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24-EPIBRASSINOLIDE

Volume 3 – B.8 (PPP) – Sunergist

Rapporteur Member State: Austria

Version history

When	What
2018/05	Initial DAR

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CP 8 FATE AND BEHAVIOUR IN THE ENVIRONMENT

This document presents studies on fate and behaviour in the environment studies for the product Sunergist containing the active substance 24-Epibrassinolide.

For the inclusion of the active substance 24-Epibrassinolide and the representative formulation Sunergist (0.01 % 24-Epibrassinolide) in Annex I, data to support the application for inclusion is provided in the following section. Studies, where available, are summarised under the respective data points. In some cases, public literature is used to address data points. In the case where published literature is used to address a data point, an extended summary of the published literature is provided and cited.

In the case where published literature is used to scientifically justify why a study was not deemed necessary to be conducted or as supporting information, only authors and year is given in the text, while full bibliographical information can be found in "Annex I: Publications to support evaluation" at the end of each section. Relevant literature from the EFSA- compliant literature search, which has to be evaluated on full-text level, is discussed under the respective data point.

The applicant submitted an extensive introduction to brassinosteroids in support with the dossier of 24-Epibrassinolide. This general information was not evaluated in detail by RMS because it is not deemed necessary for the DAR preparation but is provided in Volume 3, CA 8 Appendix 1 for completeness. Nonetheless a short version was extracted and accepted by RMS and is presented below to give an overview.

CP 8.0 General Introduction

General Introduction

Brassinosteroids, including 24-Epibrassinolide are naturally occurring, plant growth promoting molecules, present in higher plants, lower plants, including algae, mosses, the "living fossil" *Equisetum* as well as some fungi.[1,2,3] Brassinosteroids are present in all plant organs such as pollen, anthers, seeds, leaves, stems, roots, flowers, grains and fruits with the highest concentrations found in pollen, seeds and fruits and considered an obligatory plant constituent.[4,5]
Brassinosteroids are essential for normal plant growth and development. Those phylogenetically ancient phytohormones, evolved in the Pre-Cambrian, it can be expected that each organism has developed its own co-evolutionary mechanism to metabolise these phytohormones.[6] 24-Epibrassinolide elicits and activates the plant's self-defence mechanisms mediating the plant's resistance to unfavourable

[1] KCA 8/0001: Takatsuto, S., Abe, H., Gamoah, K. (1990): EVIDENCE FOR BRASSINOSTEROIDS IN STROBILUS OF EQUISETUM ARVENSE L. Report No.: na (092-059) Agricultural and Biological Chemistry, 1990, 54 (4), 1057-1059; Not GLP, published

[2] KCA 8/0011: Bajguz, A., Tretyn, A. (2003): THE CHEMICAL STRUCTURES AND OCCURRENCE OF BRASSINOSTEROIDS IN PLANTS. Report No.: na (092-145). Brassinosteroids. Chapter 1, 2003, 1-44. Not GLP, published.

[3] KCA 8/0012: Bajguz, A. (2011): BRASSINOSTEROIDS – OCCURRENCE AND CHEMICAL STRUCTURES IN PLANTS. In: Hayat, S., Ahmad, A.: BRASSINOSTEROIDS: A CLASS OF PLANT HORMONE. Report No.: na (092-146). Springer Verlag, 2011, Chapter 1, 1-27, DOI 10.1007/978-94-007-0189-2_1; ISBN: 978-94-007-0188-5. Not GLP, published

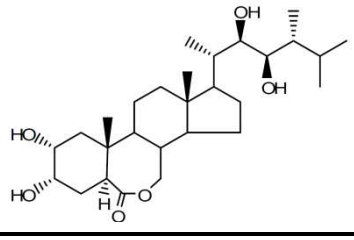
[4] KCA 8/0002: Zhu, J.-Y., Sae-Seaw, J., Wang, Z.-Y. (2013): BRASSINOSTEROID SIGNALLING. Report No.: na (092-165). Development, 2013, 140(8), 1615-1620; doi: 10.1242/dev.060590. Not GLP, published.

[5] KCA 8/0012: Codreanu, M.; Russinova, E. (2011): REGULATORY MECHANISMS OF BRASSINOSTEROID SIGNALING IN PLANTS. In: Hayat, S., Ahmad, A. (eds.): BRASSINOSTEROIDS: A CLASS OF PLANT HORMONE. Report No.: na (092-146). Springer Verlag, 2011, Chapter 2, 29-56, DOI 10.1007/978-94-007-0189-2_2; ISBN: 978-94-007-0188-5. Not GLP, published

[6] KCA 8/0005: Kutschera, U., Wang, Z.-Y. (2012): BRASSINOSTEROID ACTION IN FLOWERING PLANTS: A DARWINIAN PERSPECTIVE. Report No.: na (092-036). Journal of Experimental Botany, 2012, 63 (10), 3511-3522; doi:10.1093/jxb/ers065. Not GLP, published

environmental conditions, (e.g. salinity, drought, cold and heat stress) and fungal diseases.[7] Application of brassinosteroids leads to a complex sequence of biochemical reactions such as activation or suppression of key enzymatic reactions, induction of protein synthesis and the production of various chemical defence compounds.[8]

Table 8.0-1 : Substances and metabolites of environmental relevance (structure, synonyms and codes)

Code	IUPAC name	Compound found in	Structural formula
24-Epibrassinolide	(22R,23R,24R)-2α,3α,22,23-tetrahydroxy-24-methyl-β-homo-7-oxa-5-cholestan-6-one	Environment (soil, surface water), plant, rat	
No relevant metabolites. Due to the natural occurrence of 24-Epibrassinolide and its metabolites, risk assessments for metabolites are not considered necessary as they are deemed to be covered by the parent.			

