



# **Draft Assessment Report (DAR)**

**- public version -**

**Initial risk assessment provided by the rapporteur Member State  
The Netherlands for the existing active substance**

**ETRIDIAZOLE**

**of the third stage (part B) of the review programme  
referred to in Article 8(2) of Council Directive 91/414/EEC**

**Volume 3, Annex B, part 4, B.8**

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## B.8 Environmental Fate and Behaviour

### B.8.1 Route and rate of degradation in soil (Annex IIA 7.1.1 and Annex IIIA 9.1.1)

#### B.8.1.1 Laboratory studies

##### B.8.1.1.1 Aerobic studies

### STUDY 1

#### Characteristics

reference	:	Thomas R.J., 1976 (IIA 7.1.1.1.1/01)	incubation time	:	up to 20 d
year of execution	:	1975-1976	nominal concentration	:	1.2 mg/kg
GLP statement	:	no	temperature	:	25 and 38°C
guideline	:	not indicated	DT50	:	see results
test substance	:	(a) [3- <sup>14</sup> C]-Etridiazole, lot no: not provided	metabolites	:	see results
		(b) Etridiazole, lot no: not provided			
purity	:	(a) radiochem. purity not provided, chem. purity ≥97.2%	acceptability	:	not acceptable
		(b) purity 98.3%			
soils	:	sandy loam, silt loam			

#### Study design

Field soil from 2 locations (3 mm sieved, soil properties see Table B.8.1.1.1-04) was adjusted to 75% of field capacity. [3-<sup>14</sup>C]-etridiazole mixed with unlabelled etridiazole was added in hexane to 50 g soil portions at a rate of 1.2 mg/kg. Treated soil was incubated in the dark at 25°C or 38°C for up to 20 days under aerobic conditions which were maintained by passing humidified air through the incubation flasks. Volatiles and CO<sub>2</sub> were trapped in toluene and 0.1N NaOH, respectively.

Sampling times are shown in Table B.8.1.1.1-01 and -02. Duplicate soil samples were extracted with methanol and 1% ammonium hydroxide in methanol. Radioactivity in soil extracts and liquid traps was determined by LSC and in PES from the silt loam soil of the last sampling time only by combustion/LSC. Following addition of water, the methanol extract was partitioned with hexane. Radioactivity in organic and aqueous fractions was quantified by LSC. The organic fraction and the toluene from the traps were analysed by GC for etridiazole and its dichloro metabolite (3-dichloromethyl-5-ethoxy-1,2,4-thiadiazole). Identification of these two compounds was based on comparison with reference standards. The aqueous fractions (maximum 8.7% AR) and ammonia-methanol (maximum 9.2% AR) extracts were not further analysed. Radioactivity in selected NaOH traps was confirmed to be CO<sub>2</sub> by BaCl<sub>2</sub> precipitation.

#### Results

The results for the distribution of radioactivity and compound identification are given in Table B.8.1.1.1-01 to B.8.1.1.1-03. Total recovery of radioactivity could be calculated for the last time points of the silt loam soil only, and was 95 and 88% AR at 25 and 38°C, respectively. Extractable radioactivity in the silt loam soil decreased from 91/88% AR on day 5/1 to 55% AR on day 20/15 at

25/38°C. Extractable radioactivity in the sandy loam soil decreased from 107/93% AR on day 3/5 to 89/40% AR on day 10/15 at 25/38°C. Unextractable residues were 22/25% AR in the silt loam soil at the end of the incubation period. CO<sub>2</sub> was evolved from the soil to a maximum of 5.0-11% AR at the end of the incubation period. Volatile organic compounds were up to 11% AR.

Partitioning of the soil extracts showed main radioactivity in the organic fraction. Aqueous fractions containing max 8.7% AR.

At study end (10-20 days), etridiazole had dissipated to 3-39% AR (range for both soils and temperatures). The dichloro metabolite was an important soil metabolite with a maximum of 42% AR (mean) after 10 days (25°C, sandy loam soil).

Due to the numerous deviations from the guideline, the study was not acceptable and no half-lives were calculated.

**Table B.8.1.1.1-01 Distribution of radioactivity after incubation at 25 or 38°C of silt loam soil treated with <sup>14</sup>C-etridiazole at 1.2 mg/kg (% AR; mean of duplicate samples, unless otherwise specified)**

temp [°C]	day	extractables				unextrac- tables	CO <sub>2</sub>	organic volatiles	mass balance
		CH <sub>3</sub> OH extract			NH <sub>3</sub> .CH <sub>3</sub> OH extract				
		total <sup>(B)</sup>	Hexane phase	polar phase					
25	5 <sup>(A)</sup>	87	94	nd	3.9	na	0.9	0.9	nc
	10	77	79	6.7	7.0	na	2.5	3.1	nc
	15	74	74	3.9	3.6	na	5.7	3.5	nc
	20	46	44	3.7	9.2	22	5.0	11	95
38	1	84	86	3.7	4.1	na	0.3	nd	nc
	3	81	84	2.8	7.0	na	1.0	nd	nc
	5	79	79	0.75	6.1	na	1.7	nd	nc
	10	69	70	4.0	5.8	na	3.4	nd	nc
	15	48	46	3.6	7.2	25	6.0	nd	88

(A) one sample

(B) LSC result prior to partitioning

na: not analysed

nd: not detected

nc: can not be calculated

**Table B.8.1.1.1-02** Distribution of radioactivity after incubation at 25 or 38°C of sandy loam soil treated with <sup>14</sup>C-etridiazole at 1.2 mg/kg (% AR; mean of duplicate samples)

temp [°C]	day	extractables				unextrac- tables	CO <sub>2</sub>	organic volatiles	mass balance
		CH <sub>3</sub> OH extract			NH <sub>3</sub> .CH <sub>3</sub> OH extract				
		total <sup>(A)</sup>	Hexane phase	polar phase					
25	3	104	105	5.3	2.8	na	3.3	4.8	nc
	5	102	104	8.7	0.6	na	1.7	3.7	nc
	10	88	89	4.6	1.1	na	6.2	6.4	nc
38	5	90	89	2.2	3.2	na	1.3	nd	nc
	10	77	82	4.3	5.5	na	3.4	nd	nc
	15	39	38	4.1	1.1	na	1.1	nd	nc

