

**REGISTRATION REPORT**  
**Part B**  
**Section 3**  
**Efficacy Data and Information**  
Concise summary

Product code: HBZ10

Product names: WIZARD/BEETUP PRO/BETASANA MAX

Chemical active substances:

Ethofumesate, 125 g/L  
Phenmedipham, 125 g/L

Central Zone and Great Britain  
Zonal Rapporteur Member State: Poland / Great Britain

**CORE ASSESSMENT**  
(Authorisation - Art. 33 application)

Applicant: UPL Holdings Coöperatief U.A.  
Submission date: October 2021  
MS Finalisation date: June 2022 (initial Core Assessment)  
March 2023 (final Core Assessment)

## Version history

When	What
October 2021	Document created
June 2022	<p>Initial zRMS assessment</p> <p>The report in the dRR format has been prepared by the Applicant, therefore all comments, additional evaluations and conclusions of the zRMS are presented in grey commenting boxes. Minor changes are introduced directly in the text and highlighted in grey. Not agreed or not relevant information are struck through and shaded for transparency.</p>
March 2023	<p>Final report (Core Assessment updated following the commenting period)</p> <p>Additional information/assessments included by the zRMS in the report in response to comments received from the cMS and the Applicant are highlighted in yellow. Information no longer relevant is struck through and shaded.</p>

## Table of Contents

<b>3</b>	<b>Efficacy Data and Information (including Value Data) on the Plant Protection Product (KCP 6).....</b>	<b>4</b>
3.1	Summary and conclusions of zRMS on Section 3: Efficacy (KCP 6).....	4
3.2	Efficacy data (KCP 6) .....	13
3.2.1	Preliminary tests (KCP 6.1).....	20
3.2.2	Minimum effective dose tests (KCP 6.2) .....	26
3.2.2.1	Minimum effective dose tests, three applications.....	27
3.2.2.2	Minimum effective dose tests, 5/6 applications .....	33
3.2.3	Efficacy tests (KCP 6.2).....	38
3.2.3.1	Weed control after three applications .....	41
3.2.3.2	Weed control after 5/6 applications .....	56
3.3	Information on the occurrence or possible occurrence of the development of resistance (KCP 6.3) .....	70
3.3.1	Mode of Action.....	70
3.3.2	Mechanism of resistance .....	71
3.3.3	Evidence of Resistance.....	73
3.3.4	Baseline sensitivity .....	79
3.3.5	Resistance risk assessment of unrestricted use pattern .....	79
3.3.6	Management Strategy .....	83
3.3.7	Implementation of the management strategy .....	84
3.3.8	Monitoring, reporting and reaction to changes in performance.....	84
3.4	Adverse effects on treated crops (KCP 6.4) .....	85
3.4.1	Phytotoxicity to host crop (KCP 6.4.1) .....	88
3.4.2	Effect on the yield of treated plants or plant product (KCP 6.4.2) .....	90
3.4.2.1	Yield in bridging trials.....	90
3.4.2.2	Yield in weed-free selectivity trials.....	91
3.4.3	Effects on the quality of plants or plant products (KCP 6.4.3).....	94
3.4.3.1	Crop quality in bridging trials .....	94
3.4.3.2	Crop quality in weed-free selectivity trials.....	97
3.4.4	Effects on transformation processes (KCP 6.4.4).....	108
3.4.5	Impact on treated plants or plant products to be used for propagation (KCP 6.4.5).....	108
3.5	Observations on other undesirable or unintended side-effects (KCP 6.5).....	109
3.5.1	Impact on succeeding crops (KCP 6.5.1) .....	109
3.5.2	Impact on other plants including adjacent crops (KCP 6.5.2) .....	117
3.5.3	Effects on beneficial and other non-target organisms (KCP 6.5.3).....	119
3.6	Other/special studies.....	119
3.7	List of test facilities including the corresponding certificates .....	120
<b>Appendix 1</b>	<b>Lists of data considered in support of the evaluation.....</b>	<b>121</b>

### 3 Efficacy Data and Information (including Value Data) on the Plant Protection Product (KCP 6)

#### Transformation of the dRR (applicant version) into the RR (zRMS version)

##### Comments of zRMS:

Conclusions from the assessment were prepared using grey commenting boxes placed at the end of each chapter. Textual changes were done using grey highlights in the text. The parts of the text amended or added by the zRMS evaluator are highlighted in grey, whereas the parts struck off are ~~visibly marked with the grey font~~.

#### 3.1 Summary and conclusions of zRMS on Section 3: Efficacy (KCP 6)

##### Abstract

##### Abstract of the evaluation, by the cMS PL:

This application has been submitted for the authorization of new product HBZ10 (Wizard/Beetup Pro/Betasana Max) in Poland, Austria, Belgium, Czech Republic, Netherlands, France and United Kingdom. HBZ10 contains two active substances: ethofumesate (125 g/L) and phenmedipham (125 g/L). This product is intended to use as a herbicide for control of annual dicotyledonous weeds in beet crops at dose rate of 1,8-2,4 l/ha (in 3 applications) or 0,9-1,2 l/ha (in 5/6 applications).

##### GAP Table

The previous GAP table has been struck off and the new was included. The same table is presented in the dRR Part 0. The zRMS changed the water volume from 80-400 l/ha to 200-400 l/ha because the volume of 80 l/ha was not used in the submitted trials. The cMSs are kindly asked to consider this change on the national level.

##### MED

The trial results show that the dose range of 1,8-2,4 l/ha (for 3 application) and 0,9-1,2 l/ha (for 5/6 applications) were effective to control of annual dicotyledonous weeds in sugar beet. However, the higher doses of range (2,4 l/ha and 1,2 l/ha, respectively for each scenerio of applications) are necessary to achieve a very high level (>95%) for major weed species. To opinion of zRMS, the dose rates of 1,8 l/ha in scenerio of three applications and 0,9 l/ha in scenerio of five/six applications can be determine as minimum effective doses. However, it should be indicated the level of susceptibility for each weed species depending on the dose rate in the product label.

##### Efficacy

Based on the submitted trial results, it can be concluded that HBZ10 is effective to control of annual dicotyledonous weeds in sugar beet. No efficacy trials were carried out in other beet crops. The cMSs are kindly asked to consider these uses on the national level. The individual conclusions for each weed species in the North-East and Maritime EPPO climatic zone are presented in the chapter 3.2.3.

##### Selectivity

Due to the phytotoxicity symptoms (stunting, deformation, chlorosis, thinning, necrosis of leaf tip and discoloration) were noted in the selectivity trials, the zRMS proposes to add the warning to the product label (see in the chapter 3.4).

##### Resistance risk

The general practice guidance for the use of herbicides are advised to include to the product label (see in the chapter 3.3)

**Table 3.1-1: Acceptability of intended uses (and respective fall-back GAPs, if applicable)** The product HBZ10 containing Ethofumesate (125 g/L) and Phenmedipham (125 g/L) is intended to be applied as an herbicide on beet crops after emergence (BBCH 10-39) by multiple applications per season. The maximum intended application rate is 2.4 L product/ha per application (equivalent to 0.3 kg Ethofumesate/ha and 0.3 kg Phenmedipham/ha).

**Beet crops:**

BEAVA Sugar beet  
BEAVC Fodder beet  
BEAVD Red beet  
BEAVL Yellow beet  
BEAVV Chard

**Critical use pattern of the formulated product**

PPP (product name/code)	Wizard / HBZ10
Active substance 1	Ethofumesate
Active substance 2	Phenmedipham

Safener	None
Synergist	None

Applicant:	UPL Coöperatief U.A.
Zone:	central

Formulation type:	EC
Conc. of as 1:	125 g/L
Conc. of as 2:	125 g/L

Conc. of safener:	Not relevant
Conc. of synergist:	Not relevant

Professional use	<input checked="" type="checkbox"/>
Non professional use	<input type="checkbox"/>

Verified by MS: Yes, Central

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Use- No. ±	Member states	Crop and/or situation (crop desti- nation/ purpose of crop)	F, Fn, Fpn G, Gn, Gpn or L±±	Pests or Group of pests controlled (additionally: de- velopmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks: e.g. g saf- ener/ synergist per ha	
					Method/ Kind	Timing / Growth stage of crop & season	Max. num- ber a) per use b) per crop/ season	Min. interval between applica- tions (days)	L product/ha a) max. rate per appl. b) max. total rate per crop/season	g a.s./ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha min/max			
Zonal uses (field or outdoor uses, certain types of protected crops)														
1, 6, 11, 16, 21	UK NL	Beet crops (sugar beet, red/yellow beet, fodder beet, chard)	F	Broadleaved weeds	Spraying	Spring-summer BBCH 10-39	a) 6 b) 6	5	a) 1.2 b) 7.2	a) 150 g/ha Ethofumesate 150 g/ha Phenmedipham b) 900 g/ha Ethofumesate 900 g/ha Phenmedipham	80— 400	-	Max. 7.2 L/ha per year	
2, 7, 12, 17, 22	UK NL	Beet crops (sugar beet, red/yellow beet, fodder beet, chard)	F	Broadleaved weeds	Spraying	Spring-summer BBCH 10-39	a) 3 b) 3	6	a) 2.4 b) 7.2	a) 300 g/ha Ethofumesate 300 g/ha Phenmedipham b) 900 g/ha Ethofumesate 900 g/ha Phenmedipham	80— 400	-	Max. 7.2 L/ha per year	
3, 8, 13, 18, 23	BE CZ PL FR AT	Beet crops (sugar beet, red/yellow beet, fodder beet, chard)	F	Broadleaved weeds	Spraying	Spring-summer BBCH 10-39	a) 5 b) 5	7	a) 1.2 b) 6.0	a) 150 g/ha Ethofumesate 150 g/ha Phenmedipham b) 750 g/ha Ethofumesate 750 g/ha Phenmedipham	80— 400	-	Max. 6.0 L/ha per year	

1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Use- No. ±	Member states	Crop and/or situation (crop desti- nation/ purpose of crop)	F, Fn, Fpn, G, Gn, Gpn or I**	Pests or Group of pests controlled (additionally: de- velopmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks: e.g. g-saf- ener/ synergist per-ha	
					Method/ Kind	Timing / Growth stage of crop & season	Max. num- ber a) per use b) per crop/ season	Min. interval between applica- tions (days)	L product/ha a) max. rate per appl. b) max. total rate per crop/season	g a.s./ha a) max. rate per appl. b) max. total rate per crop/season	Water l/ha min/m ax			
4, 9, 14, 19, 24	UK NL BE CZ PL FR AT	Beet crops (sugar beet, red/yellow beet, fodder beet, chard)	F	Broadleaved weeds	Spraying	Spring-summer BBCH 10-39	a) 3 b) 3	6	a) 1.8 b) 5.4	a) 225 g/ha Ethofumesate 225 g/ha Phenmedipham b) 675 g/ha Ethofumesate 675 g/ha Phenmedipham	80— 400	-	Max. 5.4 L/ha per year	
5, 10, 15, 20, 25	BE CZ PL FR AT	Beet crops (sugar beet, red/yellow beet, fodder beet, chard)	F	Broadleaved weeds	Spraying	Spring-summer BBCH 10-39	a) 3 b) 3	9	a) 2.4 b) 7.2	a) 300 g/ha Ethofumesate 300 g/ha Phenmedipham b) 900 g/ha Ethofumesate 900 g/ha Phenmedipham	80— 400	-	Max. 7.2 L/ha per year	

\* Use numbers in accordance with the list of all intended GAPS in Part B, Section 0 should be given in column 1

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

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use-No. (e)	Member state(s)	Crop and/or situation  (crop destination / purpose of crop)	F, Fn, Fpn G, Gn, Gpn or I	Pests or Group of pests controlled  (additionally: developmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks:  e.g. g safener/synergist per ha (f)	zRMS conclusion
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/season	Min. interval between applications (days)	L product / ha a) max. rate per appl. b) max. total rate per crop/season	g as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha  min / max			
<b>Zonal uses (field or outdoor uses, certain types of protected crops)</b>														
1	NL	Sugar beet	F	Broadleaf weeds	Overall spray	Spring-summer BBCH 10-39	a) 6 b) 6	5	a) 1.2 b) 7.2	a) ETO: 150 PMP: 150 b) ETO: 900 PMP: 900	<del>80</del> 200-400	-	Max. 7.2 L/ha per year	C
2	NL	Sugar beet	F	Broadleaf weeds	Overall spray	Spring-summer BBCH 10-39	a) 3 b) 3	6	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200-400	-	Max. 7.2 L/ha per year	C
3	BE CZ PL AT	Sugar beet	F	Broadleaf weeds	Overall spray	Spring-summer BBCH 10-39	a) 5 b) 5	7	a) 1.2 b) 6.0	a) ETO: 150 PMP: 150 b) ETO: 750 PMP: 750	<del>80</del> 200-400	-	Max. 6.0 L/ha per year	A PL
														C BE, CZ, AT
4	NL BE CZ PL AT	Sugar beet	F	Broadleaf weeds	Overall spray	Spring-summer BBCH 10-39	a) 3 b) 3	6	a) 1.8 b) 5.4	a) ETO: 225 PMP: 225 b) ETO: 675 PMP: 675	<del>80</del> 200-400	-	Max. 5.4 L/ha per year	A PL
														C NL, BE, CZ, AT
5	BE CZ PL AT	Sugar beet	F	Broadleaf weeds	Overall spray	Spring-summer BBCH 10-39	a) 3 b) 3	9	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200-400	-	Max. 7.2 L/ha per year	A PL
														C BE, CZ, AT



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use- No. (e)	Member state(s)	Crop and/ or situa- tion  (crop destination / purpose of crop)	F, Fn, G, Gn, Gpn or I	Pests or Group of pests con- trolled  (additionally: developmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks:  e.g. g safen- er/synergist per ha (f)	zRMS conclusion
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. inter- val between applications (days)	L product / ha a) max. rate per appl. b) max. total rate per crop/season	g as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha  min / max			
6	NL	Red beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 6 b) 6	5	a) 1.2 b) 7.2	a) ETO: 150 PMP: 150 b) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	C
7	NL	Red beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 3 b) 3	6	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	C
8	BE CZ PL AT	Red beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 5 b) 5	7	a) 1.2 b) 6.0	a) ETO: 150 PMP: 150 b) ETO: 750 PMP: 750	<del>80</del> 200- 400	-	Max. 6.0 L/ha per year	n.r. PL: art. 51
														C
9	NL BE CZ PL AT	Red beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 3 b) 3	6	a) 1.8 b) 5.4	a) ETO: 225 PMP: 225 b) ETO: 675 PMP: 675	<del>80</del> 200- 400	-	Max. 5.4 L/ha per year	n.r. PL: art. 51
														C
10	BE CZ PL AT	Red beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 3 b) 3	9	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	n.r. PL: art. 51
														C
11	NL	Yellow beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 6 b) 6	5	a) 1.2 b) 7.2	a) ETO: 150 PMP: 150 b) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	C
12	NL	Yellow beet	F	Broadleaf weeds	Overall spray	Spring- summer	a) 3 b) 3	6	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300	<del>80</del> 200-	-	Max. 7.2 L/ha per year	C

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use- No. (e)	Member state(s)	Crop and/ or situa- tion  (crop destination / purpose of crop)	F, Fn, Fpn G, Gn, Gpn or I	Pests or Group of pests con- trolled  (additionally: developmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks:  e.g. g safen- er/synergist per ha (f)	zRMS conclusion
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. inter- val between applications (days)	L product / ha a) max. rate per appl. b) max. total rate per crop/season	g as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha  min / max			
						BBCH 10-39				b) ETO: 900 PMP: 900	400			
13	BE CZ AT	Yellow beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10-39	a) 5 b) 5	7	a) 1.2 b) 6.0	a) ETO: 150 PMP: 150 b) ETO: 750 PMP: 750	<del>80</del> 200-400	-	Max. 6.0 L/ha per year	C
14	NL BE CZ AT	Yellow beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10-39	a) 3 b) 3	6	a) 1.8 b) 5.4	a) ETO: 225 PMP: 225 b) ETO: 675 PMP: 675	<del>80</del> 200-400	-	Max. 5.4 L/ha per year	C
15	BE CZ AT	Yellow beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10-39	a) 3 b) 3	9	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200-400	-	Max. 7.2 L/ha per year	C
16	NL	Fodder beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10-39	a) 6 b) 6	5	a) 1.2 b) 7.2	a) ETO: 150 PMP: 150 b) ETO: 900 PMP: 900	<del>80</del> 200-400	-	Max. 7.2 L/ha per year	C
17	NL	Fodder beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10-39	a) 3 b) 3	6	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200-400	-	Max. 7.2 L/ha per year	C
18	BE CZ PL AT	Fodder beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10-39	a) 5 b) 5	7	a) 1.2 b) 6.0	a) ETO: 150 PMP: 150 b) ETO: 750 PMP: 750	<del>80</del> 200-400	-	Max. 6.0 L/ha per year	n.r. PL: art. 51  C BE, CZ, AT

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use- No. (e)	Member state(s)	Crop and/ or situa- tion  (crop destination / purpose of crop)	F, F <sub>n</sub> , F <sub>pn</sub> G, G <sub>n</sub> , G <sub>pn</sub> or I	Pests or Group of pests con- trolled  (additionally: developmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks:  e.g. g safen- er/synergist per ha (f)	zRMS conclusion
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. inter- val between applications (days)	L product / ha a) max. rate per appl. b) max. total rate per crop/season	g as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha  min / max			
19	NL BE CZ PL AT	Fodder beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 3 b) 3	6	a) 1.8 b) 5.4	a) ETO: 225 PMP: 225 b) ETO: 675 PMP: 675	<del>80</del> 200- 400	-	Max. 5.4 L/ha per year	n.r. PL: art. 51
							C NL, BE, CZ, AT							
20	BE CZ PL AT	Fodder beet	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	a) 3 b) 3	9	a) 2.4 b) 7.2	a) ETO: 300 PMP: 300 b) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	n.r. PL: art. 51
							C BE, CZ, AT							
21	NL	Chard	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	c) 6 d) 6	5	c) 1.2 d) 7.2	c) ETO: 150 PMP: 150 d) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	C
22	NL	Chard	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	c) 3 d) 3	6	c) 2.4 d) 7.2	c) ETO: 300 PMP: 300 d) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	C
23	BE CZ PL AT	Chard	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	c) 5 d) 5	7	c) 1.2 d) 6.0	c) ETO: 150 PMP: 150 d) ETO: 750 PMP: 750	<del>80</del> 200- 400	-	Max. 6.0 L/ha per year	n.r. PL: art. 51
							C BE, CZ, AT							
24	NL BE CZ PL AT	Chard	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	c) 3 d) 3	6	c) 1.8 d) 5.4	c) ETO: 225 PMP: 225 d) ETO: 675 PMP: 675	<del>80</del> 200- 400	-	Max. 5.4 L/ha per year	n.r. PL: art. 51
							C NL, BE, CZ, AT							

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Use- No. (e)	Member state(s)	Crop and/ or situa- tion  (crop destination / purpose of crop)	F, Fn, G, Gn, Gpn or I	Pests or Group of pests con- trolled  (additionally: developmental stages of the pest or pest group)	Application				Application rate			PHI (days)	Remarks:  e.g. g safen- er/synergist per ha (f)	zRMS conclusion
					Method / Kind	Timing / Growth stage of crop & season	Max. number a) per use b) per crop/ season	Min. inter- val between applications (days)	L product / ha a) max. rate per appl. b) max. total rate per crop/season	g as/ha a) max. rate per appl. b) max. total rate per crop/season	Water L/ha  min / max			
25	BE CZ PL AT	Chard	F	Broadleaf weeds	Overall spray	Spring- summer BBCH 10- 39	c) 3 d) 3	9	c) 2.4 d) 7.2	c) ETO: 300 PMP: 300 d) ETO: 900 PMP: 900	<del>80</del> 200- 400	-	Max. 7.2 L/ha per year	n.r. PL: art. 51  C BE, CZ, AT

**Remarks table heading:**

(a) e.g. wettable powder (WP), emulsifiable concentrate (EC), granule (GR)  
(b) Catalogue of pesticide formulation types and international coding system CropLife International Technical Monograph n°2, 6th Edition Revised May 2008  
(c) g/kg or g/l

**Remarks columns:**

1 Numeration necessary to allow references  
2 Use official codes/nomenclatures of EU Member States  
3 For crops, the EU and Codex classifications (both) should be used; when relevant, the use situation should be described (e.g. fumigation of a structure)  
4 F: professional field use, Fn: non-professional field use, Fpn: professional and non-professional field use, G: professional greenhouse use, Gn: non-professional greenhouse use, Gpn: professional and non-professional greenhouse use, I: indoor application  
5 Scientific names and EPPO-Codes of target pests/diseases/ weeds or, when relevant, the common names of the pest groups (e.g. biting and sucking insects, soil born insects, foliar fungi, weeds) and the developmental stages of the pests and pest groups at the moment of application must be named.  
6 Method, e.g. high volume spraying, low volume spraying, spreading, dusting, drench Kind, e.g. overall, broadcast, aerial spraying, row, individual plant, between the plants - type of equipment used must be indicated.

(d) Select relevant  
(e) Use number(s) in accordance with the list of all intended GAPs in Part B, Section 0 should be given in column 1  
(f) No authorization possible for uses where the line is highlighted in grey, Use should be crossed out when the notifier no longer supports this use.

7 Growth stage at first and last treatment (BBCH Monograph, Growth Stages of Plants, 1997, Blackwell, ISBN 3-8263-3152-4), including where relevant, information on season at time of application  
8 The maximum number of application possible under practical conditions of use must be provided.  
9 Minimum interval (in days) between applications of the same product  
10 For specific uses other specifications might be possible, e.g.: g/m³ in case of fumigation of empty rooms. See also EPPO-Guideline PP 1/239 Dose expression for plant protection products.  
11 The dimension (g, kg) must be clearly specified. (Maximum) dose of a.s. per treatment (usually g, kg or L product / ha).  
12 If water volume range depends on application equipments (e.g. ULVA or LVA) it should be mentioned under “application: method/kind”.  
13 PHI - minimum pre-harvest interval  
14 Remarks may include: Extent of use/economic importance/restrictions

Column 15: zRMS conclusion.

A	Acceptable
R	Acceptable with further restriction
C	To be confirmed by cMS
N	Not acceptable / evaluation not possible
n.r.	Not relevant for section 3

## 3.2 Efficacy data (KCP 6)

### Introduction

This submission is for a new product, HBZ10, which combines two well-known active substances, for control of annual broadleaved weeds in sugar beet and other beet crops.

This is the core submission. The zRMS in charge of the evaluation of the dossier in the Central zone is Poland. cMS are the Netherlands, Austria, Belgium, France and Czech Republic. This document also supports a national submission to Great Britain.

### Description of active substances

The active substances in the proposed product HBZ10 are ethofumesate and phenmedipham.

Ethofumesate is a selective systemic herbicide, absorbed by the roots of broadleaved plants, with translocation to the foliage. It inhibits the growth of meristems, retards cellular division and limits the formation of waxy cuticle. Phenmedipham is a selective systemic herbicide, absorbed through the leaves, with translocation primarily in the apoplast (Turner, 2018). Both compounds play a very valuable part in beet crop weed control programmes across Europe.

**Table 3.2-1: Details of the active substances**

Active substance	Ethofumesate	Phenmedipham
g/L	125	125
Chemical group:	Benzofuran	Phenylcarbamate
Mode of action:	Lipid synthesis inhibition (not ACCase)	Photo System II inhibition
Biological action:	Post-emergence herbicide	Post-emergence herbicide

### Description of the plant protection product

HBZ10 is an emulsifiable concentrate (EC) containing 125g/L ethofumesate and 125g/L phenmedipham.

**Table 3.2-2: Simplified table of currently registered uses and requested uses for the product code.**

Uses		Member State/GB	Requested rates	Comments / Other relevant details on GAPs
Crops	Targets			
Sugar beet (BEAVA)	Annual broadleaved weeds	PL, GB, NL, AT, BE, CZ	0.9-2.4L/ha	1.8-2.4L/ha for 3 spray programmes 0.9-1.2L/ha for 5/6 spray programmes
Fodder beet (BEAVC)	Annual broadleaved weeds	PL, GB, NL, AT, BE, CZ	0.9-2.4L/ha	1.8-2.4L/ha for 3 spray programmes 0.9-1.2L/ha for 5/6 spray programmes
Red beet (BEAVD)	Annual broadleaved weeds	PL, GB, NL, AT, BE, CZ	0.9-2.4L/ha	1.8-2.4L/ha for 3 spray programmes 0.9-1.2L/ha for 5/6 spray programmes
Chard (BEAVV)	Annual broadleaved weeds	PL, GB, NL, AT, BE, CZ	0.9-2.4L/ha	1.8-2.4L/ha for 3 spray programmes 0.9-1.2L/ha for 5/6 spray programmes

Uses		Member State/GB	Requested rates	Comments / Other relevant details on GAPS
Crops	Targets			
Yellow beetroot (BEAVL)	Annual broadleaved weeds	PL, GB, NL, AT, BE, CZ	0.9-2.4L/ha	1.8-2.4L/ha for 3 spray programmes 0.9-1.2L/ha for 5/6 spray programmes

Further details are in the table “All intended uses” in Part B - Section 0.

## Description of the target pests

**Table 3.2-3: Glossary of pests mentioned in the dossier.**

EPPO code	Scientific name	Common name
AMARE	<i>Amaranthus retroflexus</i>	Redroot amaranth
ATXPA	<i>Atriplex patula</i>	Common orache
BRSNW	<i>Brassica napus</i>	Volunteer oilseed rape
CAPBP	<i>Capsella bursa-pastoris</i>	Shepherd's purse
CHEAL	<i>Chenopodium album</i>	Fat hen
DIPTE	<i>Diploaxis tenuifolia</i>	Wall rocket
FUMOF	<i>Fumaria officinalis</i>	Fumitory
GALAP	<i>Galium aparine</i>	Cleavers
GERPU	<i>Geranium pusillum</i>	Small-flowered cranesbill
MATCH	<i>Matricaria chamomilla</i>	Scented mayweed
MATIN	<i>Tripleurospermum inodorum</i>	Scentless mayweed
MERAN	<i>Mercurialis annua</i>	Annual mercury
PAPRH	<i>Papaver rhoeas</i>	Common poppy
POLAV	<i>Polygonum aviculare</i>	Common knotgrass
POLCO	<i>Fallopia convolvulus</i>	Black knotweed
POLPE	<i>Persicaria maculosa</i>	Redshank
POLSS	<i>Polygonum sp.</i>	Polygonum species
RAPSR	<i>Raphanus sativus</i>	Small radish
SINAR	<i>Sinapis arvensis</i>	Charlock
SOLNI	<i>Solanum nigrum</i>	Black nightshade
SONAS	<i>Sonchus asper</i>	Sowthistle
STEME	<i>Stellaria media</i>	Chickweed
URTUR	<i>Urtica urens</i>	Small nettle
VERHE	<i>Veronica hederifolia</i>	Ivy-leaved speedwell
VERPE	<i>Veronica persica</i>	Common speedwell
VIOAR	<i>Viola arvensis</i>	Field pansy

Weeds in arable crops are known to reduce yields through competition for light, water and nutrients. They also cause shading and smothering of crop plants. In some cases, *e.g.* couch grass (*Elymus repens*), cleavers (*Galium aparine*) and bindweed (*Polygonum* species), they also make harvesting of crops more difficult. Weed management is therefore one of the key elements of most cropping systems.

### Major / minor status of pests

It is accepted that, of all the pests that promote damage or yield losses in worldwide commercial agriculture, weeds pose the biggest problem and cause the highest losses, estimated to be 34% of the potential attainable yield globally<sup>1</sup>.

It is not only that weeds compete for nutrients and other resources essential for growth and development of the crop, especially in cases where weeds have an extended germination period or the ability to grow above the crop canopy, but also the impact of green material on harvesting equipment, and contamination or other effects on the quality of beet yields, and increased costs (both financial and environmental) due to the need for tillage.

It is therefore considered appropriate that weeds are given ‘major’ pest status for the purposes of this submission.

### Major / minor status of crops

Table 3.2-4 presents the detail of the annual production area of sugar beet crops in 2020 per country in the Central registration zone and Great Britain. All concerned member states for this dossier are highlighted in bold.

**Table 3.2-4: Area of production of sugar beet crops in the Central registration zone and Great Britain in 2020**

Member state	‘000 hectares
<b>Austria</b>	26.32
<b>Belgium</b>	56.80
<b>Czech Republic</b>	59.68
Germany	386.00
<b>United Kingdom (including GB)</b>	<b>112.00</b>
Ireland	0.00
Luxembourg	0.00
Hungary	13.03
<b>Netherlands</b>	81.46
<b>Poland</b>	230.60
Romania	23.74
Slovenia	0.11
Slovakia	21.08

Source: Eurostat<sup>2</sup>

No recent data is widely available across the Central zone for other beet crops, but a study by Hucorne, 2012<sup>3</sup> recorded the following annual production for sugarbeet and other beet crops, as shown in Table 3.2-5

**Table 3.2-5: Area of production of beet crops in the Central registration zone and Great Britain in 2012**

Member state	Sugarbeet ‘000 hectares	Fodderbeet ‘000 hectares	Redbeet ‘000 hectares	Chard+Yellow beet* ‘000 hectares
Austria	42.7	0.3	0.2	0.4
Belgium	62.7	3.7	0.0	0.3
Czech Republic	54.9	0.8	0.0	0.0
Germany	376.0	4.3	1.4	7.3
United Kingdom (inc. GB)	122.2	0.0	1.8	33.1
Ireland	1.2	7.7	0.0	0.1

<sup>1</sup> Oerke, E.-C. 2006. Crop losses to pests. Journal of Agricultural Science 144:31-43

<sup>2</sup> <https://ec.europa.eu/eurostat/databrowser/view/tag00103/default/table?lang=en> Accessed 28th April 2021

<sup>3</sup> Hucorne, P. (2012) The actual distribution of crops in Europe, 12-18159, [Link](#)

Member state	Sugarbeet '000 hectares	Fodderbeet '000 hectares	Redbeet '000 hectares	Chard+Yellow beet* '000 hectares
Luxembourg	0.0	0.0	0.0	0.0
Hungary	24.9	0.3	0.2	0.0
Netherlands	76.0	0.3	0.4	0.3
Poland	219.3	28.3	12.6	3.7
Romania	26.5	21.5	0.7	0.1
Slovakia	18.3	1.1	0.0	0.0
Slovenia	4.7	0.8	0.2	0.0

\* detailed information for chard and yellow beet is not available; however, it is included within the classification of 'Other leafy and stalked vegetables', this group also includes other herb and salad crops.

The major/minor crop status of the different beet crops and uses in the concerned member states is summarised in Table 3.2-6 below, with reference to the EUMUDA database<sup>4</sup>.

No information is available for all beet crops in the Czech Republic, and beet crops which are not sugar beet in the majority of other countries; but given the large hectareage of production in the Czech Republic (see above), sugar beet is considered a major crop. For other beet crops, given the low hectareage of production, they are considered minor crops.

**Table 3.2-6: Major / minor status of intended uses (for GB and all cMS and zRMS)**

Crop and/or situation	Crop status		Pests or group of pests controlled	Pest status	
	Major	minor		Major	minor
Sugar beet (BEAVA)	AT, BE, CZ, PL, GB, NL	-	Annual broadleaved weeds	X	-
Fodder beet (BEAVC)	BE	AT, CZ, GB, NL, PL	Annual broadleaved weeds	X	-
Red beet (BEAVD)	■	BE, CZ, GB, NL, PL	Annual broadleaved weeds	X	-
Chard (BEAVV)	■	BE, CZ, GB, NL, PL	Annual broadleaved weeds	X	■
Yellow beet (BEAVL)	■	BE, CZ, GB, NL, PL	Annual broadleaved weeds	X	■

## Compliance with the Uniform Principles

The assessment was conducted according to the Uniform Principles.

## Information on trials submitted (3.1 Efficacy data)

**Table 3.2-7: Presentation of trials (efficacy trials, preliminary trials)**

Crops *	Targets*	Country	Years	Type of trial**	Number of trials (number of valid trials)		GEP, non-GEP, official***	Comments (any other relevant information)
					Maritime zone	North-East zone		
BEAVA	Annual broadleaved weeds	DE	2019	P	3 (3)	■	GEP	■
		FR	2019	P	3 (3)	■	GEP	■
		DE	2019	MED, E	2 (2)	■	GEP	■
		FR	2019	MED, E	2 (2)	■	GEP	■
		NL	2019	MED, E	1 (1)	■	GEP	■
		PL	2019	MED, E	■	1 (1)	GEP	■

<sup>4</sup> European Minor Uses Database, Online, <https://www.eumuda.eu/> Accessed 22<sup>nd</sup> September 2021



Crops *	Targets*	Country	Years	Type of trial**	Number of trials (number of valid trials)		GEP, non-GEP, official***	Comments (any other relevant information)
					Maritime zone	North-East zone		
		DE	2020	P, MED, E	2 (2)	1	GEP	1
		NL	2020	P, MED, E	2 (2)	1	GEP	1
		UK	2020	P, MED, E	2 (2)	1	GEP	1
		PL	2020	P, MED, E	1	3 (3)	GEP	1
TOTAL					17 (17)	4 (4)	-	1

\* According to the GAP table. Timing of the applications can be added if relevant (e.g. Pre-emergence vs post-emergence, spring vs autumn).

\*\* P = preliminary trial, MED = minimum effective dose, E = efficacy trial.

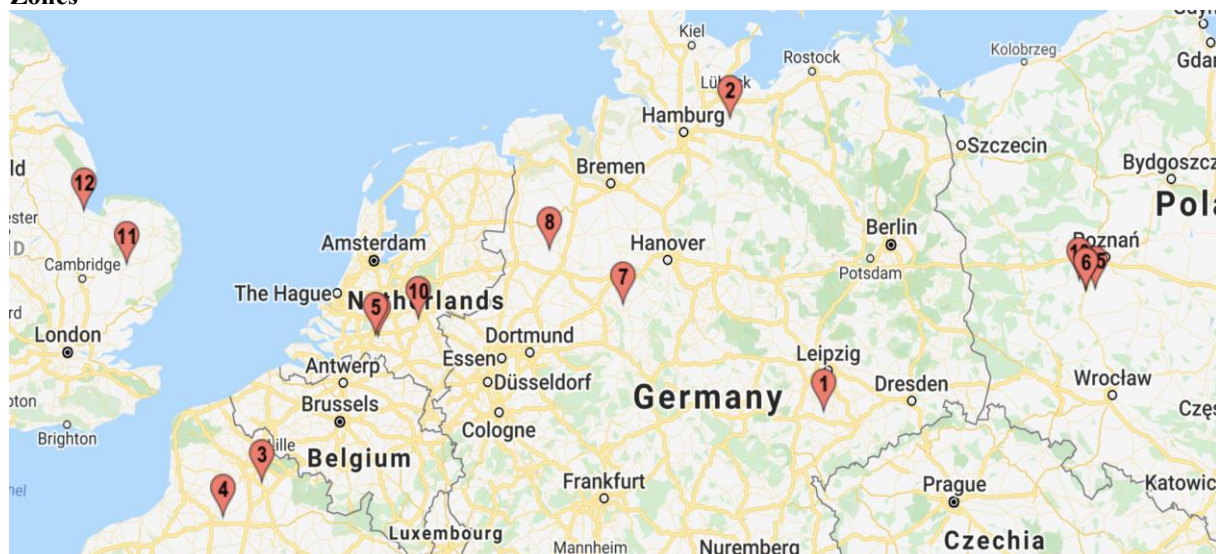
\*\*\* GEP: Good Experimental Practices. Official: carried out by a national official organisation.