CP 8.1 Fate and Behaviour in Soil

CP 8.1.1 Rate of degradation in soil

CP 8.1.1.1 Laboratory studies

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.1.2.1.

[7] KCA 8/0012: Kang, Y., Guo. S. (2011): ROLE OF BRASSINOSEROIDS ON HORTICULTURAL CROPS. In: Hayat, S., Ahmad, A. (eds.): BRASSINOSTEROIDS: A CLASS OF PLANT HORMONE. Report No.: na (092-146). Springer Verlag, 2011, Chapter 9, 269-288, DOI 10.1007/978-94-007-0189-2_9; ISBN: 978-94-007-0188-5. Not GLP, published

[8] KCA 8/0091: Bajguz, A., Hayat, S. (2009): EFFECTS OF BRASSINOSTEROIDS ON THE PLANT RESPONSES TO ENVIRONMENTAL STRESSES. Report No.: na (092-133). Plant Physiology and Biochemistry, 2009, 47, 1-8; doi:10.1016/j.plaphy.2008.10.002. Not GLP, published

CP 8.1.1.2 Field studies

CP 8.1.1.2.1 Soil dissipation studies

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.1.2.2.

CP 8.1.1.2.2 Soil accumulation studies

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.1.2.2.

CP 8.1.2 Mobility in soil

CP 8.1.2.1 Laboratory studies

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.1.4.

CP 8.1.2.2 Lysimeter studies

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.1.4.

CP 8.1.2.3 Field leaching studies

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.1.4.

CP 8.1.3 Estimation of concentrations in soil

The active substance, 24-Epibrassinolide is an elicitor and plant activator produced to protect the plant against fungal infections of *Botryotinia fuckeliana,* Downy mildew (*Thanatephorus cucumeris), Cercospora beticola* and environmental stresses. Sunergist (0.01 % Soluble Liquid (SL)) is intended to be applied as a spray application. As the efficacy of this active substance is concentration dependent, volumes and doses will vary depending to the water volume used for application, the developmental stage of the crop as well as on the crop canopy sizes.

From all intended uses, the highest application rate of 0.05 g 24-Epibrassinolide/ha in vines was chosen from the GAP as a worst-case approach (Table 8.1.3-1).

Table 8.1.3-1: Representative GAP for 24-Epibrassinolide

Formulation	Crop	Growth stage (BBCH)	Number of applications	Application rate per treatment [g a.s./ha]	Interception [%]	Effective soil exposure rate [g a.s./ha]
0.01 % SL	Wine grapes and table grapes	BBCH 15 to 85	3 (7d interval)	0.05	0	0.15
	Wine grapes and table grapes	BBCH 71-79	2 (7d interval)	0.05	0	0.10
	Leafy vegetables	BBCH 10 to 41	2 (7d interval)	0.04	0	0.08
	Leafy vegetables (indoor)	BBCH 10 to 41	2 (7d interval)	0.04	0	0.08
	Sugarbeet	BBCH 12-39	3 (7d interval)	0.04	0	0.12
	Cucurbits (indoor)	BBCH 12-69	3 (7d interval)	0.05	-	-

Predicted environmental concentrations in soil (PEC_{soil})

The PEC_{soil} calculations have been performed using the UK HSE PEC soil calculator version 1.0 (created 05.10.2015, based on the FOCUS screening step) assuming a soil bulk density of 1.5 g/cm³ and an equal distribution in the top 5 cm. No processes other than degradation (DT_{50}) are accounted for. The DT_{50} used is based on the worst-case degradation rate described in the aerobic soil degradation study of Chen *et al.* (2005). As a conservative approach, 0 % crop interception is assumed. For the multiple applications, the PEC_{soil} is based on the last application in order to account for build-up in soil. The application interval is 7 days. The detailed input parameters are given in Table 8.1.3-2.

Table 8.1.3-2: Input parameters for the Predicted environmental concentrations in soil (PEC_{soil}) calculations

Depth of soil layer [cm]	5
Soil bulk density [g/cm^3]	1.5
Crop interception [%]	0
DT_{50} [d]	43.3[1)]
Application rate [g/ha]	0.15
Number of applications	3

[1)] DT_{50} is based on the worst-case degradation rate described Chen *et al*., 2005 (loamy clay; pH 5.29; 9.94 g/kg organic matter; cation exchange capacity 10.60 cmol/kg)

The Predicted environmental concentrations in soil are given in Table 8.1.3-01.

