground water (Regulation (EU) N° 284/2013, Annex Part A, point 9.2.4.1)

Method of calculation and type of study (*e.g.* modelling, field leaching, lysimeter)	For FOCUS gw modelling, values used – Modelling using FOCUS model(s), with appropriate UK FOCUSgw scenarios, according to FOCUS guidance. Model(s) used: PEARL 4.4.4, PELMO 5.5.3, MACRO 5.5.4 Crop uptake factor: 0 Water solubility (mg/L): 39.6 at pH 7 and 20°C Vapour pressure: 0 Pa at 20°C[a)] Geometric mean DT_{50}: 54.4 d[b)] (normalisation to 10kPa or pF2, 20 °C with Q10 of 2.58 and Walker equation coefficient 0.7). K_{OC}: geomean 381.5 (K_{OM}: 221.3), arithmetic mean $^1/_n$= 0.873 Metabolite: 2,4-DBA Crop uptake factor: 0 Water solubility (mg/L): 189.4 at pH 7 and 25°C Vapour pressure: 9.0 x 10^{-3} Pa at 25°C Geometric mean DT_{50}: 5.4 d (normalisation to 10kPa or pF2, 20 °C with Q10 of 2.58 and Walker equation coefficient 0.7). K_{OC}: geomean 0 (K_{OM}: 0), arithmetic mean $^1/_n$= 1.0 Formation fraction: 1.0 (from parent) [a)] Vapour pressure set to 0 as a conservative assessment to avoid potential double-counting of volatilisation from field study derived DT50. [b)] Correct value to use in future (for SC formulations) is 48.0 days. DT_{50} based on SC formulation values. If a CS formulation use is sought, see the conclusion in the Vol 3 CA, section CA.B.8.1.2.3.22.
Application rate	Crop: Maize Gross application rate: 375 g/ha. Crop growth stage: BBCH 0 - 9 Canopy interception %: 0 No. of applications: 1 Time of application (absolute or relative application dates): 5 days pre-emergence Crop: Winter oilseed rape Gross application rate: 300 g/ha. Crop growth stage: BBCH 0 - 9 Canopy interception %: 0

	No. of applications: 1 Time of application (absolute or relative application dates): 5 days pre-emergence Crop: Winter cereals Gross application rate: 200 g/ha. Crop growth stage: BBCH 0 - 9 Canopy interception %: 0 No. of applications: 1 Time of application (absolute or relative application dates): 5 days pre-emergence Crop: Winter cereals Gross application rate: 200 g/ha. Crop growth stage: BBCH 11 - 13 Canopy interception %: 0 No. of applications: 1 Time of application (absolute or relative application dates): 5 days post-emergence

PEC(gw) - FOCUS modelling results (80th percentile annual average concentration at 1m)

Crop	**Maize (1 × 375 g a.s/ha, BBCH 00-09)**					
LOCATION	**Bixlozone**			**2,4-dichlorobenzoic acid (2,4-DBA)**		
	PELMO 5.5.3	**PEARL 4.4.4**	**MACRO 5.5.4**	**PELMO 5.5.3**	**PEARL 4.4.4**	**MACRO 5.5.4**
Châteaudun	<0.001	<0.001	<0.001	0.206	0.266	-
Hamburg	<0.001	<0.001	-	2.397	2.787	-
Kremsmünster	<0.001	<0.001	-	0.896	0.672	-
Okehampton	<0.001	<0.001	-	1.453	1.176	-

Crop	**Winter oilseed rape (1 × 300 g a.s/ha, BBCH 00-09)**					
LOCATION	**Bixlozone**			**2,4-dichlorobenzoic acid (2,4-DBA)**		
	PELMO 5.5.3	**PEARL 4.4.4**	**MACRO 5.5.4**	**PELMO 5.5.3**	**PEARL 4.4.4**	**MACRO 5.5.4**
Châteaudun	<0.001	<0.001	<0.001	0.479	0.325	-
Hamburg	<0.001	<0.001	-	4.048	3.257	-
Kremsmünster	<0.001	<0.001	-	1.432	0.890	-
Okehampton	<0.001	<0.001	-	2.054	1.292	-

Section 4 Environmental fate and behaviour

Crop	**Winter cereals (1 × 200 g a.s/ha, BBCH 00-09)**					
LOCATION	**Bixlozone**			**2,4-dichlorobenzoic acid (2,4-DBA)**		
	PELMO 5.5.3	**PEARL 4.4.4**	**MACRO 5.5.4**	**PELMO 5.5.3**	**PEARL 4.4.4**	**MACRO 5.5.4**
Châteaudun	<0.001	<0.001	<0.001	0.222	0.186	-
Hamburg	<0.001	<0.001	-	2.599	1.863	-
Kremsmünster	<0.001	<0.001	-	0.627	0.371	-
Okehampton	<0.001	<0.001	-	1.540	1.107	-

Crop	**Winter cereals (1 × 200 g a.s/ha, BBCH 11-13)**					
LOCATION	**Bixlozone**			**2,4-dichlorobenzoic acid (2,4-DBA)**		
	PELMO 5.5.3	**PEARL 4.4.4**	**MACRO 5.5.4**	**PELMO 5.5.3**	**PEARL 4.4.4**	**MACRO 5.5.4**
Châteaudun	<0.001	<0.001	<0.001	0.202	0.166	-
Hamburg	<0.001	<0.001	-	2.335	1.678	-
Kremsmünster	<0.001	<0.001	-	0.553	0.341	-
Okehampton	<0.001	<0.001	-	1.481	1.003	-

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

PEC surface water and PEC sediment (Regulation (EU) N° 284/2013, Annex Part A, points 9.2.5 / 9.3.1)

Parent Parameters used in spray drift and tier 1 drainflow assessments	Parent: Bixlozone Molecular weight (g/mol): 274.14 K_{OC} (mL/g): 381.5 $DissT_{50}$ water (d): 16.0 $DissT_{50}$ sediment (d): 35.2 Max observed sediment (%): 23.07 Metabolite: 2,4-DBA Molecular weight (g/mol): 191.01 K_{OC} (mL/g): 0 $DissT_{50}$ water (d): 1000 $DissT_{50}$ sediment (d): 1000 Max observed soil (%): 100[a)] Max observed water/sediment (%): 40.9 Max observed water (%): 30.36 Max observed sediment (%): 10.51 Metabolite: 3-OH Molecular weight (g/mol): 276.16 $DissT_{50}$ water (d): 1000 $DissT_{50}$ sediment (d): 1000 d Max observed soil (%): 0 Max observed water/sediment (%): 10.3 Max observed water (%): 3.59 Max observed sediment (%): 9.92 Metabolite: DMM Molecular weight (g/mol): 290.15 $DissT_{50}$ water (d): 1000 $DissT_{50}$ sediment (d): 1000 Max observed soil (%): 0 Max observed water/sediment (%): 16.7 Max observed water (%): 12.36 Max observed sediment (%): 5.70

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

	Metabolite: 4-carboxy-bixlozone Molecular weight (g/mol): 304.10 $DissT_{50}$ water (d): 1000 $DissT_{50}$ sediment (d): 1000 Max observed soil (%): 0 Max observed water/sediment (%): 24.5 Max observed water (%): 17.60 Max observed sediment (%): 6.85
Parameters used in Higher Tier Drainflow (HTDF) assessment	Version control of HTDF tool: v1.1 Parent: Bixlozone DT_{50} soil (d): 54.4[b)] K_{OC} (mL/g): 381.5 1/n: 0.873 Q10: 2.58 Crop uptake factor: 0 RAC: Aquatic plants: 3.3 µg/L Aquatic invertebrates: 6.69 µg/L (see ecotoxicology section) Metabolite: 2,4-DBA DT_{50} soil (d): 5.4 K_{OC} (mL/g): 0 1/n: 1.0 Q10: 2.58 Crop uptake factor: 0 Formation fraction: 1 RAC: Aquatic plants: 2400 µg/L Aquatic invertebrates: 12 µg/L (see ecotoxicology section)
Application rate	Crop and growth stage: Maize (BBCH 00-09) Number of applications: 1 Application rate(s): 375 g a.s./ha Spray drift value (%): 2.77 (1 m buffer) [c)] 0.71 (5 m buffer - 0.57% drift plus 0.14% deposition following volatilisation) HTDF target application date: 30 April Crop and growth stage: Winter oilseed rape (BBCH 00-09) Number of applications: 1 Application rate(s): 300 g a.s./ha Spray drift value (%): 2.77 (1 m buffer) [c)]

	HTDF target application date: 10 September Crop and growth stage: Winter cereals (BBCH 00-09 and 11 - 13) Number of applications: 1 Application rate(s): 200 g a.s./ha Spray drift value (%): 2.77 (1 m buffer) [c)] HTDF target application date: Autumn machine working day dates:

Soil	Climate		
	Dry	Medium	Wet/Very wet
Denchworth	25 Oct	15 Oct	5 Oct
Hanslope	25 Oct	15 Oct	5 Oct
Brockhurst	25 Oct	21 Oct	10 Oct
Clifton	25 Oct	21 Oct	10 Oct

Metabolite spray drift pseudo-application rates calculated based on parent application rate x molecular weight correction factor x maximum percentage in water or sediment (for PEC_{SW} and PEC_{sed} respectively).

2,4-DBA tier 1 drainflow pseudo-application rate calculated based on parent application rate x molecular weight correction factor x maximum percentage in soil[a)].

For metabolites formed in water or sediment, the bixlozone initial $PEC_{SW,drainflow}$ has been converted to metabolite $PEC_{SW/sed}$ by multiplying the parent PEC_{SW} with the molecular weight correction factor, percent formed in water or sediment and, for PEC_{sed} calculations, an additional conversion factor of 4.615.

[a)] 2,4-DBA detected at maximum occurrence of 69.4 % (mass basis, 99.53% molar basis) in soil disspation studies, however, 100% formation considered in $PEC_{SW/sed}$ calculations as worst-case.

[b)] Correct value to use in future (for SC formulations) is 48.0 days. DT_{50} based on SC formulation values. If a CS formulation use is sought, see the conclusion in the Vol 3 CA, section CA.B.8.1.2.3.22.

[c)] No deposition after volatilisation considered at 1 m, in line with FOCUS Air (2008); if a buffer >1 m required, see volatilisation section above.

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Maize (375 g a.s./ha) spray drift											
PECsw (µg/L) – 1 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		3.463		0.732		0.126		0.453		0.676	
Short term	24 h	3.316	3.389	0.732	0.732	0.125	0.126	0.453	0.453	0.675	0.676
	2 d	3.175	3.317	0.731	0.732	0.125	0.125	0.453	0.453	0.675	0.675
	4 d	2.912	3.179	0.730	0.731	0.125	0.125	0.452	0.453	0.674	0.675
Long term	7 d	2.557	2.987	0.729	0.730	0.125	0.125	0.451	0.452	0.673	0.674
	14 d	1.888	2.596	0.725	0.729	0.124	0.125	0.449	0.451	0.669	0.673
	21 d	1.394	2.274	0.722	0.727	0.124	0.125	0.447	0.450	0.666	0.671
	28 d	1.029	2.006	0.718	0.725	0.123	0.124	0.445	0.449	0.663	0.669
	100 d	0.045	0.789	0.683	0.707	0.117	0.121	0.423	0.438	0.631	0.653
PECsed (µg/kg) – 1 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		3.687		0.355		0.057		0.119		0.214	
Short term	24 h	3.615	3.651	0.355	0.355	0.057	0.057	0.119	0.119	0.214	0.214
	2 d	3.544	3.615	0.355	0.355	0.057	0.057	0.119	0.119	0.213	0.214
	4 d	3.408	3.545	0.354	0.355	0.057	0.057	0.119	0.119	0.213	0.213
Long term	7 d	3.212	3.444	0.353	0.354	0.057	0.057	0.119	0.119	0.213	0.213
	14 d	2.798	3.222	0.352	0.353	0.057	0.057	0.118	0.119	0.212	0.213
	21 d	2.438	3.020	0.350	0.353	0.057	0.057	0.118	0.118	0.211	0.212
	28 d	2.124	2.834	0.348	0.352	0.056	0.057	0.117	0.118	0.210	0.212
	100 d	0.515	1.611	0.331	0.343	0.054	0.056	0.111	0.115	0.199	0.206
PECsw (µg/L) – 5 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		0.888									
PECsed (µg/kg) – 5 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		0.945									