(A) LSC result prior to partitioning

na: not analysed

nd: not detected

nc: can not be calculated

**Table B.8.1.1.1-03** Identification of radioactivity after incubation at 25 or 38°C of silt loam soil or sandy loam treated with <sup>14</sup>C-etridiazole at 1.2 mg/kg (% AR; results of duplicate samples, unless otherwise specified)

silt loam									
25°C					38°C				
day	Hexane phase		Organic volatiles		day	Hexane phase		Organic volatiles	
	etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole		etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole
5 <sup>(A)</sup>	73	19	na	na	1	73/74	6.1/8.0	nd/nd	nd/nd
10	46/46	31/30	2.4/2.4	0.6/0.8	3	64/63	16/19	nd/nd	nd/nd
15	46/61	27/23	4.6/5.3	1.4/1.2	5	54/60	17/15	nd/nd	nd/nd
20	14/20	27/24	3.1/3.1	2.7/1.9	10	52/55	14/7.0	nd/nd	nd/nd
					15	32/16	12/15	nd/nd	nd/nd
sandy loam									
25°C					38°C				
day	Hexane phase		Organic volatiles		day	Hexane phase		Organic volatiles	
	etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole		etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole
3	51/59	39/41	6.3/2.5	1.7/0.6	5	63/61	10/12	nd/nd	nd/nd
5	64/58	27/25	1.1/7.8	0.3/1.5	10	50/52	18/11	nd/nd	nd/nd
10	35/42	45/39	11/7.2	5.3/3.0	15	1.8/3.7	33/28	nd/nd	nd/nd

(A) one sample

na: not analysed

nd: not detected

nc: can not be calculated

**Table B.8.1.1.1-04 Properties of soils used in aerobic degradation study with etridiazole**

Parameter	NSD-TIAK (Pulaski County, Arkansas, USA)	AMY (Pulaski County, Arkansas, USA)
% sand/silt/clay <sup>(A)</sup>	61/22/17	13/63/24
Texture	sandy loam	silt loam
pH	4.8	5.0
% organic carbon	0.88	1.18
CEC (mval/100 g)	8.4	18
% moisture at 1/3 bar (field capacity)	13.2	29.7
moisture content	75% of field capacity (9.9% w/w)	75% of field capacity (22.2% w/w)

(A) USDA classification system

### Conclusions

In two soils treated with [3- <sup>14</sup>C]-etridiazole at 1.2 mg/kg and incubated at 25/38°C in the dark, unextractable residues in one soil were 22-25% AR on day 15-20 (end of study; not measured in other soil). CO<sub>2</sub> was evolved from the soil to a maximum of 5.0-11% AR at study end (day 10-20). Volatile organic compounds reached a maximum of 6.4-11% AR at study end (10-20 days) at 25°C, but were not detected at 38°C. At study end (10-20 days of incubation, etridiazole had dissipated to 3-39% AR (range for both soils and temperatures). Dichloro-etridiazole was the most important soil metabolite (maximum 42% AR on day 10 at 25°C). Due to the numerous study limitations (see below) the study is not acceptable and results will not be used in the risk assessment and are not included in the list of endpoints. For the same reason, no half-lives were calculated.

### Guidelines & Limitations

1. The report provided no information on the history of the field site of soil sampling. A pre-incubation period was not specified. Microbial activity was not measured.
2. It was not indicated that soil moisture was adjusted during the study.
3. As unextractable residues were only determined for two samples, mass balances could not be established for most samples. The efficiency of the system to trap volatile compounds could not be verified from the report (e.g., number of traps of each type not specified, data on radioactivity levels in second trap not available).
4. Time zero samples were not analysed.
5. No description of the GC analytical method was given, nor any detailed validation data (e.g. calibration curves, procedural recoveries). Chromatographic analysis was not based on radioactivity detection, but on GC analysis, and therefore only produced data on etridiazole and dichloro-etridiazole, for which reference compounds were included, but not on other metabolites or metabolite fractions.
6. The polar phases and the ammonium-MeOH extracts were not chromatographed, although the total radioactivity in these phases exceeded 10% AR in certain samples.
7. The incubation period (≤20 days) was insufficient to fully establish the degradation pathway of etridiazole in soil.

## STUDY 2

### Characteristics

reference	:	Thomas R.J., 1982 (IIA 7.1.1.1.1/02)	incubation time	:	39 - 96 d
year of execution	:	1981-1982	nominal concentration	:	1 mg//kg
GLP statement	:	no	temperature	:	ambient
guideline	:	not indicated	DT50	:	see results
test substance	:	(a) [3- <sup>14</sup> C]-Etridiazole, lot no: not provided (b) Etridiazole, lot no: not provided	metabolites	:	see results
purity	:	(a) radiochem. purity ≥97.5% (b) purity 99.8%	acceptability	:	not acceptable
soils	:	sandy loam, sandy loam, sandy loam			

### Study design

Field soil from 3 locations (2 mm sieved, soil properties see Table B.8.1.1.1-08) was adjusted to 75% of field capacity. [3-<sup>14</sup>C]-etridiazole mixed with unlabelled etridiazole was added in hexane (1 mL) to 50 g soil portions at a rate of 1 mg/kg. After mixing and evaporation of the solvent, the treated soil was incubated in the dark at room temperature for up to 39, 70 or 96 days under aerobic conditions, which were maintained by passing humidified air through the incubation flasks. Volatiles and CO<sub>2</sub> were trapped in toluene and 0.1N NaOH, respectively.