Number of applications	3	
depth of soil (cm) =	5	
density (g/cm3) =	1,5	
Soil DT50 =	43,3	
1st Application		
Rate (g/ha)=	0,05	
Crop interception (%) =	0	
		TWA
PECINI mg/kg (1st)	0,0000667	0,0000667
1	0,0000656	0,0000661
2	0,0000646	0,0000656
4	0,0000625	0,0000646
7	0,0000596	0,0000631
14	0,0000533	0,0000597
21	0,0000476	0,0000566
28	0,0000426	0,0000537
48	0,0000309	0,0000465
100	0,0000134	0,0000332

2nd Application		
Rate (g/ha)=	0,05	
Crop interception (%) =	0	
Interval (days) =	7	
		TWA
PECINI mg/kg (2nd)	0,000126	0,000126
1	0,000124	0,000125
2	0,000122	0,000124
4	0,000118	0,000122
7	0,000113	0,000119
14	0,000101	0,000113
21	0,000090	0,000107
28	0,000081	0,000102
48	0,000059	0,000088
100	0,000025	0,000063

3rd Application		
Rate (g/ha)=	0,05	
Crop interception (%) =	0	
Interval (days) =	7	
		TWA
PECINI mg/kg (3rd)	0,000180	0,000180
1	0,000177	0,000178
2	0,000174	0,000177
4	0,000168	0,000174
7	0,000161	0,000170
14	0,000143	0,000161
21	0,000128	0,000152
28	0,000115	0,000145
48	0,000083	0,000125
100	0,000036	0,000090

Table 8.1.3-1: Worst-case PEC_{sw} calculations based upon no interception and an application rate of 0.15 g per ha per season.

The predicted environmental concentration in soil (PEC_{soil}) is calculated to be 0.000180 mg/kg soil (0.18 µg/kg soil).

Comment RMS:
The assumptions made by the Notifier for the calculation of PEC_{SOIL} are considered acceptable by the RMS, except for the maximum value of DT_{50} in soil. The DT_{50} value was measured at 25 °C and was not normalised to 20 °C prior use in the calculation. The temperature normalised DT_{50} is 69.55 days and RMS recommends using this value in the risk assessment. Assuming the other parameters, RMS recalculated the PEC_{SOIL} using the normalised DT_{50} value. The results are provided in the table below, the PEC_{SOIL} are presented in µg active substance/kg soil. The initial PEC_{SOIL} is not much affected by the change of DT_{50}, but the PEC_{SOIL} at day 100 is almost doubled by the change. Though this change will have very little influence on the overall risk assessment, it is recommended for correctness.

Predicted environmental concentrations in soil considering a maximum DT_{50} of 69.55 days

Days	PEC_{SOIL} [µg/kg]	TWA [µg/kg]
0	0.187	-
1	0.185	0.186
2	0.183	0.185
4	0.180	0.183
7	0.174	0.180
14	0.162	0.174
21	0.152	0.169
28	0.141	0.163
50	0.114	0.147

100	0.069	0.118

CP 8.2 Fate and Behaviour in Water and Sediment

CP 8.2.1 Aerobic mineralisation in surface water

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.2.2.

CP 8.2.2 Water/sediment study

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.2.2.

CP 8.2.3 Irradiated water/sediment study

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. For further information, please refer to CA 8.2.2.

CP 8.2.4 Estimation of concentrations in groundwater

Brassinosteroids are ubiquitous in the environment, and naturally present in higher plants, lower plants, including algae and mosses and in certain fungi. Brassinosteroids are present in all plant organs such as pollens, anthers, seeds, leaves, stems, roots, flowers, grains and fruits with the highest concentrations found in pollen, seeds and fruits (Zhu *et al*., 2013) and considered an obligatory plant constituent. The concentration of Brassinosteroids in plants is regulated by a complex system of feedback pathways and Brassinosteroids are constantly synthesised, metabolised, catabolised, activated and inactivated depending on the plant's needs as well as environmental cues. The concentrations of Brassinosteroids are continuously fluctuating - spatially and temporally: in a single plant, different concentrations can be measured simultaneously in different plant organs, cell structures and cells as well as in the same location at different times.

Due to the constant formation and decomposition of plant root systems, the presence of seeds, pollen, and decomposing plant material and the release of Brassinosteroids from decomposing organic matter (e.g. Aremu *et al*., 2015) as well as the vast number of other Brassinosteroid producing organisms such as algae in the environment, Brassinosteroids are expected to be naturally present in all environmental compartments including soil and water-bodies as well as sediment (Aremu *et al*., 2015, Hassett and Lee, 1977; Mudge *et al*., 1999). No different leaching of the 'natural-identical synthesized molecule', 24-Epibrassinolide, to the natural occurring 24-Epibrassinolide, into ground water are expected.

An important chemical property of a substance that affects its movement in soil is hydrophobicity. Hydrophobicity is usually expressed as the octanol-water partition coefficient (log Pow), where a high log Pow value corresponds to high hydrophobicity (Briggs *et al*., 1982; Ryan *et al*., 1988). Thus, substances

with lipophilicity close to that to the respective plant root can be transferred from soil or water to the plant spontaneously by a diffusion-driven process. Organic compounds with log Pow ranging from 1 and 3 (moderately hydrophobic) are mostly taken up by plants (Briggs *et al*., 1982).

Furthermore, 24-Epibrassinolide is a moderately hydrophobic organic compound with a log Pow of 2.0 (please refer to CA 2.7) and will be spontaneously transferred from soil or water to the plant by a diffusion-driven process and therefore not be available for leaching to the different water bodies and systems.