Winter oilseed rape (300 g a.s./ha) spray drift PECsw (µg/L) – 1 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		2.770		0.586		0.100		0.362		0.541	
Short term	24 h	2.653	2.711	0.586	0.586	0.100	0.100	0.362	0.362	0.541	0.541
	2 d	2.540	2.653	0.586	0.586	0.100	0.100	0.361	0.362	0.540	0.541
	4 d	2.329	2.543	0.585	0.586	0.099	0.100	0.361	0.361	0.540	0.540
Long term	7 d	2.045	2.389	0.583	0.585	0.099	0.099	0.360	0.361	0.538	0.540
	14 d	1.510	2.077	0.581	0.583	0.099	0.099	0.358	0.360	0.536	0.538
	21 d	1.115	1.819	0.578	0.582	0.098	0.099	0.357	0.359	0.533	0.537
	28 d	0.824	1.605	0.575	0.581	0.098	0.099	0.355	0.358	0.531	0.536
	100 d	0.036	0.631	0.547	0.566	0.093	0.096	0.338	0.350	0.505	0.523
PECsed (µg/kg) – 1 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		2.949		0.284		0.046		0.095		0.171	
Short term	24 h	2.892	2.921	0.284	0.284	0.046	0.046	0.095	0.095	0.171	0.171
	2 d	2.836	2.892	0.284	0.284	0.046	0.046	0.095	0.095	0.171	0.171
	4 d	2.726	2.836	0.284	0.284	0.046	0.046	0.095	0.095	0.171	0.171
Long term	7 d	2.570	2.755	0.283	0.284	0.045	0.046	0.095	0.095	0.170	0.171
	14 d	2.239	2.578	0.282	0.283	0.045	0.045	0.094	0.095	0.169	0.170
	21 d	1.950	2.416	0.280	0.282	0.045	0.045	0.094	0.095	0.169	0.170
	28 d	1.699	2.267	0.279	0.282	0.045	0.045	0.093	0.094	0.168	0.169
	100 d	0.412	1.289	0.265	0.275	0.043	0.044	0.089	0.092	0.160	0.165

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Winter cereals (200 g a.s./ha) spray drift PECsw (µg/L) – 1 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		1.847		0.391		0.066		0.242		0.360	
Short term	24 h	1.768	1.807	0.390	0.390	0.066	0.066	0.242	0.242	0.360	0.360
	2 d	1.693	1.769	0.390	0.390	0.066	0.066	0.242	0.242	0.360	0.360
	4 d	1.553	1.696	0.389	0.390	0.066	0.066	0.241	0.242	0.359	0.360
Long term	7 d	1.364	1.593	0.389	0.390	0.066	0.066	0.241	0.241	0.358	0.359
	14 d	1.007	1.385	0.387	0.389	0.066	0.066	0.240	0.241	0.357	0.358
	21 d	0.744	1.213	0.385	0.388	0.066	0.066	0.238	0.240	0.355	0.357
	28 d	0.549	1.070	0.383	0.387	0.065	0.066	0.237	0.240	0.353	0.357
	100 d	0.024	0.421	0.364	0.377	0.062	0.064	0.226	0.234	0.336	0.348
PECsed (µg/kg) – 1 m buffer											
		Bixlozone		2,4-DBA		3-OH		DMM		4-carboxy-bixlozone	
		Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA	Actual	TWA
Initial		1.966		0.189		0.030		0.064		0.114	
Short term	24 h	1.928	1.947	0.189	0.189	0.030	0.030	0.064	0.064	0.114	0.114
	2 d	1.890	1.928	0.189	0.189	0.030	0.030	0.064	0.064	0.114	0.114
	4 d	1.817	1.891	0.189	0..189	0.030	0.030	0.063	0.064	0.114	0.114
Long term	7 d	1.713	1.837	0.189	0.189	0.030	0.030	0.063	0.063	0.113	0.114
	14 d	1.493	1.719	0.188	0.189	0.030	0.030	0.063	0.063	0.113	0.113
	21 d	1.300	1.610	0.187	0.188	0.030	0.030	0.063	0.063	0.112	0.113
	28 d	1.133	1.511	0.186	0.188	0.030	0.030	0.062	0.063	0.112	0.113
	100 d	0.274	0.859	0.177	0.183	0.028	0.029	0.059	0.061	0.106	0.110

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Tier 1 drainflow, Maize				
	$PEC_{SW/sed}$ from soil		**$PEC_{SW/sed}$ for metabolites formed in water/sediment**	
	PEC_{SW} (µg/L)	PEC_{sed} (µg/kg)	PEC_{SW} (µg/L)	PEC_{sed} (µg/kg)
Bixlozone	20.192	21.500	-	-
2,4-DBA	38.146	176.06	4.271	6.824
3-OH	n/a	n/a	0.730	9.312
DMM	n/a	n/a	2.641	5.622
4-carboxy-bixlozone	n/a	n/a	3.942	7.081

Tier 1 drainflow, Winter oilseed rape				
	$PEC_{SW/sed}$ from soil		**$PEC_{SW/sed}$ for metabolites formed in water/sediment**	
	PEC_{SW} (µg/L)	PEC_{sed} (µg/kg)	PEC_{SW} (µg/L)	PEC_{sed} (µg/kg)
Bixlozone	16.154	17.200	-	-
2,4-DBA	30.546	140.98	3.417	5.459
3-OH	n/a	n/a	0.584	7.450
DMM	n/a	n/a	2.113	4.498
4-carboxy-bixlozone	n/a	n/a	3.154	5.665

Tier 1 drainflow, Winter cereals				
	$PEC_{SW/sed}$ from soil		**$PEC_{SW/sed}$ for metabolites formed in water/sediment**	
	PEC_{SW} (µg/L)	PEC_{sed} (µg/kg)	PEC_{SW} (µg/L)	PEC_{sed} (µg/kg)
Bixlozone	10.769	11.467	-	-
2,4-DBA	20.315	93.763	2.278	3.639
3-OH	n/a	n/a	0.389	4.966
DMM	n/a	n/a	1.409	2.998
4-carboxy-bixlozone	n/a	n/a	2.102	3.776

HTDF – Maize – Approach 1 (number of RAC exceedances (percentage in brackets))						
Soil	**Aquatic plants RACs**					
	Bixlozone (RAC: 3.3 µg/L)			**2,4-DBA (RAC: 2400 µg/L)**		
	Dry Climate	**Medium Climate**	**Wet Climate**	**Dry Climate**	**Medium Climate**	**Wet Climate**
Denchworth	1 (3.3)	2 (6.7)	1 (3.3)	0	0	0
Hanslope	0	0	0	0	0	0
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Aquatic invertebrate RACs**					
-	**Bixlozone (RAC: 6.69 µg/L)**			**2,4-DBA (RAC: 12 µg/L)**		
Denchworth	0	0	0	1 (3.3)	0	0
Hanslope	0	0	0	1 (3.3)	0	0

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

HTDF – Maize – Approach 1 (number of RAC exceedances (percentage in brackets))						
Soil	**Aquatic plants RACs**					
	Bixlozone (RAC: 3.3 µg/L)			**2,4-DBA (RAC: 2400 µg/L)**		
	Dry Climate	**Medium Climate**	**Wet Climate**	**Dry Climate**	**Medium Climate**	**Wet Climate**
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Combined assessments (Finney equation with annual max PECsw)**					
-	**Aquatic plants**			**Aquatic invertebrates**		
Denchworth	1 (3.3)	2 (6.7)	1 (3.3)	3 (10)	0	3 (10)
Hanslope	0	0	0	2 (6.7)	0	1 (3.3)
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0

HTDF – Maize – Approach 2 (weighted level of exceedances)				
Soil drainage status	**Bixlozone (aquatic plant RAC)**	**2,4-DBA (aquatic invertebrate RAC)**	**Combined annual max PECsw (aquatic plant RACs)**	**Combined annual max PECsw (aquatic invertebrate RACs)**
Not drained	50.01	50.01	50.01	50.01
Peat	1.56	1.56	1.56	1.56
Drained but ‘safe’	48.05	48.36	48.05	47.64
Drained and not ‘safe’	0.38	0.07	0.38	0.79
Total ‘safe’ years	99.62	99.93	99.62	99.21

HTDF – wOSR – Approach 1 (number of RAC exceedances (percentage in brackets))						
Soil	**Aquatic plants RACs**					
	Bixlozone (RAC: 3.3 µg/L)			**2,4-DBA (RAC: 2400 µg/L)**		
	Dry Climate	**Medium Climate**	**Wet Climate**	**Dry Climate**	**Medium Climate**	**Wet Climate**
Denchworth	0	0	0	0	0	0
Hanslope	0	0	0	0	0	0
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Aquatic invertebrate RACs**					
-	**Bixlozone (RAC: 6.69 µg/L)**			**2,4-DBA (RAC: 12 µg/L)**		
Denchworth	0	0	0	0	0	0
Hanslope	0	0	0	0	0	0
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Combined assessments (Finney equation with annual max PECsw)**					

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

HTDF – wOSR – Approach 1 (number of RAC exceedances (percentage in brackets))						
Soil	**Aquatic plants RACs**					
	Bixlozone (RAC: 3.3 µg/L)			**2,4-DBA (RAC: 2400 µg/L)**		
	Dry Climate	**Medium Climate**	**Wet Climate**	**Dry Climate**	**Medium Climate**	**Wet Climate**
-	**Aquatic plants**			**Aquatic invertebrates**		
Denchworth	0	4 (13)	3 (10)	0	**4 (13)**	2 (6.7)
Hanslope	0	4 (13)	0	0	3 (10)	0
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Combined assessments (Finney equation with daily PECsw)**					
-	**Aquatic plants**			**Aquatic invertebrates**		
Denchworth	Not required			0	3 (10)	1 (3.3)
Hanslope				0	2 (6.7)	0
Brockhurst				0	0	0
Clifton				0	0	0

HTDF – wOSR – Approach 2 (weighted level of exceedances)					
Soil drainage status	**Bixlozone (aquatic plant RAC)**	**2,4-DBA aquatic invertebrate RAC)**	**Combined annual max PECsw (aquatic plant RACs)**	**Combined annual max PECsw (aquatic invertebrate RACs)**	**Combined daily PECsw (aquatic invertebrate RACs)**
Not drained	44.80	44.80	44.80	44.80	44.80
Peat	1.54	1.54	1.54	1.54	1.54
Drained but ‘safe’	53.66	53.66	52.07	52.35	52.76
Drained and not ‘safe’	0.00	0.00	1.59	1.31	0.90
Total ‘safe’ years	100.00	100.00	98.41	98.69	99.10

HTDF – winter cereals – Approach 1 (number of RAC exceedances (percentage in brackets))						
Soil	**Aquatic plants RACs**					
	Bixlozone (RAC: 3.3 µg/L)			**2,4-DBA (RAC: 2400 µg/L)**		
	Dry Climate	**Medium Climate**	**Wet Climate**	**Dry Climate**	**Medium Climate**	**Wet Climate**
Denchworth	0	0	0	0	0	0
Hanslope	0	0	0	0	0	0
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Aquatic invertebrate RACs**					
-	**Bixlozone (RAC: 6.69 µg/L)**			**2,4-DBA (RAC: 12 µg/L)**		
Denchworth	0	0	0	0	0	0
Hanslope	0	0	0	0	0	0

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

HTDF – winter cereals – Approach 1 (number of RAC exceedances (percentage in brackets))						
Soil	**Aquatic plants RACs**					
	Bixlozone (RAC: 3.3 µg/L)			**2,4-DBA (RAC: 2400 µg/L)**		
	Dry Climate	**Medium Climate**	**Wet Climate**	**Dry Climate**	**Medium Climate**	**Wet Climate**
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0
-	**Combined assessments (Finney equation with annual max PECsw)**					
-	**Aquatic plants**			**Aquatic invertebrates**		
Denchworth	0	0	0	0	0	0
Hanslope	0	0	0	0	0	0
Brockhurst	0	0	0	0	0	0
Clifton	0	0	0	0	0	0