Sampling times are shown in Table B.8.1.1.1-05 to -07. Soil samples were extracted with methanol and with 1% ammonium hydroxide in methanol. The day 28 sample of the Agawam soil was also extracted with water/acetone prior to combustion. The methanol extract was partitioned against hexane after addition of water. Radioactivity in methanolic ammonium hydroxide soil extracts, hexane phase, aqueous phase and liquid traps was determined by LSC and in PES from the Agawam soil only by combustion/LSC. The hexane phase and the toluene from the traps were analysed for etridiazole and dichloro-etridiazole by GC.

### Results

The results for the distribution of radioactivity and compound identification are given in Table B.8.1.1.1-05 to B.8.1.1.1-07. Total recovery of radioactivity for the Agawam soil was 72-99% AR (no mass balance could be calculated for the other two soils). Extractable radioactivity decreased from 75-96% AR on day 2-5 to 10-39% AR at study end (day 39-96). PES in the Agawam soil reached a maximum of 36% AR on day 39 (no PES determined for other two soils). CO<sub>2</sub> was evolved from the soil to 1.3-12% AR at the end of the incubation period, but much higher values were recorded at earlier time points (40% AR day 39 in Red Bay soil and 29% AR on day 42 in Cheshire soil). Volatile organic compounds reached a maximum of 15% AR and 3.8% AR in the Agawam and the Red Bay soil, but of 36% AR in the Cheshire soil. Partitioning of the soil extracts showed main radioactivity in the organic fraction with aqueous fractions containing at the most 10% AR.

At study end (39-96 days), etridiazole had dissipated from soil to ≤7% AR. Dichloro-etridiazole was the most important soil metabolite with a maximum of 38% AR after 46 days (Red Bay soil). In the additional water/acetone extract (extraction performed only for Agawam soil on day 28), etridiazole-acid and oxalic acid were detected at 7.4% and 1% AR, respectively.

Because of the numerous deviations from the guideline, the study was not acceptable and no half-lives were calculated.

**Table B.8.1.1.1-05 Distribution and identification of radioactivity after incubation at 25°C of Agawam sandy loam soil treated with  $^{14}\text{C}$ -etridiazole at 1 mg/kg (% AR)**

day	extractables					unextr.	CO <sub>2</sub>	organic			mass balance
	CH <sub>3</sub> OH extract				NH <sub>3</sub> ·CH <sub>3</sub> OH extract			total	etridiazole	dichloro etridiazole	
	Hexane phase			polar phase							
	total	etridiazole	dichloro etridiazole								
5	54	51	4.3	10	11	15	1.8	9.1	8.1	0.33	99
8	42	34	4.8	4.9	12	23	2.7	14	12	0.33	99
12	39	30	6.1	4.4	13	26	2.3	8.7	7.3	0.66	93
15	30	22	5.9	7.0	17	23	3.9	9.2	7.9	0.84	91
28	13	6.2	5.3	5.7	15	10 <sup>(A)</sup>	1.0	14	12	1.3	72 <sup>(B)</sup>
39	7.5	3.9	4.0	4.3	18	36	1.3	15	11	1.7	82

(A) Excludes 13% AR which was removed by additional extractions with water/acetone. This extract contained etridiazole acid (7.4% AR) and oxalic acid (1.0% AR)

(B) Includes 13% AR which was removed from the post extraction soil by additional extractions with water/acetone.

**Table B.8.1.1.1-06 Distribution and identification of radioactivity after incubation at 25°C of Red Bay sandy loam soil treated with  $^{14}\text{C}$ -etridiazole at 1 mg/kg (% AR)**

day	extractables						CO <sub>2</sub>	organic			mass balance
	CH <sub>3</sub> OH extract			polar phase	NH <sub>3</sub> .CH <sub>3</sub> OH extract	unextr.					
	Hexane phase										
	total	etridiazole								dichloro etridiazole	
3	81	73	6.1	3.4	3.5	nd	1.0	1.7	nd	nd	nd
7	78	69	11	1.7	2.6	nd	1.5	0.6	nd	nd	nd
11	61	51	20	2.3	8.8	nd	3.0	1.1	nd	nd	nd
15	57	43	22	1.0	12	nd	4.8	1.9	nd	nd	nd
28	49	34	27	2.0	22	nd	7.5	1.8	nd	nd	nd
39	26	14	16	0.9	5.0	nd	40	0.5	nd	nd	nd
46	46	18	38	0.4	11	nd	15	3.8	nd	nd	nd
57	47	14	35	0.4	1.8	nd	15	2.3	nd	nd	nd
64	30	6	31	0.2	4.8	nd	12	2.3	nd	nd	nd
70	28	7	23	1.0	10	nd	12	2.7	nd	nd	nd

nd = not determined

**Table B.8.1.1.1-07 Distribution and identification of radioactivity after incubation at 25°C of Cheshire sandy loam soil treated with <sup>14</sup>C-etridiazole at 1 mg/kg (% AR)**

day	extractables					unextr.	CO <sub>2</sub>	organic			mass balance
	CH <sub>3</sub> OH extract				NH <sub>3</sub> .CH <sub>3</sub> OH extract			total	etridiazole	dichloro etridiazole	
	Hexane phase			polar phase							
	total	etridiazole	dichloro etridiazole								
2	95	104	no	0.05	1.0	nd	0.26	1.9	0.2	no	nd
6	92	95	1.2	0.9	0.7	nd	0.4	0.2	0.2	no	nd
14	66	72	2.0	0.45	0.96	nd	3.5	11	10	0.12	nd
21	56	60	2.9	0.46	2.9	nd	5.9	14	14	0.17	nd
28	28	27	no	0.8	2.4	nd	23	4.9	4.9	no	nd
33	31	32	3.6	3.4	11	nd	3.2	7.3	8.4	1.2	nd
42	19	19	2.0	0.45	2.0	nd	29	3.6	3.8	no	nd
62	19	17	3.3	3.3	3.0	nd	27	9.7	12	1.0	nd
77	16	17	1.6	1.3	1.5	nd	7.8	36	40	1.4	nd
96	7.2	7.3	1.2	1.3	1.6	nd	12	24	23	2.0	nd

nd = not determined

no = not observed

**Table B.8.1.1.1-08 Properties of soils used in aerobic degradation study with etridiazole**

Parameter	Agawam	Red Bay	Cheshire
% sand/silt/clay <sup>(A)</sup>	53/44/3	66/24/10	56/37/8
Texture	sandy loam	sandy loam	sandy loam
Organics (%) <sup>(B)</sup>	4.5	6.1	1.6
pH	6.1	5.9	6.5
% moisture at 1/3 bar (field capacity)	27	33	30
moisture content	75% of field capacity (20% w/w)	75% of field capacity (25% w/w)	75% of field capacity (23% w/w)

(A) USDA classification system

(B) Not further specified as organic carbon or organic matter.