CP 8.2.4.1 Calculation of concentrations in groundwater

The predicted environmental concentrations calculation of 24-Epibrassinolide in groundwater was not performed as natural occurrence of Brassinosteroids in soils is proven (see 8.2.4 above). No different leaching of the natural-identical synthesized molecule, 24-Epibrassinolide, to the natural occurring 24-Epibrassinolide, into groundwater are expected.

CP 8.2.4.2 Additional field tests

Environmental fate studies using the formulation Sunergist (0.01 % Soluble Liquid (SL)) were not conducted as data from the active substance, 24-Epibrassinolide, are available and adequate to enable extrapolation to the behaviour of the formulated product. Neither the type of plant protection product nor its ingredients and physical properties are expected to affect the fate and behaviour of 24-Epibrassinolide. No additional field studies were conducted.

Comment RMS:
No PEC_{GW} simulations were provided by the Notifier. The Notifier delivered an argumentation based on the fact that no different leaching behaviour is to be expected between the natural occurring 24-Epibrassinolide and the synthesised 24-Epibrassinolide. Furthermore, the PEC_{SOIL} for 24-Epibrassinolide is expected to be low. Altogether, the argumentation is believed to provide enough evidence to predict that the potential of leaching of 24-Epibrassinolide into groundwater at concentrations influencing the natural concentrations of brassinosteroids will be low.

CP 8.2.5 Estimation of concentrations in surface water and sediment

The active substance, 24-Epibrassinolide is an elicitor and plant activator produced to protect the plant against fungal infections *Botryotinia fuckeliana,* Downy mildew *Thanatephorus cucumeris, Cercospora beticola* and environmental stresses. Sunergist (0.01 % Soluble Liquid (SL)) is intended to be applied as a spray application. As the efficacy of active substance is concentration dependent, volumes and doses will vary depending on the crop canopy sizes.

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

For the field uses on table and wine grapes, lettuce and sugar beet, and the greenhouse uses on lettuce and cucurbits, the predicted environmental concentrations of 24-Epibrassinolide in surface water and sediment were calculated using the FOCUS Step 1 and 2 calculator version 3.2.

The FOCUS surface water scenarios provide a standard assessment tool to examine the potential surface water exposure by pesticides. Step 1 and 2 calculations should represent “worst-case loadings” and “loadings based on sequential application patterns” respectively. The assumptions at both Steps 1 and 2 are very conservative and are essentially based around drift values calculated from BBA (2000) and an estimation of the potential loading of pesticides to surface water via run-off, erosion and/or drainage.

According to Generic guidance for FOCUS surface water Scenarios Version 1.4 (2015) a tiered approach should be followed.

At Step 1, a very simplistic method uses an unrealistic worst case situation based on a single lumped loading. At Step 2 a more realistic loading is applied according to the label recommendations, but no climate, cropping, topography or soil characteristics are taken into account. At Step 3 realistic worst-case situations are considered with a regional differentiation across the European Union using ten (10) different scenarios.

According to the conclusions and recommendations given in the Generic guidance for FOCUS surface water Scenarios Version 1.4 (2015), "*The (FOCUS) Step 1, 2 and 3 scenarios have been carefully calibrated to ensure consistency of the PECsw calculated at each step. Thus, compound-specific exposure calculations using the Step 1 scenario will always give higher PECsw than those calculated using the any of the ten Step 3 scenarios."*

The guidance further states that "*As the tiered approach for surface waters indicates, at each step a comparison should take place between the calculated PEC at the level under consideration and the relevant ecotoxicological data as available in the dossier. If the TER triggers set out in Annex VI to the Directive 91/414/EEC or the uniform principles for decision making on product authorisations under Regulation (EC) No 1107/2009 are met, it can be assumed that the given use of the active substance has no unacceptable impact on the aquatic environment and no further work for surface water is needed.*"

As the TER triggers set out in Regulation (EC) No 1107/2009 are met in STEP 1, no further work for surface water is needed. For your convenience, also FOCUS step 2 was calculated and provided herewith.

The maximum application rates per growing season are 0.15 g a.s./ha for table and wine grapes and for cucurbits, 0.12 g a.s./ha for sugar beet and 0.08 g a.s./ha for lettuce. The representative uses are summarised in Table 8.2.5-1 according to the GAP (please refer to Document D-1).

Table 8.2.5-1: Representative GAP with crop type, regional and seasonal scenarios

Use	**Crop**	**Growth stage** (BBCH)	**Number of applications**	**Application rate per treatment** [g a.s./ha]	**Crop type**	**Region and season of application**
Field use*	Wine grapes and table grapes	BBCH 15 to 85	3* (7d interval)	0.05	Vine - early application	North/South March - May
Field use*	Wine grapes and table grapes	BBCH 15 to 85	3* (7d interval)	0.05	Vine - late application	North/South June - September
Field use	Sugarbeet	BBCH 12-39	3 (7d interval)	0.04	Sugar beet	North/South March - May
Field use	Sugarbeet	BBCH 12-39	3 (7d interval)	0.04	Sugar beet	North/South June - September
Field and Greenhouse use	Lettuce	BBCH 10 to 41	2 (7d interval)	0.04	Leafy vegetables	North/South October - February
Field and Greenhouse use	Lettuce	BBCH 10 to 41	2 (7d interval)	0.04	Leafy vegetables	North/South March - May