HTDF – winter cereals – Approach 2 (weighted level of exceedances)				
Soil drainage status	**Bixlozone (aquatic plant RAC)**	**2,4-DBA (aquatic invertebrate RAC)**	**Combined annual max PECsw (aquatic plant RACs)**	**Combined annual max PECsw (aquatic invertebrate RACs)**
Not drained	49.67	49.67	49.67	49.67
Peat	2.87	2.87	2.87	2.87
Drained but ‘safe’	47.46	47.46	47.46	47.46
Drained and not ‘safe’	0.00	0.00	0.00	0.00
Total ‘safe’ years	100.00	100.00	100.00	100.00

Formulation: bixlozone-4 SC Application data	Application rate calculated using a formulation density of 1.1214 g/cm^3: Maize – 0.9375 L product/ha (= 1051 g product/ha) Winter oilseed rape – 0.75 L product/ha (= 841 g product/ha) Winter cereals – 0.50 L product/ha (= 561 g product/ha)

PEC$_{(SW,\ spray\ drift)}$ (µg/L)	**Maize**		**Winter oilseed rape**		**Winter cereals**	
	Actual	**TWA**	**Actual**	**TWA**	**Actual**	**TWA**
Initial	9.704		7.765		5.180	

Estimation of concentrations from other routes of exposure (Regulation (EU) N° 284/2013, Annex Part A, point 9.4)

Method of calculation	No other routes of exposure considered

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 4 Environmental fate and behaviour

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Ecotoxicology

Effects on birds and other terrestrial vertebrates (Regulation (EU) N° 283/2013, Annex Part A, point 8.1 and Regulation (EU) N° 284/2013, Annex Part A, point 10.1)

Species	Test substance	Time scale	End point	Toxicity (mg/kg bw per day)
Birds				
Colinus virginianus	Bixlozone	Acute	LD_{50}	**>2000**
Colinus virginianus	Bixlozone	Long-term	NOEL	**77.7** (893 mg/kg feed)
Mammals				
Rat	Bixlozone	Acute	LD_{50}	**>2000**
Rat	Bixlozone	Long-term	NOAEL	**34** (based on parental reproductive toxicity)
Endocrine disrupting properties (Annex Part A, points 8.1.5) Based on the ECHA/EFSA/JRC guidance (2018) for the identification of endocrine disruptors in the context of Regulations (EU) 528/2012 and (EC) No 1107/2009, HSE concluded that bixlozone did not meet the ED criteria for the EATS-modalities and that these have been sufficiently investigated for mammals. It is not possible to reach a conclusion for birds or reptiles at present due to limitations of the available data.				
Additional higher tier studies (Annex Part A, points 10.1.1.2): *Not provided*				
Terrestrial vertebrate wildlife (birds, mammals, reptile and amphibians) (Annex Part A, points 8.1.4, 10.1.3): *Not provided*				

***Bold** indicates endpoints used in risk assessment*

Toxicity/exposure ratios for terrestrial vertebrates (Regulation (EU) N° 284/2013, Part A, Annex point 10.1)

Winter wheat BBCH 11 - 13 at 200 g a.s./ha x 1 application

Growth stage	Indicator or focal species	Time scale	DDD (mg/kg bw per day)	TER	Trigger
Screening Step (Birds)					
All	Small omnivorous bird	Acute	31.76	>63.0	10
All	Small omnivorous bird	Long-term	6.87	11.3	5
Tier 1 (Birds): Not required					
Higher tier (birds): Not required					
Screening Step (Mammals)					
All	Small herbivorous mammal	Acute	23.68	>84.5	10
All	Small herbivorous mammal	Long-term	5.12	6.6	5
Tier 1 (Mammals): Not required					
Higher tier (Mammals): Not required					

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Maize BBCH 00 - 09 at 375 g a.s./ha x 1 application

Growth stage	Indicator or focal species	Time scale	DDD (mg/kg bw per day)	TER	Trigger
Screening Step (Birds)					
All	Small granivorous bird	Acute	9.49	>210.8	10
All	Small granivorous bird	Long-term	2.27	34.2	5
Tier 1 (Birds): Not required					
Higher tier (birds): Not required					
Screening Step (Mammals)					
All	Small granivorous mammal	Acute	5.40	>370	10
All	Small granivorous mammal	Long-term	1.31	25.9	5
Tier 1 (Mammals): Not required					
Higher tier (Mammals): Not required					

Risk from bioaccumulation and food chain behaviour[1]

Indicator or focal species	Time scale	DDD (mg/kg bw per day)	TER	Trigger
Earthworm-eating birds	Long-term	2.66	29.2	5
Earthworm-eating mammals	Long-term	3.24	10.5	5
Fish-eating birds	Long-term	0.25	353	5
Fish-eating mammals	Long-term	0.22	138	5
Higher tier : Not required				

Risk from consumption of contaminated water[1]

Puddle scenario, Screening step

1)Application rate (375 g a.s./ha)/relevant endpoint <50 (koc<500 L/kg), TER calculation not needed

[1]Covers all proposed uses

Toxicity data for all aquatic tested species (Regulation (EU) N° 283/2013, Annex Part A, points 8.2 and Regulation (EU) N° 284/2013 Annex Part A, point 10.2)

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Laboratory tests				
Fish				
Oncorhynchus mykiss	a.s.	Acute 96 hr (static)	Mortality, LC_{50}	**9.8 mg a.s./L** (mm)
Lepomis macrochirus	a.s.	Acute 96 hr (static)	Mortality, LC_{50}	>13 mg a.s./L (mm)
Cyprinodon variegatus	a.s.	Acute 96 hr (static)	Mortality, LC_{50}	>14 mg a.s./L (mm)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Oncorhynchus mykiss	Preparation 'F9600 4SC'	Acute 96 hr (static)	Mortality, LC_{50}	**32 mg prep./L** (nom) (11 mg a.s./L$_{(mm)}$)
Pimephales promelas	a.s.	Chronic 32 day early life stage (flow-through)	EC_{10} Total length EC_{20} Total length NOEC Total length	4.6 mg a.s./L (mm) 7.6 mg a.s./L (mm) **0.38 mg a.s./L** (mm)
Aquatic invertebrates				
Daphnia magna	Bixlozone	48 h (static)	Mortality, EC_{50}	>2.6 mg a.s./L$_{(mm)}$
Americamysis bahia	Bixlozone	96 h (static)	LC_{50}	**0.14 mg a.s./L**$_{(mm)}$
Caecidotea communis	Bixlozone	48 h (static)	Mortality, EC_{50}	>1.6 mg a.s./L$_{(mm)}$
Chironomus riparius	Bixlozone	48 h (static)	Mortality, EC_{50}	1.9 mg a.s./L$_{(mm)}$
Pycnopsyche gentilis	Bixlozone	48 h (static)	Mortality, EC_{50}	0.33 mg a.s./L$_{(mm)}$
Hexagenia limbata	Bixlozone	48 h (static)	Mortality, EC_{50}	1.5 mg a.s./L$_{(mm)}$
Thamnocephalus platyurus	Bixlozone	48 h (static)	Mortality, EC_{50}	0.11 mg a.s./L$_{(mm)}$
Geometric mean endpoint (based on 7 acute studies above)	Bixlozone	-	Mortality, EC_{50}	**0.669 mg a.s./L**$_{(mm)}$
Daphnia magna	Preparation 'F9600 4SC'	48 h (static)	Mortality, EC_{50}	61 mg prep./L$_{(nom)}$ (23 mg a.s./L$_{(mm)}$)
Americamysis bahia	Preparation 'F9600 4SC'	96 h (static)	LC_{50}	**3.9 mg prep./L**$_{(nom)}$ (1.4 mg a.s./L$_{(mm)}$)
Americamysis bahia	Bixlozone	28 d (flow-through)	NOEC	**0.12 mg a.s./L** (mm)
Daphnia magna	2,4-dichlorobenzoic acid	48 h (static)	Mortality, EC_{50}	>100 mg p.m./L (nom)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Americamysis bahia	2,4-dichlorobenzoic acid	96 h (static)	LC_{50}	**>100 mg p.m./L** (nom)
Daphnia magna	4-Carboxyl-F9600	48 h (static)	Mortality, EC_{50}	>100 mg p.m./L (nom)
Americamysis bahia	4-Carboxyl-F9600	96 h (static)	LC_{50}	**>100 mg p.m./L** (nom)
Daphnia magna	F9600-dimethyl-malonamide	48 h (static)	Mortality, EC_{50}	>100 mg p.m./L (nom)
Americamysis bahia	F9600-dimethyl-malonamide	96 h (static)	LC_{50}	**100 mg p.m./L** (nom)
Americamysis bahia	F9600-3-OH-propanamide	96 h (static)	LC_{50}	**22 mg p.m./L** (mm)
Sediment-dwelling organisms				
Chironomus riparius	Bixlozone	28 d (static, spiked sediment)	EC_{10}, development rate EC_{20}, development rate NOEC, development rate	**69 mg a.s./kg sed. dw** (mm) (3.0 mg a.s./L) 150 mg a.s./kg sed. dw(mm) (6.4 mg a.s./L) 49 mg a.s./kg sed. dw (mm) (1.3 mg a.s./L)
Hyalella azteca	Bixlozone	10 d (static, spiked sediment)	EC_{50} growth, survival NOEC growth/survival	>84 mg a.s./kg sed. dw (mm) 84 mg a.s./kg sed. dw (mm)
Chironomus riparius	2,4-dichlorobenzoic acid	28 d (static, spiked sediment)	EC_{10} NOEC	**≥ 104.88 mg p.m./kg sed. dw** (mm) ≥ (93.26 mg p.m./L) 104.88 mg p.m./kg sed. dw (mm) (93.26 mg p.m./L)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Chironomus riparius	4-Carboxyl-F9600	28 d (static, spiked sediment)	EC_{10} NOEC	≥ 494.54 mg p.m./kg sed. dw (mm) (≥ 42.75 mg p.m./L) **494.54 mg p.m./kg sed. dw** (mm) (42.75 mg p.m./L)
Chironomus riparius	F9600-dimethyl-malonamide	28 d (static, spiked sediment)	EC_{10} NOEC	≥ 502 mg p.m./kg sed. dw (ini) (≥ 89.5 mg p.m./L) **502 mg p.m./kg sed. dw** (ini) (89.5 mg p.m./L)
Algae				
Raphidocelis subcapitata	Bixlozone	96 h (static)	72 hours Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	 **14 mg a.s./L (mm)** 6.7 mg a.s./L (mm) 4.5 mg a.s./L (mm) 0.92mg a.s./L (mm) 6.5 mg a.s./L (mm) 1.6 mg a.s./L (mm) 0.76 mg a.s./L (mm) 0.92 mg a.s./L (mm)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Raphidocelis subcapitata	Preparation 'F9600 4SC'	96 h (static)	Growth rate: E_rC_{50}	53/65 mg prep./L (19.29/23.66 mg a.s./L$_{(nom)}$)
			E_rC_{20}	27/40.9 mg prep./L (9.83/14.89 mg a.s./L$_{(nom)}$)
			E_rC_{10}	19/28.2 mg prep./L (6.92/10.26 mg a.s./L$_{(nom)}$)
			NOE_rC	13/13 mg prep./L (4.73/4.73 mg a.s./L$_{(nom)}$)
			Yield: E_yC_{50}	27/34 mg prep./L (9.83/12.38 mg a.s./L$_{(nom)}$)
			E_yC_{20}	16/16.7 mg prep./L (5.82/6.08 mg a.s./L$_{(nom)}$)
			E_yC_{10}	n.r./12.5 mg prep./L (n.r./4.55 mg a.s./L$_{(nom)}$)
			NOE_yC	13/13 mg prep./L (4.73/4.73 mg a.s./L$_{(nom)}$) (72 h/96 h)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Skeletonema costatum	Preparation 'F9600 4SC'	96 h (static)	72 hours Growth rate: E_rC_{50}	**17 mg prep./L** (6.18 mg a.s./L) (mm)
			E_rC_{20}	9.3 mg prep./L (3.38 mg a.s./L) (mm)
			E_rC_{10}	7.5 mg prep./L (2.82 mg a.s./L) (mm)
			NOE_rC	6.1 mg prep./L (2.22 mg a.s./L) (mm)
			Yield: E_yC_{50}	11 mg prep./L (4.0 mg a.s./L) (mm)
			E_yC_{20}	7.6 mg prep./L (2.76 mg a.s./L) (mm)
			E_yC_{10}	6.7 mg prep./L(2.44 mg a.s./L) (mm)
			NOE_yC	6.1 mg prep./L (2.22 mg a.s./L) (mm)
Raphidocelis subcapitata	2,4-dichlorobenzoic acid	96 h (static)	E_rC_{50}	**90.1** / 100 mg p.m./L (nom)
			NOE_rC	31.3 / 31.3 mg p.m./L (nom)
			E_yC_{50}	60.6 / 59.9 mg p.m./L (nom)
			NOE_yC	31.3 / 31.3 mg p.m./L (nom) (72 hours / 96 hours)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Skeletonema costatum	2,4-dichlorobenzoic acid	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	> 100 / > 100 mg p.m./L (nom) > 100 / > 100 mg p.m./L (nom) > 100 / > 100 mg p.m./L (nom) 31.3 / 31.3 (nom) > 100 / n.r.mg p.m./L (nom) n.r. / n.r. n.r. / n.r. 31.3 /31.3 (nom) (72 hours / 96 hours)
Raphidocelis subcapitata	4-Carboxyl-F9600	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	77 / **71 mg p.m./L** (mm) 63 / 56 mg p.m./L (mm) 56 / 51 mg p.m./L (mm) 24 / 49 mg p.m./L (mm) 62 / 65 mg p.m./L (mm) 49 / 52 mg p.m./L (mm) 42 / 44 mg p.m./L (mm) 24 / 49 mg p.m./L (mm) (72 hours / 96 hours)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Skeletonema costatum	4-Carboxyl-F9600	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	86 / > 110 mg p.m./L (mm) 59 / 67 mg p.m./L (mm) n.r. / 55 mg p.m./L (mm) 48 / 48 mg p.m./L (mm) 75 / 83 mg p.m./L (mm) n.r. / 60 mg p.m./L (mm) n.r. / n.r. 48 / 48 mg p.m./L (mm) (72 hours / 96 hours)
Raphidocelis subcapitata	F9600-dimethyl-malonamide	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	71 / **71 mg p.m./L** (mm) 57 / 56 mg p.m./L (mm) 53 / 52 mg p.m./L (mm) 49 / 49 mg p.m./L (mm) 69 / 67 mg p.m./L (mm) 56 / 53 mg p.m./L (mm) n.r. / n.r. 49 / 49 mg p.m./L (mm) (72 hours / 96 hours)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Skeletonema costatum	F9600-dimethyl-malonamide	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	> 100 / > 100 mg p.m./L (mm) > 100 / > 100 mg p.m./L (mm) > 100 / > 100 mg p.m./L (mm) 48 / 48 mg p.m./L (mm) > 100 / > 100 mg p.m./L (mm) n.r. / > 100 m.m. 51 mg p.m./L (mm)/ n.r. 48 / 48 mg p.m./L (mm) (72 hours / 96 hours)
Raphidocelis subcapitata	F9600-3-OH-propanamide	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	> 84 / **> 84 mg p.m./L** (mm) 61 / > 84 mg p.m./L (mm) 45 / - [a] mg p.m./L (mm) 33 / 33 mg p.m./L (mm) 63 / 66 mg p.m./L (mm) 43 / - [a] mg p.m./L (mm) 38 / - [a] mg p.m./L (mm) 33 / 33 mg p.m./L (mm) (72 hours / 96 hours)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Skeletonema costatum	F9600-3-OH-propanamide	96 h (static)	Growth rate: E_rC_{50} E_rC_{20} E_rC_{10} NOE_rC Yield: E_yC_{50} E_yC_{20} E_yC_{10} NOE_yC	> 85 mg p.m./L (mm) 47 mg p.m./L (mm) 32 mg p.m./L (mm) 13 (mm) 70 mg p.m./L (mm) 30 mg p.m./L (mm) 16 mg p.m./L (mm) 13 mg p.m./L (mm) (72 hours)
Higher plant				
Lemna gibba	Bixlozone	7 d (static)	$E_rC_{50, \text{frond density}}$ $E_rC_{20, \text{frond density}}$ $E_rC_{10, \text{frond density}}$ NOE_rC, frond density $E_yC_{50, \text{frond density}}$ $E_yC_{20, \text{frond density}}$ $E_yC_{10, \text{frond density}}$ NOE_yC, frond density	21 mg a.s./L (mm) 6.5 mg a.s./L (mm) 2.4 mg a.s./L (mm) 1.6 mg a.s./L (mm) 84 mg a.s./L (mm) 2.0 mg a.s./L (mm) 0.67 mg a.s./L (mm) 1.6 mg a.s./L (mm)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Myriophyllum spicatum	Bixlozone	14 d (static renewal, water-sediment system dosed via water)	E_rC_{50}, shoot length **E_rC_{20}, shoot length** E_rC_{10}, shoot length NOE_rC, shoot length E_yC_{50}, shoot length E_yC_{20}, shoot length E_yC_{10}, shoot length NOE_yC, shoot length	3.2 mg a.s./L (im) **0.033 mg a.s./L** (im) 0.0071 mg a.s./L (im) 0.0096 mg a.s./L (im) **0.410 mg a.s./L** (im) 0.012 mg a.s./L (im). 0.0051 mg a.s./L (im) 0.0096 mg a.s./L (im)
Lemna gibba	Preparation 'F9600 4SC'	7 d (static renewal	E_rC_{50} frond density E_rC_{20} dry weight E_rC_{10} dry weight NOE_rC E_yC_{50} dry weight E_yC_{20} dry weight E_yC_{10} dry weight NOE_yC	41.2 mg prep/L (15.0 mg a.s./L (mm)) 14.8 mg prep/L (5.4 mg a.s./L (mm)) 9.9 mg prep/L (3.6 mg a.s./L (mm)) 5.5 mg prep/L (2.0 mg a.s./L (mm)) 16.8 mg prep/L (6.1 mg a.s./L (mm)) 8.8 mg prep/L (3.20 mg a.s./L (mm)) 7.1 mg prep/L (2.6 mg a.s./L (mm)) 5.5 mg prep/L (2.0 mg a.s./L (mm))