## Conclusions

In three soils treated with [3-<sup>14</sup>C]-etridiazole at 1 mg/kg and incubated at 25°C in the dark, unextractable residues (determined for one soil only) were maximum 36% AR (day 39, end of study). CO<sub>2</sub> was evolved from the soil to a maximum of 29-40% AR on day 39-42 in two soils, but never exceeded 3.9% AR in the remaining soil. Volatile organic compounds (predominantly etridiazole) reached a maximum of 3.8-15% AR in two soils, but of 36% AR in the third soil. At study end (39-96 days), etridiazole had dissipated from soil to ≤7% AR. Dichloro-etridiazole was the most important soil metabolite (maximum 38% AR on day 46). Etridiazole-acid and oxalic acid were detected at 7.4% and 1% AR, respectively. Due to the numerous study limitations (see below) the study is not acceptable and results will not be used in the risk assessment and are not included in the list of endpoints. For the same reason, no half-lives were calculated.

## Guidelines & Limitations

1. The report provided no information on the history of the field site of soil sampling. A pre-incubation period was not specified. Microbial activity was not measured.
2. It was not indicated whether soil moisture was adjusted during the study.



3. Soil bound residues were determined for one soil only, hence no mass balances were available for two soils. The efficiency of the system to trap volatile compounds could not be verified from the report (e.g., number of traps of each type not specified, data on radioactivity levels in second trap not available).
4. No description of the GC analytical method was given, nor any detailed validation data (e.g. calibration curves, procedural recoveries). Chromatographic analysis was not based on radioactivity detection, but on GC analysis, and therefore only produced data on etridiazole and dichloro-etridiazole, for which reference compounds were included, but not on other metabolites or metabolite fractions. The chromatographic method which detected etridiazole-acid and oxalic acid was not identified.
5. Time zero samples were not analysed.
6. It was not checked whether the extractions were exhaustive. In a single sample, that was subjected to further extraction, an additional extraction with water/acetone released 13% AR, which indicates that the extractions were not exhaustive.
7. The polar phases and the ammonium-MeOH extracts were not chromatographed, although they contained up to 22 and 10% AR, respectively.
8. The presence of  $^{14}\text{CO}_2$  in the NaOH traps was not confirmed by e.g. precipitation by  $\text{BaCl}_2$ .
9. The results of the NaOH and toluene traps showed an abnormal pattern (e.g.  $\text{CO}_2$  results Red Bay soil, volatile results Cheshire soil).

WARNING: This document forms part of an EC evaluation data package and should not be read in isolation. Registration must not be granted on the basis of this document.

**STUDY 3****Characteristics**

reference	:	Nag J.K. and Yu W.C., 1994 (IIA 7.1.1.1.1/03)	incubation time	:	180 d
year of execution	:	1994	nominal concentration	:	5 mg/kg
GLP statement	:	yes	temperature	:	25°C
guideline	:	EPA N:162-1	DT50	:	see results
test substance	:	[3- <sup>14</sup> C]-Etridiazole, lot no: CSL-93-452-14-23	metabolites	:	see results
purity	:	radiochem. purity 99.6%	acceptability	:	acceptable
soils	:	sandy loam			

**Study design**

Soil (2 mm sieved; soil properties see Table B.8.1.1.1-09) was adjusted to 75% of field capacity. [3-<sup>14</sup>C]Etridiazole was added in methanol to 10 g (dry weight) soil portions at a rate of 5 mg/kg. Treated soil was mixed and incubated in the dark at 25°C for up to 180 days. The soil moisture content was maintained (weekly check) at 75% of field capacity. Aerobic conditions were maintained by passing humidified air through the incubation flasks. Volatiles and CO<sub>2</sub> were trapped in ethylene glycol (2 traps), 1N NaOH (2 traps) and 1N H<sub>2</sub>SO<sub>4</sub>.

Duplicate samples were analysed on days 0, 1, 3, 7, 14, 21, 30, 59, 90, 120 and 180 post treatment. Samples were extracted three times with methanol and, except for day 0 samples, 3 to 6 times with acetonitrile/1% NH<sub>4</sub>OH in water (1:1). Radioactivity in soil extracts and liquid traps was determined by LSC and in post-extraction solids by combustion/LSC. Ethylene glycol was extracted with hexane, concentrated and reconstituted in acetone, prior to reversed phase HPLC analysis. Radioactivity in the soil extracts was identified by reversed phase HPLC. Radioactivity in selected NaOH traps was confirmed to be CO<sub>2</sub> by BaCl<sub>2</sub> precipitation. The identity of etridiazole and its metabolites 3-dichloromethyl-5-ethoxy-1,2,4-thiadiazole (3-DCMT, hereafter designated as dichloro-etridiazole) and 5-ethoxy-1,2,4-thiadiazole-3-carboxylic acid (3-Carb.T, hereafter designated as etridiazole acid) in soil and ethylene glycol extracts was confirmed by two additional HPLC systems and comparison with reference standards.