Figure 3.2-1 below indicates the locations of the preliminary ratio-finding trials conducted in 2019.  
Figure 3.2-2 below indicates the locations of the formulation bridging/minimum effective dose/efficacy trials conducted in 2019 and 2020.

**Figure 3.2-1: Ratio-finding trial locations in the Maritime and North-East Zones**



**Figure 3.2-2: Minimum Effective Dose/efficacy/bridging trial locations in the Maritime/North-Eastern Zones**



**Table 3.2-8: Formulations included in efficacy trials reported in this document**

Reference standard	Country	Authorization number	Active substances	Formulation		Registered application rate*	Use rates	Number of applications	Grouped together as:
				Type	Conc of a.s.				
HBZ07	N/A	N/A	Ethofumesate Phenmedipham	EC	83 160	N/A	2.0	3	HBZ07
HBZ08	N/A	N/A	Ethofumesate Phenmedipham	EC	125 125	N/A	0.9- 2.4	Three applications of 1.8/2.4L/ha, six applications of 0.9/1.2L/ha	HBZ10
HBZ10	N/A	N/A	Ethofumesate Phenmedipham	EC	125 125	N/A	0.9- 2.4	Three applications of 1.8/2.4L/ha, five applications of 0.9/1.2L/ha	
Belvedere Duo	DE	024257-00	Ethofumesate Phenmedipham	SC	200 200	1.3	1.3	3 applications	E+P
Powertwin 400 SC + Olejan 85 EC (adjuvant)	PL	R21/2012	Ethofumesate Phenmedipham	SC	200 200	1.0	1.0	3 applications	
Betanal Tandem + Robbestar (adjuvant)	NL	15186 13797N	Ethofumesate Phenmedipham	SC	190 200	1.0-1.5	1.0- 1.5	One at 1.0L/ha + 1.0L/ha Robbestar, 2 at 1.5L/ha with 1.0L/ha Robbestar	
Belvedere Forte 400 SE	PL	R-568/2017d	Ethofumesate Phenmedipham Desmedipham	SE	100 100 100	1.0	1.0	3 applications	E+P+D
Betanal Booster	FR	2010349	Ethofumesate Phenmedipham Desmedipham	EC	112 91 71	1.5**	1.2, 1.3**	3 applications	

Reference standard	Country	Authorization number	Active substances	Formulation		Registered application rate*	Use rates	Number of applications	Grouped together as:
				Type	Conc of a.s.				
Betanal Expert	DE	024991-00	Phenmedipham Ethofumesate Desmedipham	EC	75 151 25	1.5	1.5	3 applications	E+P+D+L
Betanal MaxxPro	UK	MAPP15086	Desmediham Ethofumesate Lenacil Phenmedipham	OD	47 75 27 60	1.5	1.5	3 applications	
Powertwin + Goltix	NL	13185	Ethofumesate Phenmedipham	SC	200 200	1.0	1.0	3 applications	E+P+M
		1229	Metamitron	SC	700	0.5	0.5		

\*Products containing desmedipham are no longer authorised in the EU, but the authorisation numbers and recommended use rates were correct at the time of application.

\*\*The maximum total dose permitted was 4.0L/ha, with a maximum individual dose of 1.5L/ha. The product dose rate was therefore adapted based upon local practice for 3 applications.

Reference treatments are not direct comparisons of the use rates of ethofumesate and phenmedipham in the experimental products. However, they are representative weed control programmes using authorised products at their recommended rates, and are therefore a clear indication of the levels of control of key weeds that must be achieved if a novel product is to have value for growers. The reference product performance also allowed an assessment of trial data validity depending on if the reference product performed as expected

For clarity, reference products are grouped together according to the active substances in the products. Consequently all products containing ethofumesate and phenmedipham only are grouped together (as E+P), as are products containing ethofumesate, phenmedipham and desmedipham (E+P+D), ethofumesate, phenmedipham, desmedipham and lenacil (E+P+D+L) and ethofumesate, phenmedipham and metamitron (E+P+M). Details are summarised in Table 3.2-5 above.

In all trials the reference treatments performed as expected.

All efficacy trials were conducted in areas of commercial sugar beet, rather than specially-planted areas of crops. These trials are therefore truly representative of the performance of HBZ10 in the conditions for which it is intended.

Sites for efficacy trials were selected because of the high weed infection levels that were anticipated, based on the weed susceptibility of the crop cultivar, previous cropping *etc.*

In this submission, data are included from trials conducted in Germany, the Netherlands, Poland and the United Kingdom (Central European Zone) and France (Southern European Zone).

The use of data from France to support an application for approval in Great Britain and the Central and Southern Zones of the European Union is relevant for the following reasons:

- The climate in Northern France, where the trials took place, is comparable to that in countries such as the Netherlands, Germany and the United Kingdom. This is underlined by the comparable climatic zones detailed in EPPO Guideline PP 1/241.
- Within France, sugarbeet is generally only grown in the Maritime region of France<sup>5</sup>
- The agronomic factors influencing the sugar beet crop are similar in Northern France and the other countries of interest. This is indicated by the common planting dates and harvesting seen

<sup>5</sup> En région, Institut Technique de la Betterave (ITB). Online, <https://www.itbfr.org/en-region/>

in this series of trials. Crop rotations, cultivation methods, planting density and crop inputs such as herbicides are also very similar across the Maritime region.

- The biology and epidemiology of the weed species is the same in all regions of the EU.
- The weed incidence and the relative severity of infestation are similar in trials conducted in the Maritime parts of France, and Germany, the Netherlands and the United Kingdom.

Consequently, it is reasonable to regard the performance of products in the French trials as being indicative of their performance in Great Britain and the Central and Southern Zones of the European Union.

Data from Germany is also considered as fully supportive additional data for Poland, based on current national (Polish) guidance.

### 3.2.1 Preliminary tests (KCP 6.1)

A total programme of 15 replicated trials was conducted in France and Germany in 2019 and in Germany, UK, Netherlands and Poland in 2020, in order to address preliminary questions, including the ratio of active substances in the product and the composition of the final formulation.

Of these, six trials were for ratio confirmation, with a further nine trials bridging between two candidate formulations at the selected ratio.

#### Ratio justification

Ethofumesate and phenmedipham have been used for many years, so both actives are well understood.

Based upon a practical knowledge of effective doses of ethofumesate and phenmedipham, two products containing different ratios of the two active substances were tested.

The benefit of using a co-formulation lies in the added efficacy against key weed species from a single spray application leading to a likely reduction in the overall amount of herbicide applied and a reduction in the need to spray the crop twice at any given application timing. It is also useful in reducing the need to handle extra concentrated products, and acts as an anti-resistance tool, as both active substances have different modes of action and inherent resistance risk.

**Table 3.2.1-1: Details on ratio-finding trial methodology**

<b>Guidelines</b>	General guidelines	EPPO PP 1/152, PP 1/135, PP 1/181
	Specific guidelines	EPPO PP 1/52, PP 1/306
<b>Experimental design</b>	Plot design	RCBD (6)
	Plot size	15-24 m <sup>2</sup>
	Number of replications	4 (6)
<b>Crop</b>	Trials per crop	Sugar beet (6)
	Varieties per crop	Sugar beet: Ragoon (1), Papillon (1), Strauss (1), Epervier (1), Hannibal (1), Tisserin (1)
	Sowing period	Sugar beet: from March (3) to April (3)
<b>Application</b>	Crop stage (BBCH)* at application	Sugar beet: from BBCH 12 to BBCH 19
	Timing Weed stage at application	Post-emergence Broadleaved weeds (BBCH 10-16)
	Number of applications Intervals between applications	≥ 3 (6 trials) with intervals of 6-10 days
	Spray volumes	200 - 400 L/ha

<b>Assessment</b>	Assessment types	% of weed coverage, number of weeds/m <sup>2</sup> , % weed control relative to the untreated,
	Assessment dates	7 DAT, 14 DAT, 28 DAT +/- 3
<b>Other relevant information</b>	Soil type	Silty loam (3), Sandy silt loam (1), Clay loam (1), Silty clay loam (1)
	Natural / artificial infestation	All natural infestation
	Field / Greenhouse	All field trials

**Table 3.2.1-2: Efficacy of active substance components in HBZ07/HBZ08. Percentage of control of the different ratios at the final assessment timing (closure of crop rows)**

Target	Number of trials	Infestation of the untreated control (unit)		% control					
				HBZ07 166g a.s./ha ethofumesate + 320g a.s./ha phenmedipham		HBZ08 250g a.s./ha ethofumesate + 250g a.s./ha phenmedipham		Powertwin 250g a.s./ha ethofumesate + 250g a.s./ha phenmedipham	
		Mean	Min. & Max.	Mean	Min. & Max.	Mean	Min. & Max.	Mean	Min. & Max.
AMARE	1	66.7 pla/m <sup>2</sup>	-	93.33	-	90.67	-	0.00	-
CHEAL	4	26.2%GC 5.0 pla/m <sup>2</sup>	5.6-32.1 -	97.42 99.93	90-100	96.67	90-100	69.17	13.33-100
DIPTE	1	6 pla/m <sup>2</sup>	-	100.00	-	100.00	-	100.00	-
FUMOF	1	20%GC	-	88.00	-	89.67	-	0.00	-
GALAP	1	17.1%GC	-	95.00	-	93.33	-	92.33	-
MATCH	1	20 pl/m <sup>2</sup>	-	96.33	-	96.33	-	80.00	-
POLAV	1	2%GC	-	90.00	-	96.67	-	90.00	-
POLCO	3	48.9%GC	41.7-55.0	85.22	65-98	94.11	93.0-96.33	55.00	10.0-93.33
VIOAR	3	40.0 37.5%GC 5.0 pla/m <sup>2</sup>	10-65 5.0-65.0	93.89	86.67-100	97.78	93.33-100	84.45	70-96.67

The performance of HBZ07 and HBZ08 are broadly similar, although for key weeds like POLAV, POLCO and VIOAR the control levels achieved by HBZ07 are less consistent than those achieved by HBZ08. Consequently, the applicant decided to continue the development of HBZ08.

In six trials, HBZ07 at 166g a.s./ha ethofumesate + 320g a.s./ha phenmedipham) was compared to HBZ08 at 250g a.s./ha ethofumesate + 250g a.s./ha phenmedipham against annual broadleaved weeds. According to the presented results, the ratio in HBZ08 provided better control than the other ratio against key weeds, particularly CHEAL and POLCO.

## Bridging trials

Nine trials were conducted to demonstrate bridging between two candidate formulations at the selected ratio.

Once the optimum ratio had been determined the formulation recipe for HBZ08 was further developed and optimized. This optimization included a change in the emulsifier/surfactant system. According to EPPO Guideline PP 1/307(2), this is classified as a biologically significant change in formulation.

**Table 3.2.1-3: Details on bridging trial methodology**

<b>Guidelines</b>	General guidelines	EPPO PP 1/152, PP 1/135, PP 1/181
	Specific guidelines	EPPO PP 1/52
<b>Experimental design</b>	Plot design	RCBD (9)
	Plot size	<del>18</del> 12-24 m <sup>2</sup>
	Number of replications	4 (9)
<b>Crop</b>	Trials per crop	Sugar beet (9)
	Varieties per crop	Sugar beet: Advana (1), Bravura (1), Bryza (1), BTS 3750 (1), Cantona KWS (1), Force (1), Haydyn (1), Tapir (1) , Urselina KWS (1)
	Sowing period	Sugar beet: from March (3) to April (6)
<b>Application</b>	Crop stage (BBCH)* at application	Sugar beet: from BBCH <del>14</del> 19
	Timing Weed stage at application	Post-emergence Broadleaved weeds (BBCH 10-16)
	Number of applications Intervals between applications	3 (9 trials) with intervals of 7-26 days 5 (9 trials) with intervals of 4-26 days Note: all trials included three and five application programmes
	Spray volumes	200 – <del>300</del> 400 L/ha
<b>Assessment</b>	Assessment types	% of weed coverage, number of weeds/m <sup>2</sup> , % weed control relative to the untreated,
	Assessment dates	7 DAT, 14 DAT, 28 DAT +/- 3
<b>Other relevant information</b>	Soil type	Humic sand (1), Sand (2), Silty loam (1), Sandy loam (3), Sandy silt loam (2)
	Natural / artificial infestation	All natural infestation
	Field / Greenhouse	All field trials

Bridging trials were intended to compare the two likely use patterns for HBZ10, *i.e.* three applications of 2.4L/ha or five applications of 1.2L/ha. All trials included a reference treatment in order to validate the trials. As the reference products performed as expected no further comment will be made in this section.

**Table 3.2.1-4: Bridging of HBZ08/HBZ10. Percentage of control of the different ratios at the final assessment timing (closure of crop rows, 3 applications)**

Target	Grouping	Number of trials	Infestation of the untreated control (unit)			% control			
						HBZ08 2.4L/ha 3 applications		HBZ10 2.4L/ha 3 applications	
AMARE	NORTH-EASTERN	1	6	-	pla/m2	61.25	-	83.75	-
ATXPA	MARITIME	1	4.8	-	%GC	80.00	-	88.75	-
CAPBP	MARITIME	1	7.5	-	pla/m2	80.00 70.00		88.75 16.3	
CHEAL	MARITIME	6	3.1 13.5 34.8	3.0-3.3 37.5 6.3-101.0	%GC pla/m2	90.30 92.3	78.75-80 100	89.66 91.88	76.72-88.75 80.0-100
	NORTH-EASTERN	3	8.7	7.0-10.0	pla/m2	87.92	85-90	85.00	81.25-88.75
	ALL	9	3.1 23.6	3.0-3.3 6.3-101.0	%GC pla/m2	89.50 90.85	78.75-100	88.11 89.6	76.72-80.0-100
GALAP	NORTH-EASTERN	1	7	-	pla/m2	83.75	-	82.50	-
GERPU	NORTH-EASTERN	1	8	-	pla/m2	93.75	-	86.25	-
MATCH	MARITIME	1	19.3	-	%GC	37.50	-	37.50	-
MATIN	NORTH-EASTERN	1	6	-	pla/m2	100.00	-	100.00	-
PAPRH	NORTH-EASTERN	1	6	-	pla/m2	100.00	-	96.25	-
POLAV	MARITIME	1	6.5	-	%GC	99.84 100	-	99.84 100	-
	NORTH-EASTERN	1	5.0	-	pla/m2	86.25	-	81.25	-
	ALL	2	6.5 5.0	- -	%GC pla/m2	93.05 93.13	86.25- 99.84 100	90.55 90.63	81.25-99.84 100
POLCO	MARITIME	3	13.8 37.0	- 21.0-53.0	%GC pla/m2	96.50	90.75-100	93.33	85-100
	NORTH-EASTERN	2	7.5	6.0-9.0	pla/m2	98.13	96.25-100	92.50	87.5-97.5
	ALL	5	13.8 5.0 22.3	- 6.0-53.0	%GC pla/m2	97.15	90.75-100	93.00	85-100
RAPSR	MARITIME	1	60	-	%GC	91.25	-	91.25	-
SINAR	MARITIME	1	50	-	%GC	50.00	-	70.00	-
SOLNI	MARITIME	1	6.8	-	pla/m2	100.00	-	100.00	-
STEME	MARITIME	2	32.5 7.3	- 21.0-53.0	%GC pla/m2	100.00	100-100	96.25	92.5-100
	NORTH-EASTERN	1	8.0	6.0-9.0	pla/m2	100.00	-	100.00	-
	ALL	3	32.5 7.8 7.7	- 6.0-53.0 7.3-8.0	%GC pla/m2	100.00	100-100	97.50	92.5-100
URTUR	MARITIME	1	90.3	-	pla/m2	75.00	-	97.50	-
VERHE	MARITIME	1	10	-	pla/m2	87.97 99.5	-	83.36 95.0	-
VERPE	MARITIME	1	82.3	-	pla/m2	85.00	-	100.00	-
VIOAR	NORTH-EASTERN	1	7	-	pla/m2	88.75	-	86.25	-
ALL TRIALS/ALL WEEDS						87.69	37.5-100	86.80	16.25-100

**Table 3.2.1-5: Bridging of HBZ08/HBZ10. Percentage of control of the different ratios at the final assessment timing (closure of crop rows, 5 applications)**

Target	Grouping	Number of trials	Infestation of the untreated control (unit)			% control			
						HBZ08 1.2L/ha 5 applica- tions		HBZ10 1.2L/ha 5 applica- tions	
			Mean	Min. & Max.	Unit	Mean	Min. & Max.	Mean	Min. & Max.
AMARE	NORTH-EAST <sup>ERN</sup>	1	6	-	pla/m2	83.75	-	96.25	-
ATXPA	MARITIME	1	4.8	-	%GC	90.00	-	93.75	-
CAPBP	MARITIME	1	7.5	-	pla/m2	90.00		<del>93.75</del> 90.00	
CHEAL	MARITIME	6	<del>3.1</del> 20.3 34.8	3.0- <del>3.3</del> 37.5 6.3-101.0	%GC pla/m2	<del>95.33</del> 95.77	<del>90</del> 91.3-100	<del>95.54</del> 97.22	86.25- <del>96.25</del> 100
	NORTH-EAST <sup>ERN</sup>	3	8.7	7.0-10.0	pla/m2	90.83	86.25-93.75	92.08	87.5-96.25
	ALL	9	<del>3.1</del> 20.3 23.6	3.0- <del>3.3</del> 37.5 6.3-101.0	%GC pla/m2	<del>93.83</del> 94.13	86.25-100	<del>94.39</del> 95.51	86.25-100
GALAP	NORTH-EAST <sup>ERN</sup>	1	7	-	pla/m2	87.50	-	95.00	-
GERPU	NORTH-EAST <sup>ERN</sup>	1	8	-	pla/m2	100.00	-	97.50	-
MATCH	MARITIME	1	19.3	-	%GC	35.00	-	35.00	-
MATIN	NORTH-EAST <sup>ERN</sup>	1	6	-	pla/m2	100.00	-	100.00	-
PAPRH	NORTH-EAST <sup>ERN</sup>	1	6	-	pla/m2	100.00	-	100.00	-
POLAV	MARITIME	1	6.5	-	%GC	100.00	-	<del>99.85</del> 100	-
	NORTH-EAST <sup>ERN</sup>	1	5.0	-	pla/m2	96.25	-	96.25	-
	ALL	2	6.5 5.0	- -	%GC pla/m2	98.13	96.25-100	98.05	96.25- <del>99.85</del> 100
POLCO	MARITIME	3	13.8 37.0	- 21.0-53.0	%GC pla/m2	97.67	96.25-100	99- <del>33</del>	98-100
	NORTH-EAST <sup>ERN</sup>	2	7.5	6.0-9.0	pla/m2	96.88	93.75-100	96.25	93.75-98.75
	ALL	5	13.8 5.0	- 6.0-53.0	%GC pla/m2	97.35	93.75-100	98.10	93.75-100
RAPSR	MARITIME	1	60	-	%GC	90.00	-	93.75	-
SINAR	MARITIME	1	50	-	%GC	50.00	-	50.00	-
SOLNI	MARITIME	1	6.8	-	pla/m2	98.75	-	100.00	-
STEME	MARITIME	2	32.5 7.3	- <del>21.0-53.0</del>	%GC pla/m2	100.00	100- <del>98.75</del> 100	97.50	95-100
	NORTH-EAST <sup>ERN</sup>	1	8.0	<del>6.0-9.0</del>	pla/m2	100.00	-	100.00	-



Target	Grouping	Number of trials	Infestation of the untreated control (unit)			% control			
						HBZ08 1.2L/ha 5 applica- tions		HBZ10 1.2L/ha 5 applica- tions	
			Mean	Min. & Max.	Unit	Mean	Min. & Max.	Mean	Min. & Max.
	ALL	3	32.5 <del>7.8</del> 7.7	- <del>6.0-53.0</del> 7.3-8.0	%GC pla/m2	100.00	100-100	98.33	95-100
URTUR	MARITIME	1	90.3	-	pla/m2	59.50	-	80.00	-
VERHE	MARITIME	1	10	-	pla/m2	<del>90.00</del> 100	-	<del>90.00</del> 100	-
VERPE	MARITIME	1	82.3	-	pla/m2	100.00	-	100.00	-
VIOAR	NORTH- EASTERN	1	7	-	pla/m2	95.00	-	95.00	-
ALL TRIALS/ALL WEEDS						91.09	35-100	92.57	35-100

### Summary and conclusions on the preliminary trials

There is no clear difference in performance between HBZ08 and HBZ10, on any weed species or at either of the two rates tested. Overall means for key weeds such as CHEAL and POLCO were ~~89.5~~ 90.9% for HBZ08 at 2.4L/ha x3, compared to ~~88.1~~ 89.6% for HBZ10 at the same rate. When used at 1.2L/ha x5, the overall mean for the same weed was ~~92.8~~ 94.1% for HBZ08 and ~~94.4~~ 95.5% for HBZ10. Similarly, for POLCO the mean at the low rate was 97.2% for HBZ08 at the 2.4L/ha x3 rate and 93.0% for HBZ10 at the same rate; at the 1.2L/ha x 5 use rate HBZ08 achieved 97.4% control while HBZ10 achieved 98.1%.

There was no clear difference in performance which could be related to the location of the trials in the Maritime or North-Eastern zones. Mean levels of control achieved on CHEAL at the HBZ08 2.4L/ha x 3 rate were ~~90.3~~ 92.3% in the Maritime zone, compared to 87.9% in the North-Eastern zone. The same rate of HBZ10 achieved ~~89.7~~ 91.88% control in the Maritime zone and 85.0% in the North-Eastern zone.

Due to the clear comparability of the two formulations, from this point onwards data for HBZ08 will be presented in the same data columns as HBZ10.

### Comments of zRMS:

15 preliminary trials were conducted to compare effectiveness of three formulations (HBZ10, HBZ08 and HBZ07). The results from 9 bridging trials have been submitted to show comparability between HBZ10 and HBZ08, separate for 3 and 5 applications. The limited number of trials (only 1 trial) was carried out for most of weeds. Taking into account of total trials from MAR and NE EPPO climatic zone, it can be concluded that both formulations are comparable. In the scenario of 3 applications, the similar level of effectiveness is visible in case of CHEAL (90,85% and 89,6%), POLAV (93,13% and 90,63%), POLCO (97,15% and 93%) and STEME (100% and 97,5%). In the scenario of 5 applications, the similar level of effectiveness is visible in case of CHEAL (94,13% and 95,51%), POLAV (98,13% and 98,05%), POLCO (97,35% and 98,10%) and STEME (100% and 98,33%).

Moreover, 6 trials were carried out to ratio justification between two products of HBZ08 and HBZ07. The trial results show that the ratio of 250 g a.s./ha (ethofumesate) and 250 g a.s./ha (phenmedipham) of HBZ08 achieved slightly higher effectiveness compare to other formulation. The differences were detected in control of POLCO and VIOAR.

### 3.2.2 Minimum effective dose tests (KCP 6.2)

A total programme of 15 replicated trials was conducted in France, Poland, the Netherlands, the United Kingdom and Germany in 2019.

Ethofumesate and phenmedipham have been used for many years, so both actives are well understood.

Based upon a practical knowledge of effective doses of ethofumesate and phenmedipham likely dose rates were included in a number of trials. For control programmes including three applications, these were 1.2, 1.8 and 2.4L/ha (0.5N, 0.75N and 1N).

For programmes with 5-6 applications these rates were 0.9 and 1.2L/ha (0.75N and 1N). Results from these trials are grouped together. This is appropriate, as the growers may not need the full series of six applications, but nevertheless will require an understanding of the levels of control achieved from the product.

Efficacy assessments are disregarded if the weed population was less than 5 plants per square metre, or 2% ground cover. The key efficacy assessment is the final rating, conducted when the crop had closed in the rows (c. BBCH 39).

**Table 3.2.2-1: Details on MED trial methodology**

<b>Guidelines</b>	General guidelines	EPPO PP 1/152, PP 1/135, PP 1/181
	Specific guidelines	EPPO PP 1/52
<b>Experimental design</b>	Plot design	RCBD (15)
	Plot size	12-24 m <sup>2</sup>
	Number of replications	4 (15)
<b>Crop</b>	Trials per crop	Sugar beet (15)
	Varieties per crop	Sugar beet: Advana (1), Annnabella (1), Annasora (1), Beetle (1), Bravura (1) Bryza (2), BTS 3750 (1), Cantona KWS (1), Force (1), Haydyn (1), Marley (1), Tapir (1), Urselena Urselina KWS (2)
	Sowing period	Sugar beet: from March (6) to April (9)
<b>Application</b>	Crop stage (BBCH)* at application	Sugar beet: from BBCH 10 to BBCH 18
	Timing Weed stage at application	Post-emergence Broadleaved weeds (BBCH 10-12)
	Number of applications Intervals between applications	3 (15 trials) with intervals of 7-26 days 5 (9 trials) with intervals of 4-26 days 6 (6 trials) with intervals of 4-6 days Note: all trials included three and five/six application programmes
	Spray volumes	200 – 300 400 L/ha
<b>Assessment</b>	Assessment types	% of weed coverage, number of weeds/m <sup>2</sup> , % weed control relative to the untreated,
	Assessment dates	7 DAT, 14 DAT, 28 DAT +/- 3
<b>Other relevant information</b>	Soil type	Humic sand (1), Sand (3), Sandy loam (5), Sandy silt loam (1), Silt loam (4), Silty clay loam (1)
	Natural / artificial infestation	All natural infestation
	Field / Greenhouse	All field trials

### 3.2.2.1 Minimum effective dose tests, three applications

#### Control of CHEAL in sugar beet, three applications

**Table 3.2.2.1-1: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on CHEAL at the final assessment**

Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY, 3 RATES	4 trials	25.2 13.5	5-48 -	%GC pla/m2	97.44	92.5-100	96.06	91.5-99.0	97.69	93.5-100
NORTH-EAST ORTHOGONAL SUMMARY, 3 RATES	1 trial	7.0	-	pla/m2	60.00	-	81.25	-	83.75	-
ALL ORTHOGONAL SUMMARY, 3 RATES	5 trials	25.2 10.3	5-48 7.0- 13.5	%GC pla/m2	89.95	60-100	93.10	81.25-99	94.90	83.75- 100
MARITIME ORTHOGONAL SUMMARY, 2 RATES	6 trials	3.2 20.3  34.8	3.0- 3.25 37.5 6.3- 23.8 101	%GC  pla/m2	-	-	81.75 83.56	68.75-100 98.8	89.66 91.88	76.72 80.0-100
NORTH-EAST ORTHOGONAL SUMMARY, 2 RATES	3 trials	8.7	7.0- 10.0	pla/m2	-	-	81.25	76.25-87.5	85.00	81.25- 88.75
ALL ORTHOGONAL SUMMARY, 2 RATES	9 trials	3.2 20.3  23.6	3.0- 3.25 37.5 6.3- 23.8 101	%GC  pla/m2	-	-	81.59 82.79	68.75-100 98.8	88.11 89.6	76.72 80.0-100
ALL ORTHOGONAL SUMMARY, ALL RATES	14 trials	16.4 23.2 20.6	3.0- 48.0 6.3- 23.8 101	%GC pla/m2	89.95	60-100	85.70 86.48	68.75-100 99.0	90.53 91.5	76.72 80.0-100

At the time of the final assessment, after three applications, the dose of 1.2 L/ha of HBZ10 provided an inferior control compared to the dose of 1.8 L/ha of HBZ10 in one of five trials. The dose of 1.8 L/ha of HBZ10 provided an inferior control compared to the dose of 2.4 L/ha of HBZ10 in one of fourteen trials. The minimum effective dose of HBZ10 for effective control of CHEAL at three applications is 2.4L/ha.

### Control of GALAP in sugar beet, three applications

**Table 3.2.2.1-2: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on GALAP**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY, 3 RATES	2 trials	34.0	%GC 15-53	%GC	48.75	0-97.5	99.38	98.75-100	99.88	99.75-100
NORTH-EASTERN ORTHOGONAL SUMMARY, 3 RATES	1 trial	5	pla/m2	pla/m2	87.50	-	100.00	-	100.00	-
NORTH-EASTERN ORTHOGONAL SUMMARY, 2 RATES	1 trial	7	pla/m2	pla/m2	-	-	73.75	-	82.50	-
ALL ORTHOGONAL SUMMARY, 3 RATES	3 trials	34.0	%GC 15-53	%GC	61.67	0-97.5	99.58	98.75-100	99.92	99.75-100
		5	pla/m2	pla/m2						
ALL OVERALL SUMMARY ALL RATES	4 trials	34.0	%GC 15-53	%GC	61.67	0-97.5	93.13	73.75-100	95.56	82.5-100
		6.0	pla/m2 5-7	pla/m2						

At the time of the final assessment, after three applications, the dose of 1.2 L/ha of HBZ10 provided an inferior control compared to the dose of 1.8 L/ha of HBZ10 in two out of three trials. The dose of 1.8 L/ha of HBZ10 provided comparable control to the dose of 2.4 L/ha of HBZ10 in four trials, but greater variability. The minimum effective dose of HBZ10 for effective control of GALAP at three applications is 2.4L/ha.

### Control of MATCH in sugar beet, three applications

**Table 3.2.2.1-3: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on MATCH**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY, 3 RATES	2 trials	19.0	2.0-36.0	%GC	99.00	90-99	99.00 99.5	99-100	99.00 99.5	99-100
MARITIME ORTHOGONAL SUMMARY, 2 RATES	1 trial	19.3	-	-	-	-	35.00	-	37.50	-
ALL	3 trials	19.1	2.0-36.0	%GC	94.50	90-99	78.00	35-100	78.83	37.5-100

At the time of the final assessment, after three applications, the dose of 1.2 L/ha of HBZ10 provided an inferior control to the dose of 1.8 L/ha of HBZ10 in one out of two trials. The dose of 1.8 L/ha of HBZ10 provided comparable control to the dose of 2.4 L/ha of HBZ10 in three trials, but greater variability. In one trial in which only the 1.8 and 2.4L/ha rates were tested, no statistically significant dif-

ference between the experimental products were observed, although control was poor from all treatments, probably due to the high weed population (19% ground cover). Due to the levels of control achieved, the minimum effective dose of HBZ10 for effective control of MATCH at three applications is 2.4L/ha.

### Control of POLAV in sugar beet, three applications

**Table 3.2.2.1-5: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on POLAV**

Grouping *	Number of trials	Infestation of the un- treated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY, 3 RATES	3 trials	7.0 5.8	5.0-9.0 -	% GC pla/m2	81.4	50.0-100.0	92.3	81.3-100.0	93.8	85.0-100.0
MARITIME ORTHOGONAL SUMMARY, 2 RATES	1 trial	<del>5.8</del> 6.5	-	pla/m2	-	-	100.0	-	<del>99.8</del> 100.0	-
NORTH-EASTERN ORTHOGONAL SUMMARY, 2 RATES	1 trial	<del>6.5</del> 5.0	-	<del>% GC</del> pla/m2	-	-	77.5	-	81.3	-
ALL ORTHOGONAL SUMMARY, 2 RATES	<del>1 trial</del> 2 trials	<del>6.5</del> 5.0 5.8	5.0-6.5 -	<del>% GC</del> pla/m2	-	-	88.8	77.5-100	90.6	81.3-100
ALL	5 trials	<del>6.8</del> 7.0 5.4 5.8	5.0-9.0 5.0-5.8 6.5	% GC pla/m2	81.4	50.0-100.0	90.9	77.5-100.0	92.5	81.3-100.0

At the time of the final assessment, after three applications, the dose of 1.2 L/ha of HBZ10 provided an inferior control to the dose of 1.8 L/ha of HBZ10 in one out of three trials. The dose of 1.8 L/ha of HBZ10 provided comparable control to the dose of 2.4 L/ha of HBZ10 in five trials, but greater variability. Due to the levels of control achieved, the minimum effective dose of HBZ10 for effective control of POLAV at three applications is 2.4L/ha.

### Control of POLCO in sugar beet, three applications

**Table 3.2.2.1-6: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on POLCO**

Grouping *	Number of trials	Infestation of the un- treated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY, 3 RATES	3 trials	25.7	6.2-40.00	% GC	62.25	0-95	97.42	95-100	97.42	95.5-98.75

Grouping *	Number of trials	Infestation of the un- treated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME OR- THOGONAL SUM- MARY, 2 RATES	3 trials	13.8 37.0	- 21.0- 53.0	% GC pla/m2	-	-	89.88	75-99.65	93.40	85-100.19
NORTH-EASTERN ORTHOGONAL SUMMARY, 3 RATES	1 trial	8.0	-	pla/m2	78.75	-	75.00	-	82.50	-
NORTH-EASTERN ORTHOGONAL SUMMARY, 2 RATES	2 trials	7.5	6.0-9.0	pla/m2	-	-	82.50	68.75- 96.25	92.50	87.5-97.5
ALL ORTHOGONAL SUMMARY, 3 RATES	4 trials	25.7 8	6.2- 40.00 -	% GC pla/m2	66.38	0-95	91.81	75-100	93.69	82.5-98.75
ALL ORTHOGONAL SUMMARY, 2 RATES	5 trials	13.8 22.3	- 6.0-53.0	% GC pla/m2	-	-	86.93	68.75- 99.65	93.04	85-100.19
ALL	9 trials	22.8 19.4	6.2- 40.00 6.0-53.0	% GC pla/m2	66.38	0-95	89.10	68.75-100	93.33	82.5- 100.19

At the time of the final assessment, after three applications, the dose of 1.2 L/ha of HBZ10 provided an inferior control to the dose of 1.8 L/ha of HBZ10 in one out of four trials. The dose of 1.8 L/ha of HBZ10 an inferior control to the dose of 2.4 L/ha of HBZ10 in one out of nine trials. The minimum effective dose of HBZ10 for effective control of POLCO at three applications is 2.4L/ha.