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Myriophyllum spicatum	Preparation 'F9600 4SC'	14 d (static renewal, water-sediment system dosed via water)	E_rC_{50} shoot length E_rC_{20} shoot wet weight E_rC_{10} shoot wet weight E_yC_{50} shoot length E_yC_{20} shoot wet weight E_yC_{10} shoot wet weight NOEC, phytoxic effects	7.4 mg prep/L (2.69 mg a.s./L (im)) **2.9 mg prep/L** (1.1 mg a.s./L (im)) 0.16 mg prep/L (0.061 mg a.s./L (im)) 5.8 mg prep/L (2.11 mg a.s./L (im)) 0.20 mg prep/L (0.073 mg a.s./L (im)) 0.097 mg prep/L (0.035 mg a.s./L (im)) <0.27 mg prep/L (<0.01 mg a.s./L (im))
Myriophyllum spicatum	2,4-dichlorobenzoic acid	14 d (static renewal, water-sediment system dosed via water)	E_rC_{50}, shoot length E_rC_{20}, shoot length E_rC_{10}, shoot length NOE_rC, shoot length E_yC_{50}, shoot length E_yC_{20}, shoot length E_yC_{10}, shoot length NOE_yC, shoot length	**24 mg p.m./L** (mm) 4.3 mg p.m./L (mm). 1.1 mg p.m./L (mm) 0.92 mg p.m./L (mm) 11 mg p.m./L (mm) 3 mg p.m./L (mm) 1.1 mg p.m./L (mm) 3.3 mg p.m./L (mm)
Myriophyllum spicatum	4-Carboxyl-F9600	14 d (static renewal, water-sediment system dosed via water)	E_rC_{50}, shoot length NOE_rC, shoot length NOE_yC, shoot length	**>1.30 mg p.m./L*** (mm) 1.3 mg p.m./L (mm) 1.3 mg p.m./L (mm)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Group	Test substance	Time-scale (Test type)	End point	Toxicity[1]
Myriophyllum spicatum	F9600-dimethyl-malonamide	14 d (static renewal, water-sediment system dosed via water)	E_rC_{50}, shoot wet weight E_rC_{20}, shoot wet weight E_rC_{10}, shoot wet weight NOE_rC, shoot wet weight E_yC_{50}, plant dry weight E_yC_{20}, plant dry weight E_yC_{10}, plant dry weight NOE_yC, shoot dry weight	**> 100 mg p.m./L** (nom) 17.9 mg p.m./L (nom) 6.09 mg p.m./L (nom) 3.05 mg p.m./L (nom) 38.7 mg p.m./L (nom) 5.69 mg p.m./L (nom) n.r. 3.05 mg p.m./L (nom)
Further testing on aquatic organisms In addition to *D.magna* and *A.bahia*, seven further acute aquatic invertebrate studies were conducted in order to refine the Tier 1 RAC. However the studies conducted with *B.calyciflorus* and *G.fasciatus* were considered unreliable. Removing both *B.calyciflorus* and *G.fasciatus* results in insufficient data points for an SSD; therefore only a geomean can be derived from the remaining data points. This results in a **geomean RAC of 6.69 µg a.s./L, based on a geomean of 669 µg a.s./L and an assessment factor of 100.**				
Potential endocrine disrupting properties (Annex Part A, point 8.2.3) Overall, HSE concludes that based on current EFSA/ECHA 2018 guidance that bixlozone does not meet the criteria of being an endocrine disruptor (ED) for aquatic organisms when considering EAS and T modalities. Some uncertainties were identified by HSE in regard to study design, however, HSE still considers that bixlozone is not an endocrine disruptor for aquatic organisms when considering the EAS and T modalities. These conclusions are based on EFSA/ECHA 2018 guidance.				

[1] *n.r. = not reported; nom. = nominal concentration; mm. = mean measured concentration; im = initial measured concentration; p.m = pure metabolite; a.s. = active substance; prep = preparation*

***Bold** indicates endpoints used in risk assessment*

**corrected endpoint – highest endpoint with < 50% effects and without the presence of foaming/precipitate/turbidity in the test solutions. Given precipitate was noted in the stock and 31.3 mg/L solution, and turbidity at 9.77 mg/L, it is deemed more appropriate to derive an E_rC_{50} of >1.3 mg/L (mean measured).*

In accordance to the EFSA Aquatic Guidance Document (EFSA 2013), only the EC_{50} values determined for the more relevant endpoint 'growth rate' (E_rC_{50}) are considered for the risk assessment for aquatic primary producers if both “growth rate” and “yield / biomass” endpoints are available – apart from Kirkwood 2015b and 2017 where the E_rC_{20} has been used as a precaution due to the difference in endpoints based on yield and growth rate and the phytotoxic and morphological effects.