Use	Crop	Growth stage	Number of applications	Application rate per treatment	Crop type	Region and season of application
Field and Greenhouse use	Lettuce	BBCH 10 to 41	2 (7d interval)	0.04	Leafy vegetables	North/South June - September
Greenhouse use	Cucurbits	BBCH 12-69	3 (7d interval)	0.05	Fruiting vegetables	North/South October - February
Greenhouse use	Cucurbits	BBCH 12-69	3 (7d interval)	0.05	Fruiting vegetables	North/South March - May
Greenhouse use	Cucurbits	BBCH 12-69	3 (7d interval)	0.05	Fruiting vegetables	North/South June - September

* The plant activator use (max. 2 applications of 0.05 g a.s./ha at BBCH 71-79) of wine grapes and table grapes for the prevention against environmental stress, quality and yield increase is covered by the elicitor use (max 3 applications 0.05 g a.s./ha at BBCH 15-85).

Calculations were performed for applications to table and wine grapes and sugar beet, made between March to May and June to September in Northern and Southern Europe. Calculations were also performed for applications to lettuce and cucurbits made between October to February, March to May and June to September in Northern and Southern Europe to represent all year applications in the greenhouse.

For Step 1 and 2 calculations the crops vines (early and late application), sugar beet, leafy vegetables and fruiting vegetables were selected as the representative crop types and the interception rates set to "no interception".

The standard assumptions made by the FOCUS Step 1 and 2 calculations are given in Table 8.2.5-2 and are relevant for PECsw and PECsed calculations. A water depth of 30 cm overlying sediment of 5 cm depth was selected in order to comply with existing risk assessment approaches within the EU and existing ecotoxicity testing requirements for sediment-dwelling organisms. The density of the sediment was selected to be 0.8 $g.cm^{-3}$ and an organic carbon content of 5%. The water body is assumed to have an area equivalent to one tenth of the field from which it receives run-off or drainage water (a field:water ratio of 10). Assuming a 1 ha field, the 0.1 ha (1000 m^2) water body will have a volume of 3 x 10^5 litres.

Table 8.2.5-2: Standard assumptions used in the FOCUS Step 1 and 2 calculations

Parameter	Table and wine grape	Sugar beet	Lettuce	Cucurbits
Distance to the water body (m)	Step 1 & 2: 3.0 m	Step 1 & 2: 1.0 m	Step 1 & 2: 1.0 m	Step 1 & 2: 1.0 m
Runoff + drainage (% of application)	Step 1: 10 %	Step 1: 10 %	Step 1: 10 %	Step 1: 10 %
Spraydrift for multiple application (% of application)	Step 2: Early application: 2.5460 % Late application: 6.8980	Step 2: 2.0240 %	Step 2: 2.4380 %	Step 2: 2.0240 %
Spraydrift for single application (% of application)	Step 1 & 2: Early application: 2.6990 % Late application: 8.0280	Step 1 & 2: 2.7590 %	Step 1 & 2: 2.7590 %	Step 1 & 2: 2.7590 %
Ratio of field to water body	Step 1 & 2: 10 %	Step 1 & 2: 10 %	Step 1 & 2: 10 %	Step 1 & 2: 10 %
Water depth (cm)	Step 1 & 2:	Step 1 & 2:	Step 1 & 2:	Step 1 & 2:

	30 cm	30 cm	30 cm	30 cm
Sediment depth (cm)	Step 1 & 2: 5 cm	Step 1 & 2: 5 cm	Step 1 & 2: 5 cm	Step 1 & 2: 5 cm
Effective sediment depth for sorption (cm)	Step 1 & 2: 1.0 cm	Step 1 & 2: 1.0 cm	Step 1 & 2: 1.0 cm	Step 1 & 2: 1.0 cm
Sediment OC (%):	Step 1 & 2: 5 cm	Step 1 & 2: 5 cm	Step 1 & 2: 5 cm	Step 1 & 2: 5 cm
Sed. bulk density (kg/L):	Step 1 & 2: 0.8 Kg/L	Step 1 & 2: 0.8 Kg/L	Step 1 & 2: 0.8 Kg/L	Step 1 & 2: 0.8 Kg/L

NE, Northern Europe; SE, Southern Europe

The test substance parameters used in the calculations are given in Table 8.2.5-3.

Table 8.2.5-3: Input parameters used for 24-Epibrassinolide in the FOCUS Step 1 and 2 calculations

Solubility in water, mg/L (20 ºC)	3.8
Kfoc, (mL/g)	0 (worst case)
Half-life soil (days)	43.3 (worst case, pH 5.27, organic matter 9.94g/kg)
DT50 sed/water system (days)	1000 (worst case)
DT50 sediment (days)	1000 (worst case)
DT50 water (days)	19.6 (pH 7)

For 24-Epibrassinolde a water solubility of 3.8 mg/L (pH ca 4.5) at 20 °C was used (see M-CA 2.6). For the Koc of 24-Epibrassinolde, the worst-case value of zero (0) was selected. The DT_{50} in water of 19.6 days (pH 7) was selected based upon the hydrolytic degradation study performed by Chen *et al.*, 2005 (see MCA 8.2.1.1). In consideration of the FOCUS kinetics guidance (FOCUS 2014), a worst-case soil DT_{50} of 43.3 days (pH 5.29, 9.94 g/kg organic matter) based upon the study performed by Chen *et al.*, 2005 has been used, as the degradation appears to be dependent on the soil pH and organic matter content (see MCA 8.1.2.1). For the DT_{50} sediment and sediment/water system a worst case DT_{50} of 1000 days were selected.