**Table B.8.1.1.1-09 Properties of Paxton soil used in aerobic degradation study with [3-<sup>14</sup>C]Etridiazole**

Parameter	Paxton soil
% sand/silt/clay <sup>(A)</sup>	64/28/8
Texture	sandy loam
pH	6.6
% organic carbon	2.4
CEC (mval/100 g)	8.9
% moisture at 1/3 bar (field capacity)	24.1
moisture content	75% of field capacity (18% w/w)
microbial activity (start/end)	not determined/not determined

(A) USDA classification system

## Results

The results for the distribution and identification of radioactivity are given in Table B.8.1.1.1-10 and B.8.1.1.1-11. Total recovery of radioactivity ranged from 91 to 108% AR. Extractable radioactivity decreased from 100% AR on day 0 to 5.6% AR on day 180. Unextractable residues increased from 1.2% AR on day 0 to a maximum of 6.0% AR on day 90 and decreased to 5.2% AR on day 180. CO<sub>2</sub> was evolved from the soil to a maximum of 22% AR on day 120 (90 day value: 8.2% AR; 180 day value: 21% AR). Volatile organic compounds increased to a maximum of 60% AR on day 180.

Etridiazole dissipated to 1.9% AR after 180 days. Dichloro-etridiazole and etridiazole acid were the most important soil metabolites (>5% AR at two consecutive time points) with a maximum of 7.0% AR after 21 days and 6.7% AR after 90 days, respectively, decreasing to 2.9% AR and 0.14% AR after 180 days. No other metabolites were identified. One unidentified soil metabolite was found in low amounts (up to 0.7% AR). Etridiazole and dichloro-etridiazole were present in the volatiles traps, at a maximum of 50% AR (etridiazole) and 6.1% AR (dichloro-etridiazole) on day 180. (Etridiazole was stable in ethylene glycol traps for at least 15 days).

**Table B.8.1.1.1-10 Distribution of radioactivity after incubation at 25°C of Paxton sandy loam soil treated with [3-<sup>14</sup>C]Etridiazole at 5 mg/kg (% AR, mean of duplicate samples)**

day	extractables			unextrac- tables	CO <sub>2</sub> <sup>(A)</sup>	organic volatiles <sup>(A)</sup>	mass balance <sup>(B)</sup>
	total	MeOH extr	ACN/NH <sub>4</sub> OH extr				
0	100	100	na	1.2	na	na	101
1	93	89	4.0	1.4	0.29	11	105
3	80	74	5.7	2.2	0.69	25	108
7	73	64	8.2	2.7	1.9	27	104
14	61	50	11	2.7	3.5	33	101
21	53	42	11	4.1	5.0	42	104
30	45	32	13	4.9	6.1	44	100
59	33	22	11	5.5	7.8	45	91
90	25	15	10	6.0	8.2	57	96
120	14	8.8	4.8	5.4	22	57	98
180	5.6	3.3	2.3	5.2	21	60	92

(A) sum of both traps

(B) H<sub>2</sub>SO<sub>4</sub> trap contained no detectable amount of radioactivity

na: not applicable

**Table B.8.1.1.1-11 Identification of radioactivity after incubation at 25°C of Paxton sandy loam soil treated with [3-<sup>14</sup>C]Etridiazole at 5 mg/kg (% AR, mean of duplicate samples)**

day	extractables				organic volatiles <sup>(A)</sup>		
	Total <sup>(B)</sup>	etridiazole	dichloro-etridiazole	etridiazole acid	total	etridiazole	dichloro-etridiazole
0	100	96	nd	nd	na	na	na
1	93	86	2.0	1.5	11	10	nd
3	80	71	4.3	2.6	25	24	0.32
7	73	59	6.2	3.7	27	25	0.80
14	61	45	6.9	4.5	33	30	1.6
21	53	37	7.0	5.7	41	37	2.5
30	45	32	6.8	6.3	43	38	3.4
59	33	20	5.3	6.6	44	39	4.1
90	25	13	4.3	6.7	55	49	4.5
120	14	6.4	4.1	2.1	55	46	5.9
180	5.6	1.9	2.9	0.14	58	50	6.1

(A) primary trap

(B) includes one unknown metabolite (max 0.7% AR)

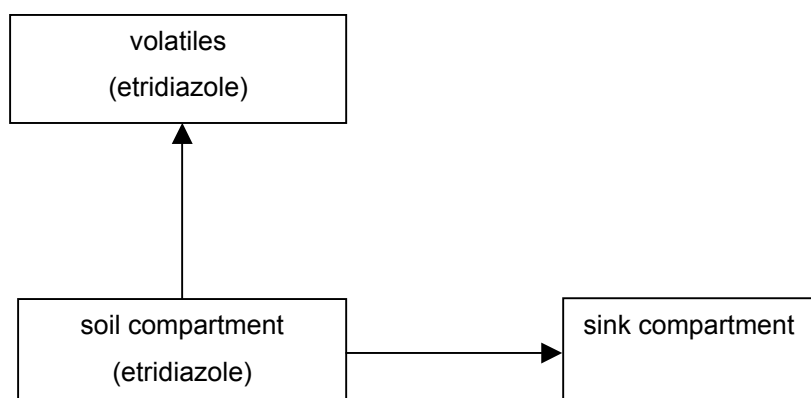
na: not applicable

nd: not detected

DT<sub>50</sub> values were calculated following the recommendations and procedures of the “Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration” (SANCO/10058/2005). Calculations were based on the individual measurements and the time zero values for etridiazole were adjusted for unextractables. All calculations were performed with ModelMaker v 4.0 software. (SFO = single first-order, FOMC = first-order multi-compartment).

#### Etridiazole

For persistence endpoints, SFO and FOMC models were evaluated by the RMS for etridiazole levels in soil, and the results for the best fit model are presented in Table B.8.4.3.2-12. In order to obtain DT<sub>50</sub> values for degradation, a correction for volatilisation was made. This was done by fitting FOMC kinetics to the etridiazole levels in the volatile traps (in agreement with the procedures in Appendix 11 of SANCO/10058/2005). Because this fit was acceptable, a conceptual model containing the compartments “volatiles”, “soil” and “sink” and the FOMC parameters  $\alpha_{vol}$ ,  $\alpha_{deg}$ ,  $\beta_{vol}$ ,  $\beta_{deg}$  and M0 (initial etridiazole concentration) was fitted to the data (see Figure B.8.1.1.1-01). The results are presented in Table B.8.4.3.2-12.