### Control of SOLNI in sugar beet, three applications

**Table 3.2.2.1-7: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on SOLNI**

Grouping *	Number of trials	Infestation of the untreat- ed control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Unit	Range	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY, 3 RATES	2 trials	5 6.8	%GC pla/m2	- -	90.88	90.0-97.8 91.8	94.63	94.3-95.0	97.50	95.0- 100.0
MARITIME OR- THOGONAL SUM- MARY, 2 RATES	1 trial	6.8	pla/m2	-	-	-	100.00	100.00	100.00	100.00
ALL	3 trials	5 6.8	%GC pla/m2	- -	90.88	90.0-97.8	96.42	94.3-100.0	98.33	95.0- 100.0

At the time of the final assessment, after three applications, the dose of 1.2 L/ha of HBZ10 provided

an inferior control to the dose of 1.8 L/ha of HBZ10 in one out of two trials. The dose of 1.8 L/ha of HBZ10 provided comparable control to the dose of 2.4 L/ha of HBZ10 in three trials, but greater variability. The minimum effective dose of HBZ10 for effective control of SOLNI at three applications is 2.4L/ha.

### Control of STEME in sugar beet, three applications

**Table 3.2.2.1-8: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on STEME**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08					
					1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MARITIME ORTHOGONAL SUMMARY 2 RATES	2 trials	32.5 7.3	- -	%GC pla/m2	-	-	98.75	97.5- 100.0	96.25	92.5-100.0
NORTH-EASTERN ORTHOGONAL SUMMARY 2 RATES	1 trial	8	-	pla/m2	-	-	100.00	100.00	100.00	100.00
ALL	3 trials	32.5 7.6	- 7.3-8.0	%GC pla/m2	-	-	99.17	97.5- 100.0	97.50	92.5- 100.0

At the time of the final assessment, after three applications, the dose of 1.8 L/ha of HBZ10 provided comparable control to the dose of 2.4 L/ha of HBZ10 in three trials. Due to the high levels of control achieved, the minimum effective dose of HBZ10 for effective control of STEME at three applications is 1.8L/ha.

### Control of other weeds in sugar beet, three applications

**Table 3.2.2.1-9: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 50% and 75% dose rates on other species**

Species	Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08					
						1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
			Mean	Unit	Min & Max	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
AMARE	MARITIME	1 trial	5	%GC	-	91.25	-	95.25	-	95.00	-
	NORTH-EASTERN	1 trial	6	pla/m2	-	-	-	78.75	-	83.75	-
	ALL	2 trials	5 6	%GC pla/m2	-	91.25	-	87.00	78.8-95.3	89.38	83.8- 95.0
ATXPA	MARITIME	1 trial	4.8	%GC	-	-	-	67.50	-	88.75	-
BRSNW	MARITIME	1 trial	9	%GC	-	20.00	-	20.00	-	20.00	-
CAPBP	MARITIME	1 trial	10	%GC	-	99.00	-	99.00	-	99.00	-
	MARITIME	1 trial	7.5	pla/m2	-	-	-	8.75	-	16.25	-
	ALL	2 trials	10.0 7.5	%GC pla/m2	-	99.0	-	53.88	8.75-99.0	57.63	16.3- 99.0
FUMOF	MARITIME	1 trial	6.2	%GC	-	93.00	-	92.75	-	93.50	-
GERPU	NORTH-EASTERN	1 trial	8	pla/m2	-	-	-	81.25	-	86.25	-

Species	Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08					
						1.2L/ha (50% of full rate)		1.8L/ha (75% of full rate)		2.4L/ha (Full rate)	
			Mean	Unit	Min & Max	Mean	Min & Max	Mean	Min & Max	Mean	Min & Max
MATIN	NORTH-EASTERN	1 trial	6	pla/m2	-	-	-	90.00	-	100.00	-
MERAN	MARITIME	1 trial	22.5	%GC	-	89.25	-	91.00	-	93.00	-
PAPRH	NORTH-EASTERN	1 trial	6	pla/m2	-	-	-	96.25	-	96.25	-
POLPE	NORTH-EASTERN	1 trial	6	pla/m2	-	96.25	-	97.50	-	100.00	-
RAPSR	MARITIME	1 trial	60	%GC	-	-	-	85.00	-	91.25	-
SINAR	MARITIME	1 trial	50	%GC	-	-	-	45.00	-	70.00	-
SONAS	MARITIME	1 trial	4	%GC	-	99.75	-	99.50	-	100.00	-
URTUR	MARITIME	1 trial	90.3	pla/m2	±	-	-	80.00	-	97.50	-
VERHE	MARITIME	1 trial	10.0	pla/m2	±	-	-	85.39 97.5	-	83.36 95.0	-
VERPE	MARITIME	1 trial	82.3	pla/m2	±	-	-	97.50	-	100.00	-
	NORTH-EASTERN	1 trial	6	pla/m2	±	98.75	-	100.00	-	100.00	-
	ALL	2 trials	44.2	pla/m2	6.0-82.3	98.75	-	98.75	97.5-100.0	100.00	100.0-100.0
VIOAR	MARITIME	1 trial	26	%GC	-	100.00	-	100.00	-	100.00	-
	NORTH-EASTERN	1 trial	7	pla/m2	-	-	-	63.75	-	86.25	-
	ALL	2 trials	26	%GC	-	100.00	-	81.88	63.8-100.0	93.13	86.3-100.0
			7	pla/m2	-						

Where there are fewer data points for each species, the minimum effective dose is determined by the levels of control achieved. Although control of POLPE was good in one trial, it would be logical to group this species with POLAV and POLCO, and to use the 2.4L/ha rate. Use rates are summarised in Table 3.2.2.1-10 below, with colours allocated according to the SANCO classification from Table 3.2.2.1-10.

**Table 3.2.2.1-10: Weed control data in summary form –means of % control of broadleaved weeds at final assessment after three applications**

Weed Code	1.2L/ha	1.8L/ha	No of trials where 1.2L/ha is >, <, = to 1.8L/ha	2.4L/ha	No of trials where 1.8L/ha is >, <, = to 2.4L/ha	Recommended use rate
AMARE	91.25	87.00	1=	89.38	2=	2.4L/ha
ATXPA	-	67.50	-	88.75	1<	2.4L/ha
BRSNW	20.00	20.00	1=	20.00	1=	2.4L/ha
CAPBP	99.0	53.88	-	57.63	2=	2.4L/ha
CHEAL	89.95	85.70	1<, 4=	90.53	1<, 13=	2.4L/ha
FUMOF	93.00	92.75	1=	93.50	1=	2.4L/ha
GALAP	61.67	93.13	2<, 1=	95.56	4=	2.4L/ha
GERPU	-	81.25	-	86.25	1=	2.4L/ha
MATCH	94.50	78.00	1<, 1=	78.83	3=	2.4L/ha
MATIN	-	90.00	-	100.00	1<	2.4L/ha
MERAN	89.25	91.00	1=	93.00	1=	2.4L/ha
PAPRH	-	96.25	-	96.25	1=	1.8L/ha
POLAV	81.42	90.86	1<, 2=	92.47	5=	2.4L/ha
POLCO	66.38	89.10	1<, 4=	93.33	1<, 8=	2.4L/ha
POLPE	96.25	97.50	1=	100.00	1=	2.4L/ha



RAPSR	-	85.00	-	91.25	1=	2.4L/ha
SINAR	-	45.00	-	70.00	1<	2.4L/ha
SOLNI	90.88	96.42	1<, 1=	98.33	3=	1.8L/ha
SONAS	99.75	99.50	1=	100.00	1=	1.8L/ha
STEME	-	97.50 99.17	-	98.33 97.50	3=	1.8L/ha
URTUR	-	80.00	-	97.50	1=	2.4L/ha
VERHE	-	85.39	-	83.36	1=	2.4L/ha
VERPE	98.75	98.75	1=	100.00	2=	1.8L/ha
VIOAR	100.00	81.88	1=	93.13	1<, 1=	2.4L/ha

**Table 3.2.2.1-11: SANCO/10055/2013 Rev. 4 weed control level classification**

Efficacy %	Efficacy level	Susceptibility of weed species
95-100%	Very high	Very Highly susceptible (HS)
85-94.9%	High	Susceptible (S)
70-84.9%	Medium	Moderately susceptible (MS)
50-69.9%	Low	Moderately tolerant (MT)
<50% 0-49.9%	Not sufficient	Tolerant (T)
0%	No control	-

#### Comments of zRMS:

15 efficacy trials were conducted to determine the minimum effective dose to control of annual dicotyledonous weeds at 3 applications of HBZ10. The applicant has submitted the summary for major weed species in sugar beet. The part of weeds were noted in only 1 trial.

In the Maritime EPPo climatic zone, 11 efficacy trials were carried out in Germany, Netherlands, France and United Kingdom. The dose response was visible for GALAP, POLAV and POLCO. The dose rate of 1,2 l/ha was not sufficient to control of these species. The high efficacy level was achieved after application at 1,8 l/ha in case of GALAP, POLAV, POLCO, SOLNI and STEME. The dose rate of 2,4 l/ha was the most effective to control of all weeds.

In the North-East EPPo climatic zone, only 4 efficacy trials were carried out in Poland. The limited number of trials was conducted in most of weed species. The dose response was visible in case of CHEAL. The dose rate of 2,4 l/ha achieved the highest effectiveness.

The trial results show that the dose rates of 1,8 and 2,4 l/ha were comparability in control of some weeds. However, the higher dose is necessary to achieve the very high level (>95%) for major weed species. To opinion of zRMS, the dose rate of 1,8 l/ha can be determine as minimum effective dose to control of dicotyledonous weeds in sugar beet in scenario of three application. However, it should be indicated the level of susceptibility for each weed species depending on the dose rate in the product label.

### 3.2.2.2 Minimum effective dose tests, 5/6 applications

#### Control of CHEAL in sugar beet, 5/6 applications

**Table 3.2.2.2-1: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on CHEAL at the final assessment**

Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	10 trials	16.4 23.2 30.5	3-48 6.3-101	%GC pla/m2	95.80 96.80	85-100	96.78 97.79	86.25-100
NORTH-EASTERN	4 trials	8.3	7.0-10.0	pla/m2	89.63 89.65	86.25-100 82.5-92.5	92.44	87.5-96.25

Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
ALL	14 trials	<del>16.4</del> 23.2 20.6	3.0-48  6.3-101	%GC  pla/m2	<del>94.04</del> 94.75	82.5-100.0	<del>95.54</del> 96.26	86.25-100

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided a comparable control to the dose of 1.2 L/ha of HBZ10 in fourteen trials. Because of the importance of this species and the need to reduce the variability of control, the minimum effective dose of HBZ10 for effective control of CHEAL at 5/6 applications is 1.2L/ha.

### Control of GALAP in sugar beet, 5/6 applications

Table 3.2.2.2-2: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on GALAP

Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	2 trials	34.0	15.0-53.0	%GC	99.88	99.75-100	99.88	99.75-100
NORTH-EASTERN	2 trials	6.0	<del>6.0</del> 5.0-7.0	pla/m2	90.00	80-100	<del>98.69</del> 97.5	95-100
ALL	4 trials	34.0  6.0	15.0- <del>34.0</del> 53.0  6.0 5.0-7.0	%GC  pla/m2	<del>90.00</del> 94.94	80-100	98.69	95-100

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided a comparable control to the dose of 1.2 L/ha of HBZ10 in four trials. Because of the importance of this species and the need to reduce the variability of control, the minimum effective dose of HBZ10 for effective control of GALAP at 5/6 applications is 1.2L/ha.

### Control of MATCH in sugar beet, 5/6 applications

Table 3.2.2.2-3: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on MATCH

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	3 trials	<del>19.0</del> 19.1	2.0-36.0	%GC	62.50	37.5-90.0	78.00	35.0-100.0

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided an inferior control to the dose of 1.2 L/ha of HBZ10 in one out of two trials. Due to the levels of control

achieved, the minimum effective dose of HBZ10 for effective control of MATCH at 5/6 applications is 1.2L/ha.

### Control of POLAV in sugar beet, 5/6 applications

**Table 3.2.2.2-4: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on POLAV**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	4 trials	7.0 5.8	5.0-9.0 -	% GC pla/m2	<b>94.64</b>	80.0-100.0	<b>98.59</b>	95.0-100.0
NORTH-EASTERN	1 trial	5.0	-	pla/m2	<b>100.00</b>	-	<b>96.25</b>	-
<b>ALL</b>	5 trials	6.8 5.4	5.0-9.0 5.0-5.8	% GC pla/m2	<b>95.71</b>	80.0-100.0	<b>98.12</b>	95.0-100.0

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided comparable control to the dose of 1.2 L/ha of HBZ10 in five trials. Due to the levels of control achieved, the minimum effective dose of HBZ10 for effective control of POLAV at 5/6 applications is 0.9L/ha.

### Control of POLCO in sugar beet, 5/6 applications

**Table 3.2.2.2-5: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on POLCO**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	5 trials	25.7 37.0	6.2-40.0 21.0-53.0	% GC pla/m2	<b>95.90</b>	90-100	<b>98.90</b>	98-100
NORTH-EASTERN	3 trials	8.0 7.7	6.0-9.0	pla/m2	<b>95.00</b>	92.5-100	<del>95.83</del> <b>95.87</b>	<del>98-100</del> <b>93.75-98.8</b>
<b>ALL</b>	8 trials	25.7 19.4	6.2-40.0 6.0-53.0	% GC pla/m2	<b>95.56</b>	90-100	<del>97.75</del> <b>97.77</b>	93.75-100

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided comparable control to the dose of 1.2 L/ha of HBZ10 in eight trials. Due to the levels of control achieved, the minimum effective dose of HBZ10 for effective control of POLCO at 5/6 applications is 0.9L/ha.

### Control of SOLNI in sugar beet, 5/6 applications

**Table 3.2.2.2-6: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 10% dose rates on SOLNI**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	2 trials	5 6.8	- -	%GC pla/m2	98.33	95.5-100	98.75	96.25-100

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided comparable control to the dose of 1.2 L/ha of HBZ10 in three trials. Due to the levels of control achieved, the minimum effective dose of HBZ10 for effective control of SOLNI at 5/6 applications is 0.9L/ha.

### Control of STEME in sugar beet, 5/6 applications

**Table 3.2.2.2-7: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on STEME**

Grouping *	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
					0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
		Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
MARITIME	2 trials	32.5 7.3	- -	%GC pla/m2	100.00	100-100	97.50	95.0-100.0
NORTH-EASTERN	1 trial	8	-	pla/m2	100.00	100-100	100.00	100-100
ALL	3 trials	32.5 7.6	- 7.3-8.0	%GC pla/m2	100.00	100-100	98.33	95.0-100.0

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided comparable control to the dose of 1.2 L/ha of HBZ10 in three trials. Due to the levels of control achieved, the minimum effective dose of HBZ10 for effective control of STEME at 5/6 applications is 0.9L/ha.

### Control of other weeds in sugar beet, 5/6 applications

**Table 3.2.2.2-8: Minimum effective dose. Efficacy of HBZ10/HBZ08 at proposed label rate, at 75% and 100% dose rates on other species**

Species	Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
						0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
			Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
AMARE	MARITIME	1 trial	5	-	%GC	95.50	-	94.75	-
	NORTH-EASTERN	1 trial	6	-	pla/m2	82.50	-	96.25	-
	ALL	2 trials	5 6	-	%GC pla/m2	89.00	82.5-95.5	95.50	94.8-96.3
ATXPA	MARITIME	1 trial	4.8	-	%GC	93.75	-	93.75	-
BRSNW	MARITIME	1 trial	9	-	%GC	20.00	-	20.00	-

Species	Grouping	Number of trials	Infestation of the untreated control (unit)			% control with HBZ10/HBZ08			
						0.9L/ha (75% of full rate)		1.2L/ha (Full rate)	
			Mean	Min & Max	Unit	Mean	Min & Max	Mean	Min & Max
CAPBP	MARITIME	1 trial	10	-	%GC	99.00	-	99.00	-
	MARITIME	1 trial	7.5	-	pla/m2	57.50	-	90.00	-
	ALL	2 trials	10 7.5	- -	%GC pla/m2	78.25	57.5-99.0	94.50	90.0-99.0
FUMOF	MARITIME	1 trial	6.2	-	%GC	95.75	-	96.50	-
GERPU	NORTH-EASTERN	1 trial	8	-	pla/m2	90.00	-	97.50	-
MATIN	NORTH-EASTERN	1 trial	6	-	pla/m2	98.75	-	100.00	-
MERAN	MARITIME	1 trial	22.5	-	%GC	94.75	-	95.50	-
PAPRH	NORTH-EASTERN	1 trial	6	-	pla/m2	97.50	-	100.00	-
POLPE	NORTH-EASTERN	1 trial	6	-	pla/m2	100.00	-	100.00	-
RAPSR	MARITIME	1 trial	60	-	%GC	80.00	-	93.75	-
SINAR	MARITIME	1 trial	50	-	%GC	50.00	-	50.00	-
SONAS	MARITIME	1 trial	4	-	%GC	100.00	-	98.75	-
URTUR	MARITIME	1 trial	90.3	-	pla/m2	80.00	-	80.00	-
VERHE	MARITIME	1 trial	10	-	pla/m2	90.00 100.0	-	90.00 100.0	-
VERPE	MARITIME	1 trial	82.3	-	pla/m2	100.00	-	100.00	-
	NORTH-EASTERN	1 trial	6	-	pla/m2	100.00	-	100.00	-
	ALL	2 trials	44.2	6.0-82.3	pla/m2	100.00	100.0-100.0	100.00	100.0-100.0
VIOAR	MARITIME	1 trial	26	-	%GC	100.00	-	100.00	-
	NORTH-EASTERN	1 trial	7	-	pla/m2	93.75	-	95.00	-
	ALL	2 trials	26 7	- -	%GC pla/m2	96.88	93.8-100.0	97.50	95.0-100.0

Where there are fewer data points for each species, the minimum effective dose is determined by the levels of control achieved. Use rates are summarised in Table 3.2.2.2-8 below, with colours allocated according to the SANCO classification from Table 3.2.2.1-10.

**Table 3.2.2.2-9: Weed control data in summary form –means of % control of broadleaved weeds at final assessment after 5/6 applications**

Weed Code	0.9L/ha	1.2L/ha	No of trials where 0.9L/ha is >, <, = to 1.2L/ha	Recommended use rate
AMARE	89.00	95.50	2=	1.2L/ha
ATXPA	93.75	93.75	1=	1.2L/ha
BRSNW	20.00	20.00	1=	1.2L/ha
CAPBP	78.25	94.50	2<	1.2L/ha
CHEAL	94.04 94.75	95.54 96.26	14=	1.2L/ha
FUMOF	95.75	96.50	1=	0.9L/ha
GALAP	94.94	98.69	4=	1.2L/ha
GERPU	90.00	97.50	1=	1.2L/ha

MATCH	62.50	78.00	2<, 1=	1.2L/ha
MATIN	98.75	100.00	1=	1.2L/ha
MERAN	94.75	95.50	1=	1.2L/ha
PAPRH	97.50	100.00	1=	1.2L/ha
POLAV	95.71	98.12	5=	0.9L/ha
POLCO	95.56	97.75 97.77	8=	0.9L/ha
POLPE	100.00	100.00	1=	0.9L/ha
RAPSR	80.00	93.75	1<	1.2L/ha
SINAR	50.00	50.00	1=	1.2L/ha
SOLNI	98.33	98.75	3=	0.9L/ha
SONAS	100.00	98.75	1=	0.9L/ha
STEME	100.00	98.33	3=	0.9L/ha
URTUR	80.00	80.00	1=	1.2L/ha
VERHE	90.00 100	90.00 100	1=	1.2L/ha
VERPE	100.00	100.00	2=	0.9L/ha
VIOAR	96.88	97.50	2=	0.9L/ha

### Summary and conclusions on the minimum effective dose

According to the presented results, the dose of 1.8 L/ha or 2.4L/ha of HBZ10 provided the optimum overall control and should be considered as effective against a wide range of annual broadleaved weeds, when used as part of a three-spray programme.

According to the presented results, the dose of 0.9 L/ha or 1.2L/ha of HBZ10 provided the optimum overall control and should be considered as effective against a wide range of annual broadleaved weeds, when used as part of a 5/6 spray programme.

As weed populations often occur as complexes of several species throughout a season, weed control programmes should be tailored to the species observed and the opportunities for application.

#### Comments of zRMS:

15 efficacy trials were conducted to determine the minimum effective dose to control of dicotyledonous weeds at 5 or 6 applications of HBZ10. The applicant has submitted the summary for major weed species and other weeds in sugar beet. The results from only 1 trial were presented for some weeds.

In the Maritime EPPO climatic zone, 11 efficacy trials were carried out in Germany, Netherlands, France and United Kingdom. The dose response was visible for RAPSR and CAPBP. The high efficacy level was achieved after application at 0,9 l/ha in case of CHEAL, GALAP, POLAV, POLCO, SOLNI and STEME. However, taking into account the low weed pressure and the limited number of submitted trials for some weed species, the dose rate of 1,2 l/ha was the most effective.

In the North-East EPPO climatic zone, only 4 efficacy trials were carried out in Poland. The limited number of trials was presented for most of weed species. The dose rate of 1,2 l/ha achieved the highest effectiveness in control of major weeds in sugar beet (AMARE, CHEAL, POLPE). The lower dose was sufficient to control of GALAP and POLCO.

The trial results show that the dose rates of 0,9 and 1,2 l/ha were comparability in control of some weeds. However, the higher dose is necessary to achieve the very high level (>95%) for major weed species. To opinion of zRMS, the dose rate of 0,9 l/ha can be determine as minimum effective dose in scenario of five or six applications. However, it should be indicated the level of susceptibility for each weed species depending on the dose rate in the product label.

### 3.2.3 Efficacy tests (KCP 6.2)

A total programme of 15 replicated trials was conducted in France, Poland, the Netherlands, the United Kingdom and Germany in 2019 and 2020.

For control programmes including three applications, use rates tested were 1.8 and 2.4L/ha. Different weed species are controlled by different rates, as specified in Section 3.2.2 of this dossier.

For programmes with 5-6 applications these rates were 0.9 and 1.2L/ha, as different weed species are controlled by different rates, as specified in Section 3.2.2 of this dossier. Efficacy from five or six

applications is comparable. The exact number of applications will depend on the growing season, dependent on issues such as weed emergence, crop stress, number of available spray days and other agronomic issues. Having the option of using up to six applications gives growers the most flexibility, which is critical on a high value crop such as sugar beet and other beet crops.

All efficacy trials were conducted in areas of commercial sugar beet, rather than specially planted areas of crops. These trials are therefore truly representative of the performance of HBZ10 in the conditions for which it is intended.

In Appendix 4 (trials for control of weeds in Europe) the details of trial sites, testing facilities and test specific parameters are shown for all the trials carried out.

Sites for efficacy trials were selected because of the high weed infection levels that were anticipated, based on the weed susceptibility of the crop cultivar, previous cropping *etc.*

In this submission, data are included from trials conducted in Germany, the Netherlands, Poland and the United Kingdom (Central European Zone) and France (Southern European Zone).

The use of data from France to support an application for approval in Great Britain and the Central and Southern Zones of the European Union is relevant for the following reasons:

② The climate in Northern France, where the trials took place, is comparable to that in countries such as the Netherlands, Germany and the United Kingdom. This is underlined by the comparable climatic zones detailed in EPPO Guideline PP 1/241.

② Within France, sugarbeet is generally only grown in the Maritime region of France<sup>6</sup>

② The agronomic factors influencing the sugar beet crop are similar in Northern France and the other countries of interest. This is indicated by the common planting dates and harvesting seen in this series of trials. Crop rotations, cultivation methods, planting density and crop inputs such as herbicides are also very similar across the Maritime region.

② The biology and epidemiology of the weed species is the same in all regions of the EU.

The weed incidence and the relative severity of infestation are similar in trials conducted in the Maritime parts of France, and Germany, the Netherlands and the United Kingdom.

Consequently, it is reasonable to regard the performance of products in the French trials as being indicative of their performance in Great Britain and the Central and Southern Zones of the European Union.

Data from Germany is also considered as fully supportive additional data for Poland, based on current national (Polish) guidance.

**Table 3.2.3-1: Details on efficacy trial methodology**

<b>Guidelines</b>	General guidelines	EPPO PP 1/152, PP 1/135, PP 1/181
	Specific guidelines	EPPO PP 1/52
<b>Experimental design</b>	Plot design	RCBD (15)
	Plot size	12-24 m <sup>2</sup>
	Number of replications	4 (15)
<b>Crop</b>	Trials per crop	Sugar beet (15)
	Varieties per crop	Sugar beet: Advana (1), Annnabella (1), Annasora (1), Beetle (1), Bravura (1), Bryza (2), BTS 3750 (1), Cantona KWS (1), Force (1), Haydyn (1), Marley (1), Tapir (1), Urselena KWS (2)
	Sowing period	Sugar beet: from March (6) to April (9)

<sup>6</sup> En région, Institut Technique de la Betterave (ITB). Online, <https://www.itbfr.org/en-region/>

<b>Application</b>	Crop stage (BBCH)* at application	Sugar beet: from BBCH 10 to BBCH <del>14</del> <b>18</b>
	Timing Weed stage at application	Post-emergence Broadleaved weeds (BBCH 10-12)
	Number of applications Intervals between applications	3 (15 trials) with intervals of 7-26 days 5 (9 trials) with intervals of 4-26 days 6 (6 trials) with intervals of 4-6 days Note: all trials included three and five/six application programmes
	Spray volumes	200 – <del>300</del> <b>400</b> L/ha
<b>Assessment</b>	Assessment types	% of weed coverage, number of weeds/m <sup>2</sup> , % weed control relative to the untreated,
	Assessment dates	7 DAT, 14 DAT, 28 DAT +/- 3
<b>Other relevant information</b>	Soil type	Humic sand (1), Sand (3), Sandy loam (5), Sandy silt loam (1), Silt loam (4), Silty clay loam (1)
	Natural / artificial infestation	All natural infestation
	Field / Greenhouse	All field trials

**Table 3.2.3-2: Formulations included in efficacy trials reported in this document**

Reference standard	Country	Authorization number	Active substances	Formulation		Registered application rate*	Use rates	Number of applications	Grouped together as:
				Type	Conc of a.s.				
HBZ08	N/A	N/A	Ethofumesate Phenmedipham	EC	125 125	N/A	0.9- 2.4	Three applications of 1.8/2.4L/ha, six applications of 0.9/1.2L/ha	HBZ10
HBZ10	N/A	N/A	Ethofumesate Phenmedipham	EC	125 125	N/A	0.9- 2.4	Three applications of 1.8/2.4L/ha, five applications of 0.9/1.2L/ha	
Belvedere Duo	DE	024257-00	Ethofumesate Phenmedipham	SC	200 200	1.3	1.3	3 applications	E+P
Powertwin 400 SC + Olejan 85 EC (adjuvant)	PL	R21/2012	Ethofumesate Phenmedipham	SC	200 200	1.0	1.0	3 applications	
Betanal Tandem + Robbestar (adjuvant)	NL	15186 13797N	Ethofumesate Phenmedipham	SC	190 200	1.0-1.5	1.0- 1.5	One at 1.0L/ha + 1.0L/ha Robbestar, 2 at 1.5L/ha with 1.0L/ha Robbestar	
Belvedere Forte 400 SE	PL	R-568/2017d	Ethofumesate Phenmedipham Desmedipham	SE	100 100 100	1.0	1.0	3 applications	E+P+D
Betanal Booster	FR	2010349	Ethofumesate Phenmedipham Desmedipham	EC	112 91 71	1.5**	1.2, 1.3**	3 applications	
Betanal Expert	DE	024991-00	Phenmedipham Ethofumesate	EC	75 151	1.5	1.5	3 applications	



Reference standard	Country	Authorization number	Active substances	Formulation		Registered application rate*	Use rates	Number of applications	Grouped together as:
				Type	Conc of a.s.				
			Desmedipham		25				
Betanal MaxxPro	UK	MAPP15086	Desmedipham Ethofumesate Lenacil Phenmedipham	OD	47 75 27 60	1.5	1.5	3 applications	E+P+D+L
Powertwin + Goltix	NL	13185 1229	Ethofumesate Phenmedipham Metamitron	SC SC	200 200 700	1.0 0.5	1.0 0.5	3 applications	E+P+M

\*Products containing desmedipham are no longer authorised in the EU, but the authorisation numbers and recommended use rates were correct at the time of application.

\*\*The maximum total dose permitted was 4.0L/ha, with a maximum individual dose of 1.5L/ha. The product dose rate was therefore adapted based upon local practice for 3 applications

Reference treatments are not direct comparisons of the use rates of ethofumesate and phenmedipham in the experimental products. However, they are representative weed control programmes using authorised products at their recommended rates, and are therefore a clear indication of the levels of control of key weeds that must be achieved if a novel product is to have value for growers. The reference product performance also allowed an assessment of trial data validity depending on if the reference product performed as expected.

For clarity, reference products are grouped together according to the active substances in the products. Consequently all products using ethofumesate and phenmedipham only are grouped together (as E+P), as are products using Ethofumesate, Phenmedipham and desmedipham (E+P+D), ethofumesate, Phenmedipham, desmedipham and lenacil (E+P+D+L) and ethofumesate, Phenmedipham and metamitron (E+P+M). Details are summarised in Table 3.2.3.1-5 above. Full results are available in the appendices.

In all trials the reference treatments performed as expected.

### 3.2.3.1 Weed control after three applications

#### Control of CHEAL in sugar beet, three applications

At the time of the final assessment, after three applications, the dose of 2.4 L/ha of HBZ10 provided superior control to the reference programme in five out of fourteen trials.

Overall levels of control achieved by HBZ10 at 2.4L/ha were ~~90.5~~ 91.5%, with a slight difference between the Maritime and North-East zones (~~92.9~~ 94.2% compared to 84.7%).

Orthogonal comparisons indicated that HBZ10 was superior to the E+P treatments, giving 85.0%-90.3% in the North-East and Maritime zones respectively, compared to ~~63.4~~ 57.8% and 77.9% from the reference. Performance of HBZ10 in the Maritime zone was comparable to the performance of the E+P+D treatments (96.9% compared to 97.6%).

In two Maritime trials HBZ10 achieved ~~88.4~~ 95% control, with the E+P+D+L achieved 91.3%.

The data also demonstrated that there was no difference between the performance of the product when separated by EPPO zone.

**Table 3.2.3.1-1: Efficacy of HBZ10 at proposed label rate compared to reference products against CHEAL at the final assessment**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control										No of trials where HBZ10 is >, <, = compared to standards	
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		E+P+M product at N rate			
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range		
CHEAL	2.4L/ha	MARITIME ALL	10 trials	<del>16.35</del> 23.2 30.5	%GC pla/m2	3.0-48.0 6.3-101.0	<del>92.87</del> 94.21	<del>76.72</del> 80.0-100	<del>63.44</del> 57.82	35- 100 77.5	97.58	95.5-99	91.25	87.5-95	100.00	<del>100</del> 100	3> 7=	
		NORTH-EASTERN ALL	4 trials	8.3	pla/m2	7.0-10.0	84.69	81.25-88.75	77.92	72.5-86.25	68.75	<del>68.75</del> 68.75	■	■	■	■	2> 2=	
		MARITIME ORTHOGONAL v. E+P	4 trials	<del>25.2</del> 20.2 13.5	%GC pla/m2	<del>5.0-48.0</del> 3.0-37.5 6.3-23.8	90.31	80-100	<del>63.44</del> 57.82	35- 100 77.5	■	■	■	■	■	■	3> 4> 1=	
		MARITIME ORTHOGONAL v. E+P+D	3 trials	<del>3.2</del> 25.2 6.3	%GC pla/m2	<del>3.0-3.3</del> 5.0-48.0	96.92	93.5-99	■	■	97.58	95.5-99	■	■	■	■	3=	
		MARITIME ORTHOGONAL v. E+P+D+L	2 trials	<del>62.4</del> 54.5	pla/m2	<del>23.8</del> 8.0-101.0	<del>88.36</del> 95.00	<del>76.72</del> 90.0-100	■	■	■	■	91.25	87.5-95	■	■	21= 1>	
		MARITIME ORTHOGONAL v. E+P+M	1 trial	13.5	pla/m2	-	100	-	-	-	-	-	-	-	-	100	-	1=
		NORTH-EASTERN ORTHOGONAL v. E+P	3 trials	<del>78.7</del>	pla/m2	<del>7.0-9.0</del> 10.0	85.00	81.25-88.75	77.92	72.5-86.25	■	■	■	■	■	■	1> 2=	
		NORTH-EAST ORTHOGONAL v. E+P+D	1 trial	7.0	pla/m2	-	83.8	-	-	-	68.75	-	-	-	-	-	-	1>
		ALL	14 trials	<del>16.4</del> 23.2 20.6	%GC pla/m2	3.0-48.0 6.3-23.8 101.0	<del>90.53</del> 91.5	76.72-100	69.64	35-100	90.38	68.75-99	91.25	87.5-95	100.00	100-100	5> 9=	

### **Control of GALAP in sugar beet, three applications**

At the time of the final assessment, after three applications, the dose of 2.4 L/ha of HBZ10 provided comparable control to the reference programme in four trials.

Performance of HBZ10 was comparable in the two climatic zones, with the product achieving 99.9% in the Maritime zone and 91.3% in the North-East zone.

The 2.4L/ha treatment was comparable to the E+P+D treatments, in both zones (100.0% compared to 99.5% in the Maritime zone, with both treatments giving 100% control in Poland).

The HBZ10 treatment was statistically equivalent to the E+P reference treatment in the second Polish trial, giving 82.5% control compared to 76.3% from the reference.

The data also demonstrated that there was no difference between the performance of the product when separated by EPPO zone.

**Table 3.2.3.1-2: Efficacy of HBZ10 at proposed label rate compared to reference products against GALAP**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control						No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	
GALAP	2.4L/ha	MARITIME ALL	2 trials	34.0	%GC	15.0-53.0	99.88	99.75-100	<div><div></div></div>	<div><div></div></div>	99.50	99-100	2=
		NORTH-EAST ALL	2 trials	6.0	pla/m2	5.0-67.0	91.25	82.5-100	76.25	-	100.00	100-100	2=
		ALL	4 trials	34.0 6.0	%GC pla/m2	15-53 5.0-67.0	95.56	82.5-100	76.25	76.25-76.25	99.67	99-100	2=

### Control of MATCH in sugar beet, three applications

At the time of the final assessment, after three applications, the dose of 2.4 L/ha of HBZ10 provided superior control to the reference programme in one out of three trials.

In two trials the 2.4L/ha treatment achieved 99.0-100%, identical to the E+P+D reference. In one trial in Germany the E+P reference failed, giving 0.0% control, while HBZ10 gave ~~35.0~~ 37.5%. Control was poor from all treatments, probably due to the high weed population (19% ground cover).

The data also demonstrated that there was no difference between the performance of the product when separated by EPPO zone.