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Bioconcentration in fish (Annex Part A, point 8.2.2.3)

	Active substance	Metabolite1	Metabolite2	Metabolite3
$logP_{O/W}$	3.3	-	-	-
Steady-state bioconcentration factor (BCF) (total wet weight/normalised to 5% lipid content)	77.5*	-	-	-
Uptake/depuration kinetics BCF (total wet weight/normalised to 5% lipid content)	-	-	-	-
Annex VI Trigger for the bioconcentration factor	-	-	-	-
Clearance time (days) (CT_{50})	-	-	-	-
(CT_{90})	-	-	-	-
Level and nature of residues (%) in organisms after the 14 day depuration phase	-	-	-	-
Higher tier study				
Not required				

* based on total ^{14}C or on specific compounds

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

PEC/RAC ratios for the most sensitive aquatic organisms (Regulation (EU) N° 284/2013, Annex Part A, point 10.2)

Tier 1 PEC/RAC ratios for Bixlozone in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		O. mykiss	*P. promelas*	*A. bahia*	*A. bahia*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{20})	RAC (NOEC)
		98 µg/L	38 µg/L	1.4 µg/L	12 µg/L	1400 µg/L	3.3 µg/L	6900 µg/kg sed. dw
Spraydrift (1 m)	3.463 (3.687)[a]	0.035	0.09	**2.474**	0.289	0.002	**1.05**	0.0005
Drainflow	20.192 (21.500)	0.206	0.53	**14.423**	**1.683**	0.014	**6.12**	0.003

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates
Values in **bold** are above the trigger of 1

Tier 1 PEC/RAC ratios for Bixlozone in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		O. mykiss	*P. promelas*	*A. bahia*	*A. bahia*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{20})	RAC (NOEC)
		98 µg/L	38 µg/L	1.4 µg/L	12 µg/L	1400 µg/L	3.3 µg/L	6900 µg/kg sed. dw
Spraydrift (1 m)	2.770 (2.949)[a]	0.028	0.073	**1.979**	0.231	0.002	0.84	0.0004
Drainflow	16.154 (17.200)	0.165	0.425	**11.539**	**1.346**	0.012	**4.895**	0.002

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates
Values in **bold** are above the trigger of 1

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Tier 1 PEC/RAC ratios for Bixlozone in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		O. mykiss	*P. promelas*	*A. bahia*	*A. bahia*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{20})	RAC (NOEC)
		98 µg/L	38 µg/L	1.4 µg/L	12 µg/L	1400 µg/L	3.3 µg/L	6900 µg/kg sed. dw
Spraydrift (1 m)	1.847 (1.966)[a]	0.019	0.049	**1.319**	0.154	0.001	0.56	0.0002
Drainflow	10.769 (11.467)	0.110	0.283	**7.692**	0.897	0.008	**3.26**	0.002

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates
Values in **bold** are above the trigger of 1

Tier 2 PEC/RAC ratios for Bixlozone in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Aquatic invertebrates acute	Aquatic invertebrates long-term	Aquatic plants
		7 aquatic invertebrate endpoints (without *B.calyciflorus and G.fasciatus*)	*A. bahia*	*M. spicatum*
		Geomean RAC	RAC (NOEC)	RAC
		6.69 µg/L	12 µg/L	3.3 µg/L
Spraydrift (1 m)	3.463	0.512	0.289	**1.049**
Spraydrift (5 m)	0.888	0.133	0.074	0.269
Drainflow	20.192	**3.02**	**1.683**	**6.12**

Values in **bold** are above the trigger of 1

Tier 2 PEC/RAC ratios for Bixlozone in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Aquatic invertebrates acute	Aquatic invertebrates long-term	Aquatic plants
		7 aquatic invertebrate endpoints (without *B.calyciflorus and G.fasciatus*)	*A. bahia*	*M. spicatum*
		Geomean RAC	RAC (NOEC)	RAC
		6.69 µg/L	12 µg/L	3.3 µg/L

Spraydrift (1 m)	2.770	0.414	0.231	0.839
Drainflow	16.154	**2.42**	**1.35**	**4.895**

Values in **bold** are above the trigger of 1

Tier 2 PEC/RAC ratios for Bixlozone in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Aquatic invertebrates acute	Aquatic invertebrates long-term	Aquatic plants
		7 aquatic invertebrate endpoints (without *B.calyciflorus and G.fasciatus*)	*A. bahia*	*M. spicatum*
		Geomean RAC	RAC (NOEC)	RAC
		6.69 µg/L	12 µg/L	3.3 µg/L
Spraydrift (1 m)	1.847	0.276	0.154	0.56
Drainflow	10.769	**1.61**	0.897	**3.263**

Values in **bold** are above the trigger of 1

<u>Metabolites of Bixlozone</u>

Tier 1 PEC/RAC ratios for 2,4-dichlorobenzoic acid in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	9010 µg/L	2400 µg/L	10488 µg/kg sed. dw
Spraydrift (1 m)	0.732 (0.355)[a]	0.007	0.019	<0.001	0.061	<0.001	<0.001	<0.001
Drainflow	38.146 (176.06)	0.389	**1.00**	0.004	**3.179**	0.004	0.016	0.02
Groundwater	2.787	0.028	0.073	0.000	0.232	<0.001	0.001	-

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates
Values in **bold** exceed the PEC/RAC of 1 and further consideration is required

Tier 1 PEC/RAC ratios for 2,4-dichlorobenzoic acid in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	9010 µg/L	2400 µg/L	10488 µg/kg sed. dw
Spraydrift (1 m)	0.586 (0.284)[a]	0.006	0.015	<0.001	0.048	<0.001	<0.001	<0.001
Drainflow	30.546 (140.98)	0.312	0.804	0.003	**2.546**	0.003	0.013	0.01
Groundwater	4.048	0.041	0.009	<0.001	0.337	<0.001	0.002	

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates
Values in **bold** exceed the PEC/RAC of 1 and further consideration is required

Tier 1 PEC/RAC ratios for 2,4-dichlorobenzoic acid in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	9010 µg/L	2400 µg/L	10488 µg/kg sed. dw
Spraydrift (1 m)	0.391 (0.189)[a]	0.004	0.010	0.000	0.033	<0.001	<0.001	<0.001
Drainflow	20.315 (93.763)	0.207	0.535	0.002	**1.693**	0.002	0.008	0.008

Groundwater	2.599	0.027	0.001	<0.001	0.217	0<0.001	0.001	

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates
Values in **bold** exceed the PEC/RAC of 1 and further consideration is required

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Tier 1 PEC/RAC ratios for 4-Carboxyl-F9600 in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	7100 µg/L	>130 µg/L	49454 µg/kg sed. dw
Spraydrift (1 m)	0.676 (0.214)	0.007	0.018	<0.001	0.056	<0.001	0.005	<0.001
Drainflow	3.942 (7.081)	0.040	0.104	<0.001	0.329	0.001	0.030	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Tier 1 PEC/RAC ratios for 4-Carboxyl-F9600 in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	7100 µg/L	>130 µg/L	49454 µg/kg sed. dw
Spraydrift (1 m)	0.541 (0.171)	0.006	0.014	<0.001	0.045	<0.001	0.004	<0.001
Drainflow	3.154 (5.665)	0.032	0.083	<0.001	0.263	<0.001	0.024	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Tier 1 PEC/RAC ratios for 4-Carboxyl-F9600 in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	7100 µg/L	>130 µg/L	49454 µg/kg sed. dw
Spraydrift (1 m)	0.360 (0.114)	0.004	0.009	<0.001	0.030	<0.001	0.003	<0.001
Drainflow	2.102 (3.776)	0.021	0.055	<0.001	0.175	<0.001	0.016	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Tier 1 PEC/RAC ratios for F9600-dimethyl-malonamide in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	7100 µg/L	> 10000 µg/L	50200 µg/kg sed. dw
Spraydrift (1 m)	0.453 (0.119)	0.005	0.012	<0.001	0.038	<0.001	<0.001	<0.001
Drainflow	2.641 (5.622)	0.027	0.070	<0.001	0.220	<0.001	<0.001	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Tier 1 PEC/RAC ratios for F9600-dimethyl-malonamide in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	7100 µg/L	> 10000 µg/L	50200 µg/kg sed. dw
Spraydrift (1 m)	0.362 (0.095)	0.004	0.010	<0.001	0.030	<0.001	<0.001	<0.001
Drainflow	2.113 (4.498)	0.022	0.056	<0.001	0.176	<0.001	<0.001	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Tier 1 PEC/RAC ratios for F9600-dimethyl-malonamide in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*M. spicatum*	*C. riparius*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{50})	RAC (NOEC)
		98 µg/L	38 µg/L	> 10000 µg/L	12 µg/L	7100 µg/L	> 10000 µg/L	50200 µg/kg sed. dw
Spraydrift (1 m)	0.242 (0.064)	0.002	0.006	<0.001	0.020	<0.001	<0.001	<0.001
Drainflow	1.409 (2.998)	0.014	0.037	<0.001	0.117	<0.001	<0.001	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Tier 1 PEC/RAC ratios for F9600-3-OH-propanamide in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*Parental toxicity*	*Parental toxicity*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{20})	RAC (NOEC)
		98 µg/L	38 µg/L	2200 µg/L	12 µg/L	> 8400 µg/L	3.3 µg/L	6900 µg/kg sed. dw
Spraydrift (1 m)	0.126 (0.057)	0.001	0.003	<0.001	0.011	<0.001	0.038	<0.001
Drainflow	0.730 (9.312)	0.007	0.019	<0.001	0.061	<0.001	0.22	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Tier 1 PEC/RAC ratios for F9600-3-OH-propanamide in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*Parental. toxicity*	*Parental. toxicity*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{20})	RAC (NOEC)
		98 µg/L	38 µg/L	2200 µg/L	12 µg/L	> 8400 µg/L	3.3 µg/L	6900 µg/kg sed. dw
Spraydrift (1 m)	0.100 (0.046)	0.001	0.003	<0.001	0.008	<0.001	0.03	<0.001
Drainflow	0.584 (7.450)	0.006	0.015	<0.001	0.049	<0.001	0.18	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Tier 1 PEC/RAC ratios for F9600-3-OH-propanamide in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Fish long-term	Aquatic invertebrates	Aquatic invertebrates long-term	Algae	Higher plant	Sediment dwelling invertebrate
		Parental toxicity	*Parental toxicity*	*A. bahia*	*Parental toxicity*	*R. subcapitata*	*Parental. toxicity*	*Parental toxicity*
		RAC (LC_{50})	RAC (NOEC)	RAC (LC_{50})	RAC (NOEC)	RAC (E_rC_{50})	RAC (E_rC_{20})	RAC (NOEC)
		98 µg/L	38 µg/L	2200 µg/L	12 µg/L	> 8400 µg/L	3.3 µg/L	6900 µg/kg sed. dw
Spraydrift (1 m)	0.066 (0.030)	<0.001	0.0017	<0.001	0.006	<0.001	0.02	<0.001
Drainflow	0.389 (4.966)	0.004	0.010	<0.001	0.032	<0.001	0.12	<0.001

[a] PEC values in parentheses are sediment exposure concentrations expressed as µg/kg sed. dw; they have been used for risk assessment of the sediment dwelling invertebrates

Higher tier drainflow modelling

Higher tier drainflow modelling (HTDF) was carried out by HSE Environmental Fate and Behaviour in section 3CP B8.5.2.2. The modelling uses the RAC of 3.3 µg/L based on aquatic plants for bixlozone and the RAC of 12 µg/L based on aquatic invertebrates for the metabolite 2,4-DBA. Combined higher tier drainflow has also been assessed using the Finney equation (based on annual maximum PEC_{SW} and, where necessary, daily PEC_{SW}). As the bixlozone and 2,4-DBA RACs come from different aquatic groups (i.e. bixlozone from aquatic plants and 2,4-DBA from aquatic invertebrates), the CA has undertaken separate combined risk assessments considering the relevant RAC in each group. For aquatic plants, this corresponds to 3.3 µg/L for bixlozone and 2400 µg/L for 2,4-DBA. For aquatic invertebrates, the relevant RAC values are 6.69 µg/L for bixlozone and 12 µg/L for 2,4-DBA.

As the total number of years with bixlozone RAC exceedances were ≤18 (the threshold for acceptability for aquatic plants) and the overall weighted level of exceedance 'safe years' were ≥90%, an acceptable HTDF was obtained for the maize, winter oilseed rape and winter cereals GAP for bixlozone. Similarly, as the total number of years with 2,4-DBA RAC exceedances were ≤3 (the threshold for acceptability for aquatic invertebrates) and the overall weighted level of exceedance 'safe years' were ≥90%, an acceptable HTDF was also obtained for the maize, winter oilseed rape and winter cereals GAPs for 2,4-DBA. As the total number of years where the aquatic plant RACs were exceeded were ≤18 and the aquatic invertebrate RACs were ≤3, and in both instances the weighted level of exceedances 'safe years' were ≥90%, acceptable combined HTDF assessments were obtained for the maize, winter oilseed rape and winter cereals GAPs.
Therefore an acceptable risk to aquatic organisms for all proposed GAPs can be concluded.