**Figure B.8.1.1.1-01 Multicompartment model for the estimation of the degradation half-life of etridiazole**

**Table B.8.1.1.1-12 Half-lives for etridiazole in Paxton sandy loam treated with [3-<sup>14</sup>C]-etridiazole at 5 mg/kg and incubated in the dark at 25°C.**

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> 25°C	DT <sub>90</sub> 25°C	DT <sub>50</sub> 25°C	DT <sub>90</sub> 25°C
Soil (Paxton sandy loam)	degradation and volatilisation	FOMC	6.12	0.985	12.9	128	-	-
Soil (Paxton sandy loam)	degradation	FOMC	2.64	0.980	45.5	194	58.4 <sup>1,2</sup>	-

FOMC: first order multicompartment

<sup>1</sup> back-calculated as FOMC DT<sub>90</sub>/3.32

<sup>2</sup> value at pF 2/10 kPa and 20°C is 71.2 d

#### *Dichloro-etridiazole*

Dichloro-etridiazole is formed directly out of etridiazole and is subsequently volatilised from soil or degraded. To add to the complexity, because etridiazole is also directly degraded to etridiazole acid, the degradation rate of etridiazole is not equal to the formation rate of dichloro-etridiazole. Calculating a half-life for dichloro-etridiazole starting from the maximum % of formation (day 21) yields a half-life for dissipation (including volatilisation and ignoring the effect of formation) (Table B.8.1.1.1-13). A reliable half-life for degradation in soil of dichloro-etridiazole cannot be determined from the data (overparameterised model and taking into consideration the study limitations given under “guidelines and limitations”).

**Table B.8.1.1.1-13** Half-lives for dichloro-etridiazole in Paxton sandy loam treated with [3-<sup>14</sup>C]-etridiazole at 5 mg/kg and incubated in the dark at 25°C.

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> 25°C	DT <sub>90</sub> 25°C	DT <sub>50</sub> 25°C	DT <sub>90</sub> 25°C
Soil (Paxton sandy loam)	degradation and volatilisation <sup>1</sup>	SFO	3.74	0.931	119	395	-	-

<sup>1</sup> ignoring formation from etridiazole

SFO: single first order

*Etridiazole acid*

Taking into consideration the study limitations given under “guidelines and limitations” and the availability of reliable half-lives (STUDY 5), no half-life is calculated.

**Conclusions**

In soil treated with [3-<sup>14</sup>C] etridiazole, unextractable residues increased from 1.2% AR on day 0 to a maximum of 6.0% AR on day 90 and decreased to 5.2% AR on day 180. CO<sub>2</sub> was evolved from soil to a maximum of 22% AR on day 120 (90 day value: 8.2% AR; 180 day value: 21% AR). Volatile organic compounds, consisting of etridiazole (max. 50% AR) and dichloro-etridiazole (max. 6.1% AR), increased to a maximum of 60% AR on day 180. Etridiazole dissipated (volatilisation and degradation) with a FOMC half-life of 12.9 days (25°C) and degraded with a FOMC half-life of 45.5 days (25°C). Dichloro-etridiazole and etridiazole acid exceeded 5% AR at two consecutive time points and reached a maximum in soil of 7.0% AR after 21 days and 6.7% AR after 90 days, respectively. The maximum level of dichloro-etridiazole formed at any time point (soil + traps) was 10.2% AR. The first-order half-life for dissipation (ignoring formation and including degradation and volatilisation) of dichloro-etridiazole was 119 days (25°C).

**Guidelines & Limitations**

1. The date of soil collection and storage conditions in the laboratory prior to use were not reported. A pre-incubation period was not specified.
2. Microbial activity was not determined at the start and end of the study.
3. Soil portions (10 g dry weight) are below the currently recommended minimum of 50 grams (OECD 307). The use of such small portions may have lead to an exaggerated rate of moisture loss and volatilisation and may have reduced microbial viability.
4. Moisture loss was on average 0.5 g per week. Hence, the moisture content fluctuated from 18% w/w to 13% w/w (54 to 75% of field capacity).
5. No procedural recoveries of the concentration of hexane phases of the ethylene glycol traps were reported (this is of importance since this phase contains volatile components).
6. Evaluation of acceptability:
  - The calculation of the rate of degradation of etridiazole in soil included a correction for losses by volatilisation. Therefore, the possibly exaggerated rate of volatilisation does not affect this parameter. Due to the possibly exaggerated moisture losses and possibly low microbial viability of the test soil, however, the calculated DT<sub>50</sub> (deg) of 45.5 days is

acceptable only as a worst case value. The rate of dissipation of etridiazole in soil (DT50 12.9 days, DT90 128 days) may have been overestimated due to the possibly exaggerated rate of volatilisation. However, even the DT50 (deg) and DT90 (deg) values from this study do not exceed the Annex VI persistence trigger values of 60 and 365 days, respectively. In addition, the DT<sub>50</sub> (dis) values from the more reliable study 4 were much lower than the worst case endpoints from the present study. The combined data, including the worst case endpoints from this study, demonstrate that the DT50 (dis) and DT90 (dis) of etridiazole do not exceed the Annex VI persistence trigger values of 60 and 365 days, respectively.

- The maximum level of dichloro-etridiazole in soil (7.0% AR) may have been underestimated, due to the possibly exaggerated rate of volatilization. As an alternative endpoint, the maximum level in soil + traps (10.2% AR) may be selected.
- Overall evaluation: the endpoints are acceptable.