**Table 3.2.3.1-3: Efficacy of HBZ10 at proposed label rate compared to reference products against MATCH**

Target	Recom- mended rate	Grouping	Number of trials	Infestation in the untreated control			% control						No of trials where HBZ10 is >, <, = compared to stand- ards
							HBZ10 at recom- mended rate		E+P prod- uct at N rate		E+P+D product at N rate		
				Mea n	Unit	Rang e	Mea n	Rang e	Mea n	Rang e	Mea n	Ran ge	
MATC H	2.4L/ha	MARITIME ALL	3 trials	19.1	%G C	2.0- 36.0	78.0 0 78.8	35 37.5- 100	0.00	-	99.5 0	99- 100	1> 2=
		MARITIME ORTHOGO- NAL v. E+P	1 trial	19.3	%G C	-	37.5	-	0.0	-	-	-	1>
		MARITIME ORTHOGO- NAL v. E+P+D	2 trials	19.0	%G C	2.0- 36.0	99.5 0	99- 100	-	-	99.5 0	99- 100	2=

### Control of POLAV in sugar beet, three applications

At the time of the final assessment, after three applications, the dose of 2.4 L/ha of HBZ10 provided comparable control to the reference programme in five trials.

Orthogonal comparison with the E+P+D reference in the Maritime zone (2 trials) indicated that the performance of HBZ10 and the reference was comparable, with HBZ10 achieving 98.1% and the reference giving 98.6%.

An apparently poor performance from the E+P+M reference in one trial may be misleading, as there is no statically significant difference between the treatments

The data also demonstrated that there was no difference between the performance of the product when separated by EPPO zone.

**Table 3.2.3.1-4: Efficacy of HBZ10 at proposed label rate compared to reference products against POLAV**

Target	Recommended rate	Grouping	Number of trials	Infestation in the un- treated control			% control								No of trials where HBZ10 is >, <, = com- pared to standards
							HBZ10 at rec- ommended rate		E+P product at N rate		E+P+D product at N rate		E+P+M prod- uct at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
POLAV	2.4L/ha	MARITIME ALL	4 trials	6.8 5.8	% GC pla/m2	5.0-9.0 -	95.27	85.00- 100	99.83 100	99.83 99.83	98.63	97.25-100	75.00	-	4=
		MARITIME ORTHOGONAL v. E+P	1 trial	6.5	%GC	-	100	-	100	-	-	-	-	-	1=
		MARITIME ORTHOGONAL v. E+P+D	2 trials	7.0	%GC	5.0-9.0	98.13	96.25- 100	█	█	98.63	97.25-100	█	█	2=
		MARITIME ORTHOGONAL v. E+P+M	1 trial	5.8	pla/m2	-	85.0	-	-	-	-	-	75.0	-	1>
		NORTH-EAST ALL	1 trial	5	pla/m2	-	81.25	81.25- 81.25	88.75	88.75- 88.75	█	█	█	█	1=
		ALL	5 trials	6.8 5.4	% GC pla/m2	5.0-9.0 5.0-5.8	92.47	81.25- 100	94.29 94.37	88.75- 99.83 100	98.63	97.25-100	75.00	75-75	5=

### **Control of POLCO in sugar beet, three applications**















At the time of the final assessment, after three applications, the dose of 2.4 L/ha of HBZ10 provided superior control to the reference programme in one out of seven trials.

There was no difference in the performance of HBZ10 between the two climatic zones, with HBZ10 2.4L/ha achieving 95.4% in the Maritime zone and 89.2% in the North-East zone. In both zones the performance of HBZ10 was comparable to that of the E+P reference treatments (97.6:98.0% in the Maritime zone, 92.5:93.1% in the North-East zone).

Orthogonal comparison with the E+P+D reference treatments in the Maritime zone show that HBZ10 achieved 97.4%, compared to 97.3% from the reference.

The data also demonstrated that there was no difference between the performance of the product when separated by EPPO zone.

**Table 3.2.3.1-5: Efficacy of HBZ10 at proposed label rate compared to reference products against POLCO**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
POLCO	2.4L/ha	MARITIME ALL	6 trials	22.8 37.0	%GC pla/m2	6.2-40.0 21.0-53.0	95.41	85-100	97.95	96.25-99.65	97.33	94.5-100	83.75	-	6=
		MARITIME ORTHOGONAL v. E+P	2 trials	21 13.8	pla/m2 %GC	- -	97.60	95-100	97.95	96.25-99.65					2=
		MARITIME ORTHOGONAL v. E+P+D	3 trials	25.7	%GC	6.2-53.0 40.0	97.42	95.5-98.75			97.33	94.5-100			3=
		MARITIME ORTHOGONAL v. E+P+D+L	1 trial	53.0	pla/m2	-	85.0	-	-	-	-	-	83.75	-	1=
		NORTH-EASTERN ALL	3 trials	7.7	pla/m2	6.0-9.0	89.17	82.5-97.5	93.13	90-96.25	57.50	57.5-57.5			1> 2=
		NORTH-EASTERN ORTHOGONAL v. E+P	2 trials	7.5	pla/m2	6.0-9.0	92.50	87.5-97.5	93.13	90-96.25					2=
		NORTH-EAST ORTHOGONAL v. E+P+D	1 trial	8.0	pla/m2	-	82.5	-	-	-	57.5	-	-	-	1>
		ALL	9 trials	22.8 19.4	% GC pla/m2	6.2-40.00 6.0-53.0	93.33	82.5-100.19	95.54	90-99.65	87.38	57.5-100	83.75	-	1> 6=



### **Control of SOLNI in sugar beet, three applications**

At the time of the final assessment, after three applications, the dose of 1.8 L/ha of HBZ10 provided statistically equivalent control to the reference programme in three trials. Overall control was 96.1%.

**Table 3.2.3.1--6: Efficacy of HBZ10 at proposed label rate compared to reference products against SOLNI**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+M product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
SOLNI	1.8L/ha	Maritime All	3 trials	5 6.8	%GC pla/m2	- -	96.4	94.3-100	97.5	-	95.5	-	100.0	-	3=
		MARITIME ORTHOGONAL v. E+P	1 trial	6.8	pla/m2	-	100	-	97.5	-	-	-	-	-	1=
		MARITIME ORTHOGONAL v. E+P+M	1 trial	6.8	pla/m2	-	100	-	-	-	-	-	100.0	-	1=
		MARITIME ORTHOGONAL v. E+P+D	1 trial	5.0	%GC	-	94.3	-	-	-	95.5	-	-	-	1=

### Control of STEME in sugar beet, three applications

At the time of the final assessment, after three applications, the dose of 1.8 L/ha of HBZ10 provided statistically equivalent control to the reference programme in three trials.

In all trials the 1.8L/ha programme of HBZ10 achieved 99.2% control, comparable to the E+P reference programme (98.3%).

**Table 3.2.31-7: Minimum effective dose. Efficacy of HBZ10 at proposed label rate compared to reference products against STEME**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control				No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	
STEME	1.8L/ha	Maritime All	3 trials	32.5 7.6 7.3	%GC pla/m2	- 7.3- 8.0	99.2 98.75	97.5- 100	98.3 97.5	95-100	3=
		North-East All	1 trial	8.0	pla/m2	-	100	-	100	-	1=
		ALL	3 trials	32.5 7.6	%GC pla/m2	- 7.3- 8.0	99.2	97.5- 100	98.3	95-100	3=

### Control of other weeds in sugar beet, three applications

Where there are fewer data points for each species, control levels achieved by HBZ10 at the recommended rate was either statistically superior or equivalent to the reference products.

In five cases HBZ10 at the recommended rate was superior to the E+P reference programme. In one case HBZ10 was inferior at a statistically significant level, with a comparable performance in the other cases in which this programme was tested.

Eight instances of comparison with HBZ10 with the E+P+D reference showed a comparable performance for the two treatments, whereas in one case the HBZ10 was superior to the reference. Similarly, control levels achieved by HBZ10 were comparable to the E+P+D+L reference programme

**Table 3.2.3.1-8: Efficacy of HBZ10 at proposed label rate compared to reference products against other species after three applications**

Target	Recommended rate	Grouping	No. trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
AMARE	2.4L/ha	All	2	5 6	%GC pla/m2	- -	89.38	83.8-99.0	70.0	-	93.8	-	-	-	1> 1=
		Maritime	1	5	%GC	-	95.0	-	-	-	93.8	-	-	-	1=
		North-Eastern	1	6	pla/m2	-	83.8	-	70.0	-	-	-	-	-	1>
ATXPA	2.4L/ha	Maritime	1	4.8	%GC	-	88.8	-	35.0	-	-	-	-	-	1>
BRSNW	2.4L/ha	Maritime	1	9	%GC	-	20.0	-	20.0	-	-	-	-	-	1=
CAPBP	2.4L/ha	Maritime	2	10 7.5	%GC pla/m2	- -	57.63	16.3-99.0	80.0	-	-	-	99.0	-	1= 1<
FUMOF	2.4L/ha	Maritime	1	6.2	%GC	-	93.5	-	-	-	95.0	-	-	-	1=
GERPU	2.4L/ha	North-Eastern	1	8	pla/m2	-	81.3	-	86.3	-	76.3	-	-	-	1=
MATIN	2.4L/ha	North-Eastern	1	6	pla/m2	-	100.0	-	95.0	-	-	-	-	-	1=
MERAN	2.4L/ha	Maritime	1	22.5	%GC	-	93.0	-	92.8	-	-	-	-	-	1=
PAPRH	1.8L/ha	North-Eastern	1	6	pla/m2		96.3	-	96.3	-	-	-	-	-	1=
POLPE	2.4L/ha	North-Eastern	1	6	pla/m2	-	97.5	-	-	-	80.0	-	-	-	
RAPSR	2.4L/ha	Maritime	1	60	%GC	-	91.3	-	55.0	-	-	-	-	-	1>
SINAR	2.4L/ha	Maritime	1	50	%GC	-	70.0	-	50.0	-	-	-	-	-	1>
SONAS	1.8L/ha	Maritime	1	4	%GC	-	99.5	-	-	-	99.8	-			1=
URTUR	2.4L/ha	Maritime	1	90.3	pla/m2	-	97.5	-		-	-	-	62.5	-	1=
VERHE	2.4L/ha	Maritime	1	10	pla/m2	-	95.0	-	-	-	-	-	97.5	-	
VERPE	1.8L/ha	All	2	44.2	pla/m2	6.0-82.3	98.8	63.8-100.0	-	-	100.0	-	90.0	-	2=
		Maritime	1	82.3	pla/m2	-	100.0	-	-	-			90.0	-	1=
		North-Eastern	1	6.0	pla/m2	-	63.8	-	-	-	100.0	-	-	-	1=

Target	Recommended rate	Grouping	No. trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
VIOAR	2.4L/ha	All	2	26 7	%GC pla/m2	- -	93.13	86.3-100.0	75.0	-	100.0	-	-	-	2=
		Maritime	1	26	%GC	-	100.0	-	-	-	100.0	-	-	-	1=
		North-Eastern	1	7	pla/m2	-	86.3	-	75.0	-	-	-	-	-	1=

Use rates are summarised in Table 3.2.3.1-9 below, with colours allocated according to the SANCO classification from Table 3.2.3.1-10 and the CRD classifications from Table 3.2.3.1-11.

**Table 3.2.3.1-9: Weed control data in summary form –means of % control of broadleaved weeds at final assessment after three applications, SANCO/10055/2013 Rev.4 and CRD classifications**

Target	Recommended rate	CRD classification	SANCO classification
AMARE	2.4L/ha	S	Susceptible
ATXPA	2.4L/ha	S	Susceptible
BRSNW	2.4L/ha	R	Tolerant
CAPBP	2.4L/ha	R	Moderately tolerant
CHEAL	2.4L/ha	S	Susceptible
FUMOF	2.4L/ha	S	Susceptible
GALAP	2.4L/ha	S	Very Highly susceptible
GERPU	2.4L/ha	MS	Moderately susceptible
MATCH (3 trials)	2.4L/ha	MS	Moderately susceptible
MATCH (2 trials)	2.4L/ha	S	Highly susceptible
MATIN	2.4L/ha	S	Very Highly susceptible
MERAN	2.4L/ha	S	Susceptible
PAPRH	1.8L/ha	S	Very Highly susceptible
POLAV	2.4L/ha	S	Susceptible
POLCO	2.4L/ha	S	Susceptible
POLPE	2.4L/ha	S	Very Highly susceptible
RAPSR	2.4L/ha	S	Susceptible
SINAR	2.4L/ha	MS	Moderately susceptible
SOLNI	1.8L/ha	S	Very Highly susceptible
SONAS	1.8L/ha	S	Very Highly susceptible
STEME	1.8L/ha	S	Very Highly susceptible
URTUR	2.4L/ha	S	Very Highly susceptible
VERHE	2.4L/ha	S	Very Highly susceptible
VERPE	1.8L/ha	S	Very Highly susceptible
VIOAR	2.4L/ha	S	Susceptible

**Table 3.2.3.1-10: SANCO/10055/2013 Rev. 4 weed control level classification**

Efficacy %	Efficacy level	Susceptibility of weed species
95-100%	Very high	Very Highly susceptible (HS)
85-94.9%	High	Susceptible (S)
70-84.9%	Medium	Moderately susceptible (MS)
50-69.9%	Low	Moderately tolerant (MT)
<50% 0-49.9%	Not sufficient	Tolerant (T)
0%	No control	-

**Table 3.2.3.1-11: CRD weed control classification levels**

Appropriate label claim	Level of effectiveness
Susceptible (S)	Consistent control of 85% and above*
Moderately susceptible (MS)	More variable control, mean 75-85% but with results often above 85%
Moderately resistant (MR)	Variable control, mean 60-75% but some results above this level
Resistant (R)	Poor control below the levels given above

\*To ensure worthwhile levels of control of certain important weeds in field crops, all these categories are raised with the susceptible rating being as follows: pernicious grass weeds where seed return must be prevented, e.g. blackgrass and wild oats 95% and above, cleavers 90% and above.

#### Comments of zRMS:

15 field efficacy trials were conducted in the two EPPO climatic zones: Maritime and North-East. HBZ10 was tested at dose rates of 1,8 and 2,4 l/ha in three applications.

A total of 11 efficacy trials were carried out in the **Maritime EPPO climatic zone** in the following countries: Germany (4 trials), Netherlands (3 trials), France (2 trials) and United Kingdom (2 trials). The classification of weed susceptibility for each weed species, which have been located in the Maritime zone is presented below. Very limited number of trials was noted for the following weeds (only 1 trial): AMARE, ATXPA, BRNSW, FUMOF, MERAN, RAPS, SINAR, SONAS, URTUR, VERHE, VERPE and VIOAR. The cMSs are kindly asked to consider these species on the national level.

Weed species	No of trials	Level of effectiveness	Dose rate	Susceptibility of weed species (according to SANCO)
CHEAL	10 trials	94,21%	2,4 l/ha	Susceptible (S)
POLCO	6 trials	95,41%	2,4 l/ha	Highly susceptible (HS)
POLAV	4 trials	95,27%	2,4 l/ha	Highly susceptible (HS)
SOLNI	3 trials	96,4%	1,8 l/ha	Highly susceptible (HS)
GALAP	2 trials	99,88%	2,4 l/ha	Highly susceptible (HS)
MATCH	2 trials	99,5% (78% from 3 trials)*	2,4 l/ha	Highly susceptible (HS)
STEME	2 trials	98,75%	1,8 l/ha	Highly susceptible (HS)
CAPBP	2 trials	57,63%	2,4 l/ha	Moderately tolerant (MT)

\* Control was poor from all treatments, probably due to the high weed population (19% ground cover)

A total of 4 efficacy trials were carried out in the **North-East EPPO climatic zone**, all in Poland. The zRMS decided to include in overall estimation also trials conducted in Germany to support of product registration in Poland. The classification of weed susceptibility for each weed species, which have been located in the North-East zone and Germany is presented below. Very limited number of trials (only 1 trial) was noted for the following species: AMARE, ATXPA, BRNSW, CAPBP, GERPU, MATIN, PAPRH, POLPE, RAPS, SINAR, SONAS, THLAR and VERPE. These weed species were excluded from the summary table. In case of VIOAR,

the weed pressure was lower than 2% in one out two trials (conducted in Germany). However, accordance with Polish requirements this PESSEV is acceptable. This trial was not included to the overall calculation in the Maritime EPPO zone.

Weed species	No of trials	Level of effectiveness	Dose rate	Susceptibility of weed species (according to SAN-CO)
CHEAL	8 trials	90,77%	2,4 l/ha	Susceptible (S)
POLCO	6 trials	93,41%	2,4 l/ha	Susceptible (S)
GALAP	3 trials	94,1%	2,4 l/ha	Susceptible (S)
MATCH	2 trials	68,25%*	2,4 l/ha	Moderately tolerant (MT)
POLAV	2 trials	90,65%	2,4 l/ha	Susceptible (S)
STEME	2 trials	100%	1,8 l/ha	Highly susceptible (HS)
VIOAR	2 trials	93,05%	2,4 l/ha	Susceptible (S)

\* Control was poor from all treatments, probably due to the high weed population (19% ground cover)

No efficacy trials have been submitted for other beet crops (red beet, yellow beet, fodder beet, chard). The cMSs are kindly asked to use extrapolation of trial results from sugar beet and consider these crops on the national level.

### 3.2.3.2 Weed control after 5/6 applications

Efficacy from five or six applications is comparable. The exact number of applications will depend on the growing season, dependent on issues such as weed emergence, crop stress, number of available spray days and other agronomic issues. Having the option of using up to six applications gives growers the most flexibility, which is critical on a high value crop such as sugar beet and other beet crops.

#### Control of CHEAL in sugar beet, 5/6 applications

At the time of the final assessment, after 5/6 applications,

Overall levels of control achieved by HBZ10 at 1.2L/ha were ~~95.5~~ 96.2%, with no clear difference between the Maritime and North-East zones (~~96.8~~ 97.8 compared to 92.4%).

Orthogonal comparisons indicated that HBZ10 was superior to the E+P treatments, giving 92.1%-95.8% in the North-East and Maritime zones respectively, compared to ~~63.4~~ 57.8% and 77.9% from the reference. Performance of HBZ10 in the Maritime zone was comparable to the performance of the E+P+D treatments (98.2% compared to 97.6%).

In two Maritime trials HBZ10 achieved ~~95.0~~ 100% control, with the E+P+D+L achieved 91.3%. The data also demonstrated that there was no difference between the performance of the product when separated by EPPO zone.



**Table 3.2.3.2-1: Efficacy of HBZ10 at proposed label rate compared to reference products against CHEAL**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control										No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		E+P+M product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
CHEAL	1.2L/ha	MARITIME ALL	10 trials	<del>16.35</del> 23.2	%GC	3.0-48.0	<del>96.78</del> 97.8	86.25-100	<del>63.44</del> 57.82	<del>35-100</del> 77.5	97.58	95.5-99	91.25	87.5-95	100.00	-	3> 7=
			30.5	pla/m2	6.3-101.0												
		NORTH-EASTERN ALL	4 trials	8.3	pla/m2	7.0-10.0	92.44	87.5-96.25	77.91	72.5-86.25	68.75	<del>68.75-68.75</del>	■	■	■	■	4>
		MARITIME ORTHOGONAL v. E+P	4 trials	<del>25.2</del> 20.2	%GC	<del>5.0-48.0</del> 3.0-37.5	95.81	86.25-100	57.82	<del>69.6</del> 35.0-77.5	<del>35-100</del>	■	■	■	■	■	3> 4=
			13.5 15.1	pla/m2	6.3-23.8												
		MARITIME ORTHOGONAL v. E+P+D	3 trials	<del>3.2</del> 6.3 25.2	%GC /m2	<del>3.0-3.3</del> 5.0-48.0 -	98.17	95.75-99.75	■	■	97.58	95.5-99	■	■	■	■	3=
		MARITIME ORTHOGONAL v. E+P+D+L	2 trials	<del>62.4</del> 54.5	pla/m2	<del>23.8</del> 8.0-101.0	<del>95.00</del> 100	<del>90-100</del> 100	■	■	■	■	91.25	87.5-95	■	■	2=
MARITIME ORTHOGONAL v. E+P+M	1 trial	13.5	pla/m2	-	100	-	-	-	-	-	-	-	-	100	-	1=	
NORTH-EASTERN ORTHOGONAL v. E+P	3 trials	7.7	pla/m2	7.0-9.0	92.08	87.5-96.25	77.91	72.5-86.25	■	■	■	■	■	■	■	3>	

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control										No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		E+P+M product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
		NORTH-EASTERN ORTHOGONAL v. E+P+D	1 trial	7.0	pla/m2	-	93.5	-	-	-	68.75	-	-	-	-	-	1>
		ALL	14 trials	<del>16.4</del> 23.2 20.6	%GC  pla/m2	3.0-48.0 6.3-23.8 101	<del>95.54</del> 96.26	86.25-100	69.37	<del>35-100</del> 86.25	90.38	68.75-99	91.25	87.5-95	100.00	-	7> 7=

### **Control of GALAP in sugar beet, 5/6 applications**

At the time of the final assessment, after 5/6 applications, the dose of 1.2 L/ha of HBZ10 provided statistically equivalent control of GALAP in four trials.

Performance of HBZ10 was comparable in the two climatic zones, with the product achieving 94.6% in the Maritime zone and 100% in the North-East zone.

The 1.2L/ha treatment was comparable to the E+P+D treatments, in both zones (99.9% compared to 99.5% in the Maritime zone, with both treatments giving 100% control in Poland).

The HBZ10 treatment was statistically superior to the E+P reference treatment in the second Polish trial, giving 95.0% control compared to 76.3% from the reference

**Table 3.2.3.2-2: Efficacy of HBZ10 at proposed label rate compared to reference products against GALAP**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control						No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	
GALAP	1.2L/ha	All	4 trials	34.0 6.0	%GC pla/m2	15-53 5.0-6.0	98.69	95.0-100.0	76.3	-	99.7	99-100	4=
		Maritime	2 trials	34.0	%GC	15.0- 53.0	99.88	99.8-100.0	<div><div></div></div>	<div><div></div></div>	99.5	99-100	2=
		North-East	2 trials	6.0	pla/m2	5.0-6 7.0	97.5	95.0-100.0	76.3	-	100.0	-	2=

### Control of MATCH in sugar beet, 5/6 applications

At the time of the final assessment, after 5/6 applications, the dose of 1.2 L/ha of HBZ10 provided statistically superior control of CHEAL in four trials, and equivalent control to the reference programme in ten trials.

In two trials the 1.2L/ha treatment achieved 99.0-100%, identical to the E+P+D reference. In one trial in Germany the E+P reference failed, giving 0.0% control, while HBZ10 gave ~~37.5~~ **35**%. Control was poor from all treatments, probably due to the high weed population (19% ground cover).

**Table 3.2.3.2-3: Efficacy of HBZ10 at proposed label rate compared to reference products against MATCH**

Target	Recom- mended rate	Grouping	Num- ber of trials	Infestation in the untreated control			% control						No of trials where HBZ10 is >, <, = com- pared to stand- ards
							HBZ10 at recom- mended rate		E+P prod- uct at N rate		E+P+D product at N rate		
				Mea n	Unit	Rang e	Mea n	Rang e	Mea n	Rang e	Mea n	Rang e	
MATC H	1.2L/ha	MARITIME ALL	3 trials	19.1	%G C	2.0- 36.0	78.0 8	37.5 35.0- 100.0	0.0	-	99.5	99- 100	1> 2=
		MARITIME ORTHOGO- NAL v. E+P+D	2 trials	19.0	%G C	2.0- 36.0	99.5 0	99- 100	-	-	99.5 0	99- 100	2=
		MARITIME ORTHOGO- NAL v. E+P	1 trial	19.3	%G C	-	35.0	-	0.0	-	-	-	1>

### Control of POLAV in sugar beet, 5/6 applications

At the time of the final assessment, 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided statistically equivalent control to the reference programme in five trials.

Orthogonal comparison with the E+P+D reference in the Maritime zone (2 trials) indicated that the performance of HBZ10 and the reference was comparable, with HBZ10 achieving 99.4% and the reference giving 98.6%.

An apparently poor performance from the E+P+M reference in one trial may be misleading, as there is no statically significant difference between the treatments.

**Table 3.2.3.2-4: Efficacy of HBZ10 at proposed label rate compared to reference products against POLAV**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+M product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
POLAV	0.9L/ha	MARITIME ALL	4 trials	6.8 5.8	% GC pla/m2	5.0-9.0 -	94.64	81.3-80.0-100	99.83 100	99.83 99.83	98.63	97.25-100	75.00	-	4=
		MARITIME ORTHOGONAL v. E+P	1 trial	6.5	%GC	-	100	-	100	-	-	-	-	-	1=
		MARITIME ORTHOGONAL v. E+P+D	2 trials	7.0	%GC	5.0-9.0	99.38	98.75-100	-	-	98.63	97.25-100	-	-	2=
		MARITIME ORTHOGONAL v. E+P+M	1 trial	5.8	pla/m2	-	80.0	-	-	-	-	-	75.0	-	1=
		NORTH-EASTERN ALL	1 trial	5	pla/m2	-	100.00	100-100	88.75	88.75-88.75	-	-	-	-	1=
		ALL	5 trials	6.8 5.4	% GC pla/m2	5.0-9.0 5.0-5.8	95.71 95.76	80-100	94.29 94.37	88.75-99.83 100	98.63	97.25-100	75.00	-	5=

### **Control of POLCO in sugar beet, 5/6 applications**

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided statistically superior control in one trial, and equivalent control to the reference programme in six trials.

There was no difference in the performance of HBZ10 between the two climatic zones, with HBZ10 at 0.9L/ha achieving 95.9:96.6% in the Maritime zone and 95.0% in the North-eastern zone. In both zones the performance of HBZ10 was comparable to that of the E+P reference treatments (93.8:98.0% in the Maritime zone, 96.3:93.1% in the North-eastern zone).

Orthogonal comparison with the E+P+D reference treatments in the Maritime Zone show that HBZ10 achieved 98.6%, compared to 97.3% from the reference.

**Table 3.2.3.2-5: Efficacy of HBZ10 at proposed label rate compared to reference products against POLCO**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
POLCO	0.9L/ha	MARITIME ALL	6 trials	22.8 37.0	%GC pla/m2	6.2-40.0 21.0-53.0	95.90 96.59	90-100	97.95 98.12	96.25- 99.65 100	97.33	94.5-100	83.75	-	5 6=
		MARITIME ORTHOGONAL v. E+P	2 trials	21 13.8	pla/m2 %GC	- -	93.75 96.87	93.75- 100	97.95 98.12	96.25- 99.65 100	█	█	█	█	2=
		MARITIME ORTHOGONAL v. E+P+D	3 trials	25.7	%GC	6.2-53.0 40.0	98.58	96.75-100	█	█	97.33	94.5-100	█	█	3=
		MARITIME ORTHOGONAL v. E+P+D+L	1 trial	53.0	pla/m2	-	90.0	-	-	-	-	-	83.75	-	1=
		NORTH-EASTERN ALL	3 trials	7.7	pla/m2	6.0-9.0	95.00	92.5-100	93.13	90-96.25	57.50	57.5 57.5	█	█	1> 2=
		NORTH-EASTERN ORTHOGONAL v. E+P	2 trials	7.5	pla/m2	6.0-9.0	96.25	92.5-100	93.13	90-96.25	█	█	█	█	2=
		NORTH-EAST ORTHOGONAL v. E+P+D	1 trial	8.0	pla/m2	-	92.5	-	-	-	57.5	-	-	-	1>
		ALL	9 trials	22.8 19.4	% GC pla/m2	6.2-40.00 6.0-53.0	95.56 96.06	90-100	95.54 96.56	90-99.65 100	87.38	57.5-100	83.75	-	1> 6 8=



### Control of SOLNI in sugar beet, 5/6 applications

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided statistically equivalent control to the reference programme in three trials.

No statistically significant difference between the HBZ10 programme and the different reference products, which indicates that HBZ10 at 0.9L/ha is comparable to typical reference weed control products. The overall mean level of control was 98.3%.

**Table 3.2.3.2-6: Efficacy of HBZ10 at proposed label rate compared to reference products against SOLNI**

Tar- get	Recom- mended rate	Group- ing	Num- ber of trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to stand- ards
							HBZ10 at recom- mended rate		E+P prod- uct at N rate		E+P+D product at N rate		E+P+M product at N rate		
				Mea n	Unit	Ran ge	Mea n	Rang e	Mea n	Ran ge	Mea n	Ran ge	Mea n	Ran ge	
SOL NI	0.9L/ha	Mari- time all	3 trials	5 6.8	%GC pla/ m2	6.8- 6.8	98.3 3	95.5- 100	97.5	-	95.5	-	100. 0	-	3=
		Mari- time v. E+P	1 trial	6.8	pla/ m2	-	99.5	-	97.5	-	-	-	-	-	1=
		Mari- time v. E+P+D	1 trial	5.0	%GC	-	95.5	-	-	-	95.5	-	-	-	1=
		Mari- time v. E+P+M	1 trial	6.8	pla/ m2	-	100	-	-	-	-	-	100	-	1=

### Control of STEME in sugar beet, 5/6 applications

At the time of the final assessment, after 5/6 applications, the dose of 0.9 L/ha of HBZ10 provided statistically equivalent control to the reference programme in three trials.

In all trials the 0.9L/ha programme of HBZ10 achieved 100% control, comparable to the E+P reference programme.

Overall means were 100% control from the 0.9L/ha rate, with 98.3% from the E+P reference.

**Table 3.2.3.2-7: Efficacy of HBZ10 at proposed label rate compared to reference products against STEME**

Target	Recommended rate	Grouping	Number of trials	Infestation in the untreated control			% control				No of trials where HBZ10 is >, <, = compared to stand-ards
							HBZ10 at recommended rate		E+P product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	
STEME	0.9L/ha	Maritime <b>ALL</b>	3 trials	32.5 7.6	%GC pla/m2	- 7.3- 8.0	100.0	100.0- 100.0	98.3	95- 100	3=
		North-East	1 trial	8.0	pla/m2	-	100	-	100	-	1=
		Maritime	2 trials	32.5 7.3	%GC pla/m2	-	100	100-100	97.5	95.0- 100	2=

### Control of other weeds in sugar beet, 5/6 applications

Control of other weed species is summarised in Table 3.2.3.2-8. High levels of control were observed on many species, as indicated in Table 3.2.3-21. Colours are allocated according to the SANCO/10055/2013 Rev. 4 classification from Table 3.2.2-10 and CRD classification from Table 3.2.3.1-11.

**Table 3.2.3-2-8: Efficacy of HBZ10 at proposed label rate compared to reference products against other species after 5/6 applications**

Target	Recommended rate	Grouping	No. trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
AMARE	2-4 1.2L/ha	All	2	5 6	%GC pla/m2	- -	95.50	94.75-96.25	70.0	-	93.8	-	-	-	1> 1=
		Maritime	1	5	%GC	-	94.75	-	-	-	93.8	-	-	-	1=
		North-Eastern	1	6	pla/m2	-	96.25	-	70.0	-	-	-	-	-	1>
ATXPA	2-4 1.2L/ha	Maritime	1	4.8	%GC	-	93.75	-	35.0	-	-	-	-	-	1>
BRSNW	2-4 1.2L/ha	Maritime	1	9	%GC	-	20.0	-	20.0	-	-	-	-	-	1=
CAPBP	2-4 1.2L/ha	Maritime	2	10 7.5	%GC pla/m2	- -	94.5	90.0-99.0	80.0	-	-	-	99.0	-	2=
FUMOF	2-4 1.2L/ha	Maritime	1	6.2	%GC	-	95.8 96.5	-	-	-	95.0	-	-	-	1=
GERPU	2-4 1.2L/ha	North-Eastern	1	8	pla/m2	-	97.5	-	86.3 76.3	-	76.3	-	-	-	1=
MATIN	2-4 1.2L/ha	North-Eastern	1	6	pla/m2	-	100.0	-	95.0	-	-	-	-	-	1=
MERAN	2-4 1.2L/ha	Maritime	1	22.5	%GC	-	95.50	-	92.8	-	-	-	-	-	1=
PAPRH	1-8 0.9L/ha	North-Eastern	1	6	pla/m2	-	100.0	-	96.3	-	-	-	-	-	1=
POLPE	2-4 1.2L/ha	North-Eastern	1	6	pla/m2	-	100.0	-	-	-	80.0	-	-	-	1>
RAPSR	2-4 1.2L/ha	Maritime	1	60	%GC	-	93.75	-	55.0	-	-	-	-	-	1>
SINAR	2-4 1.2L/ha	Maritime	1	50	%GC	-	50.0	-	50.0	-	-	-	-	-	1>
SONAS	1-8 0.9L/ha	Maritime	1	4	%GC	-	100.0	-	-	-	99.8	-	-	-	1=

Target	Recommended rate	Grouping	No. trials	Infestation in the untreated control			% control								No of trials where HBZ10 is >, <, = compared to standards
							HBZ10 at recommended rate		E+P product at N rate		E+P+D product at N rate		E+P+D+L product at N rate		
				Mean	Unit	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range	
URTUR	2.4 1.2L/ha	Maritime	1	90.3	pla/m2	-	80.0	-	-	-	-	-	62.5	-	1=
VERHE	2.4 1.2L/ha	Maritime	1	10	pla/m2	-	100.0	-	-	-	-	-	97.5	-	1=
VERPE	1.8 0.9L/ha	All	2	44.2	pla/m2	6.0-82.3	98.8 100	63.8 100-100.0	-	-	100.0	-	90.0	-	2=
		Maritime	1	82.3	pla/m2	-	100.0	-	-	-	-	-	90.0	-	1=
		North-Eastern	1	6.0	pla/m2	-	63.8 100.0	-	-	-	100.0	-	-	-	1=
VIOAR	2.4 1.2L/ha	All	2	26 7	%GC pla/m2	- -	100.0	100.0 95.0-100.0	75.0	-	100.0	-	-	-	2=
		Maritime	1	26	%GC	-	100.0	-	-	-	100.0	-	-	-	1=
		North-Eastern	1	7	pla/m2	-	100.0 95.0	-	75.0	-	-	-	-	-	1=

**Table 3.2.3.18-4: Weed control data in summary form –means of % control of broadleaved weeds at final assessment after 5/6 applications, SANCO and CRD classifications**

Target	Recommended rate	CRD classification	SANCO classification
AMARE	1.2L/ha	S	<del>Very</del> Highly susceptible
ATXPA	1.2L/ha	S	Susceptible
BRSNW	1.2L/ha	R	Tolerant
CAPBP	1.2L/ha	S	Susceptible
CHEAL	1.2L/ha	S	Susceptible
FUMOF	0.9L/ha	S	<del>Very</del> Highly susceptible
GALAP	1.2L/ha	S	<del>Very</del> Highly susceptible
GERPU	1.2L/ha	S	<del>Very</del> Highly susceptible
MATCH (3 trials)	1.2L/ha	MS	Moderately susceptible
MATCH (2 trials)	1.2L/ha	S	Highly susceptible
MATIN	1.2L/ha	S	<del>Very</del> Highly susceptible
MERAN	1.2L/ha	S	<del>Very</del> Highly susceptible
PAPRH	1.2L/ha	S	<del>Very</del> Highly susceptible
POLAV	0.9L/ha	S	Susceptible
POLCO	0.9L/ha	S	<del>Very</del> Highly susceptible
POLPE	0.9L/ha	S	<del>Very</del> Highly susceptible
RAPSR	1.2L/ha	S	Susceptible
SINAR	1.2L/ha	MS	Moderately susceptible
SOLNI	0.9L/ha	S	<del>Very</del> Highly susceptible
SONAS	0.9L/ha	S	<del>Very</del> Highly susceptible
STEME	0.9L/ha	S	<del>Very</del> Highly susceptible
URTUR	1.2L/ha	S	<del>Very</del> Highly susceptible
VERHE	1.2L/ha	S	<del>Very</del> Highly susceptible
VERPE	0.9L/ha	S	<del>Very</del> Highly susceptible
VIOAR	0.9L/ha	S	<del>Very</del> Highly susceptible

## Minor use

According to EPPO PP 1/257 HEET 67 (1) the indicator crop for beet crops is any *Beta* species (BEASS); extrapolation from one species to all others is allowed for weed control purposes. It is therefore reasonable to regard HBZ10 as being safe and efficacious for use on all beet crops.