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Representative formulation 'F9600 4SC'

Tier 1 PEC/RAC ratios for 'F9600 4SC' in maize at 1 x 375 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Aquatic invertebrates		Algae	Higher plant
		O. mykiss	*D. magna*	*A. bahia*	*S. costatum*	*M. spicatum*
		RAC (LC_{50})	RAC (LC_{50})	RAC (LC_{50})	RAC	RAC (E_rC_{20})
		320 µg/L	610 µg/L	39 µg/L	1700	290 µg/L
Spraydrift (1 m)	9.704	0.030	0.016	0.249	0.006	0.033

Tier 1 PEC/RAC ratios for 'F9600 4SC' in winter oilseed rape at 1 x 300 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Aquatic invertebrates		Algae	Higher plant
		O. mykiss	*D. magna*	*A. bahia*	*S. costatum*	*M. spicatum*
		RAC (LC_{50})	RAC (LC_{50})	RAC (LC_{50})	RAC	RAC (E_rC_{20})
		320 µg/L	610 µg/L	39 µg/L	1700	290 µg/L
Spraydrift (1 m)	7.765	0.024	0.013	0.199	0.005	0.027

Tier 1 PEC/RAC ratios for 'F9600 4SC' in winter cereals at 1 x 200 g a.s./ha

Scenario	PEC (µg/L)	Fish acute	Aquatic invertebrates		Algae	Higher plant
		O. mykiss	*D. magna*	*A. bahia*	*S. costatum*	*M. spicatum*
		RAC (LC_{50})	RAC (LC_{50})	RAC (LC_{50})	RAC	RAC (E_rC_{20})
		320 µg/L	610 µg/L	39 µg/L	1700	290 µg/L
Spraydrift (1 m)	5.180	0.016	0.008	0.133	<0.003	0.018

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Effects on bees (Regulation (EU) N° 283/2013, Annex Part A, point 8.3.1 and Regulation (EU) N° 284/2013 Annex Part A, point 10.3.1)*

* This section does reflect the new EFSA Guidance Document on bees which has not yet been noted by the Standing Committee on Plants, Animals, Food and Feed.

Species	Test substance	Time scale/type of endpoint	End point	toxicity
Apis mellifera	Bixlozone	Acute	Oral toxicity (LD_{50})	> 100 µg a.s./bee
			Contact toxicity (LD_{50})	> 100 µg a.s./bee
Bombus terrestris	Bixlozone	Acute	Oral toxicity (LD_{50})	> 1000 µg a.s./bee
			Contact toxicity (LD_{50})	> 1000 µg a.s./bee
Osmia bicornis	Bixlozone	Acute	Oral toxicity (LD_{50})	≥ 462 µg a.s./bee
			Contact toxicity (LD_{50})	> 600 µg a.s./bee
Apis mellifera	Preparation ‘F9600 4SC’	Acute	Oral toxicity (LD_{50})	> 111.1 µg a.s./bee
			Contact toxicity (LD_{50})	> 100 µg a.s./bee
Apis mellifera	Bixlozone	Chronic	10 d-LD_{50}	> 9.475 µg a.s./bee/day
			10 d-LD_{10}	> 9.475 µg a.s./bee/day
			NOED	9.475 µg a.s./bee/day
Apis mellifera	Bixlozone	Bee brood development	22 d-$ED_{10, emergence}$	5.9 µg a.s./larva
			22 d-$NOED_{larvae}$	6.3 µg a.s./larva
Apis mellifera	Bixlozone	Sub-lethal effects (behavioural and reproductive)	NOEC hypopharyngeal glands	No data

Potential for accumulative toxicity: **-**
Semi-field test (Cage and tunnel test) None submitted.
Field tests None submitted.

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Risk assessment for – maize at 375 g a.s./ha [x 1 application] [a]

Species	Test substance	Risk quotient	HQ/ETR	Trigger
Apis mellifera	Bixlozone	HQcontact	< 3.75	> 50
		HQoral	< 3.75	
Apis mellifera	Preparation 'F9600 4SC'	HQcontact	< 3.38	> 50
		HQoral	< 3.75	
-	a.s.	ETRacute adult oral	-	-
-	a.s.	ETRchronic adult oral	-	-
-	a.s.	ETRlarvae	-	-
-	a.s.	ETRhpg	-	-

[a] The risk assessment for this use addresses all other representative uses (i.e. winter cereals (1 x 200 g a.s./ha) and winter oilseed rape (1 x 300 g a.s./ha)). The same conclusions apply in all cases.

Effects on other arthropod species (Regulation (EU) N° 283/2013, Annex Part A, point 8.3.2 and Regulation (EU) N° 284/2013 Annex Part A, point 10.3.2)

Laboratory tests with standard sensitive species

Species	Test Substance	End point	Toxicity
Typhlodromus pyri	Preparation 'F9600 4SC'	Mortality, LR_{50}	97.4 g a.s./ha
Aphidius rhopalosiphi	Preparation 'F9600 4SC'	Mortality, LR_{50}	≥ 344 g a.s./ha [a]
Additional species			
None.			

[a] The modelled LR_{50} was greater than the maximum treatment concentration, this extrapolated value was not considered suitable for use in risk assessment. However, to account for the observed results the lower 95 % confidence limit has been used as a conservative endpoint for the risk assessment. Though it is noted that there is uncertainty over the true endpoint.

First tier risk assessment for – winter cereals at 200 g a.s./ha [x 1 application]

Test substance	Species	Effect (LR_{50} g /ha)	HQ in-field	HQ off-field	Trigger
'F9600 4SC'	*Typhlodromus pyri*	97.4	**2.05**	- [a]	≥ 2
	Aphidius rhopalosiphi	≥ 344	≤ 0.58	- [a]	≥ 2

[a] Addressed by risk assessment for the use on maize, see below, the same conclusion applies.

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

First tier risk assessment for – winter oilseed rape at 300 g a.s./ha [x 1 application]

Test substance	Species	Effect (LR_{50} g/ha)	HQ in-field	HQ off-field	Trigger
'F9600 4SC'	*Typhlodromus pyri*	97.4	**3.08**	- [a]	≥ 2
	Aphidius rhopalosiphi	≥ 344	≤ 0.87	- [a]	≥ 2

[a] Addressed by risk assessment for the use on maize, see below, the same conclusion applies.

First tier risk assessment for – maize at 375 g a.s./ha [x 1 application]

Test substance	Species	Effect (LR_{50} g/ha)	HQ in-field	HQ off-field	Trigger
'F9600 4SC'	*Typhlodromus pyri*	97.4	**3.85**	0.11 (1m)	≥ 2
	Aphidius rhopalosiphi	≥ 344	≤ 1.09	≤ 0.03 (1m)	≥ 2

Extended laboratory tests, aged residue tests

Species	Life stage	Test substance, substrate	Time scale	Dose (g a.s./ha)	End point	% effect	ER_{50}
Typhlodromus pyri	Adult	'F9600 4SC', vine leaves (2D)	7 days	Control 45.7 91.6 183 367 489 (ini)	Mortality [1]	13 (-) 30 (19.2) 25 (13.5) 30 (19.2) 38 (28.8) 77 (73.1) (LD_{50} = 473 g a.s./ha)	473
			14 days	Control 45.7 91.6 183 367 489 (ini)	Reproduction [2]	- -18.5 4.2 14.3 43.5 n.d.	≥ 367
Chrysoperla carnea	Larvae	'F9600 4SC', vine leaves (2D)	21 days	Control 45.7 91.6 183 367 489 (ini)	Mortality [1]	10.0 (-) 13 (2.8) 20 (11.1) 23 (13.9) 13 (2.8) 7.5 (-2.8)	> 489

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Species	Life stage	Test substance, substrate	Time scale	Dose (g a.s./ha)	End point	% effect	ER_{50}
				Control 45.7 91.6 183 367 489 (ini)	Reproduction [3]	17.9 (92.9) 15.8 (94.9) 15.3 (89.6) 20.3 (88.7) 15.4 (95.1) 15.0 (91.7)	- [3]

ini = initial residues; n.d. = not determined

[1] Values indicate absolute mortality, values in parentheses indicate mortality corrected for control mortaility

[2] Negative values indicate an increase compared to the control, positive values indicate a decrease

[3] Reproduction in terms of eggs/female/day outside parentheses. Inside parentheses the larval hatching rate (%) is reported. Where the eggs/female/day is ≥ 15 and the hatching rate is > 70 % no adverse reproductive effects are concluded according to the study guideline (Vogt *et al*., 2000).

Risk assessment for – winter cereals at 200 g a.s./ha [x 1 application] based on extended lab test

Species	ER_{50} (g/ha)	In-field rate	Off-field rate
Typhlodromus pyri	≥ 367	200	n.r.
Chrysoperla carnea	> 489		

n.r. = not required, risk resolved at first tier

Risk assessment for – winter oilsed rape at 300 g a.s./ha [x 1 application] based on extended lab test

Species	ER_{50} (g/ha)	In-field rate	Off-field rate
Typhlodromus pyri	≥ 367	300	n.r.
Chrysoperla carnea	> 489		

n.r. = not required, risk resolved at first tier

Risk assessment for – maize at 375 g a.s./ha [x 1 application] based on extended lab test

Species	ER_{50} (g/ha)	In-field rate	Off-field rate
Typhlodromus pyri	≥ 367	**375 [a]**	n.r.
Chrysoperla carnea	> 489		

n.r. = not required, risk resolved at first tier

[a] Risk unresolved as the *T. pyri* ER_{50} is potentially below the maximum in-field rate

An acceptable in-field risk could be concluded for an application rate to maize of ≤ 367 g a.s./ha (as < 50% effects were reported at this concentration).

Semi-field tests
None submitted.
Field studies
None submitted.
Additional specific test

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

None submitted.

Effects on non-target soil meso- and macro fauna; effects on soil nitrogen transformation (Regulation (EU) N° 283/2013, Annex Part A, points 8.4, 8.5, and Regulation (EU) N° 284/2013 Annex Part A, points 10.4, 10.5)

Test organism	Test substance	Application method of test a.s./ OM[1]	Time scale	End point	Toxicity
Earthworms					
Eisenia fetida	Bixlozone[a]	Incorporated with quartz sand and mixed with soil / 5 %	Chronic	NOEC(mortality) $NOEC(mortality)_{corr}$[b]	200 mg a.s./kg soil dw 100 mg a.s./kg soil dw
				NOEC(body weight) $NOEC(body weight)_{corr}$[b]	400 mg a.s./kg soil dw 200 mg a.s./kg soil dw
				NOEC(reproduction) $NOEC(reproduction)_{corr}$[b]	100 mg a.s./kg soil dw **50 mg/kg soil dw**
Eisenia fetida	Preparation F9600-4 SC[a,c]	Incorporated with quartz sand and mixed with soil / 5 %	Chronic	NOEC(mortality) $NOEC(mortality)_{corr}$[b]	160mg F9600-4/kg soil dw (58.2 mg a.s./kg soil dw) 80 mg F9600-4/kg soil dw (29.1 mg a.s./kg soil dw)
				NOEC(body weight) $NOEC(body weight)_{corr}$[b]	80 mg F9600-4/kg soil dw (29.1 mg a.s./kg soil dw) 40 mg F9600-4/kg soil dw (14.55 mg a.s./kg soil dw)
				NOEC(reproduction) $NOEC(reproduction)_{corr}$[b]	80 mg F9600-4/kg soil dw (29.1 mg a.s./kg soil dw) **40 mg F9600-4/kg soil dw** (14.55 mg a.s./kg soil dw)

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Test organism	Test substance	Application method of test a.s./ OM[1]	Time scale	End point	Toxicity
Eisenia fetida	2,4-dichlorobenzoic acid	Incorporated with quartz sand and mixed with soil / 5 %	Chronic	NOEC(mortality) NOEC(mortality)$_{corr}$[b]	340 mg/kg soil dw 170 mg/kg soil dw
				NOEC(body weight) NOEC(body weight)$_{corr}$[b]	612 mg/kg soil dw 306 mg/kg soil dw
				NOEC(reproduction) NOEC(reproduction)$_{corr}$[b]	58.3 mg/kg soil dw$_{d}$ **29.15 mg/kg soil dw**
				EC_{50} EC_{50corr}[b]	112 mg/kg soil dw (95% confidence limits: 89.2 – 136 mg/kg soil dw) 106 mg/kg soil dw
				EC_{20} EC_{20corr}[b]	76.9 mg/kg soil dw (95% confidence limits: 32.7 – 98.4 mg/kg soil dw) 38.45 mg/kg soil dw
				EC_{10} EC_{10corr}[b]	61.6 mg/kg soil dw **(**95% confidence limits: 16.3 – 84.9 mg/kg soil dw**)** 30.8 mg/kg soil dw
Other soil macroorganisms					