## STUDY 4

### Characteristics

reference	:	Nag J.K. and Regis R.R., 1998 (IIA 7.1.1.1.1/04)	incubation time	:	100 d
year of execution	:	1997-1998	nominal concentration	:	3.6 mg/kg
GLP statement	:	yes	temperature	:	20°C
guideline	:	Dutch G.1.1.1	DT50	:	see results
test substance	:	[3- <sup>14</sup> C]-Etridiazole, lot no: CSL-96-647-62-30	metabolites	:	see results
purity	:	radiochem. purity >98%	acceptability	:	acceptable
soils	:	sandy loam, loam			

### Study design

Fresh soil (2 mm sieved, soil properties see Table B.8.1.1.1-14) was acclimated for ~2 wks at ~20°C. After adjusting to field capacity (pF 2.5), <sup>14</sup>C-etridiazole was added in methanol to 10 g (dry weight) soil portions at a rate of 3.6-3.7 mg/kg. A high dose soil was prepared for metabolite identification. Treated soil was mixed and incubated in the dark at 20°C for up to 100 days. The soil moisture content was maintained at pF 2.5. Aerobic conditions were maintained by passing humidified air through the incubation flasks. Volatiles and CO<sub>2</sub> were trapped in ethylene glycol (2 traps) and 1N NaOH (2 traps), respectively.

Duplicate soil samples were analysed on days 0, 0.17 (sandy loam soil only), 1, 2, 4, 8, 16, 32, 64 and 100 post treatment. Samples were extracted three times with methanol and subsequently 1 (day 0, 0.17 and 1) or 4 times with acetonitrile/1%NH<sub>4</sub>OH in water (1:1 v/v). Radioactivity in soil extracts and liquid traps was quantified by LSC and in post-extraction solids by combustion/LSC. Ethylene glycol was extracted with hexane, concentrated and reconstituted in acetone, prior to reversed phase HPLC analysis. Radioactivity in the soil extracts was identified by reversed phase HPLC. Radioactivity in post-extraction solids (day 32 (sandy loam) and day 64 (loam)) was fractionated into fulvic and humic acids and humin. Radioactivity in selected NaOH traps was confirmed to be CO<sub>2</sub> by BaCl<sub>2</sub> precipitation. The identity of etridiazole and its metabolites 3-dichloromethyl-5-ethoxy-1,2,4-thiadiazole (dichloro-etridiazole) and 5-ethoxy-1,2,4-thiadiazole-3-carboxylic acid (etridiazole acid) in soil and

ethylene glycol extracts was confirmed by an additional HPLC system, comparison with reference standards and MS/MS analysis.

**Table B.8.1.1.1-14 Properties of the soils used in aerobic degradation study with [3-<sup>14</sup>C]Etridiazole**

Parameter	RI-174 Dutch soil	RI-175 Dutch soil
% sand/silt/clay <sup>(A)</sup>	38/45/16	69/26/5
Texture	loam	sandy loam
pH (KCl)	7.4	6.0
% organic matter	3.1	2.1
CEC (meq/100 g)	14.6	2.6
Field moisture capacity (%) at pF 2.5	33.3	21.3
microbial biomass <sup>(B)</sup> (start)	46	16
microbial biomass <sup>(B)</sup> (end)	16	8

(A) USDA classification system

(B) (mg C/100 g soil)

## Results

Microbial activity of the test soil was confirmed at the start (1.3-2.6% OC) and the end (0.7-0.9% OC) of aerobic incubation (see table B.8.1.1.1-14).

The results for the distribution and identification of radioactivity are given in Table B.8.1.1.1-15 and -16. Total recovery of radioactivity ranged from 88 to 99% AR. The day 0 recovery confirmed the extraction to be exhaustive for etridiazole. Extractable radioactivity decreased from 98% AR on day 0 to 25/31% AR on day 100. Unextractable residues increased from 0.9/0.2% AR on day 0 to 39/30% AR on day 8 and thereafter remained between 29-40/23-33% AR in the loam soil/sandy loam soil. CO<sub>2</sub> was evolved from the soil to 4.8/4.7% AR on day 100 (max in the loam soil on day 64: 8.7% AR). Volatile organic compounds increased to 19/26% AR on day 16/32 and thereafter remained between 16-21/26-36% AR. Unextractable soil residues were shown to consist of humic acids (max 7.8% AR), humin (max 28% AR) and fulvic acids (max 5.1% AR).

Etridiazole dissipated to 4.7/6.1% AR after 8/16 days, thereafter no significant further dissipation was observed (1.2/1.4% AR after 100 days). Two soil metabolites were identified: dichloro-etridiazole in soil increased to 12% AR (13.3/12.9% AR when including volatiles) on day 4/8 and decreased to <1% AR from day 64 onwards; etridiazole acid increased to 31/20% AR on day 32/64 and decreased to 26/17% AR on day 100. A third metabolite identified as etridiazole acid-methyl ester was found in low amounts (max 3.5% AR) and is considered to be formed during extraction with methanol (esterification).



**Table B.8.1.1.1-15 Distribution of radioactivity after incubation at 20°C of loam soil treated with <sup>14</sup>C-etridiazole at 3.58 mg/kg (% AR, mean of duplicate samples)**

day	extractables				unextrac- tables	CO <sub>2</sub> <sup>(B)</sup>	Organic volatiles <sup>(C)</sup>			mass balance
	Total <sup>(A)</sup>	etridia- zole	dichloro- etridiazole	etridia- zole acid			total	etridia- zole	dichloro- etridiazole	
0	98	96	nd	nd	0.92	na	na	na	na	99
0.17	96	95	0.58	1.2	2.7	0.02	0.78	0.67	nd	99
1	90	84	3.9	3.5	4.5	0.11	2.9	2.7	0.03	97
2	71	49	9.2	8.6	14	0.15	7.0	6.4	0.23	93
4	51	15	12	18	26	0.28	14	14	1.3	93
8	40	4.7	7.3	24	39	0.37	16	13	2.2	96
16	42	4.1	5.8	29	29	2.1	19	14	3.7	93
32	38	2.6	1.4	31	33	2.5	21	17	3.3	95
64	32	1.1	0.82	27	37	8.7	20	15	3.3	97
100	31	1.2	0.63	26	40	4.8	16	12	3.0	91

(A) includes etridiazole acid-methylester (max 3.5% AR) which is considered to be formed during extraction with methanol

(B) total of trap 1+2 (second trap contained <0.1% AR)