Calculation of PECsw and PECsed at the different steps was performed using the latest software packages according to the FOCUS workgroup as follows:
Step 1: Step 1-2 Version 3.2
Step 2: Step 1-2 Version 3.2

Results are presented in Tables 9.2.5-2 to Table 8.2.5-11. All relevant raw data to the assessment of predicted environmental concentration in surface water and sediment is provided in the following document, attached in the CADDY as zip-file (additional attachment).

Data point addressed:	CP 8.2.5/01
Author(s) (year):	Liebenberg, A., Heidemann, A. (2017)
Title:	RAW DATA TO THE PREDICTED ENVIRONMENTAL CONCENTRATIONS IN SURFACE WATER (PECsw) AND SEDIMENT (PECsed) FOR 24-EPIBRASSINOLIDE USING FOCUS MODELS RELATED TO THE NEW ACTIVE SUBSTANCE APPROVAL ACCORDING TO REGULATION (EC) NO. 1107/2009
Laboratory report / project Number (Doc. No.):	PP309-00002 (782-001)
Testing facility:	Scientific Consulting Company, Bad Kreuznach, Germany
Published:	No
Test guideline used:	FOCUS Surface Water Guidances (2000, 2015)
Deviations:	None
GLP:	No

Predicted environmental concentrations in surface water (PECsw) and soil (PECsed)
Summaries of the PECsw and PECsed calculations are presented below. For Step 1 and Step 2 the initial predicted environmental concentration of 24-Epibrassinolide in surface water (PECsw) and sediment (PECsed) are summarised in Table 8.2.5-2 to Table 8.2.5-11, respectively for table and wine grapes, sugar beet, lettuce and cucurbits.

Table 8.2.5-4: FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to table and wine grapes (3 x 0.05 g a.s./ha)

Scenario FOCUS	Time period	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	Early application	0.0513	0.000
Step 1	Late application	**0.0540**	0.000

Bold value was used for risk assessments.

Table 8.2.5-5: FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to table and wine grapes (3 x 0.05 g a.s./ha)

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	March-May (early application)	0.0093	0.000	0.0035	0.000
	June-Sept (late application)	0.0108	0.000	0.0043	0.000
Southern Europe	March-May (early application)	0.0177	0.000	0.0066	0.000
	June-Sept (late application)	0.0150	0.000	0.0059	0.000

Table 8.2.5-6: FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to sugarbeet (3 x 0.04 g a.s./ha)

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0411	0.000

Table 8.2.5-7: FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to sugarbeet (3 x 0.04 g a.s./ha)

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	March-May	0.0073	0.000	0.0028	0.000
	June-Sept	0.0073	0.000	0.0028	0.000
Southern	March-May	0.0140	0.000	0.0053	0.000

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
Europe	June-Sept	0.0107	0.000	0.0041	0.000

Table 8.2.5-8: FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to lettuce (2 x 0.04 g a.s./ha)

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0274	0.000

Table 8.2.5-9: FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to lettuce (2 x 0.04 g a.s./ha)

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	Oct-Febr	0.0123	0.000	0.0066	0.000
	March-May	0.0052	0.000	0.0028	0.000
	June-Sept	0.0052	0.000	0.0028	0.000
Southern Europe	Oct-Febr	0.0100	0.000	0.0053	0.000
	March-May	0.0100	0.000	0.0053	0.000
	June-Sept	0.0076	0.000	0.0041	0.000

Table 8.2.5-10: FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to cucurbits (3 x 0.05 g a.s./ha)

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0514	0.000

Table 8.2.5-11: FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to cucurbits (3 x 0.05 g a.s./ha)

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	Oct-Febr	0.0218	0.000	0.0082	0.000
	March-May	0.0091	0.000	0.0035	0.000

	June-Sept	0.0091	0.000	0.0035	0.000
Southern Europe	Oct-Febr	0.0175	0.000	0.0067	0.000
	March-May	0.0175	0.000	0.0067	0.000
	June-Sept	0.0133	0.000	0.0051	0.000

At step 1, initial PECsw values ranged from 0.0270 µg/L (lettuce) to 0.0540 µg/L (wine and table grapes). The lowest values were derived for the lettuce use with the smallest application rate (0.08 g a.s./ha/growing season) and the highest values were derived for the use on wine and table grapes (0.15 g a.s./ha/growing season).

At step 2 the maximum PECsw values ranged from 0.0093 - 0.0177 µg/L for wine and table grapes, between 0.0073 - 0.0140 µg/L for sugar beet, between 0.0052 - 0.0123 µg/L for lettuce and between 0.0091 – 0.0218 µg/L for cucurbits.

Since the predicted environmental concentrations of the Step 1 (and Step 2) calculations for 24-Epibrassinolide were significantly above the ecotoxicological endpoint for the aquatic risk assessment (MCP 10.2) no further calculations at Step 3 were performed according to FOCUS Generic guidance for FOCUS surface water Scenarios Version 1.4 (2015).