## Yield (and relevant quality indicators), from efficacy trials (in the presence of challenging pest populations)

No efficacy trials were harvested.

## Summary and conclusion

General trends indicate that HBZ10 when used at the recommended rate is often superior to the performance of the E+P reference products, while being equivalent to the more complex reference products and programmes. Products with desmedipham are no longer available to growers, which further demonstrates the value of the formulation optimization work which resulted in HBZ10.

Control of the majority of weed species is high, with almost every species tested being Susceptible or Very Susceptible to HBZ10, when used in either the 3-spray programme or in the 5/6 spray programme.

### Comments of zRMS:

15 field efficacy trials were conducted in the two EPPO climatic zones: Maritime and North-East. HBZ10 was tested at dose rates of 0,9 and 1,2 l/ha in five or six applications.

A total of 11 efficacy trials were carried out in **the Maritime EPPO climatic zone** in the following countries: Germany (4 trials), Netherlands (3 trials), France (2 trials) and United Kingdom (2 trials). The classification of weed susceptibility for each weed species, which have been located in the Maritime zone is presented below. Very limited number of trials was noted for the following weeds (only 1 trial): AMARE, ATXPA, BRNSW, FUMOF, MERAN, RAPS, SINAR, SONAS, URTUR, VERHE, VERPE and VIOAR. The cMSs are kindly asked to consider these species on the national level.

Weed species	No of trials	Level of effectiveness	Dose rate	Susceptibility of weed species (according to SAN-CO)
CHEAL	10 trials	97,8%	1,2 l/ha	Highly susceptible (HS)
POLCO	6 trials	96,59%	0,9 l/ha	Highly susceptible (HS)
POLAV	4 trials	94,64%	0,9 l/ha	Susceptible (S)
SOLNI	3 trials	98,33%	0,9 l/ha	Highly susceptible (HS)
MATCH	2 (3) trials	99,5% (78% in 3 trials)*	1,2 l/ha	Highly susceptible (HS)
GALAP	2 trials	99,88%	1,2 l/ha	Highly susceptible (HS)
CAPBP	2 trials	94,5%	1,2 l/ha	Susceptible (S)
STEME	2 trials	100%	0,9 l/ha	Highly susceptible (HS)

\* Control was poor from all treatments, probably due to the high weed population (19% ground cover)

A total of 4 efficacy trials were carried out in **the North-East EPPO climatic zone**, all in Poland. The zRMS decided to include in overall estimation also trials conducted in Germany to support of product registration in Poland. The classification of weed susceptibility for each weed species, which have been located in the North-East zone and Germany is presented below. Very limited number of trials (only 1 trial) was noted for the following species: AMARE, ATXPA, BRNSW, CAPBP, GERPU, MATIN, PAPRH, POLPE, RAPS, SINAR, SONAS, THLAR and VERPE. These weed species were excluded from the summary table. In case of VIOAR,

the weed pressure was lower than 2% in one out two trials (conducted in Germany). However, accordance with Polish requirements this PESSEV (1%) is acceptable. Whereas, this trial was not included to the overall calculation in the Maritime EPPO zone.

Weed species	No of trials	Level of effectiveness	Dose rate	Susceptibility of weed species (according to SAN-CO)
CHEAL	8 trials	95,91%	1,2 l/ha	Highly susceptible (HS)
POLCO	6 trials	96,29%	0,9 l/ha	Highly susceptible (HS)
GALAP	3 trials	98,27%	1,2 l/ha	Highly susceptible (HS)
MATCH	2 trials	67%*	1,2 l/ha	Moderately tolerant (MT)
POLAV	2 trials	100%	0,9 l/ha	Highly susceptible (HS)
STEME	2 trials	100%	0,9 l/ha	Highly susceptible (HS)
VIOAR	2 trials	97,5%	1,2 l/ha	Highly susceptible (HS)

\* Control was poor from all treatments, probably due to the high weed population (19% ground cover)

No efficacy trials have been submitted for other beet crops (red beet, yellow beet, fodder beet, chard). The cMSs are kindly asked to use extrapolation of trial results from sugar beet and consider these crops on the national level.

The zRMS changed the water volume from 80-400 l/ha to 200-400 l/ha because the volume of 80 l/ha was not used in the submitted trials. The cMSs are kindly asked to consider this change on the national level.

### 3.3 Information on the occurrence or possible occurrence of the development of resistance (KCP 6.3)

HBZ10 is an emulsifiable concentrate (EC) formulation containing ethofumesate (125 g/L) and Phenmedipham (125 g/L) for use as a post-emergence herbicide for the control of broadleaved weed species in sugar beet and other beet crops. The possibility of development of resistance or cross-resistance to the active substances contained in is discussed hereafter based on the requirements detailed in the EPPO standard PP1/213(4) “Resistance risk analysis”.

#### 3.3.1 Mode of Action

The herbicide HBZ10 contains the active substances ethofumesate and phenmedipham.

Both active substances are well known and already approved for use in the United Kingdom and the European Union.

Ethofumesate is a benzofurane herbicide in HRAC Group 15 (Legacy group K3).

Benzofurans are examples of herbicides that are known inhibitors of several plant processes, including: 1) biosynthesis of fatty acids and lipids, which may account for reported reductions in cuticular wax deposition; 2) biosynthesis of proteins, isoprenoids (including gibberellins) and flavonoids (including anthocyanins); and 3) gibberellin synthesis inhibition, which may result from the inhibition of kaurene synthesis. Photosynthesis may also be inhibited. A currently viable hypothesis that may link all these effects involves the conjugation of acetyl coenzyme A and other sulfhydryl-containing biomolecules by thiocarbamate sulfoxides. The sulfoxide forms may be the active herbicides.

Benzofurans belong to HRAC Group 15 (Inhibition of very long-chain fatty acid synthesis), the legacy HRAC group is K3. Herbicides from eight different chemical families belong to Group 15 (K3). These

include benzofurans (*e.g.* ethofumesate); azolyl-carboxamides (*e.g.* ipfencarbazone); isoxazolines (*e.g.* fenoxasulfone); oxiranes (*e.g.* indanofan); thiocarbamates (*e.g.* prosulfocarb and tri-allate);  $\alpha$ -Chloroacetamides (*e.g.* metazachlor, S-metolachlor and dimethenamid);  $\alpha$ -Oxyacetamides (*e.g.* flufenacet); and  $\alpha$ -Thioacetamides (*e.g.* anilofos).

Ethofumesate is a selective systemic herbicide absorbed by the emerging shoots (grasses) and roots (broad-leaved weeds) with translocation to the foliage. It has good residual activity in the soil.

Phenmedipham is a phenyl-carbamate herbicide in HRAC Group 5 (legacy group C1). It acts by inhibition of photosynthesis (photosystem II), and is both a selective and systemic active substance, used as post-emergence herbicides. It is absorbed through the leaves and then translocated, and is efficient against broadleaved weeds, especially at cotyledon stages. It has been used for many years, phenmedipham was first reported in 1967. It is recognised as vital pest management tool for the efficient control of broad-leaved weeds in beet crops.

Phenylcarbamates, pyridazinones, triazines, triazinones, and uracils are Group 5 (HRAC legacy code C1) herbicides that inhibit photosynthesis by binding to the Q<sub>B</sub>-binding niche on the D1 protein of the photosystem II complex in chloroplast thylakoid membranes. Herbicide binding at this protein location blocks electron transport from Q<sub>A</sub> to Q<sub>B</sub> and stops CO<sub>2</sub> fixation and production of ATP and NADPH<sub>2</sub> which are all needed for plant growth. However, plant death occurs by other processes in most cases. Inability to reoxidize Q<sub>A</sub> promotes the formation of triplet state chlorophyll which interacts with ground state oxygen to form singlet oxygen. Both triplet chlorophyll and singlet oxygen can abstract hydrogen from unsaturated lipids, producing a lipid radical and initiating a chain reaction of lipid peroxidation. Lipids and proteins are attacked and oxidized, resulting in loss of chlorophyll and carotenoids and in leaky membranes which allow cells and cell organelles to dry and disintegrate rapidly. Some compounds in this group may also inhibit carotenoid biosynthesis (fluometuron) or synthesis of anthocyanin, RNA, and proteins (propanil), as well as effects on the plasmalemma (propanil)<sup>7</sup>.

### 3.3.2 Mechanism of resistance

#### Ethofumesate

The mechanism of resistance in weeds to Group 15 including benzofurans (*e.g.* ethofumesate), thiocarbamates,  $\alpha$ -Chloroacetamides and  $\alpha$ -Oxyacetamides is unknown. Thiocarbamate (*e.g.* prosulfocarb and tri-allate) herbicides in particular have been persistently used for weed control in cereal production in many parts of the world and this practice has as a result led to the highest number of instances of resistance within this group of chemicals.

Generally, non-target site, metabolic resistance is mediated through increased activity of multiple enzymes, including cytochrome P450 mono-oxygenases (P450s), glucosyl transferases (GTs), glutathione S-transferases (GSTs) and / or other systems such as aryl acylamidase, that conjugate and thereby inactivate herbicide compounds present in the cell. The precise mechanism will depend on the plant species and the active ingredient.

The first report of herbicide resistance involving a Group 15 herbicide was in 1982, with a further 34 until 2020; seven of these in the last 5 years<sup>8</sup>. Only four cases of resistance have been identified in Europe, and involved resistance to thiocarbamate- prosulfocarb (Sweden), and  $\alpha$ -Oxyacetamide- flufenacet (Germany, France, UK).

In the case reported in Sweden, the following comments are recorded by the author on the Weedsience website<sup>8</sup>, “*The results indicate enhanced metabolism to be the most common resistance mechanism in ALOMY in Sweden affecting mainly fenoxaprop-P and flupyralsulfuron and to less extent prosulfocarb (thiocarbamate) and pyroxsulam.*”

<sup>7</sup> Devine, M. D., J. C. Hall, M. L. Romano, M. A. S. Marles, L. W. Thompson, and R. H. Shimabukuro. 1993. Diclofop and fenoxaprop resistance in wild oat is associated with an altered effect on the plasma membrane electrogenic potential. *Pestic. Biochem. Physiol.* 45: 167-177.

<sup>8</sup> Heap, I. The International Herbicide-Resistant Weed Database. Online, [www.weedsience.org](http://www.weedsience.org), Accessed 18<sup>th</sup> August 2021

In the cases reported in France, Germany and the United Kingdom, field and greenhouse trials compared known susceptible biotypes of *L. perenne* and *A. myosuroides* with the samples collected from France, Germany and the United Kingdom to confirm resistance. Resistance of both species was found to be caused by enhanced metabolism of herbicides<sup>8</sup>.

Other mechanisms of resistance reported for cases of Group 15 resistance<sup>8</sup> include:

- Elevated endogenous levels of gibberellins responsible for thiocarbamate- tri-allate resistance in Canada.
- Altered target site for resistance for  $\alpha$ -Chloroacetamide- S-metolachlor in Arkansas, USA.
- Enhanced metabolism for  $\alpha$ -Chloroacetamides- acetochlor, dimethenamid and S-metolachlor and  $\alpha$ -Oxyacetamide- flufenacet in Illinois, Oregon, and Washington, USA.
- Altered target site and enhanced metabolism for thiocarbamate- tri-allate and  $\alpha$ -Chloroacetamide- S-metolachlor resistance in Australia.

Details of all cases are included in the section below.

### Phenmedipham

Specific mechanisms of resistance to Group 5 herbicides have been recorded.

Triazine herbicides in particular have been persistently used for weed control in maize production in many parts of the world and this practice has led to widespread resistance in target weeds. The first report of herbicide resistance involved a triazine herbicide<sup>9</sup>, and since then triazine resistance has become the most prevalent and well characterised example of herbicide resistance world-wide. Resistance in non-triazine, Group C5 compounds has been observed to a much lower degree.

With a few exceptions, triazine resistance is due to a target-site mechanism of resistance endowed by a modification at the herbicide target site, the D1 protein of PS2<sup>10</sup>. Only one mutation (Ser 264 Gly) has been identified in triazine-resistant weed species<sup>11</sup>. This mutation leads to a reduction in the capacity for photosynthetic electron transport between QA and QB<sup>12</sup>, which in turn leads to an increased susceptibility to photo-inhibition in the resistant biotypes<sup>13</sup>.

It is therefore clear that for triazine resistance in higher plants a single mutation of Ser 264 Gly within the QB binding site on the D1 protein confers resistance, with no other target site mutations yet identified. Evidently, only this specific mutation can endow resistance while retaining enzyme functionality, despite selection of countless numbers of plants with triazine herbicides in many parts of the world. This is somewhat unusual compared to other examples of single-site modes of action. For example for ALS or ACCase herbicide resistance it is likely that several mutations are required in order to endow resistance to weeds. Once the mutation for triazine resistance has occurred, weeds show an extremely high tolerance to chemicals, in the order of 10 times previously effective concentrations.

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<sup>9</sup> Ryan, G. F. 1970. Resistance of common groundsel to simazine and atrazine. *Weed Sci.* 18: 614-616

<sup>10</sup> Ryan, G. F. 1970. Resistance of common groundsel to simazine and atrazine. *Weed Sci.* 18: 614-616

<sup>11</sup> Trebst, A. 1991. The molecular biology of resistance to photosystem II herbicides. In *Herbicide Resistance in Weeds and Crops*. (J. C. Caseley, G. W. Cussans, and R. K. Atkin, Eds.). Butterworth Heinemann, Oxford, pp. 145-164

<sup>12</sup> Bowes, J., A. R. Crofts, and C. J. Arntzen. 1980. Redox reactions on the reducing side of photosystem II in chloroplasts with altered herbicide-binding properties. *Arch. Biochem. Biophys.* 200: 303-308; Ort, D. R., W. H. Ahrens, B. Martin, and E. W. Stoller. 1983. Comparison of photosynthetic performance in triazine- resistant and susceptible biotypes of *Amaranthus hybridus*. *Plant Physiol.* 72: 925-930.

<sup>13</sup> Hart, J. J., and A. Stemler. 1990. High light-induced reduction and low light-enhanced recovery of photon yield in triazine-resistant *Brassica napus* L. *Plant Physiol.* 94: 1301- 1307. ; Sundby, C., W. S. Chow, and J. M. Anderson. 1993. Effects on photosystem II function, photoinhibition, and plant performance of the spontaneous mutation of serine-264 in the Photosystem II reaction center D1 protein in triazine- resistant *Brassica napus* L. *Plant Physiol.* 103: 105-113.



In addition to the above, in a limited number of cases, other mechanisms of resistance have been reported.

In 2001, in the United States, a case of resistance was confirmed involving *Amaranthus tuberculatus*. The following comment is attached to this report: “Although the exact mechanism of resistance is not known, resistance is not due to an altered target site.”

In 2013, again in the United States, a case of resistance was confirmed involving *Kochia scoparia*. The following comment is attached to this report: “Studies on the mechanism of resistance of multiple resistant *Kochia* from United States indicate that resistance is due to an altered target site, and gene amplification.”

In 1981, this time in Spain, a case of resistance was confirmed involving *Panicum dichotomiflorum*. The following comment is attached to this report: “Studies on the mechanism of resistance of Group C1/5 resistant *Fall Panicum* from Spain indicate that resistance is due to enhanced metabolism.”

Further evidence of enhanced metabolism has been found in Australia, in populations of *L. rigidum* and *A. myosuroides*. For the latter biotypes displaying similar characteristics have also been found in Europe. It is clear that this mechanism of resistance is limited. Further discussion of this route is discussed below under the heading, ‘Cross-resistance’.

Finally, in Italy, in 1992, a case of resistance was confirmed involving *Setaria verticillata*. The following comment is attached to this report: “Growth chamber experiments revealed that atrazine-resistant *S. verticillata* plants developed from seed collected from both atrazine-treated and non-treated maize fields in the province of Cordoba, whereas atrazine-resistant *S. faberi* biotypes only developed in the treated fields. The resistance to atrazine of *S. verticillata* from both situations was apparently due to detoxification by conjugation of the herbicide with glutathione. The atrazine-resistant *S. faberi* biotype could be explained by a dual mechanism: (i) a lower affinity of the herbicide for the target site in the D1 protein, and (ii) by conjugation. Although the non-treated biotype of *S. faberi* conjugated glutathione to atrazine, it did so less efficiently than the corresponding resistant biotype.”□

### 3.3.3 Evidence of Resistance

Only one weed has exhibited resistance to phenmedipham, a biotype of *Atriplex patula* in Belgium. The mechanism of resistance for this biotype is unknown or has not been entered in the database. There is no record of differences in fitness or competitiveness of this resistant biotype when compared to that of normal susceptible biotypes.□No broadleaved weeds are resistant to ethofumesate.

The following table summarises the number of instances of resistance reported globally and in Europe, by active, for all Group 15 active substances. Only chemical families and active substances with reported resistance are included, all others are excluded.

**Table 3.3.3-1: Reported cases of resistance to Group 15 active substances\***

Legacy HR AC code	Chemical Family	Active Substance	Number of cases of resistance reported <u>Globally</u>	Number of cases of resistance reported in <u>Europe</u>	Crop / Situation (number)#
K3/N	$\alpha$ -Chloroacetamides	aceto-chlor	1	0	Maize, Soybean
		butachlor	3	0	Rice
		dimethenamid	1	0	Maize, Soybean
		metolachlor	2	0	Cereals (1), Cropland (1)
		S-metolachlor	3	0	Soybean (3), Maize (1), Cotton (1)
	$\alpha$ -Oxyacetamides	flufenacet	6	3	Cereals (6), Legumes (1), Canola (1)

	Benzofurans	ethofume sate	1	0	Grass seed
	Isoxazolines	pyrox- asulfone	3	0	Cereals (= 1), Maize (1), Soybean (1)
	Thiocarba- mates	molinate	3	0	Rice (3)
		prosul- focarb	1	1	Cereals (1)
		Thioben- carb =benthio carb	5	0	Rice (5)
		Tri-allate	12	0	Cereals (12), Canola (2), Legumes (2)
TOTAL			41	4	-

Source: Weedsience<sup>8</sup>

\* Due to an error in the Weedsience database active substances in the thiocarbamate and benzofuran chemical families are not included in the Group 15 (legacy K3) dataset; therefore, the data of reported cases of resistance to these chemical families is added manually to the table above.

# some single reported cases of resistance are observed in multiple crops

Specific cases of resistance linked to ethofumesate:

**Table 3.3.3-2: Reported cases of resistance to ethofumesate**

Year	Species	Country	Actives	Situations
1994	<i>Poa annua</i>	United States (Oregon)	ethofumesate	Grass seed

Source: Weedsience<sup>8</sup>

According to the above field reports, the majority of cases of resistance to Group 15 herbicides occur to thiocarbamates, and in particular tri-allate. Most reported cases of resistance occur outside of Europe and/or in cereals, maize and soybean crops. Despite the long history of use over a wide range of geographies, only one instance of resistance has ever been reported to ethofumesate; this was outside of Europe and in grass seed.

Since both phenmedipham and ethofumesate have a single-site mode of action, it must be considered they present a moderate to high ‘theoretical risk’ of resistance development if used intensively and without restriction, and therefore have a higher potential for developing ‘practical resistance’ in the field. However, the evidence from reported cases of resistance suggests that whilst resistance has developed, the majority is outside of Europe, and the number of cases of resistance to phenmedipham or ethofumesate is limited.

Therefore, overall whilst the ‘theoretical risk’ cannot be completely excluded, it does seem reasonable to conclude that up to this point, the ‘practical risk’ of resistance development, especially in Europe, is low.

#### Group 5 herbicides (including phenmedipham)

The following table summarises the number of instances of resistance reported globally and in Europe, by active, for all Group 5 active substances. Only chemical families and active substances with reported resistance are included, all others are excluded.

**Table 3.3.3-3: Reported cases of resistance to Group 5 active substances**

Legacy HR AC code	Chemical Family	Active Sub- stance	Number of cases of resistance reported globally	Number of cases of re- sistance reported in Europe	Crop / Situation (number)*
C1	Phenicar- bamates	Desmedipham	1	1	Sugarbeet
		Phen- medipham	1	1	Sugarbeet

Legacy HR AC code	Chemical Family	Active Substance	Number of cases of resistance reported globally	Number of cases of resistance reported in Europe	Crop / Situation (number)*
	Pyridazinones	Chloridazon=pyrazon	1	1	Maize, Soybean, Sugarbeet
	Triazines	Ametryne	2	0	Sugarcane (2), Roadsides (1)
		Atrazine	241	85	Maize (172), Cropland (37), Roadsides (44), Railways (19), Soybean (19), Orchards (18), Nurseries (8), Sorghum (7), Vegetables (2), Sugarbeet (6), Berries and Grapes (5), Forests (5), Canola (1), Wheat (4), Cotton (2), Industrial sites (2), Tomatoes (1)
		Cyanazine	15	7	Maize (9), Railways (6), Orchards (3), Cropland (2), Sugarbeet (2), Roadsides (1), Soybean (1)
		Prometon	1	1	Maize, Sugarbeet
		Prometryn	12	7	Railways (5), Maize (3), Orchards (3), Sugarbeet (2), Vegetables (2), Cotton (2), Roadsides (1)
		Simazine	74 72	36	Orchards (24), Maize (16), Golf courses (8), Roadsides (13), Nurseries (8), Cropland (7), Fruit (7), Vegetables (5), Railways (5), Forests (4), Soybean (2), Sugarbeet (2), Canola (2), Industrial sites (1), Lupins (1)
		Terbuthylazine	5 6	4 5	Maize (= 4), Sugarbeet (= 3), Railways (= 3), Orchards (1)
		Terbutryn	8	8	Railways (5), Maize (3), Sugarbeet (3), Orchards (3), Roadsides (1)
	Triazinones	Hexazinone	2	0	Blueberries (1), Alfalfa (1)
		Metamitron	7 9	7 9	Sugarbeet (= 8), Maize (= 6), Potato (2), Soybean (1), Orchard (1), Roadsides (= 2)

Legacy HR AC code	Chemical Family	Active Substance	Number of cases of resistance reported globally	Number of cases of resistance reported in Europe	Crop / Situation (number)*
		Metribuzin	27 28	9	Maize (9), Cropland (4), Vegetables (9), Soybean (3), Orchards (2), Wheat (3), Mint (2), Sugarbeet (2), Roadsides (2), Grass seed (1), Turf (1), Alfalfa (1), Grapes (1), Lentils (1), Nurseries (1), Sugarcane (1), Forest (1), Railways (1), Industrial sites (1)
	Uracils	Lenacil	6	6	Sugarbeet (3), Railways (3), Maize (2), Orchards (1)
		Terbacil	5	0	Mint (5), Potato (2)
C2	Amides	Propanil	28	4	Rice (28), Cropland (1)
	Ureas	Chlorotoluron	14	12	Cereals (13), Sugarbeet (1), Canola (1), Legumes (2)
		Diuron	10	0	Vegetables (3), Blueberries (2), Grass seed (2), Roadsides (1), Sugarcane (1), Nurseries (1), Railways (1), Wheat (1), Soybean (1)
		Fenuron	1	1	Maize, Railways, Roadsides
		Isoproturon	17	15	Cereals (17), Sugarbeet (1), Canola (1), Legumes (1)
		Linuron	12	4	Vegetables (8), Cropland (2), Maize (1), Orchards (1)
		Methabenzthiazuron	1	0	Roadsides
		Monolinuron	1	±	Vegetables
		Tebuthiuron	1	0	Railways
TOTAL			490 495	210	-

Source: Weedsience<sup>8</sup>

\* some single reported cases of resistance are observed in multiple crops

Specific cases of resistance linked to phenmedipham:

**Table 3.3.3-4: Reported cases of resistance to phenmedipham**

Year	Species	Country	Actives	Situations
2015	<i>Atriplex patula</i>	Belgium	phenmedipham, desmedipham, metamitron, lenacil	Sugar beets

Source: Weedsience<sup>8</sup>

According to the above field reports, the majority of cases of resistance to Group 5 herbicides occur to triazines, and in particular atrazine. Most reported cases of resistance occur outside of Europe and/or in maize crops. Despite the long history of use over a wide range of geographies, only one instance of resistance has ever been reported phenmedipham; this was in a sugar beet crop in Belgium.

## Cross-resistance

### Group 15 herbicides (including ethofumesate)

Of all reported cases of resistance to Group 15 active substances, half (16) are to Group 15 substances only, but these generally relate to the chemical families  $\alpha$ -chloroacetamides and thiocarbamates; there is none to benzofurans such as ethofumesate. The remaining cases of resistance which show cross resistance to other HRAC groups with different modes of action are generally to ACCase inhibitors (Group 1/A) and ALS inhibitors (Group 2/B).

**Table 3.3.3-5: Reported cases of cross resistance between Group 15 and other MOA groups: Global**

HRAC Group (legacy code)	Group name	No. of cases
1 (A)	ACCase inhibitors	10
2 (B)	ALS inhibitors	10
0 (Z)	Unknown	4
5 (C2)	PSII inhibitor	3
14 (E)	PPO inhibitors	2
3 (K1)	Microtubule inhibitors	2
9 (G)	ESPS inhibitors	1
13 (F4)	DOXP inhibitors	1
23 (K2)	Microtubule inhibitors	1

Source: Weedsience<sup>8</sup>

There are currently only two reported cases of cross-resistance between Group 15 active substances and other HRAC groups within Europe, and these are limited to resistant grassweeds in wheat; see Table 3.3.3-6.

**Table 3.3.3-6: Reported cases of cross resistance between Group 15 and other MOA groups: Europe**

Year	Species	Country	Actives	HRAC Group / legacy group	Situations
2007	<i>Alopecurus myosuroides</i>	Germany	fenoxaprop-P-ethyl, isoproturon, chlorotoluron, flufenacet, mesosulfuron-methyl, pinoxaden	ACCase inhibitors (1/A), ALS inhibitor (2/B) VLCFA inhibitors (15/K3) PSII inhibitors (5/C2)	Wheat
2011		Sweden	fenoxaprop-P-ethyl, flupyrsulfuron-methyl-sodium, prosulfocarb, pyroxsulam	ACCase inhibitors (1/A), ALS inhibitor (2/B) VLCFA inhibitors (15/K3)	Wheat

Source: Weedsience<sup>8</sup>

There is only one case of resistance to ethofumesate and this shows no cross resistance to other Group 15 chemical families or herbicides with different modes of action.

### Group 5 herbicides

Of all reported cases of resistance to Group 5 active substances, the majority (310) are to Group 5 substances only.

Although there is reported cross resistance between Group 5 active substances and other HRAC groups with different modes of action (see Table 3.3.3-), the majority are cases of cross resistance to ALS inhibitors [Group 2].

**Table 3.3.3-7: Reported cases of cross resistance between Group 5 and other MOA groups: Global**

HRAC Group (legacy code)	Group name	No. of cases
2 (B)	ALS inhibitors	47
9 (G)	ESPS inhibitors	14
1 (A)	ACCase inhibitors	13

27 (F2)	HPPD inhibitors	9
14 (E)	PPO inhibitors	8
4 (O)	Synthetic auxins	7
15 (K3)	VLCFA inhibitors	3
22 (D)	PSI electron diverters	2
3 (K1)	Microtubule inhibitors	2
12 (F1)	Cartenoid biosynthesis inhibitors	2

Source: Weedsience<sup>8</sup>

There are currently only 12 reported cases of cross-resistance between Group 5 active substances and other HRAC groups within Europe, and these are almost exclusively to resistant grassweeds in cereals; see Table 3.3.3-8.

**Table 3.3.3-8: Reported cases of cross resistance between Group 5 and other MOA groups: Europe**

Year	Species	Country	Actives	HRAC Group / legacy group	Situations
2005	<i>Apera spica-venti</i>	Czech Republic	sulfosulfuron, chlorsulfuron, isoproturon, iodosulfuron-methyl-sodium, mesosulfuron-methyl, pyroxulam	ALS inhibitors (2/B), PSII inhibitor (5/C2)	Cereals, Winter wheat
2009		Austria	isoproturon, iodosulfuron-methyl-sodium	ALS inhibitors (2/B), PSII inhibitor (5/C2)	Cereals
2009		Germany	fenoxaprop-P-ethyl, sulfosulfuron, isoproturon, iodosulfuron-methyl-sodium, mesosulfuron-methyl, pinoxaden, pyroxulam	ACCase inhibitors (1/A), ALS inhibitors (2/B), PSII inhibitor (5/C2)	Spring Barley, Winter wheat
1983	<i>Alopecurus myosuroides</i>	Germany	fenoxaprop-P-ethyl, isoproturon, chlorotoluron	ACCase inhibitors (1/A), PSII inhibitor (5/C2)	Wheat, Sugar beets
1996		Netherlands	clodinafop-propargyl, fenoxaprop-P-ethyl, isoproturon, chlorotoluron	ACCase inhibitors (1/A), PSII inhibitor (5/C2)	Winter wheat
1996		Belgium	clodinafop-propargyl, propaquizafop, fenoxaprop-P-ethyl, flupyrsulfuron-methyl-sodium, atrazine, chlorotoluron, pendimethalin	ACCase inhibitors (1/A), ALS inhibitors (2/B), Microtubule inhibitors (3/K1), PSII inhibitors (5/C1)	Winter wheat
2007		Germany	fenoxaprop-P-ethyl, isoproturon, chlorotoluron, flufenacet, mesosulfuron-methyl, pinoxaden	ACCase inhibitors (1/A), ALS inhibitors (2/B), VLCFA inhibitors (15/K3), PSII inhibitor (5/C2)	Wheat
2015		Spain	clodinafop-propargyl, cloransulam-methyl, isoproturon, chlorotoluron, iodosulfuron-methyl-sodium, mesosulfuron-methyl, pinoxaden	ACCase inhibitors (1/A), ALS inhibitors (2/B), PSII inhibitor (5/C2)	Wheat, Canola, Peas, Winter barley, Faba beans
1992		Spain	diclofop-methyl, chlorotoluron	ACCase inhibitors (A/1), PSII inhibitor (5/C2)	Wheat
1996	<i>Kochia scoparia</i>	Czech Republic	imazapyr, sulfosulfuron, thifensulfuron-methyl, chlorsulfuron, triflurosulfuron-	ALS inhibitors (2/B), PSII inhibitors (5/C1)	Railways, Roadsides

Year	Species	Country	Actives	HRAC Group / legacy group	Situations
			methyl, tribenuron-methyl, prosulfuron, metsulfuron-methyl, nicosulfuron, rimsulfuron, atrazine		
2004	<i>Echinochloa erecta</i>	Italy	propanil, quinclorac (MOA in monocots)	Inhibition of Acetolactate Synthase (29/L) PSII inhibitors (5/C1)	Rice
2018	<i>Lolium perenne ssp. multiflorum</i>	Switzerland	chlorotoluron, iodosulfuron-methyl-Na, mesosulfuron-methyl	Inhibition of Acetolactate Synthase (29/L) PSII inhibitors (5/C1)	Peas

Source: Weedsience<sup>8</sup>

### Summary

Overall, the risk of cross resistance from use of HBZ10 against broad-leaved weed in beet crops can be considered low. There are currently only two cases of cross-resistance between Group 15 herbicides and other herbicides in Europe, and these are grassweeds in cereals. For both phenmedipham and ethofumesate there are no reported cases of cross-resistance. Globally, there are only three reported cases of resistance to both Group 5 and Group 15 herbicides. Only one of these was in Europe and relates to *Alopecurus myosuroides* in wheat (Germany, 2007).

The majority of cases of cross-resistance between Group 5 and other herbicides occur outside Europe, most often on grassweeds in cereals.

### 3.3.4 Baseline sensitivity

Ethofumesate and phenmedipham have been used commercially in Europe for many years. It is therefore no longer possible to conduct true baseline sensitivity testing, using populations gathered from the field which can be guaranteed not to have been exposed to the chemistry. A modified version of this sensitivity testing, in which performance in field trials is recorded and monitored, is possible. The trials data presented in this dossier represent a suitable baseline, from which variations in control levels can be measured.

### 3.3.5 Resistance risk assessment of unrestricted use pattern

An unrestricted use pattern could include multiple applications of HBZ10 during the crop growth period, with no limits on the number of applications. There would also be no reference to the other products used in the sugar beet and other beet crops.

The following resistance risk assessment is based on the unmodified use pattern and results from the inherent risk when the product is applied under the unrestricted use conditions. It is a combination of the risk posed by the target, the active substances and agronomic conditions.

#### Inherent risk – target weeds

The most important factors to consider in terms of the inherent resistance of weed species to herbicides<sup>2</sup> include the following:

- <sup>2</sup> Propagation method – annual weeds develop resistance more rapidly compared to predominantly vegetatively propagated perennials
- <sup>2</sup> Fecundity - high fecundity results in a greater chance of producing a resistant biotype
- Genetic diversity – a genetically diverse species has a greater chance of containing resistance genes

Seed persistence - more persistent seeds will inhabit a seedbank that then poses a longer-term resistance problem

Based on these factors, and the number of resistance cases observed, the following weed species have been given the following inherent resistance ratings reported in Vencil *et al.*<sup>14</sup> and Moss *et al.*<sup>15</sup>: High – *Alopecurus myosuroides* (ALOMY), *Amaranthus* species (AMASS), *Apera spica-venti* (APESV), *Chenopodium* species (CHESS), *Lolium* species (LOLSS), *Papaver rhoeas* (PAPRH); Medium – *Av-ena* species (AVESS), *Conyza* species (ERISS), *Echinochloa* species (ECHSS), *Matricaria* species (MATSS), *Phalaris* species (PHASS), *Senecio vulgaris* (SENVU), *Stellaria media* (STEME); all weed species being of low risk.

In the case of HBZ10, the primary target weed species are spring-germinating broad-leaved weed species including CHEAL, POLAV, POLPE, STEME, SOLNI, and GALAP. As this list includes *Chenopodium* species, which are one of the most common weed species found in sugarbeet, the theoretical risk of resistance from a range of weed species is **Low to High**.

#### Inherent risk – active substances

According to Vencill *et al.* (2014)<sup>14</sup> and Moss *et al.* (2019)<sup>15</sup>, Group 5 (C1) herbicides, including phenmedipham have a theoretical high risk of causing resistance among weed populations. The same references also suggest that Group 15 (K3) herbicides have a theoretical low risk of causing resistance among weed populations. Therefore, given the limited number of cases of resistance to both phenmedipham and ethofumesate in Europe, the overall risk is determined to be **medium**.