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Test organism	Test substance	Application method of test a.s./ OM[1]	Time scale	End point	Toxicity
Folsomia candida	Preparation F9600-4 SC[a,c]	Mixed with soil as a solution / 5 %	Chronic	NOEC(mortality) NOEC(mortality)corr[b] NOEC(reproduction) NOEC(reproduction)corr[b]	250 mg F9600-4/kg soil dw (90 mg a.s./kg soil dw) 125 mg F9600-4 SC/kg soil dw (45 mg a.s./kg soil dw) 62.5 mg F9600-4 SC/kg soil dw (22.5 mg a.s./kg soil dw)[d] **31.25 mg F9600-4 SC/kg soil dw** (**11.25 mg a.s./kg soil dw**)[e]
Hypoaspis aculeifer	Preparation F9600-4 SC[a,c]	Mixed with soil as a solution / 5 %	Chronic	NOEC(mortality) NOEC(mortality)corr[b] NOEC(reproduction) NOEC(reproduction)corr[b]	1000 mg F9600-4/kg soil dw (360 mg a.s./kg soil dw) 500 mg F9600-4/kg soil dw (180 mg a.s./kg soil dw) 250 mg F9600-4/kg soil dw (90 mg a.s./kg soil dw) **125 mg F9600-4 SC/kg soil dw (45 mg a.s./kg soil dw**)

[1]To indicate whether the test substance was oversprayed/to indicate the organic content of the test soil (e.g. 5 % or 10 %).
Endpoints highlighted in **bold** were used in the risk assessment
In accordance with the outcome of the EFSA (2015) pesticides peer review meeting on general recurring issues in ecotoxicology, the lower between the median EC_{10} and the NOEC will be used in the risk assessment, when reliable.
[a] It was not possible to calculate meaningful EC_{10}, EC_{20} and EC_{50} values for reproduction due to the distribution of the data and the number of concentrations used. Therefore, the NOEC will be used in the risk assessment.
[b] Corrected value derived by dividing the endpoint by a factor of 2 in accordance with the EPPO earthworm scheme 2002.
[c] Formulation contained 36.4% w/w active substance, corresponding to 400 g/L; density 1.2 g/mL

[d] It is noted that the study authors proposed a $NOEC_{(reproduction)}$ of 105 mg/kg soil dw for 2,4-dichlorobenzoic acid, however, at this concentration a 34.3% reduction in juvenile number was observed. As such, the CA considers that the NOEC should be set at the lower test concentration of 58.3 mg/kg soil dw (29.15 mg/kg soil dw_{corr}) at which there was no reduction in reproductive output (-4% in comparison to the control group).
[e] The study authors have proposed a NOEC for reproduction of 125 mg F9600-4 SC/kg soil dw, however, at this concentration there was a 15% reduction in comparison to the control, in addition this appears to be part of a dose-response relationship. As such, the CA considers that the NOEC should be set at the lower concentration of 62.5 mg/kg soil dw (31.25 mg/kg soil dw_{corr}) at which there was a 7% reduction.

Higher tier testing (e.g. modelling or field studies): None.

Nitrogen transformation	Bixlozone	28 d	No effect >25% at **1000mg/kg soil dw**
Nitrogen transformation	Preparation ‘F9600-4SC’[a]	28 d	No effect at 1.51 mg F9600-4/kg soil dw (375 g a.s./ha) and **7.55 mg F9600-4/kg soil dw (1875 g a.s./ha)**
Nitrogen transformation	2,4-Dichlorobenzoic acid	28 d	No effect >25% at .357 mg/kg soil dw and **1.79 mg/kg soil dw**

[a] Formulation contained 36.4% w/w active substance, corresponding to 400 g/L
Endpoints highlighted in **bold** used in the risk assessment

Toxicity/exposure ratios for soil organisms

Maize at 375 g a.s./ha [x 1]

Test organism	Test substance	Time scale	Soil PEC[1]	TER	Trigger
Earthworms					
Eisenia fetida	Bixlozone	Chronic	0.780	64.1	5
Eisenia fetida	2,4-dichlorobenzoic acid	Chronic	0.544	53.6	5
Eisenia fetida	Preparation ‘F9600-4 SC’	Chronic	1.402[e]	28.5	5
Other soil macroorganisms					
Folsomia candida	Bixlozone[c]	Chronic	0.780	14.4	5
Folsomia candida	2,4-dichlorobenzoic acid[d]	Chronic	0.544	**2.1**	5
Folsomia candida	2,4-dichlorobenzoic acid[d]	Chronic	0.349[f]	**3.2**	5
Folsomia candida	Preparation ‘F9600-4 SC’	Chronic	1.402[e]	22.3	5
Hypoaspis aculeifer	Bixlozone[c]	Chronic	0.780	57.7	5
Hypoaspis aculeifer	2,4-dichlorobenzoic acid[d]	Chronic	0.544	8.3	5

Test organism	Test substance	Time scale	Soil PEC[1]	TER	Trigger
Hypoaspis aculeifer	Preparation ‘F9600-4 SC’	Chronic	1.402[e]	89.2	5

[1] The maximum $PEC_{accumulation}$ value for bixlozone and maximum $PEC_{initial}$ values for 2,4-dichlorobenzoic acid and bixlozone-4 SC (Section 3CP B.8), have been used in the risk assessment.
[c] In the absence of toxicity data with the technical a.s., the formulation data have been expressed in terms of the a.s. content and used alongside the a.s. PEC_{soil} in the risk assessment.
[d] In the absence of toxicity data with the metabolite 2,4-dichlorobenzoic acid, the it has been assumed in the risk assessment that the metabolite is 10x more toxic than the parent.
[e] mg formulation/kg dw.
[f] Refined value for 2,4-dichlorobenzoic acid , please refer to 3CP B.8.

Winter oilseed rape at 300 g a.s./ha [x 1]

Test organism	Test substance	Time scale	Soil PEC[1]	TER	Trigger
Earthworms					
Eisenia fetida	Bixlozone	Chronic	0.780	80.1	5
Eisenia fetida	2,4-dichlorobenzoic acid	Chronic	0.544	67.0	5
Eisenia fetida	Preparation ‘F9600-4 SC’	Chronic	1.402[e]	35.7	5
Other soil macroorganisms					
Folsomia candida	Bixlozone[c]	Chronic	0.780	18.0	5
Folsomia candida	2,4-dichlorobenzoic acid[d]	Chronic	0.544	**2.6**	5
Folsomia candida	2,4-dichlorobenzoic acid[d]	Chronic	0.349[f]	**4.0**	5
Folsomia candida	Preparation ‘F9600-4 SC’	Chronic	1.402[e]	27.9	5
Hypoaspis aculeifer	Bixlozone[c]	Chronic	0.780	72.1	5
Hypoaspis aculeifer	2,4-dichlorobenzoic acid[d]	Chronic	0.544	10.3	5
Hypoaspis aculeifer	Preparation ‘F9600-4 SC’	Chronic	1.402[e]	112	5

[1] The maximum $PEC_{accumulation}$ value for bixlozone and maximum $PEC_{initial}$ values for 2,4-dichlorobenzoic acid and bixlozone-4 SC (Section 3CP B.8), have been used in the risk assessment.
[c] In the absence of toxicity data with the technical a.s., the formulation data have been expressed in terms of the a.s. content and used alongside the a.s. PEC_{soil} in the risk assessment.
[d] In the absence of toxicity data with the metabolite 2,4-dichlorobenzoic acid, the it has been assumed in the risk assessment that the metabolite is 10x more toxic than the parent.
[e] mg formulation/kg dw.
[f] Refined value for 2,4-dichlorobenzoic acid , please refer to 3CP B.8.

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Winter cereals at 200 g a.s./ha [x 1]

Test organism	Test substance	Time scale	Soil PEC[1]	TER	Trigger
Earthworms					
Eisenia fetida	Bixlozone	Chronic	0.780	120	5
Eisenia fetida	2,4-dichlorobenzoic acid	Chronic	0.544	100	5
Eisenia fetida	Preparation 'F9600-4 SC'	Chronic	1.402	53.5	5
Other soil macroorganisms					
Folsomia candida	Bixlozone[c]	Chronic	0.780	27.0	5
Folsomia candida	2,4-dichlorobenzoic acid[d]	Chronic	0.544	**3.9**	5
Folsomia candida	2,4-dichlorobenzoic acid[d]	Chronic	0.349[f]	6.0	5
Folsomia candida	Preparation 'F9600-4 SC'	Chronic	1.402[e]	41.8	5
Hypoaspis aculeifer	Bixlozone[c]	Chronic	0.780	108	5
Hypoaspis aculeifer	2,4-dichlorobenzoic acid[d]	Chronic	0.544	15.5	5
Hypoaspis aculeifer	Preparation 'F9600-4 SC'	Chronic	1.402[e]	167	5

[1] The maximum $PEC_{accumulation}$ value for bixlozone and maximum $PEC_{initial}$ values for 2,4-dichlorobenzoic acid and bixlozone-4 SC (Section 3CP B.8), have been used in the risk assessment.
[c] In the absence of toxicity data with the technical a.s., the formulation data have been expressed in terms of the a.s. content and used alongside the a.s. PEC_{soil} in the risk assessment.
[d] In the absence of toxicity data with the metabolite 2,4-dichlorobenzoic acid, the it has been assumed in the risk assessment that the metabolite is 10x more toxic than the parent.
[e] mg formulation/kg dw.
[f] Refined value for 2,4-dichlorobenzoic acid , please refer to 3CP B.8.

Maize at 375 g a.s./ha [x 1]

Test organism	Test substance	Timescale	No effect >25% (mg/kg dw)	PEC_{soil} (mg/kg dw)[1]	Risk acceptable?
Nitrogen transformation	Bixlozone	28 d	1000	0.780	Yes
	2,4-dichlorobenzoic acid	28 d	1.79	0.544	Yes
	Preparation 'F9600-4 SC'	28 d	7.55[a]	1.402[a]	Yes

[1]The maximum $PEC_{accumulation}$ value for bixlozone and maximum $PEC_{initial}$ values for 2,4-dichlorobenzoic acid and bixlozone-4 SC (Section 3CP B.8), have been used in the risk assessment.
[a] mg formulation/kg dw

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Winter oilseed rape at 300 g a.s./ha [x 1]

Test organism	Test substance	Timescale	No effect >25% (mg/kg dw)	PEC_{soil} (mg/kg dw)[1]	Risk acceptable?
Nitrogen transformation	Bixlozone	28 d	1000	0.624	Yes
	2,4-dichlorobenzoic acid	28 d	1.79	0.435	Yes
	Preparation 'F9600-4 SC'	28 d	7.55[a]	1.121[a]	Yes

[a]The maximum $PEC_{accumulation}$ value for bixlozone and maximum $PEC_{initial}$ values for 2,4-dichlorobenzoic acid and bixlozone-4 SC (Section 3CP B.8), have been used in the risk assessment.
[a] mg formulation/kg dw

Winter cereals at 200 g a.s./ha [x 1]

Test organism	Test substance	Timescale	No effect >25% (mg/kg dw)	PEC_{soil} (mg/kg dw)[1]	Risk acceptable?
Nitrogen transformation	Bixlozone	28 d	1000	0.416	Yes
	2,4-dichlorobenzoic acid	28 d	1.79	0.290	Yes
	Preparation 'F9600-4 SC'	28 d	7.55[a]	0.748[a]	Yes

[1]The maximum $PEC_{accumulation}$ value for bixlozone and maximum $PEC_{initial}$ values for 2,4-dichlorobenzoic acid and bixlozone-4 SC (Section 3CP B.8), have been used in the risk assessment.
[a] mg formulation/kg dw