As a worst case, Koc of 0 was selected in the above approach to ensure the maximum predicted environmental concentration in surface water, relevant for aquatic risk assessments, the predicted environmental concentration in sediment was calculated to be 0.

Comment RMS:
The Notifier provided simulations based on erroneous DT_{50} values. Both soil degradation values and hydrolysis degradation values were not normalised to 20 °C. A worst-case K_{fOC} value of 0 L/kg was selected for the active substance. RMS considers the choice of a worst-case value to be acceptable, but argues that this value will provide a conservative assessment only for the water phase. The sediment phase is therefore underestimated. To provide a more conservative scenario for the sediment compartment, the RMS recalculated the $PEC_{SW/SED}$ using a worst-case K_{fOC} value of 10000 L/kg. Furthermore, the DT_{50} value was set to 69.55 days, and the DT_{50} water value to 31.48 days (pH 7, temperature normalised to 20 °C). All other parameters were set to the ones provided by the Notifier. The RMS performed two sets of new simulations, the first set using the revised DT_{50} values and the K_{fOC} of 0 L/kg, and a second set using the revised DT_{50} values and the K_{fOC} of 10000 L/kg. The results of the simulations performed by the RMS are provided in the tables below.

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to table and wine grapes (3 x 0.05 g a.s./ha) – K_{fOC} set to 0 L/kg

Scenario FOCUS	Time period	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	Early application	0.0513	0.000
Step 1	Late application	**0.0540**	0.000

Bold value was used for risk assessments.

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to table and wine grapes (3 x 0.05 g a.s./ha) – K_{foC} set to 0 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	March-May (early application)	0.0100	0.000	0.0036	0.000
	June-Sept (late application)	0.0117	0.000	0.0044	0.000
Southern Europe	March-May (early application)	0.0190	0.000	0.0068	0.000
	June-Sept (late application)	0.0162	0.000	0.0060	0.000

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to sugarbeet (3 x 0.04 g a.s./ha) – K_{foC} set to 0 L/kg

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0411	0.000

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to sugarbeet (3 x 0.04 g a.s./ha) – K_{foC} set to 0 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	March-May	0.0078	0.000	0.0029	0.000
	June-Sept	0.0078	0.000	0.0029	0.000
Southern Europe	March-May	0.0150	0.000	0.0055	0.000
	June-Sept	0.0114	0.000	0.0042	0.000

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to lettuce (2 x 0.04 g a.s./ha) – K_{foC} set to 0 L/kg

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0274	0.000

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to lettuce (2 x 0.04 g a.s./ha) – K_{foc} set to 0 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	Oct-Febr	0.0129	0.000	0.0067	0.000
	March-May	0.0055	0.000	0.0029	0.000
	June-Sept	0.0055	0.000	0.0029	0.000
Southern Europe	Oct-Febr	0.0105	0.000	0.0055	0.000
	March-May	0.0105	0.000	0.0055	0.000
	June-Sept	0.0080	0.000	0.0042	0.000

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to cucurbits (3 x 0.05 g a.s./ha) – K_{foc} set to 0 L/kg

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0514	0.000

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to cucurbits (3 x 0.05 g a.s./ha) – K_{foc} set to 0 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	Oct-Febr	0.0232	0.000	0.0084	0.000
	March-May	0.0098	0.000	0.0036	0.000
	June-Sept	0.0098	0.000	0.0036	0.000
Southern Europe	Oct-Febr	0.0188	0.000	0.0068	0.000
	March-May	0.0188	0.000	0.0068	0.000
	June-Sept	0.0143	0.000	0.0052	0.000

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to table and wine grapes (3 x 0.05 g a.s./ha) – K_{foc} set to 10000 L/kg

Scenario FOCUS	Time period	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	Early application	0.0048	0.3488
Step 1	Late application	**0.0075**	0.3488

Bold value was used for risk assessments.

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to table and wine grapes (3 x 0.05 g a.s./ha) – K_{foC} set to 10000 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	March-May (early application)	0.0007	0.0711	0.0004	0.0254
	June-Sept (late application)	0.0014	0.0857	0.0013	0.0315
Southern Europe	March-May (early application)	0.0014	0.1337	0.0005	0.0477
	June-Sept (late application)	0.0014	0.1170	0.0013	0.0426

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to sugarbeet (3 x 0.04 g a.s./ha) – K_{foC} set to 10000 L/kg

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0039	0.2791

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to sugarbeet (3 x 0.04 g a.s./ha) – K_{foC} set to 10000 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	March-May	0.0006	0.0555	0.0004	0.0204
	June-Sept	0.0006	0.0555	0.0004	0.0204
Southern Europe	March-May	0.0011	0.1056	0.0004	0.0382
	June-Sept	0.0008	0.0805	0.0004	0.0293

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to lettuce (2 x 0.04 g a.s./ha) – K_{foC} set to 10000 L/kg

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0026	0.1860

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to lettuce (2 x 0.04 g a.s./ha) – K_{foc} set to 10000 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	Oct-Febr	0.0009	0.0907	0.0005	0.0472
	March-May	0.0004	0.0389	0.0004	0.0204
	June-Sept	0.0004	0.0389	0.0004	0.0204
Southern Europe	Oct-Febr	0.0008	0.0735	0.0004	0.0382
	March-May	0.0008	0.0735	0.0004	0.0382
	June-Sept	0.0006	0.0562	0.0004	0.0293