#### Agronomic risk

Of the many agronomic practices and/or cropping factors with potential to enhance the resistance development, chemical usage is the most important. The regular and repeated use of the same active substance, or those with a similar mode of action, and monocultures and rotations that rely on the same herbicide mode of action lead to resistance.

Currently, it is recommended to use different modes of action in mixture or in sequence as part of a wider spray programme where each herbicide in the mixture targets the same weed. Season-long programmes of herbicide treatment with different modes of action are carefully planned in sugarbeet. A regular crop rotation is also necessary to allow the use of different chemicals with various modes of action, applied at different timings. Finally, non-chemical control methods need to be incorporated as part of an overall Integrated Pest Management strategy, using cultivation, stale seed beds and cover crops alongside chemical control.

Cultivation of root crops in regular rotation with cereal crops, oilseeds and pulse crops is common. In general, growers tend to grow root crops such as sugarbeet as a break crop between two crops of cereals, and often will grow a temporary cover crop in the Autumn before planting, which is then destroyed prior to planting sugarbeet. These are all considered to contribute to a lower risk crop.

Fortunately, Good Agricultural Practice in sugar beet and other beet crops already covers many of these recommendations; possibly one reason for the low incidence of resistance to these two molecules.

Suitable modifiers are listed below.

#### **Rotation of Crops**

The principle of crop rotation as a resistance management tool is to avoid successive crops in the same field which require herbicides with the same mode of action for control of the same weed species.

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<sup>14</sup> Vencill, W., Nichols, R., Webster, T & Moss, S. 2014. Framework for an expert evaluation for the evolution of weed resistance. 26<sup>th</sup> German conference on weed biology and weed control, March 11-13, 2014, Braunschweig, Germany. DOI 10.5073/jka.2014.443.004.

<sup>15</sup> Moss, S., Ulber, L & den Hoed, I. 2019. A herbicide resistance matrix. Crop Protection. 115: 13-19.



Crop rotation allows the following options:

- Different crops permit the use of herbicides having a different mode of action.
  - The growing season of the weed can be avoided or disrupted.
  - Crops with differing sowing times and different seedbed preparation can lead to a variety of cultural techniques being employed to manage a particular weed problem.
- Crops also differ in their inherent competitiveness against weeds. A strongly competitive crop will better restrict weed seed production.

### **Cultural techniques**

Cultural (or non-chemical) weed control methods do not exert a chemical selection pressure and assist greatly in reducing the soil seed bank. Cultural techniques must be incorporated into the general agronomy of the crop and other weed control strategies. Not all of the examples given are adequate in all situations.

Some of the cultural measures for weed control could include:

- Cultivation or ploughing prior to sowing to control emerged plants and to bury non-germinated seed.
- Delayed planting so that initial weed flushes can be controlled with a non-selective herbicide.
- Use of certified crop seed free of weed.
- Post-harvest grazing, where practical.
- Stubble burning, where allowed, can limit weed seed fertility.

In extreme cases of confirmed resistance, fields can be cut for hay or silage to prevent weed seed production and dispersion.

A number of these are unsuitable for use in sugar beet and other beet crops. The key factor in beet crops is the crop rotation which is required when this crop is grown.

### **Herbicide rotation and herbicide mixtures**

Herbicide rotation or mixtures refer to the rotation or mixtures of Herbicide Mode of Action against any identified weed species. HRAC has recently prepared a classification of herbicides according to mode of action. When planning a weed control program, products should be chosen from different mode of action groups to control the same weed in successive applications or in mixtures.

A general guideline for the rotation of chemical groups should consider:

- Avoiding the continued use of the same herbicide or herbicides having the same mode of action in the same field unless it is integrated with other weed control practices.
  - Limiting the number of applications of a single herbicide or herbicides having the same mode of action in a single growing season.
  - Where possible, using mixtures or sequential treatments of herbicides having a different mode of action but which are active on the same target weeds.
- Using non-selective herbicides to control early flushes of weeds (prior to crop emergence) and/or weed escapes.

### **The use of chemical mixtures to prevent resistance**

Mixtures can be a useful tool in managing or preventing the establishment of resistant weeds. For chemical mixtures to be effective, they should:

Include active ingredients which both give high levels of control of the target weed, and include active ingredients with different modes of action.

- 2 Additional to the above guideline, the grower should:
  - 2 Know which weeds infest the field or non-crop area and where possible, tailor the weed control programme according to weed densities and/or economic thresholds.
  - 2 Follow label instructions carefully. This especially includes recommended use rates and application timing for the weeds to be controlled.
- Routinely monitor results of herbicide applications, being aware of any trends or changes in the weed populations present.

Economic control levels should be the aim, not higher visual efficacy levels which increase selection pressure without providing a financial return to the grower.

As a result, and supported by the ‘practical risk’ of resistance in the field, the risk of resistance developing to this chemistry in beet crops is considered to continue to be low to moderate.

Agronomic risk is dependent on growers implementing such practices, and on following all label recommendations. Based on the assumption that Good Agricultural Practice and the guidelines provided by HRAC (see table below) are followed, it is estimated that there is a **low** risk associated with agronomic factors in this case.

#### Overall risk of resistance

The figure below illustrates the relationship between the separate and sometimes differing degrees of resistance risk associated with target weed species, active substances and agronomic risk. The matrix in Figure 3.3.5-1.3-1 gives a numerical score for the interaction of herbicide mode of action and target weed species. These scores may then be used to aid decision-making regarding the anti-resistance strategy. A score of 0.3-2.7 is considered as low; scores of 3-4 are medium; a score of 6 is high; and a score of 9 is very high.

Based on the proposed matrix below for assessing resistance risk it is considered that using HBZ10 (medium), against primary target weed species (high), and according to Good Agricultural Practice, Integrated Weed Management practices and HRAC guidelines (low) the overall risk of resistance of an unrestricted use pattern is **Low** (0.7-2.0) for all weed targets.

**Figure 3.3.5-1 : Matrix diagram to exemplify the relationships between the use of a particular herbicide (legacy) class and the control of a particular weed species (after Moss . (2019)<sup>15</sup>**

			WEED RISK			
			Low	Medium	High	
			1	2	3	
			All other weed species	(examples) AVESS ECHSS ERISS STEME	(examples) ALOMY AMASS LOLSS PAPRH	
HERBICIDE RISK	High (A, B, C1)	3	3	6	9	Unmodified Risk (x1)
			2	4	6	Partially modified (x0.67)
			1	2	3	IWM (x0.33)
	Medium (C2, D, G, O, )	2	2	4	6	Unmodified Risk (x1)
			1.3	2.7	4	Partially modified (x0.67)
			0.7	1.3	2	IWM (x0.33)
	Low (C3, E, F1, F3, H, K1, K3, L, N, Z + very low MOA)	1	1	2	3	Unmodified Risk (x1)
			0.7	1.3	2	Partially modified (x0.67)
			0.3	0.7	1	IWM (x0.33)

### 3.3.6 Management Strategy

The risk of resistance arising through the use of HBZ10 is mitigated by label recommendations, including a maximum of six applications per season, a maximum total dose of 1000 g/ha of ethofumesate every three years, and to be applied when weeds are small and at an active stage of weed growth for optimal control.

As the risk of resistance development from Group 15 herbicides (including ethofumesate) and Group 5 (including phenmedipham) is low, there are no specific HRAC Working Groups dedicated to resistance management of these herbicide groups, and which publishes specific guidance. In the absence of specific guidance, HRAC recommends the following best management practice guidance<sup>16</sup> for the use of all herbicides:

- ② Use mixtures or sequential treatments of herbicides having different sites of action. Each herbicide in the mixture should target the same weed species.
- ② Consider all chemical control options before planting, in-crop and after harvest.
- ② Avoid continued use of the same herbicides, or herbicides with the same site of action in the same field, unless integrated with other weed control practices.
- ② Limit the number of applications of a single herbicide or herbicides with the same site of action in a single growing season.
- ② Herbicide mixtures and herbicide rotations alone are not enough to prevent resistance. They must be used in a diversified plan than also incorporates mechanical, cultural and biological practices.
- ② Follow label use instructions, such as application rates, timing and equipment recommendations.

<sup>16</sup> Best Management Practice, Herbicide Resistance Action Committee (HRAC), Online, <https://hracglobal.com/prevention-management/best-management-practices>, Accessed 19<sup>th</sup> October 2020

- ☐ Know the weeds in their fields and nearby non-crop areas and tailor their weed control program to weed densities and economic thresholds.
- ☐ Monitor herbicide results and be aware of any trends or changes in weed populations.
- ☐ Maintain detailed field records to confirm cropping and herbicide history.

Non-chemical weed control methods do not exert a chemical selection pressure and assist greatly in reducing the seed bank in the soil. Cultural techniques must be incorporated into the general agronomy of the crop and other weed control strategies. Cultural measures for weed control in all crops include:

- ☐ Use of stale seed beds between crop rotations, followed by cultivation or ploughing prior to sowing to control emerged plants and/or to bury non-germinated seed.
- ☐ Delay planting so that initial weed flushes can be controlled with a non-selective herbicide.

In cases of confirmed resistance, fields can be partially or completely destroyed to prevent weed seed set.

### 3.3.7 Implementation of the management strategy

Statements relating to resistance risks and best practice management strategies will be included on the proposed label for HBZ10.

Following HRAC guidelines and recommendations and prompting the user to follow the specific preventive measures indicated by the label, constitutes an effective implementation of the management strategy.

### 3.3.8 Monitoring, reporting and reaction to changes in performance

The applicant is committed to responding to any reports of changes in performance levels following the use of HBZ10 in the field. In the event that the applicant is made aware of a reduction in the performance of HBZ10 seed samples will be collected from the treated area and tested for sensitivity using published methodology.

If resistance is confirmed, the applicant will respond appropriately by informing the relevant authorities and communicating with growers, following the advice of the relevant national authorities and HRAC in cases of confirmed herbicide resistance; and will continue to monitor performance and amend the resistance management strategy if necessary.

#### Comments of zRMS:

HBZ10 (Wizard/Beetup Pro/Betasana Max) contains two active substances: ethofumesate and phenmedipham. Ethofumesate belongs to the chemical group of benzofurans (HRAC Group 15, legacy K3/N) and phenmedipham belongs to the chemical group of phenylcarbamates (HRAC Group 5, legacy C1). Currently, there are reported 4 cases of resistance to HRAC group 15 (no cases for ethofumesate) and 210 cases of resistance to HRAC group 5 (only one case for phenmedipham) in Europe. Moreover, there are only two reported cases of cross-resistance between Group 15 active substances and other HRAC groups and 12 cases of cross-resistance between Group 5 active substances and other HRAC groups within Europe. These cases are limited to resistant grassweeds in cereals. The overall risk of resistance of an unrestricted use pattern is low **to medium** for all weed targets. No specific HRAC Working group 15 or 5 recommendations were published on the HRAC website. Due to that the general practice guidance for the use of herbicides are advised to include to the product label. The zRMS proposes to use the below recommendations:

1. Follow label use instructions, such as application rates, timing and equipment recommendations.
2. Use mixtures or sequential treatments of herbicides having different sites of action.
3. Avoid continued use of the same herbicides, or herbicides with the same site of action in the same field, unless integrated with other weed control practices.
4. Limit the number of applications of a single herbicide or herbicides with the same site of action in a single growing season.
5. Monitor herbicide results

### 3.4 Adverse effects on treated crops (KCP 6.4)

Information on trials submitted (3.4: Adverse effects on treated crops)

In addition to the efficacy trials reported in Section 3.2 of this Report, a total programme of twelve replicated selectivity trials was conducted in France, Poland, the Netherlands, the United Kingdom and Germany in 2019 and 2020.

All products were applied at N and 2N dose rates. HBZ08/10 was tested at 2.4 and 4.8L/ha applied three times, as this represents the worst case for the crop, and is also equivalent in the total dose to the Low Dose System programme (1.2L/ha applied at 5-6 applications).

#### Minor use

According to EPPO PP 1/257 HCET 68 (1) the indicator crop for selectivity in beet crops is red beet (BEAVD), with extrapolation to any *Beta* species (BEASS). However, given the well-known selectivity of ethofumesate and phenmedipham, when used as recommended, it is reasonable to extrapolate that selectivity data generated on sugar beet is representative of selectivity on other beet crops.

**Table 3.4-1: Numbers of selectivity trials conducted in the Maritime/North-East zones**

Table 3.4-1. Numbers of selectivity trials conducted in the Maritime/North-East zones								
Crop/ situation	Targets	Country	Years	Type of trial	Number of trials (num- ber of valid trials)		GEP, non- GEP, offi- cial***	Comments (any other relevant infor- mation)
					Maritime zone	North- East zone		
Sugar beet	N/A	DE	2019	S, Y	3 (3)	<div><div></div></div>	GEP	HBZ08 only
		NL	2019	S, Y	2 (2)	<div><div></div></div>	GEP	HBZ08 only
		FR	2020	S, Y	3 (3)	<div><div></div></div>	GEP	Bridging be- tween HBZ08 and HBZ10
		UK	2020	S, Y	2 (2)	<div><div></div></div>	GEP	Bridging be- tween HBZ08 and HBZ10
		PL	2020	S, Y	<div><div></div></div>	2 (2)	GEP	Bridging be- tween HBZ08 and HBZ10
TOTAL					10 (10)	2 (2)	-	

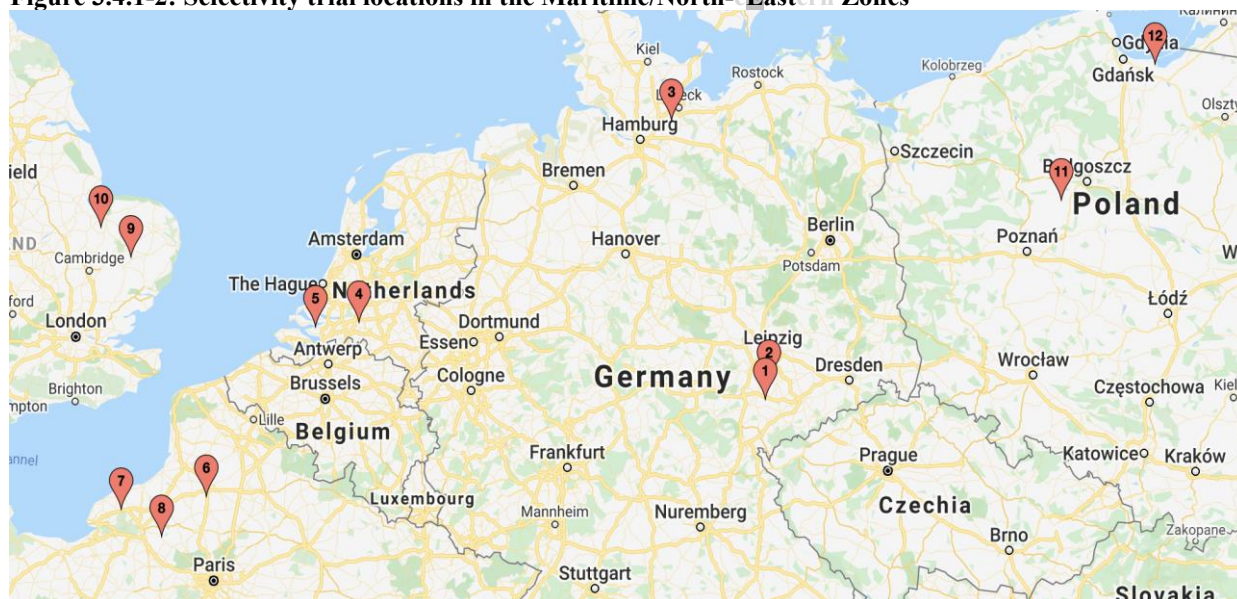
\* According to the GAP table

\*\* S = selectivity trial, Y = trial with yield assessment, Q = trial with quality assessment, T = trial on the basis of the study of impact on transformation process (TP: Physical transformation, TF: transformation involving microbial fermentation), P = trial with assessment of impact on propagation

\*\*\* Official: carried out by a national official organisation

Selectivity trial locations are presented in Figure 3.4.1-1 below.

**Figure 3.4.1-2: Selectivity trial locations in the Maritime/North- Eastern Zones**



**Table 3.4.1-2: Details on selectivity trial methodology**

<b>Guidelines</b>	General guidelines	EPPO PP 1/152, PP 1/135, PP 1/181
	Specific guidelines	EPPO PP 1/52
<b>Experimental design</b>	Plot design	RCBD (+12)
	Plot size	20-33 m <sup>2</sup>
	Number of replications	4 (12)
<b>Crop</b>	Trials per crop	Sugar beet (12)
	Varieties per crop	Sugar beet: BTS 2345 (1), BTS 3750 (1), BTS 770 (1), Chamois (1), Cortessa (1), Fantasja (1), Landon (1), Lareina (1), Lightning (1), Rashida (1), Urselina KWS (1), Zeltic (1)
	Sowing period	Sugar beet: from March (7) to April (+5)
<b>Application</b>	Crop stage (BBCH)* at application	Sugar beet: from BBCH 10 to BBCH 18
	Timing Weed stage at application	N/A
	Number of applications Intervals between applications	3 (12 trials) with intervals of 5-14 days Note: the higher rates applied three times are regarded as a more challenging situation regarding crop selectivity than lower rates at 5/6 applications
	Spray volumes	200 - 400 300 L/ha
<b>Assessment</b>	Assessment types	Crop colour 0-10, general phytotoxicity, crop stunting, crop thinning, leaf deformation, crop volume reduction, crop vigour, overall yield, sugar content, amino acid content, sodium content, potassium content
	Assessment dates	7 DAT, 14 DAT, 28 DAT +/- 3, crop harvest, quality assessments
<b>Other relevant information</b>	Soil type	Clay (1), clay loam (1), loamy sand (1), sand (1), sandy loam (1), silt (2), silt loam (2), silty clay loam (3)
	Natural / artificial infestation	N/A
	Field / Greenhouse	All field trials

**Table 3.4.1-3: Presentation of reference standards used in trials (selectivity trials)**

Crop	Reference standard	Country	Authorization number	Active substances	Formulation		Registered application rate*	Use rates	Grouped together as:
					Type	Conc of a.s.			
BEAVA	HBZ08	N/A	N/A	Ethofumesate Phenmedipham	EC	125 125	N/A	2.4-4.8	HBZ10
BEAVA	HBZ10	N/A	N/A	Ethofumesate Phenmedipham	EC	125 125	N/A	2.4-4.8	
BEAVA	Powertwin 400 SC + Olejan 85 EC (adjuvant)	PL	R21/2012	Ethofumesate Phenmedipham	SC	200 200	1.0	1.0-2.0	E+P
BEAVA	Saroual	FR	2090095	Ethofumesate Phenmedipham	SC	190 200	1.5**	0.8-1.6**	
BEAVA	Betanal Expert	DE	024991-00	Phenmedipham Ethofumesate Desmedipham	EC	75 151 25	1.5	1.5-3.0	E+P+D
BEAVA	Betanal MaxxPro	UK	MAPP15086	Desmedipham Ethofumesate Lenacil Phenmedipham	OD	47 75 27 60	1.5	1.5-3.0	E+P+D+L
BEAVA	Powertwin + Goltix	NL	13185	Ethofumesate Phenmedipham	SC	200 200	1.0	1.0-2.0	E+P+M
			1229	Metamitron	SC	700	0.5	0.5-1.0	

\*Products containing desmedipham are no longer authorised in the EU, but the authorisation numbers and recommended use rates were correct at the time of application. (1) only on uses applied for (with the test product)

\*\*The maximum total dose permitted is 2.5L/ha, with a maximum individual dose of 1.5L/ha. The product dose rate was therefore adapted based upon local practice for 3 applications

All efficacy trials were conducted in areas of commercial sugar beet, rather than specially-planted areas of crops. Trial sites were maintained weed-free through the course of the trial.

These trials are therefore truly representative of the performance of HBZ10 in the conditions for which it is intended.

In Appendix 4 the details of trial sites, testing facilities and test specific parameters are shown for all the trials carried out.

In this submission, data are included from trials conducted in Germany, the Netherlands, Poland and the United Kingdom (Central European Zone) and France (Southern European Zone).














































The use of data from France to support an application for approval in Great Britain and the Central and Southern Zones of the European Union is relevant for the following reasons:

② The climate in Northern France, where the trials took place, is comparable to that in countries such as the Netherlands, Germany and the United Kingdom. This is underlined by the comparable climatic zones detailed in EPPO Guideline PP 1/241(2).









② Within France, sugarbeet is generally only grown in the Maritime region of France.

② The agronomic factors influencing the sugar beet crop are similar in Northern France and the other countries of interest. This is indicated by the common planting dates and harvesting seen in this series of trials. Crop rotations, cultivation methods, planting density and crop inputs such as herbicides are also very similar across the Maritime region.

The biology and epidemiology of the weed species is the same in all regions of the EU.

Number of trials with...		Selectivity trials (12 trials)									
		HBZ10		E+P		E+P+D		E+P+D+L		E+P+M	
		N	2N	N	2N	N	2N	N	2N	N	2N
Maximum of phytotoxicity recorded during the trials	0% to 5%	9	7	5	5	3	3	2	2		
	>5% to 10%	1	2							2	
	>10% to 15%										2
	>15 %	2	3								
Level of symptoms at the last assessments	0% to 5%	11	10	5	5	3	3	2	2	2	1
	>5% to 10%										1
	>10% to 15%										



Number of trials with...	Selectivity trials (12 trials)									
	HBZ10		E+P		E+P+D		E+P+D+L		E+P+M	
	N	2N	N	2N	N	2N	N	2N	N	2N
>15 %	1	2								

### Efficacy trials

In all except three trials phytotoxicity from both formulations was transient and not observed at the time of the final assessment. In ten trials conducted in Poland (4) and Germany (4) and France (2) no phytotoxic effects were observed.

In three further trials phytotoxicity reached a maximum of 10%, which is clear but still within the bounds of acceptability.

In six trials effects varied from 20-34%, with no unacceptable effects observable at the final assessment.

These results include one trial in which treatment applications deviated from protocol and GAP table. A maximum of 18% phytotoxicity was observed in the untreated plots 6DAD, which indicates that the phytotoxicity results from this trial are unreliable.

Phytotoxicity effects observed included necrosis of the leaf tip, crop thinning, leaf deformation, crop stunting and chlorosis. Not all symptoms were observed in all trials.

In all trials, with the exception of one trial in which the GAP was not respected, phytotoxicity from both formulations was transient and not observed at the time of the final assessment. In four trials conducted in Poland (3) and Germany no phytotoxic effects were observed. In the remaining five trials effects from HBZ10 were less damaging than those observed from HBZ08 in two cases and equivalent statistically in three cases.

In all efficacy trials in which the GAP was respected the crop safety of HBZ10 was clear, with transient effects reducing to acceptable levels over the course of the trial.

### Selectivity trials

In two trials, conducted in France and Poland, no phytotoxic symptoms were observed. In one trial phytotoxicity was never above the 2.75% level.

Phytotoxicity effects observed included necrosis of the leaf tip, crop thinning, leaf deformation, crop stunting and chlorosis. Not all symptoms were observed in all trials.

The high levels of damage observed in the trials conducted in the Netherlands were associated with high temperatures around the time of Applications A and B. One trial had temperatures from 22.4-25.3°C from the day before Application A, to the day after Application B. Similarly, another trial had temperatures from 21.3-20.6°C from the day before Application A, to the day of Application B. These conditions are known to cause a temporary check in crop growth after the use of ethofumesate and phenmedipham, and growers will be instructed to avoid application while the crop plants are likely to be under heat or drought stress.

Similar high temperatures were recorded in at applications in two other trials. Both trials were sprayed in periods with maximum temperatures of 27-28°C, which are likely to have induced stress in the crop plants. Analysis of these results should therefore take this into consideration.

There was no difference in the levels of phytotoxicity observed between HBZ08 and HBZ10, which indicates that the two formulations are comparable and that data for HBZ08 may be used to represent the likely results for HBZ10.

## Conclusion

When used as recommended HBZ10 is safe to sugar beet crops. Extrapolation to other beet crops is also proposed.

### Comments of zRMS:

12 selectivity (10 in MAR and 2 in NE EPPO zone) and 21 efficacy trials have been submitted to crop safe evaluation. No negative impact on sugar beet was observed in four efficacy trials conducted in Poland. Necrosis of the leaf tip, crop thinning, leaf deformation, crop stunting and chlorosis were detected in the efficacy trials from Maritime EPPO zone. These symptoms were transient with acceptable level in the last assessment. In one selectivity trial conducted in Poland, thinning was observed but on acceptable level (<5%), also in the last assessment. Stunting, deformation, chlorosis, thinning, necrosis of leaf tip and discoloration were noted in the selectivity trials conducted in Netherlands, France and United Kingdom. The high level of phytotoxicity symptoms was detected in Netherlands. However taking into account of high temperatures recorded during applications, the special recommendation to the product label is justified. Moreover, the zRMS proposes to add the warning: “HBZ10 (Wizard/Beetup Pro/Betasana Max) can cause the transient phytotoxicity symptoms”.

No selectivity trials were carried out in other beet crops. The cMSs are kindly asked to consider these uses on the national level.

## 3.4.2 Effect on the yield of treated plants or plant product (KCP 6.4.2)

### 3.4.2.1 Yield in bridging trials

Yield was assessed in seven bridging trials conducted in France (3), the United Kingdom (2) and Poland (2). All trials included 2.4L/ha and 4.8L/ha of HBZ08 and HBZ10, applied three times.

In no trial was there a statistically significant difference in total yield between the untreated plots and the plots treated with HBZ08 or HBZ10, regardless of use rate. This indicates that both formulations are safe to the sugar beet crop, and also that data for HBZ08 may be used to support the application for HBZ10.

**Table 3.4.2.1-1: Presentation of trials data (selectivity/weed-free trials BRIDGING); total crop yield (T/ha). All results as % of untreated check**

				Name	HBZ08	HBZ10	HBZ08	HBZ10
					2.4	2.4	4.8	4.8
					l/ha	l/ha	l/ha	l/ha
Grouping	No. trials	Untreated value	Assessment Unit	Name	1N	1N	2N	2N
MARITIME BRIDGING	5 trials	61.08	T/ha	Mean	108.21	105.37	101.07	106.19
		42.21-82.8		Range	94.85-121.82	89.34-123.9	91.56-111.97	93.22-120.89
NORTH-EASTERN BRIDGING	2 trials	63.98	T/ha	Mean	99.16	100.89	100.18	101.14
		58.43-69.52		Range	98.69-99.63	99.17-102.6	98.29-102.07	98.97-103.31
ALL BRIDGING	7 trials	61.91	T/ha	Mean	105.62	104.09	100.81	104.75
		42.21-82.8		Range	94.85-121.82	89.34-123.9	91.56-111.97	93.22-120.89

### **3.4.2.2 Yield in weed-free selectivity trials**

Yield was assessed in twelve weed-free trials conducted in Germany (3), France (3), the Netherlands, (2), the United Kingdom (2) and Poland (2). All trials included 2.4L/ha (1N) and 4.8L/ha (2N) of HBZ10, applied three times.

In no trial was there a statistically significant difference in total yield between the untreated plots and the plots treated with HBZ10, regardless of use rate. Similarly, there was no statistically significant difference between HBZ10 and any of the reference products. This indicates that the crop safety of HBZ10 is comparable to that of all the reference products.

**Table 3.4.2.2-1: Presentation of trials data (selectivity/weed-free trials); Total crop yield. All results as % of untreated check**

				Na me	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D+ L	E+P+D+ L	E+P+M	E+P+M
				Rat e	2.4	4.8	E: 152- 200 P: 160- 200	E: 304- 400 P: 320- 400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Uni t	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping	Num ber of trials	Untreat- ed value	Assess- ment Unit	Na me	N	2N	N	2N	N	2N	N	2N	N	2N
MARITIME ALL	10 trials	73.15	T/ha	Me an	105.37	104.15	103.12	112.67	98.12	99.18	117.01	111.09	100.58	108.22
		42.21- 104.58		Ran ge	89.34- 123.9	89.34- 123.9	90.06- 120.89	95.5- 143.43	89.43- 103.83	93.01- 103.9	94.32- 139.69	92.75- 129.43	93.33- 107.83	103.06- 113.38
NORTH- EASTERN ALL	2 trials	63.98	T/ha	Me an	100.89	101.14	99.09	98.79	█	█	█	█	█	█
		58.43- 69.52		Ran ge	99.17- 102.6	98.97- 103.31	98.28- 99.89	98.27- 99.3	█	█	█	█	█	█
MARITIME ORTHOGONAL E+P	3 trials	71.19	T/ha	Me an	109.87	106.89	110.45	112.67	█	█	█	█	█	█
		0-82.8		Ran ge	93.58- 123.9	93.22- 120.89	100.58- 129.69	95.5- 143.43	█	█	█	█	█	█
MARITIME ORTHOGONAL E+P+D	3 trials	80.44	T/ha	Me an	104.05	101.76	█	█	98.12	99.18	█	█	█	█
		74.95- 89.03		Ran ge	102.61- 104.77	100.02- 104.53	█	█	89.43- 103.83	93.01- 103.9	█	█	█	█
MARITIME ORTHOGONAL E+P+D+L	2 trials	45.92	T/ha	Me an	98.63	105.15	█	█	█	█	117.01	111.09	█	█
		42.21- 49.62		Ran ge	89.34- 107.91	97.65- 112.64	█	█	█	█	94.32- 139.69	92.75- 129.43	█	█
MARITIME ORTHOGONAL E+P+M	2 trials	92.41	T/ha	Me an	101.24	97.50	█	█	█	█	█	█	100.58	108.22
		80.23- 104.58		Ran ge	98.19- 104.29	90.06- 104.94	█	█	█	█	█	█	93.33- 107.83	103.06- 113.38
NORTH- EASTERN ORTHOGONAL E+P	2 trials	63.98	T/ha	Me an	100.89	101.14	99.09	98.79	█	█	█	█	█	█
		58.43- 69.52		Ran ge	99.17- 102.6	98.97- 103.31	98.28- 99.89	98.27- 99.3	█	█	█	█	█	█

				<b>Na me</b>	<b>HBZ10</b>	<b>HBZ10</b>	<b>E+P</b>	<b>E+P</b>	<b>E+P+D</b>	<b>E+P+D</b>	<b>E+P+D+ L</b>	<b>E+P+D+ L</b>	<b>E+P+M</b>	<b>E+P+M</b>
				<b>Rat e</b>	2.4	4.8	E: 152- 200 P: 160- 200	E: 304- 400 P: 320- 400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				<b>Uni t</b>	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
<b>Grouping</b>	<b>Num ber of trials</b>	<b>Untreat- ed value</b>	<b>Assess- ment Unit</b>	<b>Na me</b>	N	2N	N	2N	N	2N	N	2N	N	2N
ALL ORTHOGONAL E+P	5 trials	68.30	T/ha	<b>Me an</b>	106.28	104.59	105.91	107.11	■	■	■	■	■	■
		58.43- 82.8		<b>Ran ge</b>	93.58- 123.9	93.22- 120.89	98.28- 129.69	95.5- 143.43	■	■	■	■	■	■
ALL	12 trials	71.62	T/ha	<b>Me an</b>	104.09	104.75	105.91	107.11	98.12	99.18	117.01	111.09	100.58	108.22
		42.21- 104.58		<b>Ran ge</b>	89.34- 123.9	93.22- 120.89	98.28- 129.69	95.5- 143.43	89.43- 103.83	93.01- 103.9	94.32- 139.69	92.75- 129.43	93.33- 107.83	103.06- 113.38

**Table 3.4.2.2-2: Relationship between phytotoxicity and yield.**

Test re- port	Variety	Stand- ard	Maximum phyto. at 1N rate (%) (DAA)		Maximum phyto. at 2N rate (%) (DAA)		Yield in the un- treated control Absolute figures (T/ha)	Yield at 1N as % of untreated		Yield at 2N (or other) rate as % of untreated	
			HBZ1 0	Stand- ard	HBZ1 0	Stand- ard		HBZ1 0	Stand- ard	HBZ1 0	Stand- ard
Trial 1	Urselina KWS	E+P+M	31.25 7DAC	10.0 7DAC	62.50 7DAC	11.25 7DAC	104.58	104.29	107.83	104.94	113.38
Trial 2	BTS 2343	E+P+M	15.0 0DAC	8.75 0DAC	35.00 0DAC	11.25 0DAC	80.23	98.19	93.33	90.06	103.06
Trial 3	CHAM-OIS	E+P	7.5 0DAC	1.25 0DAC	10.00 0DAC	3.75 0DAC	82.8	93.58	100.58	93.22	95.50
Trial 4	CHAM-OIS	EP	5.0 0DAC	0.50 0DAC	10.00 0DAC	2.50 0DAC	59.42	123.90	129.69	120.89	143.43
Trial 5	Lightning	E+D+L	3.75 0DAC	3.75 0DAC	22.50 0DAC	0.00 0DAC	42.21	107.91	139.69	112.64	129.43

There was no relationship between any phytotoxicity observed and the final yield, even in those trials conducted in the Netherlands which had 35-62.5% phytotoxicity from HBZ10. This was also true for the reference products. For these purposes, significant phyto is defined as >10% of any symptom.

### 3.4.3 Effects on the quality of plants or plant products (KCP 6.4.3)

#### 3.4.3.1 Crop quality in bridging trials

Crop quality was assessed in seven bridging trials conducted in France (3), the United Kingdom (2) and Poland (2). All trials included 2.4L/ha (1N) and 4.8L/ha (2N) of HBZ08 and HBZ10, applied three times.