Effects on terrestrial non target higher plants (Regulation (EU) N° 283/2013, Annex Part A, point 8.6 and Regulation (EU) N° 284/2013 Annex Part A, point 10.6)

Screening data

Not required for herbicides or plant growth regulators as ER_{50} tests should be provided

Laboratory dose response tests

Species	Test substance	ER_{50} (g a.s./ha) vegetative vigour	ER_{50} (g a.s./ha) emergence	Exposure [1] (g a.s./ha)	TER	Trigger
Risk assessment for – winter cereals at 200 g a.s./ha [x 1 application]						
Lycopersicon esculentum	Preparation 'F9600 4SC'	-	19	5.54 (1m)	**3.4**	< 5
Allium cepa	Preparation 'F9600 4SC'	99.8 (1.5 [a])	-	5.54 (1m)	18.0 (**0.27** [a])	< 5
Risk assessment for – winter oilseed rape at 300 g a.s./ha [x 1 application]						
Lycopersicon esculentum	Preparation 'F9600 4SC'	-	19	8.31 (1m)	**2.3**	< 5
Allium cepa	Preparation 'F9600 4SC'	99.8 (1.5 [a])	-	8.31 (1m)	12.0 (**0.18** [a])	< 5
Risk assessment for – maize at 375 g a.s./ha [x 1 application]						

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Species	Test substance	ER_{50} (g a.s./ha) vegetative vigour	ER_{50} (g a.s./ha) emergence	Exposure [1] (g a.s./ha)	TER	Trigger
Lycopersicon esculentum	Preparation 'F9600 4SC'	-	19	10.39 (1m)	**1.8**	< 5
Allium cepa	Preparation 'F9600 4SC'	99.8 (1.5 [a])	-	10.39 (1m)	9.6 (**0.14** [a])	< 5

[a] *Screen to account for other morphological/phytotoxic effects observed in the vegetative vigour study.*

Extended laboratory studies: None submitted.
Semi-field and field test: A wind tunnel study (Staffa, 2016) was submitted to address exposure via volatilisation. A summary, in relation to the ecotoxicological risk assessment, is included in Volume 3, Section B.9.12.2.2 (PPP). The study was suitable for use in risk assessment and has been used to establish exposure estimates for plants exposed via volatilisation. The lower-tier toxicity data has been used to establish a toxicological endpoint for use in risk assessment. The risk from volatilisation has been considered based on the following risk assessment:

Use/crop (application rate)	**Distance (m)**	**Deposition (%)**	**$PER_{volatilisation}$ (g a.s./ha)**	**Toxicity value (g a.s./ha)**	**TER (criterion: TER ≥ 5)**
Winter cereals (200 g a.s./ha)	1	0.42	0.84	1.5	**1.8**
	5	0.14	0.28		5.4
Oilseed rape (300 g a.s./ha)	1	0.42	1.26		**1.2**
	5	0.14	0.42		**3.6**
	10	0.08	0.24		6.3
Maize (375 g a.s./ha)	1	0.42	1.58		**0.95**
	5	0.14	0.53		**2.8**
	10	0.08	0.30		5

MAF: Multiple application factor; $PER_{volatilisation}$: Predicted environmental rate, due to volatilisation (= application rate x (deposition(%)/100)); TER: toxicity to exposure ratio. TER values shown in bold are below the relevant trigger and an acceptable risk has not been demonstrated.

[1] Exposure has been calculated using Ganzelmeier drift data, buffer distances are stated in parentheses
[a] Screen to account for other morphological/phytotoxic effects observed in the vegetative vigour study.

Effects on biological methods for sewage treatment (Regulation (EU) N° 283/2013, Annex Part A, point 8.8)

Test type/organism	end point
Activated sludge	NOEC (Total respiration) = **100 mg/L** NOEC (Heterotrophic Respiration) = 1000 mg/L NOEC (Nitrification Respiration) = 100 mg/L EC_{10} (Total respiration) = 291 (104 – 820) mg/L EC_{10} (Heterotrophic Respiration) = n.d. (considered to be > 1000 mg/L) EC_{10} (Nitrification Respiration) = 140 (51-382) mg/L

Monitoring data (Regulation (EU) N° 283/2013, Annex Part A, point 8.9 and Regulation (EU) N° 284/2013, Annex Part A, point 10.8)

Available monitoring data concerning adverse effect of the a.s. Available monitoring data concerning effect of the PPP.

Definition of the residue for monitoring (Regulation (EU) N° 283/2013, Annex Part A, point 7.4.2) Ecotoxicologically relevant compounds[1]

Compartment	
soil	Parent (Bixlozone), Metabolite 1 (2,4-dichlorobenzoic acid)
water	Parent (Bixlozone), Metabolite 1 (2,4-dichlorobenzoic acid)
sediment	Parent (Bixlozone)
groundwater	Parent (Bixlozone)

[1] metabolites are considered relevant when, based on the risk assessment, they pose a risk comparable or higher than the parent

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Section 5 Ecotoxicology

Classification and labelling with regard to ecotoxicological data (Regulation (EU) N° 283/2013, Annex Part A, Section 10)

Substance	Bixlozone
Harmonised classification according to Regulation (EC) No 1272/2008 and its Adaptations to Technical Process [Table 3.1 of Annex VI of Regulation (EC) No 1272/2008 as amended][8]:	Draft assessment not complete.
Peer review proposal[9] for harmonised classification according to Regulation (EC) No 1272/2008:	Aquatic Acute 1; H400: Very toxic to aquatic life. Acute M-Factor of 1 Aquatic Chronic 1; H410: Very toxic to aquatic life with long lasting effects. Chronic M-Factor of 10

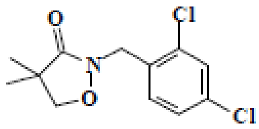
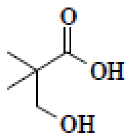
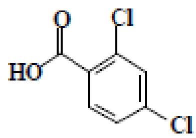
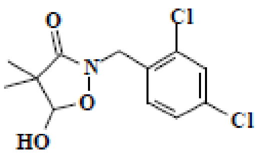
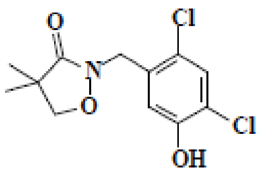
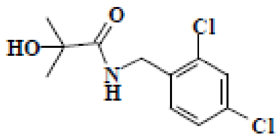
[8] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006. OJ L 353, 31.12.2008, 1-1355.

[9] It should be noted that harmonised classification and labelling is formally proposed and decided in accordance with Regulation (EC) No 1272/2008. Proposals for classification made in the context of the evaluation procedure under Regulation (EC) No 1107/2009 are not formal proposals.

List of end points

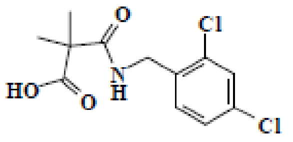
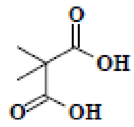
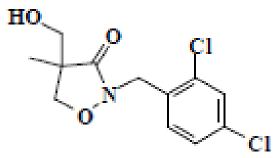
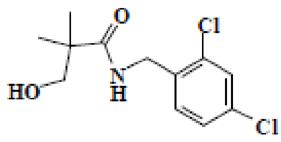
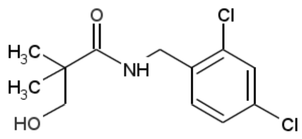
Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Used compounds code(s)

Code/Trivial name(s)*	IUPAC name/SMILES notation	Structural formula
F9600/**Bixlozone**	2-[(2,4-dichlorophenyl)methyl]-4,4-dimethyl-1,2-oxazolidin-3-one	
M118/1 **2,2-dimethyl-3-hydroxypropionic acid**	2,2-dimethyl-3-hydroxypropionic acid	
M190/1 **2,4-DBA** **2,4-dichlorobenzoic acid**	2,4-dichlorobenzoic acid	
M289/1 **5-hydroxy-bixlozone** 5-hydroxy-F9600	2-(2,4-dichlorobenzyl)-5-hydroxy-4,4-dimethylisoxazolidin-3-one	
M289/3 **5'-hydroxy-bixlozone** 5'-OH-F9600 5'-hydroxy-F9600	2-(2,4-dichloro-5-hydroxy benzyl)-4,4-dimethylisoxazolidin-3-one	
M261/1 **Bixlozone-hydroxy-isobutyramide** **Bixlozone-OH-isobutyramide** F9600-hydroxy-Isobutyramide, also termed bixlozone (F9600)-dimethyl-	N-(2,4-dichlorobenzyl)-2-hydroxy-2-methylpropanamide	

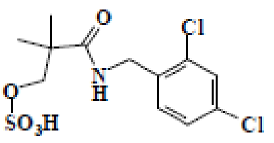
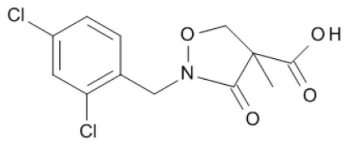
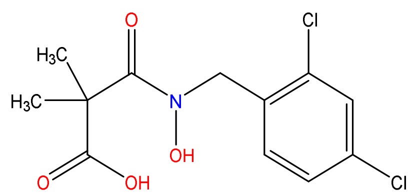
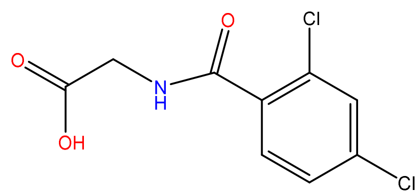
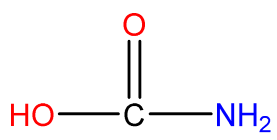
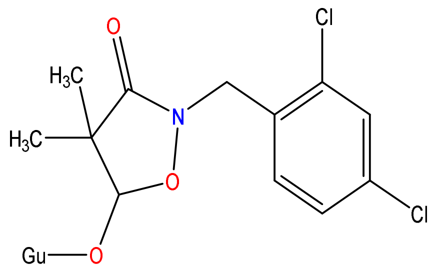
List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Code/Trivial name(s)*	**IUPAC name/SMILES notation**	**Structural formula**
isobutyramide		
M289/2 **Bixlozone-dimethyl-malonamide** (in residues section) **F9600-dimethyl-malonamide** (in ecotox section)	3-((2,4-dichlorobenzyl)amino)-2,2-dimethyl-3-oxopropanoic acid	
M132/1 **Dimethyl malonic acid**	2,2-Dimethylmalonic acid	
M289/4 **4-OH-Me-bixlozone** **4-hydroxymethyl-bixlozone** 4-hydroxy-methyl-F9600	2-(2,4-dichlorobenzyl)-4-(hydroxymethyl)-4-methylisoxazolidin-3-one	
M275/1 **Bixlozone-3-OH-Propanamide** (in residues section) **F9600-3-OH-Propanamide** (in ecotox section)	N-[(2,4-dichlorophenyl)methyl]-3-hydroxy-2,2-dimethylpropanamide	
F9600-3-OH-propanamide Bixlozone-3-OH-propanamide **3-OH-propanamide**	F9600-3-OH-propanamide	

List of end points

Evaluator	Month and year	Active substance
HSE	**July 2022**	**Bixlozone (F9600)**

Code/Trivial name(s)*	IUPAC name/SMILES notation	Structural formula
M355/1 **Bixlozone-3-OH-propanamide-sulfate** F9600-3-OH-propanamide-sulfate	F9600-3-OH-propanamide-sulfate	
4-carboxy-bixlozone (in fate section) **4-carboxyl-F9600** (in ecotox section)	2-(2,4-dichlorobenzyl)-4-methyl-3-oxoisoxazolidine-4-carboxylic acid	
5-Keto-hydrate	3-((2,4-dichlorobenzyl)(hydroxy)amino)-2,2-dimethyl-3-oxopropanoic acid	
2,4-Dichloroippuric acid	N-(2,4-dichlorobenzoyl)glycine	
Carbamic acid	Carbamic acid	
5-hydroxy-bixlozone-glucuronide 5-OH-F9600-Glucuronide	2-(2,4-dichlorobenzyl)-4,4-dimethyl-3-oxoisoxazolidin-5-yl 3,4,5,6-tetrahydroxytetrahydro-2H-pyran-2-carboxylate	

* The compound code / trivial name in bold is the name used in the list of endpoints.