FOCUS Step 1 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to cucurbits (3 x 0.05 g a.s./ha) – K_{foc} set to 10000 L/kg

Scenario FOCUS	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Step 1	0.0049	0.3488

FOCUS Step 2 PECsw and PECsed for 24-Epibrassinolide following three applications of Sunergist (SL) to cucurbits (3 x 0.05 g a.s./ha) – K_{foc} set to 10000 L/kg

Scenario FOCUS Step 2	Time period	Calculated Concentrations in the water body (multiple application)		Calculated Concentrations in the water body (respective single application pattern)	
		Max. PECsw [µg/L]	Max. PECsed [µg/kg]	Max. PECsw [µg/L]	Max. PECsed [µg/kg]
Northern Europe	Oct-Febr	0.0017	0.1632	0.0006	0.0590
	March-May	0.0007	0.0694	0.0005	0.0255
	June-Sept	0.0007	0.0694	0.0005	0.0255
Southern Europe	Oct-Febr	0.0014	0.1319	0.0005	0.0478
	March-May	0.0014	0.1319	0.0005	0.0478
	June-Sept	0.0010	0.1007	0.0005	0.0366

CP 8.3 Fate and Behaviour in Air

CP 8.3.1 Route and rate of degradation in air and transport via air

No special experimental data are available on the active substance 24-Epibrassinolide or its products in air. However, 24-Epibrassinolide is naturally occurring and has a low volatility (vapour pressure: 1.90 x 10^{-15} Pa; calculated Henry's law constant 2.40 x 10^{-13} Pa·m^3/mol) and hence it is not considered to pose any significant concern in air.

Comment RMS:

The RMS agrees with the conclusions.

CP 8.4 Estimation of Concentrations for Other Routes of Exposure

No other routes of exposure were identified to be necessary for calculation of PEC values and consideration during environmental fate risk assessment.

Appendix I:Publications to support evaluation

Report:	CP 8/01, Takatsuto, S., Abe, H., Gamoah, K., 1990 a
Title:	EVIDENCE FOR BRASSINOSTEROIDS IN STROBILUS OF EQUISETUM ARVENSE L.
Laboratory report / project number (Doc. No.)	Not applicable (092-059)
Guidelines:	Not indicated
Published:	Yes (Agricultural and Biological Chemistry, 1990, 54 (4), 1057-1059)
GLP:	No

Report:	CP 8/02, Zhu, J.-Y., Sae-Seaw, J., Wang, Z.-Y., 2013
Title:	BRASSINOSTEROID SIGNALLING
Laboratory report / project number (Doc. No.)	Not applicable (092-165)
Guidelines:	Not indicated
Published:	Yes (Development, 2013, 140(8), 1615-1620; doi: 10.1242/dev.060590)
GLP:	No

Report:	CP 8/05, Kutschera, U., Wang, Z.-Y., 2012
Title:	BRASSINOSTEROID ACTION IN FLOWERING PLANTS: A DARWINIAN PERSPECTIVE
Laboratory report / project number (Doc. No.)	Not applicable (092-036)
Guidelines:	Not indicated
Published:	Yes (Journal of Experimental Botany, 2012, 63 (10), 3511-3522; doi:10.1093/jxb/ers065)
GLP:	No

Report:	CP 8/11, Bajguz, A., Tretyn, A., 2003
Title:	THE CHEMICAL STRUCTURES AND OCCURRENCE OF BRASSINOSTEROIDS IN PLANTS
Laboratory report / project number (Doc. No.)	Not applicable (092-145)
Guidelines:	Not indicated
Published:	Yes (Brassinosteroids. Chapter 1, 2003, 1-44)
GLP:	No

Report:	CP 8/12, Hayat, s., Ahmad, A., 2011
Title:	BRASSINOSTEROIDS: A CLASS OF PLANT HORMONE
Laboratory report / project number (Doc. No.)	Not applicable (092-146)
Guidelines:	Not indicated
Published:	Yes (Springer Verlag, 2011, 1-477, DOI 10.1007/978-94-007-0189-2; ISBN:

	978-94-007-0188-5)
GLP:	No

Report:	CP 8/91, Bajguz, A., Hayat, S., 2009
Title:	EFFECTS OF BRASSINOSTEROIDS ON THE PLANT RESPONSES TO ENVIRONMENTAL STRESSES
Laboratory report / project number (Doc. No.)	Not applicable (092-133)
Guidelines:	Not indicated
Published:	Yes (Plant Physiology and Biochemistry, 2009, 47, 1-8; doi:10.1016/j.plaphy.2008.10.002)
GLP:	No

Report:	CP 8.2.5/02 Chen, S., Shi, L., Shan, Z., Hu, Q., 2005
Title:	CHARACTERISTICS OF HYDROLYSIS AND DEGRADATION OF BRASSINOLIDE IN SOILS
Laboratory report / project number (Doc. No.)	Not applicable (092-001)
Guidelines:	Not indicated
Published:	Yes (Rural Eco-Environment, 2005, 21 (1), 55-57)
GLP:	No