Quality parameters tested were:

- Ammino-N content, expressed as millimoles/100g (MM100G) or %
- Potassium content, expressed as millimoles/100g (MM100G) or %
- Sodium content, expressed as millimoles/100g (MM100G) or %
- Sugar content, expressed as %

Total sugar yield, calculated at beet yield (T/ha) multiplied by sugar content (%)

**Table 3.4.3.1-1: Presentation of trials data (selectivity/weed-free BRIDGING trials); Amino N content. All results as % of untreated check**

Grouping	No. of trials	Untreated value	Assessment Unit	Name	HBZ08	HBZ10	HBZ08	HBZ10
				Rate	2.4	2.4	4.8	4.8
				Unit	l/ha	l/ha	l/ha	l/ha
Grouping	No. of trials	Untreated value	Assessment Unit	Name	1N	1N	2N	2N
MARITIME BRIDGING	5 trials	2.00	MM100G 2 trials	Mean	102.20	106.71	97.85	107.65
		1.90-2.11		Range	55.93-126.22	53.38-128.57	32.2-126.22	77.11-132.14
		0.54	% 3 trials	Mean	115.16	121.56	116.2	119.0
		0.28-0.72		Range	96.5-124.9	115.7-128.6	105.4-126.1	102.1-130.4
NORTH-EASTERN BRIDGING	2 trials	3.03	MM100G 2 trials	Mean	97.59	101.07	94.51	100.08
		2.3-3.75		Range	88.73-106.43	96.86-105.28	73.13-115.88	91.85-108.3
ALL BRIDGING	7 trials	2.52	MM100G 4 trials	Mean	100.88	105.10	96.90	105.49
		1.90-3.76		Range	55.93-126.22	53.38-128.57	32.2-126.22	77.11-132.14
		0.54	% 3 trials	Mean	115.16	121.56	116.2	119.0
		0.28-0.72		Range	96.5-124.9	115.7-128.6	105.4-126.1	102.1-130.4

**Table 3.4.3.1-2: Presentation of trials data (selectivity/weed-free BRIDGING trials); Potassium content. All results as % of untreated check**

Grouping	No. of trials	Untreated value	Assessment Unit	Name	HBZ08	HBZ10	HBZ08	HBZ10
				Rate	2.4	2.4	4.8	4.8
				Unit	l/ha	l/ha	l/ha	l/ha
Grouping	No. of trials	Untreated value	Assessment Unit	Name	1N	1N	2N	2N
MARITIME BRIDGING	5 trials	5.90	MM100G 2 trials	Mean	101.22	99.06	102.28	99.91
		3.35-8.44		Range	92.52-104.47	90.22-104.47	97.34-107.55	90.61-103.24
		3.15	% 3 trials	Mean	105.16	102.06	102.03	102.26
		2.46-3.61		Range	104.3-106.4	98.8-104.6	97.5-104.7	100.8-103.4
NORTH-EASTERN BRIDGING	2 trials	4.24	MM100G 2 trials	Mean	93.00	98.90	89.84	97.86
		3.52-4.95		Range	87.31-98.68	96.11-101.67	79.51-100.16	97.47-98.24
ALL BRIDGING	7 trials	5.07	MM100G 4 trials	Mean	98.87	99.01	97.62	99.32
		3.35-8.44		Range	87.31-106.37	90.22-104.47	79.51-104.87	90.61-103.24
		3.15	% 3 trials	Mean	105.16	102.06	102.03	102.26
		2.46-3.61		Range	104.3-106.4	98.8-104.6	97.5-104.7	100.8-103.4

**Table 3.4.3.1-3: Presentation of trials data (selectivity/weed-free trials BRIDGING); sodium content. All results as % of untreated check**

				Name	HBZ08	HBZ10	HBZ08	HBZ10
				Rate	2.4	2.4	4.8	4.8
				Unit	l/ha	l/ha	l/ha	l/ha
Grouping	No. of trials	Untreated value	Assessment Unit	Name	1N	1N	2N	2N
MARITIME BRIDGING	5 trials	2.64	MM100G 2 trials	Mean	94.31	99.69	111.75	106.68
		0.81-1.83		Range	82-103.12	86.44-115.09	107.5-118.75	95.39-115.62
		0.42	% 3 trials	Mean	99.36	104.9	112.0	110.6
		0.32-0.53		Range	94.8-103.9	92.5-115.2	107.5-118.0	102.5-116.4
NORTH-EASTERN BRIDGING	2 trials	0.49	MM100G 2 trials	Mean	96.18	101.46	100.04	92.40
		0.38-0.59		Range	78.41-113.94	79.76-123.15	76.39-123.68	63.74-121.05
ALL BRIDGING	7 trials	0.90	MM100G 4 trials	Mean	94.85	100.20	108.41	102.60
		0.38-1.83		Range	78.41-113.94	79.76-123.15	76.39-123.68	63.74-121.05
		0.42	% 3 trials	Mean	99.36	104.9	112.0	110.6
		0.32-0.53		Range	94.8-103.9	92.5-115.2	107.5-118.0	102.5-116.4

**Table 3.4.3.1-4: Presentation of trials data (selectivity/weed-free trials BRIDGING); sugar content (%). All results as % of untreated check**

				Name	HBZ08	HBZ10	HBZ08	HBZ10
				Rate	2.4	2.4	4.8	4.8
				Unit	l/ha	l/ha	l/ha	l/ha
Grouping	No. of trials	Untreated value	Assessment Unit	Name	1N	1N	2N	2N
MARITIME BRIDGING	5 trials	16.71	%	Mean	99.09	98.99	96.45	98.32
		15.25-18.65		Range	96.73-102.68	97.57-102.3	92.91-98.28	95.6-102.14
NORTH-EASTERN BRIDGING	2 trials	17.19	%	Mean	98.94	98.66	97.47	97.00
		17.07-17.31		Range	97.11-100.76	98.53-98.78	93.29-101.64	92.89-101.11
ALL BRIDGING	7 trials	16.85	%	Mean	99.05	98.90	96.74	97.95
		15.25-18.65		Range	96.73-102.68	97.57-102.3	92.91-101.64	97.57-102.3

**Table 3.4.3.1-5: Presentation of trials data (selectivity/weed-free trials BRIDGING); sugar yield (T/ha). All results as % of untreated check**

				Name	HBZ08	HBZ10	HBZ08	HBZ10
				Rate	2.4	2.4	4.8	4.8
				Unit	l/ha	l/ha	l/ha	l/ha
Grouping	No. of trials	Untreated value	Assessment Unit	Name	1N	1N	2N	2N



<b>MARITIME BRIDGING</b>	5 trials	<b>23.20</b>	<b>T/ha</b>	<b>Mea n</b>	<b>105.58</b>	<b>101.79</b>	<b>96.08</b>	<b>99.30</b>
		6.96- 77.04		Rang e	96.69- 115.66	86.24- 115.89	87.56- 103.28	91.29- 111.89
<b>NORTH- EASTERN BRIDGING</b>	2 trials	<b>11.00</b>	<b>T/ha</b>	<b>Mea n</b>	<b>98.08</b>	<b>99.41</b>	<b>97.70</b>	<b>98.07</b>
		9.97- 12.03		Rang e	96.75-99.39	97.92-100.9	91.68- 103.71	91.93- 104.21
<b>ALL BRIDGING</b>	7 trials	<b>19.72</b>	<b>T/ha</b>	<b>Mea n</b>	<b>103.44</b>	<b>101.11</b>	<b>96.54</b>	<b>98.95</b>
		6.96- 77.04		Rang e	96.69- 115.66	86.24- 115.89	87.56- 103.71	91.29- 111.89

In no trial was there a statistically significant difference in any of the quality parameters tested, between the plots treated with HBZ08 or HBZ10, regardless of use rate.

When total sugar yield was assessed in trial H20EU-018-011-007 the HBZ10 treatments were statistically lower than that in the untreated plot. This is the only difference between experimental and untreated plots.

This indicates that both formulations are safe to the sugar beet crop, and also that data for HBZ08 may be used to support the application for HBZ10.

### 3.4.3.2 Crop quality in weed-free selectivity trials

Crop quality was assessed in twelve weed-free trials conducted in Germany (3), France (3), the Netherlands, (2), the United Kingdom (2) and Poland (2). All trials included 2.4L/ha and 4.8L/ha of HBZ10, applied three times. All weed-free trials were harvested by hand at the normal commercial harvest timing. Samples of beet were then analysed for quality parameters.

Quality parameters tested were:

- ☐ Amino-N content, expressed as millimoles/100g (MM100G) or %
- ☐ Potassium content, expressed as millimoles/100g (MM100G) or %
- ☐ Sodium content, expressed as millimoles/100g (MM100G) or %
- Sugar content, expressed as %
- Total sugar yield, calculated at beet yield (T/ha) multiplied by sugar content (%)

Results are summarised in Table 3.4.3.2-1 to 3.4.3.2-5.



				Name	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D+L	E+P+D+L	E+P+M	E+P+M
				Rate	2.4	4.8	E: 152-200 P: 160-200	E: 304-400 P: 320-400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Unit	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping E+P+M	No. of trials	Un-treated value	Assessment Unit	Name	N	2N	N	2N	N	2N	N	2N	N	2N
		1.48-1.54	2 trials	Range	91.89-114.15	85.81-103.11							102.59-102.7	94.79-95.97
NORTH-EASTERN ORTHOGONAL E+P	2 trials	3.03	MM100 G	Mean	101.07	100.08	99.27	109.20						
		2.3-3.75	2 trials	Range	96.86-105.28	91.85-108.3	95.88-102.66	102.58-115.81						
ALL ORTHOGONAL E+P	5 trials	3.03	MM100 G	Mean	113.46	111.66	103.10	115.17						
		2.3-3.75	2 trials	Range	96.86-128.57	91.85-132.14	95.88-114.75	102.58-128.57						
		0.54	%	Mean										
		0.28-0.72	3 trials	Range										
ALL	12 trials	2.34	MM100 G	Mean	104.36 98.5	102.26 96.46	103.10 99.27	115.17 109.2	98.02	97.38	76.34	75.06	102.65	95.39
		1.48-3.76	9 trials	Range	53.38-128.57	77.11-132.14	95.88-114.75 102.66	102.58-128.57 115.81	88.34-109.04	91.11-105.88	51.69-100.98	52.54-97.57	102.59-102.7	94.79-95.97
		0.54	%	Mean	121.72	119.37	105.65	119.15						
		0.28-0.72	3 trials	Range	115.27-128.57	101.38-132.14	98.61-114.75	112.5-128.57						

[illegible]

				Name	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D+L	E+P+D+L	E+P+M	E+P+M
				Rate	2.4	4.8	E: 152-200 P: 160-200	E: 304-400 P: 320-400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Unit	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping	No. of trials	Un-treated value	Assessment Unit	Name	N	2N	N	2N	N	2N	N	2N	N	2N
		4.85		ge	100.56	97.73							99.23	99.48
NORTH-EASTERN ORTHOGONAL E+P	2 trials	4.24	MM100 G 2 trials	Mean	98.90	97.86	94.08	97.64						
		3.52-4.95		Range	96.11-101.67	97.47-98.24	89.07-99.09	96.73-98.54						
ALL ORTHOGONAL E+P	5 trials	4.24	MM100 G 2 trials	Mean	100.77	100.53	99.34	102.57						
		3.52-4.95		Range	96.11-104.47	97.47-103.24	89.07-106.09	96.73-108.94						
		3.15	% 3 trials	Mean	102.02	102.31	102.85	105.86						
		2.46-3.61		Range	98.82-104.47	100.83-103.24	99.41-106.09	103.32-108.94						
ALL	12 trials	4.46	MM100 G 9 trials	Mean	98.45	98.02	94.08	102.57 97.64	100.82	101.38	110.20	102.28	98.65	99.36
		3.35-8.44		Range	90.22-107.58	90.61-105.96	89.07-106.09	96.73-108.94 98.54	96.49-105.96	96.76-104.87	101.53-118.86	101.72-102.83	98.06-99.23	99.23-99.48
		3.15	% 3 trials	Mean	102.02	102.31	102.85	105.86						
		2.46-3.61		Range	98.82-104.47	100.83-103.24	99.41-106.09	103.32-108.94						















				Name	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D+L	E+P+D+L	E+P+M	E+P+M
				Rate	2.4	4.8	E: 152-200 P: 160-200	E: 304-400 P: 320-400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Unit	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping	No. of trials	Un-treated value	Assessment Unit	Name	N	2N	N	2N	N	2N	N	2N	N	2N
E+P+M		0.27-0.34		Range	86.44-98.16	95.39-108.57							100-101.44	95.32-96.52
NORTH-EASTERN ORTHOGONAL E+P	2 trials	0.49	MM100G	Mean	101.46	92.40	105.60	106.15						
		0.38-0.59	2 trials	Range	79.76-123.15	63.74-121.05	80.94-130.26	86.5-125.78						
ALL ORTHOGONAL E+P	5 trials	0.49	MM100G	Mean	101.46	92.4	105.6	106.15						
		0.38-0.59	2 trials	Range	79.76-123.15	63.74-121.05	80.94-130.26	86.5-125.78						
		0.42	%	Mean	104.61	109.82	106.28	102.32						
		0.32-0.53	3 trials	Range	92.5-115.09	102.5-115.62	97.5-115.09	95-115.09						
ALL	12 trials	0.64	MM100G	Mean	98.7	99.2	105.6	106.15	117.30	113.00	102.93	104.24	100.72	95.92
		0.28-1.83	or % 8 trials	Range	79.76-123.15	63.74-121.05	80.94-130.26	86.5-125.78	100-131.48	101.92-120.4	98.53-107.33	97.09-111.38	100-101.44	95.32-96.52
		0.42	%	Mean	104.61	109.82	106.28	102.32						
		0.32-0.53	3 trials	Range	92.5-115.09	102.5-115.62	97.5-115.09	95-115.09						

**Table 3.4.3.2-4: Presentation of trials data (selectivity/weed-free trials); % sugar content. All results as % of untreated check**







				Na me	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D +L	E+P+D +L	E+P+ M	E+P+M
				Rat e	2.4	4.8	E: 152- 200 P: 160- 200	E: 304- 400 P: 320- 400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Unit	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping	No. of trials	Un- treated value	Assess- ment Unit	Na me	N	2N	N	2N	N	2N	N	2N	N	2N
MARITIME ALL	10 trials	17.06	%	Mea n	99.73	99.67	100.08	99.52	102.65	101.64	96.94	97.18	99.82	100.92
		15.25- 18.65		Ran ge	97.37- 102.66	95.6- 103.05	96.95- 103.91	95.48- 102.14	101.25- 104.67	99.72- 102.72	96.13- 97.73	94.62- 99.73	99.63- 100	100.49- 101.34
NORTH- EASTERN ALL	2 trials	17.19	%	Mea n	98.66	97.00	98.01	94.52	█	█	█	█	█	█
		17.07- 17.31		Ran ge	98.53- 98.78	92.89- 101.11	95.84- 100.17	92.66- 96.36	█	█	█	█	█	█
MARITIME ORTHOGONAL E+P	3 trials	17.31	%	Mea n	99.72	99.33	100.08	99.52	█	█	█	█	█	█
		0-18.65		Ran ge	97.65- 102.3	97.06- 102.14	96.95- 103.91	95.48- 102.14	█	█	█	█	█	█
MARITIME ORTHOGONAL E+P+D	3 trials	17.88	%	Mea n	101.10	101.53	█	█	102.65	101.64	█	█	█	█
		17.35- 18.31		Ran ge	99.3- 102.66	100.49- 103.05	█	█	101.25- 104.67	99.72- 102.72	█	█	█	█
MARITIME ORTHOGONAL E+P+D+L	2 trials	15.81	%	Mea n	97.90	96.82	█	█	█	█	96.94	97.18	█	█
		15.25- 16.37		Ran ge	97.57- 98.22	95.6-98.03	█	█	█	█	96.13- 97.73	94.62- 99.73	█	█
MARITIME ORTHOGONAL E+P+M	2 trials	16.72	%	Mea n	99.51	100.22	█	█	█	█	█	█	99.82	100.92
		16.31- 17.13		Ran ge	97.37- 101.65	98.54- 101.9	█	█	█	█	█	█	99.63- 100	100.49- 101.34
NORTH- EASTERN ORTHOGONAL E+P	2 trials	17.19	%	Mea n	98.66	97.00	98.01	94.52	█	█	█	█	█	█
		17.07- 17.31		Ran ge	98.53- 98.78	92.89- 101.11	95.84- 100.17	92.66- 96.36	█	█	█	█	█	█



				Na me	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D +L	E+P+D +L	E+P+ M	E+P+M
				Rat e	2.4	4.8	E: 152- 200 P: 160- 200	E: 304- 400 P: 320- 400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Unit	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping	No. of trials	Un- treated value	Assess- ment Unit	Na me	N	2N	N	2N	N	2N	N	2N	N	2N
ALL ORTHOGONAL E+P	5 trials	17.26	%	Mea n	99.30	98.40	99.25	97.52						
		16.23- 18.65		Ran ge	97.65- 102.3	92.89- 102.14	95.84- 103.91	92.66- 102.14						
ALL	12 trials	17.08	%	Mea n	98.90	97.95	99.25	97.52	102.65	101.64	96.94	97.18	99.82	100.92
		15.25- 18.65		Ran ge	97.57- 102.3	92.89- 102.14	95.84- 103.91	92.66- 102.14	101.25- 104.67	99.72- 102.72	96.13- 97.73	94.62- 99.73	99.63- 100	100.49- 101.34

**Table 3.4.3.2-5: Presentation of trials data (selectivity/weed-free trials); Total sugar yield. All results as % of untreated check**

				Na me	HBZ10	HBZ10	E+P	E+P	E+P+D	E+P+D	E+P+D+ L	E+P+D+ L	E+P+M	E+P+M
				Rat e	2.4	4.8	E: 152- 200 P: 160- 200	E: 304- 400 P: 320- 400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				Unit	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
Grouping	No. of trials	Un- treated value	Assess- ment Unit	Na me	N	2N	N	2N	N	2N	N	2N	N	2N
MARITIME ALL	10 trials	18.99	T/ha	Mea n	102.54	100.20	108.10	113.55	100.69	100.30	109.81	101.86	100.33	108.82
		6.96- 77.04		Ran ge	86.24- 115.89	89.8- 111.89	96.74- 128.3	93.1- 148.82	90.98- 108.75	92.71- 104.69	89.15- 130.45	91.93- 111.78	93.44- 107.21	104.15- 113.48
NORTH- EASTERN ALL	2 trials	11.00	T/ha	Mea n	99.41	98.07	97.14	93.30	█	█	█	█	█	█
		9.97- 12.03		Ran ge	97.92- 100.9	91.93- 104.21	94.18- 100.1	92.01- 94.58	█	█	█	█	█	█
MARITIME ORTHOGONAL E+P	3 trials	33.83	T/ha	Mea n	106.61	101.71	108.10	113.55	█	█	█	█	█	█
		0-77.04		Ran ge	95.71- 115.89	91.29- 111.89	96.74- 128.3	93.1- 148.82	█	█	█	█	█	█
MARITIME ORTHOGONAL E+P+D	3 trials	14.38	T/ha	Mea n	105.02	102.97	█	█	100.69	100.30	█	█	█	█
		13.42-16		Ran ge	103.35- 107.63	101.13- 105.03	█	█	90.98- 108.75	92.71- 104.69	█	█	█	█
MARITIME ORTHOGONAL E+P+D+L	2 trials	7.26	T/ha	Mea n	94.56	95.69	█	█	█	█	109.81	101.86	█	█
		6.96- 7.56		Ran ge	86.24- 102.87	95.1-96.26	█	█	█	█	89.15- 130.45	91.93- 111.78	█	█
MARITIME ORTHOGONAL E+P+M	2 trials	15.39	T/ha	Mea n	100.69	98.27	█	█	█	█	█	█	100.33	108.82
		13.73- 17.05		Ran ge	95.63- 105.75	89.8- 106.74	█	█	█	█	█	█	93.44- 107.21	104.15- 113.48
NORTH- EASTERN ORTHOGONAL E+P	2 trials	11.00	T/ha	Mea n	99.41	98.07	97.14	93.30	█	█	█	█	█	█
		9.97- 12.03		Ran ge	97.92- 100.9	91.93- 104.21	94.18- 100.1	92.01- 94.58	█	█	█	█	█	█
ALL	5	24.70	T/ha	Mea	103.73	100.26	103.72	105.45	█	█	█	█	█	█

				<b>Na me</b>	<b>HBZ10</b>	<b>HBZ10</b>	<b>E+P</b>	<b>E+P</b>	<b>E+P+D</b>	<b>E+P+D</b>	<b>E+P+D+ L</b>	<b>E+P+D+ L</b>	<b>E+P+M</b>	<b>E+P+M</b>
				<b>Rat e</b>	2.4	4.8	E: 152- 200 P: 160- 200	E: 304- 400 P: 320- 400	E: 226.5 P: 112.5 D: 37.5	E: 453 P: 225 D: 75	E:112.5 P: 90 D: 70.5 L: 40.5	E: 225 P: 180 D: 141 L: 81	E: 200 P: 200 M: 350	E: 400 P: 400 M: 700
				<b>Unit</b>	l/ha	l/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha	g ai/ha
<b>Grouping</b>	<b>No. of trials</b>	<b>Un- treated value</b>	<b>Assess- ment Unit</b>	<b>Na me</b>	N	2N	N	2N	N	2N	N	2N	N	2N
ORTHOGONAL E+P	trials			<b>n</b>										
		9.75- 77.04		Ran ge	95.71- 115.89	91.29- 111.89	94.18- 128.3	92.01- 148.82						
ALL	12 trials	17.66	T/ha	<b>Mea n</b>	101.11	98.95	103.72	105.45	100.69	100.30	109.81	101.86	100.33	108.82
		6.96- 77.04		Ran ge	86.24- 115.89	91.29- 111.89	94.18- 128.3	92.01- 148.82	90.98- 108.75	92.71- 104.69	89.15- 130.45	91.93- 111.78	93.44- 107.21	104.15- 113.48

### **Amino N content**

In one trial HBZ10 plots had statistically significantly higher levels of Amino N compared to the untreated or reference plots.

### **Potassium content**

In all trials there was no statistically significant difference between treated and untreated

### **Sodium content**

In two trials the reference products had sodium contents statistically significantly higher than HBZ10 or the untreated.

### **Sugar content**

Sugar % content in one trial was variable, with the HBZ10 N rate statistically significantly lower than the 2N. In turn, this 2N rate had a sugar content that was significantly higher than the untreated.

### **Sugar yield**

The reference product in one trial had a sugar yield statistically significantly higher than that from the HBZ10 or untreated plots.

In another trial the reference 2N treatment had significantly lower total sugar yield than the untreated or HBZ10. Similarly, in another trial HBZ10 and the reference product at 2N had a statistically significantly lower sugar yield than the untreated plots.

### **Conclusion**

HBZ10 is safe to sugar beet when applied as directed, with regard to its influence on crop quality parameters.

The crop safety of HBZ10 is comparable to that of all the reference products.

#### **Comments of zRMS:**

The results from 12 selectivity trials have been submitted to show an effects of HBZ10 on the quality and quantity of sugar beet yield. 7 out of 12 trials were bridging between HBZ08 and HBZ10. HBZ10 and HBZ08 were tested at single (1N=2,4 l/ha) and double dose rate (2N=4,8 l/ha). The total crop yield between HBZ10 and HBZ08 was similar in 7 bridging trials. Moreover, no significant differences were observed in the quality parameters between both formulations. No negative impact on the yield were observed after application of, either 1N and 2N. Based on the trial results it can be concluded that HBZ10 is safe for the sugar beet yield when it is used accordance with the label. Because no selectivity trials were carried out on other beet crops, the cMSs are kindly asked to consider these crops on the national level.

### **3.4.4 Effects on transformation processes (KCP 6.4.4)**

Sugar beet and other beet crops are not subject to any biological transformation processes, therefore according to PP 1/243(2), no data is required.

#### **Comments of zRMS:**

Accepted.

### **3.4.5 Impact on treated plants or plant products to be used for propagation (KCP 6.4.5)**

As detailed in EPPO standard PP 1/135, the application of HBZ10 is made during the vegetative phase of growth of the sugar beet and other beet crops, rather than during inflorescence initiation. Further, testing is therefore not required.

## Summary and conclusion

HBZ10 has been evaluated on a number of cultivars over a number of seasons, in a variety of climatic conditions and with a range of application timings and rates (N and 2N in weed-free trials). When used as directed the product has shown no permanent phytotoxicity at any evaluation. This strongly supports the conclusion that this product is safe to sugar beet. Extrapolation to other beet crops is also proposed.

It is submitted that based on the data presented in this dossier HBZ10 can be approved for use on sugar beet and other beet crops.

### Comments of zRMS:

Accepted.

## 3.5 Observations on other undesirable or unintended side-effects (KCP 6.5)

### 3.5.1 Impact on succeeding crops (KCP 6.5.1)

As has been established in Section 3.4 of this dossier, this product is safe to sugar beet when used as recommended; it is therefore highly unlikely that crop replacement would be necessary after its use.

HBZ10 is a post-emergence herbicide, containing the active ingredients phenmedipham and ethofumesate. HBZ10 is intended to be applied to beet crops, in the spring and summer only, for control of a range of broadleaved weeds.

The following assessment has been carried out in accordance with EPPO Standard PP 1/207(2) 'Effects on succeeding crops'.

Following the guidance provided in EPPO Standard PP 1/207(2) 'Effects on succeeding crops', Predicted Environmental Concentration in soil (PEC<sub>soil</sub>) values and sensitive toxicity endpoints from biological screens are compared in a Tier 1 assessment, in order to determine if further work is needed.

Initial PEC<sub>soil</sub> values for each active substance are provided in Table 3.5.1-1. See Section 8 (Environmental Fate) of this dossier for further details of how these values have been determined. All calculations are based on worst case assumptions, including maximum number of applications, minimum application interval, maximum dose rate, worst case DT<sub>50</sub> values, 20% crop interception, a 5cm soil depth, and a soil density of 1.5 g/m<sup>3</sup>.

The maximum dose rate applied at 3 applications is 2.4 L product/ha with a minimum interval of 6 days; the equivalent dose rate of each active substance at each application is 300 g a.s./ha. The maximum dose rate applied at 6 applications is 1.2 L product/ha with a minimum interval of 5 days; the equivalent dose rate of each active substance at each application is 150 g a.s./ha.

**Table 3.5.1-1: Initial PEC<sub>soil</sub> values for phenmedipham and ethofumesate immediately after application**

Active substance	Worst case DT <sub>50</sub> values (days)	Number of applications	Application interval	Maximum use rate [g a.s./ha]	Crop interception [%]*	Effective soil exposure rate [g a.s./ha]	PEC <sub>soil</sub> [mg a.s./kg]
Phenmedipham	43	3	6	300	20	240	0.874
Ethofumesate	157	3	6	300	20	240	0.935
Phenmedipham	43	6	5	150	20	120	0.792
Ethofumesate	157	6	5	150	20	120	0.909

\* = Based upon FOCUS guidance<sup>17</sup>

From the data above, it is considered that 3 applications of 2.4 L product/ha are the worst-case scenario use, as the PEC<sub>soil</sub> values are higher than from 6 applications at 1.2 L product/ha. Further analysis and discussion will only focus on the 3-application programme.

<sup>17</sup> Generic Guidance for Tier 1 FOCUS Ground Water Assessments, version 2.3, June 2021, Online, [Link](#)

Long-term PEC<sub>soil</sub> values for each active substance, after 3 applications are provided in Table 3.5.1-2. Time intervals were chosen based upon typical intervals following crop failure, and typical sowing timings for a range of crops, based upon a Spring-Summer application of HBZ10.

**Table 3.5.1-2: Long-term PEC<sub>soil</sub> values for phenmedipham and ethofumesate, 1 to 365 days after application**

Days after application	Phenmedipham PEC <sub>s</sub> (mg/kg)	Ethofumesate PEC <sub>s</sub> (mg/kg)
1	0.860	0.931
7	0.781	0.907
14	0.698	0.879
21	0.623	0.852
28	0.557	0.826
60	0.332	0.718
90	0.205	0.628
120	0.126	0.551
150	0.078	0.482
180	0.048	0.422
210	0.030	0.370
240	0.018	0.324
270	0.011	0.284
300	0.007	0.249
330	0.004	0.218
365	0.002	0.187

In order to determine relevant toxicity endpoints, biological screens with a range of non-target plants were undertaken following OECD guideline 208 (Terrestrial Plant Test: Seedling Emergence and Growth Test). The data presented is from study (SO20031/TNK18743), which is also referenced in Section 9 (Ecotoxicology) of this dossier. Although this study deviated slightly from the requirements in EPPO guidance, in that it tested surface application and only determined ED<sub>25</sub> and ED<sub>50</sub> endpoints, it is still considered valid.

Both active ingredients have been used for many years and their succeeding crop profile is well understood. The final recommendation which follows also considers the long-term usage recommendations of other phenmedipham and ethofumesate co-formulated beet herbicide products (*e.g.* BELVEDERE DUO, BETANAL TANDEM and POWERTWIN), solo phenmedipham products (*e.g.* BETASANA SC, BEETUP FLO, and CORZAL), and solo ethofumesate products (*e.g.* ETHOFOL, OBLIX 500 and TRAMAT 500); many of these products deliver a similar or greater total dose of each active substance than HBZ10. Therefore, consideration of the historical use recommendations of other phenmedipham and ethofumesate products is considered to be more conservative and off-set the lower conservatism of using ED<sub>25</sub> values from surface application testing (instead of EC<sub>10</sub> values and soil incorporation).

The non-target plant study tested formulated product HBZ10 at a range of dose rates, including the target rate (2.4 L/ha), in order to successfully define critical toxicity endpoints, including ED<sub>25</sub>, and ED<sub>50</sub> values for each plant species tested. As HBZ10 is intended for use on beet crops (dicotyledons), and these would typically be followed in rotation with cereal and other broad-leaved crops, a range of plant species have been tested. The outcomes of this study are summarised according to Seedling emergence, Shoot height, and Shoot weight in Table 3.5.1-3, Table 3.5.1-4 and Table 3.5.1-5 below.

**Table 3.5.1-3: Effects on emergence (number of emerged seedlings)**

Class	Family	Species	ED <sub>25</sub> values (L/ha)
Monocotyledon	Poaceae	<i>Avena sativa</i> (Oats)	>5.52
Monocotyledon	Poaceae	<i>Triticum aestivum</i> (Winter wheat)	>5.52
Monocotyledon	Liliceae	<i>Allium cepa</i> (Onion)	>12.7
Dicotyledon	Brassicaceae	<i>Brassica napus</i> (Oilseed rape)	>12.7
Dicotyledon	Brassicaceae	<i>Raphanus sativus</i> (Radish)	>12.7
Dicotyledon	Linaceae	<i>Linum usitatissimum</i> (Flax)	>12.7
Dicotyledon	Asteraceae	<i>Helianthus annuus</i> (Sunflower)	>12.7

Class	Family	Species	ED <sub>25</sub> values (L/ha)
Dicotyledon	Asteraceae	<i>Lactuca sativa</i> (Lettuce)	>5.52
Dicotyledon	Solanaceae	<i>Lycopersicon esculentum</i> (Tomato)	>12.7
Dicotyledon	Fabaceae	<i>Glycine max</i> (Soybean)	>12.7

**Table 3.5.1-4: Effects on biomass (shoot height)**

Class	Family	Species	ED <sub>25</sub> values (L/ha)
Monocotyledon	Poaceae	<i>Avena sativa</i> (Oats)	2.58
Monocotyledon	Poaceae	<i>Triticum aestivum</i> (Winter wheat)	0.751
Monocotyledon	Liliceae	<i>Allium cepa</i> (Onion)	>12.7
Dicotyledon	Brassicaceae	<i>Brassica napus</i> (Oilseed rape)	8.29
Dicotyledon	Brassicaceae	<i>Raphanus sativus</i> (Radish)	10.9
Dicotyledon	Linaceae	<i>Linum usitatissimum</i> (Flax)	2.20
Dicotyledon	Asteraceae	<i>Helianthus annuus</i> (Sunflower)	>12.7
Dicotyledon	Asteraceae	<i>Lactuca sativa</i> (Lettuce)	2.19
Dicotyledon	Solanaceae	<i>Lycopersicon esculentum</i> (Tomato)	10.1
Dicotyledon	Fabaceae	<i>Glycine max</i> (Soybean)	7.50

**Table 3.5.1-5: Effects on biomass (shoot fresh weight)**

Class	Family	Species	ED <sub>25</sub> values (L/ha)
Monocotyledon	Poaceae	<i>Avena sativa</i> (Oats)	1.51
Monocotyledon	Poaceae	<i>Triticum aestivum</i> (Winter wheat)	0.703
Monocotyledon	Liliceae	<i>Allium cepa</i> (Onion)	12.0
Dicotyledon	Brassicaceae	<i>Brassica napus</i> (Oilseed rape)	2.42
Dicotyledon	Brassicaceae	<i>Raphanus sativus</i> (Radish)	4.98
Dicotyledon	Linaceae	<i>Linum usitatissimum</i> (Flax)	1.96
Dicotyledon	Asteraceae	<i>Helianthus annuus</i> (Sunflower)	>12.7
Dicotyledon	Asteraceae	<i>Lactuca sativa</i> (Lettuce)	2.48
Dicotyledon	Solanaceae	<i>Lycopersicon esculentum</i> (Tomato)	5.03
Dicotyledon	Fabaceae	<i>Glycine max</i> (Soybean)	7.66

The worst-case (lowest) ED<sub>25</sub> values were determined from the shoot fresh weight test for all species, except for Lettuce and Soybean, in which the shoot height test gave the lowest values. The lowest values from either of these tests is therefore taken forward for calculation of the Toxicity Exposure Ratio (TER) values. As ED<sub>25</sub> values are based upon the co-formulated product, the same values are used for calculation of the TER values for each individual active substance, this adds a further level of conservatism.

The ER<sub>25</sub> (L/ha) values are converted to concentration in the soil (mg/kg soil) by using the equation below. The product dose rate is converted to total amount of active substance (both). The calculation assumes an even distribution of chemical in the top 5 cm of soil and an average soil bulk density of 1.5 g/cm<sup>3</sup>:

$$\frac{\text{L/ha} \times 250 \text{ g a.s./ha}}{100 \times 5 \text{ (soil depth)} \times 1.5 \text{ (bulk density dry soil)}} = \text{mg a.s./kg of soil}$$

Individual TER values based upon the ED<sub>25</sub> endpoints and the PEC<sub>soil</sub> concentrations for phenmedipham and ethofumesate are presented in Table 3.5.1-6 to Table 3.5.1-9 below. TER values are presented for both with, and without soil cultivation (ploughing, to 20 cm). Shaded values are those that fail to meet the EPPO threshold of a TER of >1.0.

Based on this Tier 1 assessment, ethofumesate poses the greatest risk to succeeding crops, probably due to the higher DT<sub>50</sub> value and PEC<sub>soil</sub> values. The TER values are consistently lower than from phenmedipham, at all intervals.

Immediately after application, Onion, Radish, Sunflower, Tomato and Soybean can be planted with no cultivation requirement. After 2 months (60 days), Rape and Lettuce can be planted with no cultiva-

tion. After 3 months (90 days), Flax can be planted with no cultivation. Oats and Wheat can be planted respectively after intervals of 5 months (150 days) and 11 months (330 days) with no cultivation.

After deep cultivation (ploughing) to 15cm, all crops above except wheat can be planted with no interval. For wheat an interval of 3 months (90 days) should have elapsed.

When considering the succeeding crop planting intervals of other phenmedipham and ethofumesate co-formulated and solo products (several of which deliver a comparable or greater total dose of active substance than HBZ10), the general recommendation is that any crop can be planted after an interval of 3 months and with deep cultivation (ploughing) to a depth of 15cm. Example products include 190-200 + 200 g/L phenmedipham + ethofumesate products such as BELVEDERE DUO, BETANAL TANDEM and POWERTWIN which deliver a total dose per season of up to 800-850 g as/ha of each active substance; 157-160 g/L phenmedipham formulations such as BETASANA SC, BEETUP FLO, and CORZAL which deliver a total dose per season of 960 g as/ha; and 500 g/L ethofumesate formulations such as ETHOFOL, OBLIX 500 and TRAMAT 500 which deliver a total dose per season of 900-1000 g as/ha. In comparison application of HBZ10 at 2.4 L/ha at 3 applications applies a total dose of 900 g as/ha of each active substance.

**Based on the combined risk of both molecules, the following statements are considered supported:**

- **Safe use for sowing of Onion, Radish, Sunflower, Tomato and Soybean immediately with no cultivation requirement.**
- **Safe use for sowing Oilseed rape and Lettuce after 2 months with no cultivation requirement, or immediately if ploughing to 15cm is performed.**
- **Safe use for sowing of Flax after 3 months, with not cultivation requirement; or immediately if ploughing to 15cm is performed.**
- **Safe use for sowing of Oats and Wheat after 5 months or 11 months (respectively), with no cultivation requirement; or immediately for Oats and 3 months for Wheat if ploughing to 15cm is performed.**
- **Based upon the above statements and the label recommendations of other co-formulated and solo phenmedipham and ethofumesate products, extrapolation to planting of all crops is proposed based upon a planting interval of 3 months and ploughing to a depth of 15cm.**

#### **Comments of zRMS:**

Taking into account the previous experiences with the actives of ethofumesate and phenmedipham and the trial results submitted by the applicant, it can be concluded that the above recommendations are justify to include to the product label. The zRMS proposes to add the below recommendation to the label:

*“Onion, radish, sunflower, tomato and soybean can be sowing after use of HBZ10 (Wizard/Beetup Pro/Betasana Max) with no cultivation requirement. After 2 months, oilseed rape and lettuce can be planted without cultivation. After 3 months, flax can be planted without cultivation. Oats can be planted after 5 months and 11 months for wheat without cultivation. After deep cultivation (ploughing) to 15 cm, all crops (except wheat) can be planted without interval. In case of wheat, an interval of 3 months should be followed.”*



**Table 3.5.1-6: TER values, without soil cultivation - Phenmedipham**

Days after application	Initial PEC soil mg/kg at 5 cm	TER=ED25/PECsoil at 5 cm [min-/no-tillage]										
		Crop	Oats	Wheat	Onion	Rape	Radish	Flax	Sunflower	Lettuce	Tomato	Soybean
		ED25 (mg/kg)	0.5033	0.2343	4.0000	0.8067	1.6600	0.6533	4.2333	0.7300	1.6767	2.5000
0	0.8740		0.5759	0.2681	4.5767	0.9230	1.8993	0.7475	4.8436	0.8352	1.9184	2.8604
1	0.8600		0.5853	0.2725	4.6512	0.9380	1.9302	0.7597	4.9225	0.8488	1.9496	2.9070
7	0.7810		0.6445	0.3000	5.1216	1.0329	2.1255	0.8365	5.4204	0.9347	2.1468	3.2010
14	0.6980		0.7211	0.3357	5.7307	1.1557	2.3782	0.9360	6.0649	1.0458	2.4021	3.5817
21	0.6230		0.8079	0.3761	6.4205	1.2948	2.6645	1.0487	6.7951	1.1717	2.6913	4.0128
28	0.5570		0.9037	0.4207	7.1813	1.4482	2.9803	1.1730	7.6002	1.3106	3.0102	4.4883
60	0.3320		1.5161	0.7058	12.0482	2.4297	5.0000	1.9679	12.7510	2.1988	5.0502	7.5301
90	0.2050		2.4553	1.1431	19.5122	3.9350	8.0976	3.1870	20.6504	3.5610	8.1789	12.1951
120	0.1260		3.9947	1.8598	31.7460	6.4021	13.1746	5.1852	33.5979	5.7937	13.3069	19.8413
150	0.0780		6.4530	3.0043	51.2821	10.3419	21.2821	8.3761	54.2735	9.3590	21.4957	32.0513
180	0.0480		10.4861	4.8819	83.3333	16.8056	34.5833	13.6111	88.1944	15.2083	34.9306	52.0833
210	0.0300		16.7778	7.8111	133.3333	26.8889	55.3333	21.7778	141.1111	24.3333	55.8889	83.3333
240	0.0180		27.9630	13.0185	222.2222	44.8148	92.2222	36.2963	235.1852	40.5556	93.1481	138.8889
270	0.0110		45.7576	21.3030	363.6364	73.3333	150.9091	59.3939	384.8485	66.3636	152.4242	227.2727
300	0.0070		71.9048	33.4762	571.4286	115.2381	237.1429	93.3333	604.7619	104.2857	239.5238	357.1429
330	0.0040		125.8333	58.5833	1000.0000	201.6667	415.0000	163.3333	1058.3333	182.5000	419.1667	625.0000
365	0.0020		251.6667	117.1667	2000.0000	403.3333	830.0000	326.6667	2116.6667	365.0000	838.3333	1250.0000

**Table 3.5.1-7: TER values, without soil cultivation - Ethofumesate**

Days after application	Initial PEC soil mg/kg at 5 cm	TER=ED25/PECsoil at 5 cm [min-/no-tillage]										
		Crop ED25 (mg/kg)	Oats	Wheat	Onion	Rape	Radish	Flax	Sunflower	Lettuce	Tomato	Soybean
			<b>0.5033</b>	<b>0.2343</b>	<b>4.0000</b>	<b>0.8067</b>	<b>1.6600</b>	<b>0.6533</b>	<b>4.2333</b>	<b>0.7300</b>	<b>1.6767</b>	<b>2.5000</b>
0	0.9350		0.5383	0.2506	4.2781	0.8627	1.7754	0.6988	4.5276	0.7807	1.7932	2.6738
1	0.9310		0.5406	0.2517	4.2965	0.8665	1.7830	0.7018	4.5471	0.7841	1.8009	2.6853
7	0.9070		0.5549	0.2584	4.4101	0.8894	1.8302	0.7203	4.6674	0.8049	1.8486	2.7563
14	0.8790		0.5726	0.2666	4.5506	0.9177	1.8885	0.7433	4.8161	0.8305	1.9075	2.8441
21	0.8520		0.5908	0.2750	4.6948	0.9468	1.9484	0.7668	4.9687	0.8568	1.9679	2.9343
28	0.8260		0.6094	0.2837	4.8426	0.9766	2.0097	0.7910	5.1251	0.8838	2.0299	3.0266
60	0.7180		0.7010	0.3264	5.5710	1.1235	2.3120	0.9099	5.8960	1.0167	2.3352	3.4819
90	0.6280		0.8015	0.3731	6.3694	1.2845	2.6433	1.0403	6.7410	1.1624	2.6699	3.9809
120	0.5510		0.9135	0.4253	7.2595	1.4640	3.0127	1.1857	7.6830	1.3249	3.0430	4.5372
150	0.4820		1.0443	0.4862	8.2988	1.6736	3.4440	1.3555	8.7828	1.5145	3.4786	5.1867
180	0.4220		1.1927	0.5553	9.4787	1.9115	3.9336	1.5482	10.0316	1.7299	3.9731	5.9242
210	0.3700		1.3604	0.6333	10.8108	2.1802	4.4865	1.7658	11.4414	1.9730	4.5315	6.7568
240	0.3240		1.5535	0.7233	12.3457	2.4897	5.1235	2.0165	13.0658	2.2531	5.1749	7.7160
270	0.2840		1.7723	0.8251	14.0845	2.8404	5.8451	2.3005	14.9061	2.5704	5.9038	8.8028
300	0.2490		2.0214	0.9411	16.0643	3.2396	6.6667	2.6238	17.0013	2.9317	6.7336	10.0402
330	0.2180		2.3089	1.0749	18.3486	3.7003	7.6147	2.9969	19.4190	3.3486	7.6911	11.4679
365	0.1870		2.6916	1.2531	21.3904	4.3137	8.8770	3.4938	22.6381	3.9037	8.9661	13.3690

**Table 3.5.1-8: TER values, with 15cm ploughing soil cultivation - Phenmedipham**

Days after application	Initial PEC soil mg/kg at 20 cm	TER=ED25/PECsoil at 15 cm [plough, =33% of PECsoil at 5 cm]										
		Crop	Oats	Wheat	Onion	Rape	Radish	Flax	Sunflower	Lettuce	Tomato	Soybean
		ED25 (mg/kg)	0.5033	0.2343	4.0000	0.8067	1.6600	0.6533	4.2333	0.7300	1.6767	2.5000
0	0.2913		1.7277	0.8043	13.7300	2.7689	5.6979	2.2426	14.5309	2.5057	5.7551	8.5812
1	0.2867		1.7558	0.8174	13.9535	2.8140	5.7907	2.2791	14.7674	2.5465	5.8488	8.7209
7	0.2603		1.9334	0.9001	15.3649	3.0986	6.3764	2.5096	16.2612	2.8041	6.4405	9.6031
14	0.2327		2.1633	1.0072	17.1920	3.4670	7.1347	2.8080	18.1948	3.1375	7.2063	10.7450
21	0.2077		2.4238	1.1284	19.2616	3.8844	7.9936	3.1461	20.3852	3.5152	8.0738	12.0385
28	0.1857		2.7110	1.2621	21.5440	4.3447	8.9408	3.5189	22.8007	3.9318	9.0305	13.4650
60	0.1107		4.5482	2.1175	36.1446	7.2892	15.0000	5.9036	38.2530	6.5964	15.1506	22.5904
90	0.0683		7.3659	3.4293	58.5366	11.8049	24.2927	9.5610	61.9512	10.6829	24.5366	36.5854
120	0.0420		11.9841	5.5794	95.2381	19.2063	39.5238	15.5556	100.7937	17.3810	39.9206	59.5238
150	0.0260		19.3590	9.0128	153.8462	31.0256	63.8462	25.1282	162.8205	28.0769	64.4872	96.1538
180	0.0160		31.4583	14.6458	250.0000	50.4167	103.7500	40.8333	264.5833	45.6250	104.7917	156.2500
210	0.0100		50.3333	23.4333	400.0000	80.6667	166.0000	65.3333	423.3333	73.0000	167.6667	250.0000
240	0.0060		83.8889	39.0556	666.6667	134.4444	276.6667	108.8889	705.5556	121.6667	279.4444	416.6667
270	0.0037		137.2727	63.9091	1090.9091	220.0000	452.7273	178.1818	1154.5455	199.0909	457.2727	681.8182
300	0.0023		215.7143	100.4286	1714.2857	345.7143	711.4286	280.0000	1814.2857	312.8571	718.5714	1071.4286
330	0.0013		377.5000	175.7500	3000.0000	605.0000	1245.0000	490.0000	3175.0000	547.5000	1257.5000	1875.0000
365	0.0007		755.0000	351.5000	6000.0000	1210.0000	2490.0000	980.0000	6350.0000	1095.0000	2515.0000	3750.0000

**Table 3.5.1-9: TER values, with 15cm ploughing soil cultivation - Ethofumesate**

Days after application	Initial PEC soil mg/kg at 20 cm	TER=ED250/PECsoil at 15 cm [plough, =33% of PECsoil at 5 cm]										
		Crop	Oats	Wheat	Onion	Rape	Radish	Flax	Sunflower	Lettuce	Tomato	Soybean
		ED25 (mg/kg)	0.5033	0.2343	4.0000	0.8067	1.6600	0.6533	4.2333	0.7300	1.6767	2.5000
0	0.3117		1.6150	0.7519	12.8342	2.5882	5.3262	2.0963	13.5829	2.3422	5.3797	8.0214
1	0.3103		1.6219	0.7551	12.8894	2.5994	5.3491	2.1053	13.6412	2.3523	5.4028	8.0559
7	0.3023		1.6648	0.7751	13.2304	2.6681	5.4906	2.1610	14.0022	2.4146	5.5458	8.2690
14	0.2930		1.7179	0.7998	13.6519	2.7531	5.6655	2.2298	14.4482	2.4915	5.7224	8.5324
21	0.2840		1.7723	0.8251	14.0845	2.8404	5.8451	2.3005	14.9061	2.5704	5.9038	8.8028
28	0.2753		1.8281	0.8511	14.5278	2.9298	6.0291	2.3729	15.3753	2.6513	6.0896	9.0799
60	0.2393		2.1031	0.9791	16.7131	3.3705	6.9359	2.7298	17.6880	3.0501	7.0056	10.4457
90	0.2093		2.4045	1.1194	19.1083	3.8535	7.9299	3.1210	20.2229	3.4873	8.0096	11.9427
120	0.1837		2.7405	1.2759	21.7786	4.3920	9.0381	3.5572	23.0490	3.9746	9.1289	13.6116
150	0.1607		3.1328	1.4585	24.8963	5.0207	10.3320	4.0664	26.3485	4.5436	10.4357	15.5602
180	0.1407		3.5782	1.6659	28.4360	5.7346	11.8009	4.6445	30.0948	5.1896	11.9194	17.7725
210	0.1233		4.0811	1.9000	32.4324	6.5405	13.4595	5.2973	34.3243	5.9189	13.5946	20.2703
240	0.1080		4.6605	2.1698	37.0370	7.4691	15.3704	6.0494	39.1975	6.7593	15.5247	23.1481
270	0.0947		5.3169	2.4754	42.2535	8.5211	17.5352	6.9014	44.7183	7.7113	17.7113	26.4085
300	0.0830		6.0643	2.8233	48.1928	9.7189	20.0000	7.8715	51.0040	8.7952	20.2008	30.1205
330	0.0727		6.9266	3.2248	55.0459	11.1009	22.8440	8.9908	58.2569	10.0459	23.0734	34.4037
365	0.0623		8.0749	3.7594	64.1711	12.9412	26.6310	10.4813	67.9144	11.7112	26.8984	40.1070

### 3.5.2 Impact on other plants including adjacent crops (KCP 6.5.2)

HBZ10 is a post-emergence herbicide, containing the active ingredients phenmedipham and ethofumesate. HBZ10 is intended to be applied to beet crops, in the spring and summer only, for control of a range of broadleaved weeds.

The impact of HBZ10 on non-target plants is of concern in the off-field environment, where they may be exposed to spray drift. A risk assessment carried out in the context of efficacy guidelines is presented here.

Seedling emergence ED<sub>25</sub> and ED<sub>50</sub> values have been generated for 10 different commonly rotated crops in a laboratory study carried out in Germany in 2021, as described in Section 6.5.1. Please refer to the trial report for further details.

Data on the effects of HBZ10 on the vegetative vigour of 10 different sensitive indicator plant species have been generated in study SO20032/TNW18743, performed according to OECD 227, using the test item HBZ10 containing 125 g/L phenmedipham and 125 g/L ethofumesate (total active substance content 250 g/L).

The indoor vegetative vigour pot trial was conducted on 10 different crop species representing common monocotyledon and dicotyledon crops planted in rotation with or adjacent to beet crops. Each species was sown in sowing trays, and then transplanted to test containers (pots) containing 3 plants per pot and 7-8 replicates per treatment / crop combination. An untreated control was also included. Application of HBZ10 was made at BBCH 12-14 of each crop species at a range of dose rates including the target dose rate of 2.4 L/ha. After treatment, the pots were randomised and placed in a climatic room under controlled conditions. Symptoms of phytotoxicity and mortality were assessed at 7, 14 and 21 days after application, and the final shoot height and fresh weight was determined at 21 days after application.

Symptoms shown by affected plants were degrees of stunting, leaf deformation, necrosis and chlorosis.

A summary of the ED<sub>50</sub> endpoint values based the Seedling emergence tests, and the Vegetative vigour tests are presented below.

**Table 3.5.2-1: Seedling emergence endpoint values (ED<sub>50</sub>) for the effects of HBZ10 on a range of crop types**

Class	Family	Species	Shoot height ED <sub>50</sub> values (g as/ha)	Shoot fresh weight ED <sub>50</sub> values (g as/ha)
Monocotyledon	Poaceae	<i>Avena sativa</i> (Oats)	1099	770
Monocotyledon	Poaceae	<i>Triticum aestivum</i> (Winter wheat)	348	312
Monocotyledon	Liliceae	<i>Allium cepa</i> (Onion)	>3174	>3174
Dicotyledon	Brassicaceae	<i>Brassica napus</i> (Oilseed rape)	>3174	2400
Dicotyledon	Brassicaceae	<i>Raphanus sativus</i> (Radish)	>3174	>3174
Dicotyledon	Linaceae	<i>Linum usitatissimum</i> (Flax)	1205	992
Dicotyledon	Asteraceae	<i>Helianthus annuus</i> (Sunflower)	>3174	>3174
Dicotyledon	Asteraceae	<i>Lactuca sativa</i> (Lettuce)	980	994
Dicotyledon	Solanaceae	<i>Lycopersicon esculentum</i> (Tomato)	>3174	2847
Dicotyledon	Fabaceae	<i>Glycine max</i> (Soybean)	>3174	>3174

**Table 3.5.2-2: Vegetative vigour endpoint values (ED<sub>50</sub>) for the effects of HBZ10 on a range of crop types**

Class	Family	Species	Shoot height ED <sub>50</sub> values (g as/ha)	Shoot fresh weight ED <sub>50</sub> values (g as/ha)
Monocotyledon	Poaceae	<i>Avena sativa</i> (Oats)	>1380	573
Monocotyledon	Poaceae	<i>Triticum aestivum</i> (Winter wheat)	>1380	244
Monocotyledon	Liliceae	<i>Allium cepa</i> (Onion)	>600	344
Dicotyledon	Brassicaceae	<i>Brassica napus</i> (Oilseed rape)	>1380	914
Dicotyledon	Brassicaceae	<i>Raphanus sativus</i> (Radish)	>600	169
Dicotyledon	Linaceae	<i>Linum usitatissimum</i> (Flax)	441	243
Dicotyledon	Asteraceae	<i>Helianthus annuus</i> (Sunflower)	145	92.8
Dicotyledon	Asteraceae	<i>Lactuca sativa</i> (Lettuce)	>600	148
Dicotyledon	Solanaceae	<i>Lycopersicon esculentum</i> (Tomato)	142	36.3
Dicotyledon	Fabaceae	<i>Glycine max</i> (Soybean)	1302	518

The lowest ED<sub>50</sub> values are found to be from the vegetative vigour shoot fresh weight tests, so these values are taken forward for calculation of the Toxicity Exposure Ratio (TER) values.

#### **Risk assessment - TER values for non-target plants, including adjacent crops**

EC<sub>50</sub> values and the maximum off-field predicted environmental rate, which is based on the maximum proposed label rate of 600 g as/ha (2.4 L product/ha), as relevant to the use of HBZ10 against broad leaves weeds in beet crops, is used to calculate the worst-case Toxicity Exposure ratio (TER) taking into account the 90<sup>th</sup> percentile spray drift estimates derived by the BBA (2000)<sup>18</sup> from the predictions of Ganzelmeier & Rautmann (2000)<sup>19</sup>, and according to the guidelines in EPPO standard PP1/256 (1).

Based upon the maximum proposed application rate of 600 g as/ha at a single application, and a % drift value at 1 metre of 2.77% (field crops, at 90<sup>th</sup> percentile), the predicted off-field amount of HBZ10 is 16.62 g as/ha.

The TER results for individual indicator crops at a distance of 1 metre is shown Table 3.5.2-3. The TER values are calculated as the ED<sub>50</sub> values divided by the estimated drift.

**Table 3.5.2-3: Calculation of TER values for the application of HBZ10 at the maximum proposed rate of 600 g as/ha (2.4 L product/ha) in beet crops**

Species	ED <sub>50</sub> values (g as/ha)	Estimated drift (g as/ha) at 1 metre	TER values
<i>Avena sativa</i> (Oats)	573	16.62	34.48
<i>Triticum aestivum</i> (Winter wheat)	244		14.68
<i>Allium cepa</i> (Onion)	344		20.70
<i>Brassica napus</i> (Oilseed rape)	914		54.99
<i>Raphanus sativus</i> (Radish)	169		10.17
<i>Linum usitatissimum</i> (Flax)	243		14.62
<i>Helianthus annuus</i> (Sunflower)	92.8		5.58
<i>Lactuca sativa</i> (Lettuce)	148		8.90
<i>Lycopersicon esculentum</i> (Tomato)	36.3		2.18
<i>Glycine max</i> (Soybean)	518		31.17

As the TER values are consistently above the trigger value of 1 (according to EPPO PP1/256) for all sensitive indicator species, no risk mitigation is required when spraying HBZ10 according to the proposed use.

#### **Comments of zRMS:**

The laboratory study were carried out in 2021 in Germany to determine impact of HBZ10 on non-target plants.

<sup>18</sup> BBA (2000) Bundesanzeiger Jg. 52 (Official Gazette), Nr 100, S. 9879-9880 (25.05.2000) Bekanntmachung über die Abtrifteckwerte, die bei der Prüfung und Zulassung von Pflanzenschutzmitteln herangezogen werden. Public domain.

<sup>19</sup> Ganzelmeier H., Rautmann D. (2000) Drift, drift-reducing sprayers and sprayer testing. Aspects of Applied Biology 57, 2000, Pesticide Application. Public domain.

10 different commonly crops were tested. The trial results show that HBZ10 applied at maximum dose rate of 2,4 l/ha (600 g a.s./ha) is safe for all sensitive indicator species at a distance of 1 metre. No special risk mitigation is necessary if the test product is used accordance with the label.

### **Tank cleaning and drift onto non-target plants**

No adverse effects on other plants including adjacent crops away from the site of application have been observed in efficacy trials following the application of HBZ10, even when applied at double dose rate.

Therefore, it is reasonable to conclude that HBZ10 when used according to other label recommendations has no adverse effects on other plants, including adjacent crops.

It is important to reduce the drift of the product onto neighbouring crops.

Normal tank washing procedures should be followed by users.

#### **Comments of zRMS:**

The trial of effectiveness of cleaning was carried out in 2021 in the United Kingdom. The EC formulation containing 125 g/l ethofumesate and 125 g/l phenmedipham has a mean effectiveness of cleaning result of 0,0114% residue for ethofumesate and 0,00741% residue for phenmedipham using three water rinses. The zRMS proposes to include the below recommendation to the product label:

*“Triple water rinsing the sprayer tank allows to remove the residues of active substances to a level that is safe for the next crops.”*

### **3.5.3 Effects on beneficial and other non-target organisms (KCP 6.5.3)**

In all of the trials, observations were conducted concerning any adverse impact on beneficial or non-target organisms (ALLSYM). No negative effects were reported.

More detailed information on risks to non-target organisms can be found in the submission dossier in the section on Ecotoxicology.

#### **Comments of zRMS:**

Accepted.

### **3.6 Other/special studies**

No data to present.

### 3.7 List of test facilities including the corresponding certificates

**Table 3.7-1: List of test facilities**

Name	Address	Valid From	Valid To	Link to certificate on Certibase
Eurofins Agro-science Services GmbH (Germany)	Eurofins Agroscience Service GmbH/Agrartest GmbH Carl-Goereler-Weg 5 21684 Stade Germany	15-Jan-2016	15-Jan-2021	<a href="#">1d6926e024a</a>
Eurofins Agroscience Services sp. Zoo (Poland)	Eurofins Agroscience Services Sp. z o.o. ul. Parkowa 6 64-530 Kaźmierz Poland	10-Aug-2015	31-Dec-2100	<a href="#">1d6926e0046</a>
Exploras Agro Development	Willem Eschotstraat 4 Dongen The Netherlands	18-Jan-2016	18-Jan-2022	<a href="#">1d6926e00ca</a>
Field Research Support (DE)	Max-Planck-Str. 5 D-31515 Wunstorf Germany	3-Mar-2016	3-Mar-2021	<a href="#">1d6926e00a2</a>
Field Research Support (PL)	Dworcowa 2 St. 64-000 Kościan Poland	7-Jun-2013	31-Dec-2100	<a href="#">1d6926e0009</a>
Staphyt (France)	23 rue de Moevres 62860 Inchy en Artois France	14-Jun-2016	13-Jun-2021	<a href="#">1d6926e00d7</a>
STAPHYT GmbH	Langenburger Strasse 35 74572 Blufelden Bornshain Grosswallstadt Germany	10-Nov-2015	10-Nov-2020	<a href="#">1d6926e004f</a>
Syntech Research France	613 route du Bois de Loyse 71570 La Chapelle De Guinchay France	30-Oct-2019	29-Oct-2024	<a href="#">1d6926e020f</a>
Syntech Research France	613 route du Bois de Loyse 71570 La Chapelle De Guinchay France	30-Oct-2014	30-Oct-2019	<a href="#">1d6926e00a1</a>
SynTech Research UK	Old Hall Farm Barns, Thurston Rd, Pakenham, Bury St. Edmunds, Suffolk UK	3-Apr-2015	2-Apr-2020	<a href="#">1d6926e0113</a>



## Appendix 1 Lists of data considered in support of the evaluation

### List of data submitted by the applicant and relied on

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
KCP 6	UPL	2021	HBZ10 Biological Assessment Dossier - Detailed summary – Central zone and Great Britain Version 1 - September 2021 UPL Europe Ltd. non GEP Unpublished	N	UPL Europe Ltd.
KCP 6.5	David Norris	2021	Determination of storage stability and shelf life specification. Data for an Emulsifiable Concentrate Formulation containing Ethofumesate and Phenmedipham, stored at 54°C±2°C for Two Weeks, in Compliance with Good Laboratory Practice. Report No. DNA6253 Source: David Norris Analytical Laboratories Ltd., UK GLP Yes not published	N	UPL Europe Ltd.
KCP 6.5	Gunda Winkelmann	2021	Ethofumesate/Phenmedipham 125/125 g/l EC (HBZ10). Terrestrial Plant Test: Seedling Emergence and Seedling Growth Test Report No. SO20031 / TNK18743 Source: Noack Laboratorien GmbH, Germany GLP Yes not published	N	UPL Europe Ltd.
KCP 6.5	Gunda Winkelmann	2021	Ethofumesate/Phenmedipham 125/125 g/l EC (HBZ10). Terrestrial Plant Test: Vegetative Vigour Test Report No. SO20032 / TNW18743 Source: Noack Laboratorien GmbH, Germany GLP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Katja Malecek	2020	Determination of efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central Zone. Report No. H20EU-017-011-001 Source: Eurofins Agrosience Services GmbH, Germany GLP No GEP Yes	N	UPL Europe Ltd.

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
			not published		
KCP 6.1 6.2 6.4	Jean-Marie Stoz	2020	Determination of the efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central Zone. Report No. H20EU-017-011-002 Source: Eurofins Agrosience Services, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Ad Embrechts	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central and South Zone. Report No. H20EU-017-011-003 Source: Exploras Agro Development BV, Netherlands GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Ad Embrechts	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central and South Zone. Report No. H20EU-017-011-004 Source: Exploras Agro Development BV, Netherlands GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Callum MacEwan	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO. UK (Maritime 2020). Report No. H20EU-017-011-005 Source: SynTech Research UK GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Kerry Sumner	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL AND POLCO, in Central and South zone. Report No. H20EU-017-011-006 Source: SynTech Research UK	N	UPL Europe Ltd.

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
			GLP No GEP Yes not published		
KCP 6.1 6.2 6.4	Piotr Umiński	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central and South Zone (Poland 2020). Report No. H20EU-017-011-007 Source: Field Research Support, Poland GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Piotr Umiński	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central and South Zone. (Poland 2020). Report No. H20EU-017-011-008 Source: Field Research Support, Poland GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.2 6.4	Piotr Umiński	2020	The efficacy of HBZ010 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in Central and South Zone. (Poland 2020) Report No. H20EU-017-011-009 Source: Field Research Support, Poland GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Mélanie Lefranc	2020	The selectivity of HBZ08 and HBZ10 applied post-emergence of sugarbeet, in the Central and South zone. France – MAR zone - Spring 2020 Report No. H20EU-018-011-001 Source: SynTech Research France S.A.S GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Mélanie Lefranc	2020	The selectivity of HBZ08 and HBZ10 applied post-emergence of sugarbeet, in the Central and South zone. Spring 2020	N	UPL Europe Ltd.

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
			Report No. H20EU-018-011-002 Source: SynTech Research France S.A.S GLP No GEP Yes not published		
KCP 6.4	Mélanie Lefranc	2020	The selectivity of HBZ08 and HBZ10 applied post-emergence of sugarbeet, in the Central and South zone. France – MAR zone - Spring 2020 Report No. H20EU-018-011-003 Source: SynTech Research France S.A.S GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Matt Stuttard	2020	The selectivity of HBZ08 and hbz10 applied post-emergence of sugarbeet. Central and South zone Report No. H20EU-018-011-004 Source: SynTech Research UK GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Kerry Sumner	2020	The selectivity of HBZ08 and HBZ10 applied post-emergence of sugarbeet. Central and South zone Report No. H20EU-018-011-005 Source: SynTech Research UK GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Michał Pławuszcwski	2020	The selectivity of HBZ08 and HBZ10 applied post-emergence of Sugarbeet, in Central and South Zone. Report No. H20EU-018-011-006 Source: Eurofins Agroscience Services Sp. z o.o., Poland GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Michał Pławuszcwski	2020	The selectivity of HBZ08 and HBZ10 applied post-emergence of Sugarbeet, in Central and South Zone. Report No. H20EU-018-011-007 Source: Eurofins Agroscience Services Sp. z o.o., Poland	N	UPL Europe Ltd.

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
			GLP No GEP Yes not published		
KCP 6.1 6.4	Magdalena Siebold	2019	Field study to evaluate the efficacy of efficacy and visual selectivity of herbicides in sugar beet in Germany in 2019 (HBZ07-HBZ08/BEAVA/EFFICACY (BLW)). Report No. H-19-EU-BEAVA-001E02-01DE Source: Field Research Support, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.4	Clément Duley	2019	Evaluate efficacy and visual selectivity of herbicides in sugar beet. GEP Trial, FRANCE, 2019 Report No. H-19-EU-BEAVA-001E02-01FR Source: Staphyt, France GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.4	Magdalena Siebold	2019	Field study to evaluate the efficacy of efficacy and visual selectivity of herbicides in sugar beet in Germany in 2019 (HBZ07-HBZ08/BEAVA/EFFICACY (BLW)). Report No. H-19-EU-BEAVA-001E02-02DE Source: Field Research Support, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.4	Clément Duley	2019	Evaluate efficacy and visual selectivity of herbicides in sugar beet. GEP Trial, FRANCE, 2019 Report No. H-19-EU-BEAVA-001E02-02FR Source: Staphyt, France GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.1 6.4	Ingo Schmidt	2019	Evaluate efficacy and visual selectivity of herbicides in sugar beet. GEP Trial, GERMANY, 2019 Report No. H-19-EU-BEAVA-001E02-03DE Source: Staphyt, Germany GLP No	N	UPL Europe Ltd.

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
			GEP Yes not published		
KCP 6.1 6.4	Clément Duley	2019	Evaluate efficacy and visual selectivity of herbicides in sugar beet. GEP Trial, FRANCE, 2019 Report No. H-19-EU-BEAVA-001E02-03FR Source: Staphyt, France GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.2 6.4	Ingo Schmidt	2019	The efficacy of HBZ08 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in the Central Zone. GEP Trial, GERMANY, 2019 Report No. H-19-EU-BEAVA-383E02-01DE Source: Staphyt, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.2 6.4	Ingo Schmidt	2019	The efficacy of HBZ08 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in the Central Zone. GEP Trial, GERMANY, 2019 Report No. H-19-EU-BEAVA-383E02-02DE Source: Staphyt, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.2 6.4	Clément Duley	2019	The efficacy of HBZ08 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in the Central Zone. GEP Trial, FRANCE, 2019 Report No. H-19-EU-BEAVA-383E02-03FR Source: Staphyt, France GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.2 6.4	Clément Duley	2019	The efficacy of HBZ08 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in the Central Zone. GEP Trial, FRANCE, 2019 Report No. H-19-EU-BEAVA-383E02-04FR Source: Staphyt, France	N	UPL Europe Ltd.

Data point	Authors	Year	Title Company Report No. Source (where different from company) GLP or GEP status Published or not	Vertebrate study Y/N	Owner
			GLP No GEP Yes not published		
KCP 6.2 6.4	Ad Embrechts	2019	The efficacy of HBZ08 applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO, in the Central Zone Report No. H-19-EU-BEAVA-383E02-05NL Source: Exploras Agro Development BV, Netherlands GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.2 6.4	Piotr Umiński	2019	Field study to evaluate the efficacy of HBZ08 (authorization number R-86/2019) applied post-emergence of sugar beet for the control of GALAP, CHEAL and POLCO in the Central Zone. Report No. H-19-EU-BEAVA-383E02-07PL Source: Field Research Support, Poland GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Ingo Schmidt	2019	The selectivity of HBZ07 and HBZ08 applied post-emergence of Sugarbeet, in the Central Zone. GEP Trial, Germany, 2019 Report No. H-19-EU-BEAVA-383S01-01DE Source: Staphyt, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Ingo Schmidt	2019	The selectivity of HBZ07 and HBZ08 applied post-emergence of Sugarbeet, in the Central Zone. GEP Trial, Germany, 2019 Report No. H-19-EU-BEAVA-383S01-02DE Source: Staphyt, Germany GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Ingo Schmidt	2019	The selectivity of HBZ07 and HBZ08 applied post-emergence of Sugarbeet, in the Central Zone. GEP Trial, Germany, 2019	N	UPL Europe Ltd.

<b>Data point</b>	<b>Authors</b>	<b>Year</b>	<b>Title Company Report No. Source (where different from company) GLP or GEP status Published or not</b>	<b>Vertebrate study Y/N</b>	<b>Owner</b>
			Report No. H-19-EU-BEAVA-383S01-03DE Source: Staphyt, Germany GLP No GEP Yes not published		
KCP 6.4	Ad Embrechts	2019	The selectivity of HBZ07 and HBZ08 applied postemergence of Sugarbeet, in the Central Zone. Report No. H-19-EU-BEAVA-383S01-04NL Source: Exploras Agro Development BV, Netherlands GLP No GEP Yes not published	N	UPL Europe Ltd.
KCP 6.4	Ad Embrechts	2019	The selectivity of HBZ07 and HBZ08 applied postemergence of Sugarbeet, in the Central Zone. Report No. H-19-EU-BEAVA-383S01-05NL Source: Exploras Agro Development BV, Netherlands GLP No GEP Yes not published	N	UPL Europe Ltd.

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

<b>Data point</b>	<b>Authors</b>	<b>Year</b>	<b>Title Company Report No. Source (where different from company) GLP or GEP status Published or not</b>	<b>Vertebrate study Y/N</b>	<b>Owner</b>
-	-	-	-	-	-



**List of data submitted by the applicant and not relied on**

<b>Data point</b>	<b>Authors</b>	<b>Year</b>	<b>Title Company Report No. Source (where different from company) GLP or GEP status Published or not</b>	<b>Vertebrate study Y/N</b>	<b>Owner</b>
-	-	-	-	-	-

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

<b>Data point</b>	<b>Authors</b>	<b>Year</b>	<b>Title Company Report No. Source (where different from company) GLP or GEP status Published or not</b>	<b>Vertebrate study Y/N</b>	<b>Owner</b>
-	-	-	-	-	-