(C) primary trap; second trap contained <0.2% AR

na: not applicable

nd: not detected

**Table B.8.1.1.1-16 Distribution of radioactivity after incubation at 20°C of sandy loam soil treated with <sup>14</sup>C-etridiazole at 3.73 mg/kg (% AR, mean of duplicate samples)**

day	extractables				unextrac- tables	CO <sub>2</sub> <sup>(B)</sup>	Organic volatiles <sup>(C)</sup>			mass balance
	Total <sup>(A)</sup>	etridia- zole	dichloro- etridiazole	etridia- zole acid			total	etridia- zole	dichloro- etridiazole	
0	98	94	nd	nd	0.20	na	na	na	na	98
1	82	77	1.5	1.3	0.51	1.1	7.8	7.6	nd	92
2	79	73	3.2	2.2	1.5	1.2	9.7	8.7	nd	92
4	65	50	5.8	4.9	5.3	0.19	20	17	0.35	90
8	44	11	12	14	30	0.20	13	10	0.86	88
16	34	6.1	4.2	18	32	0.59	22	18	2.1	89
32	30	4.8	1.5	19	33	1.2	26	22	1.7	90
64	29	3.3	0.72	20	30	3.5	26	23	2.5	88
100	25	1.4	0.41	17	23	4.7	36	33	2.9	88

(A) includes 3-Carb.T-ester (max 2.1% AR) which is considered to be formed during extraction with methanol

(B) total of trap 1+2 (second trap contained <0.6% AR)

(C) primary trap; second trap contained <0.7% AR

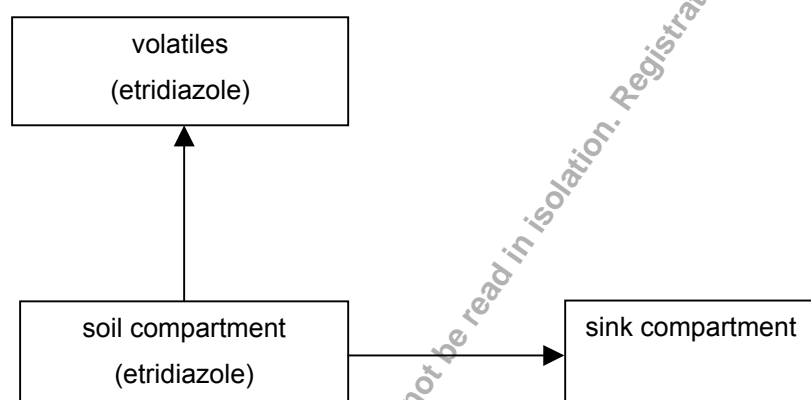
na: not applicable

nd: not detected

DT<sub>50</sub> values were calculated following the recommendations and procedures of the "Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration" (SANCO/10058/2005). Calculations were based on the individual measurements and the time zero values for etridiazole were adjusted for unextractables. All calculations were performed with ModelMaker v 4.0 software.

**Etridiazole**

For persistence endpoints, SFO and FOMC models were evaluated by the RMS for etridiazole levels in soil, and the results for the best fit model are presented in Table B.8.4.3.2-12. In order to obtain DT<sub>50</sub> values for degradation, a correction for volatilisation was made. This was done by fitting SFO kinetics to the etridiazole levels in the volatile traps (in agreement with the procedures in Appendix 11 of SANCO/10058/2005). Because this fit was acceptable, a conceptual model containing the compartments “volatiles”, “soil” and “sink” and the SFO parameters kdeg, kvol and M0 (initial etridiazole concentration) was fitted to the data (see Figure B.8.1.1.1-02). The results are presented in Table B.8.4.3.2-17.



**Figure B.8.1.1.1-02 Multicompartment model for the estimation of the degradation half-life of etridiazole**

**Table B.8.1.1.1-17 Half-lives for etridiazole in loam and sandy loam soil treated with [3-<sup>14</sup>C]-etridiazole at 3.6 mg/kg and incubated in the dark at 20°C.**

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> 20°C	DT <sub>90</sub> 20°C	DT <sub>50</sub> 20°C	DT <sub>90</sub> 20°C
Soil (RI-174, loam)	degradation and volatilisation	SFO	11.98	0.978	1.91	6.34	-	-
Soil (RI-174, loam)	degradation	SFO	11.98	0.979	2.22	7.37	2.22	7.37
Soil (RI-175, sandy loam)	degradation and volatilisation	SFO	11.18	0.978	3.61	12.0	-	-
Soil (RI-175, sandy loam)	degradation	SFO	11.18	0.964	4.80	15.96	4.80	15.96

SFO: single first order

*Dichloro-etridiazole*

Dichloro-etridiazole is formed directly out of etridiazole and is subsequently volatilised from soil or degraded. To add to the complexity, because etridiazole is also directly degraded to etridiazole acid, the degradation rate of etridiazole is not equal to the formation rate of dichloro-etridiazole. Calculating a half-life for dichloro-etridiazole starting from the maximum % of formation (day 21) yields a half-life for dissipation (including volatilisation and ignoring the effect of formation) (Table B.8.1.1.1-18). A reliable half-life for degradation in soil of dichloro-etridiazole cannot be determined from the data (overparameterised model and taking into consideration the study limitations given under “guidelines and limitations”).

**Table B.8.1.1.1-18** Half-lives for dichloro-etridiazole in loam and sandy loam soil treated with [3-<sup>14</sup>C]-etridiazole at 3.6 mg/kg and incubated in the dark at 20°C.

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> 20°C	DT <sub>90</sub> 20°C	DT <sub>50</sub> 20°C	DT <sub>90</sub> 20°C
Soil (RI-174, loam)	degradation and volatilisation <sup>1</sup>	FOMC	12.55	0.956	7.76	47.7	-	-
Soil (RI-175, sandy loam)	degradation and volatilisation <sup>1</sup>	FOMC	1.56	0.991	4.66	33.3	-	-

<sup>1</sup> ignoring formation from etridiazole  
FOMC: first order multicompartiment

*Etridiazole acid*

Taking into consideration the absence of a clear decline phase, the study limitations given under “guidelines and limitations” and the availability of reliable half-lives (STUDY 5), no half-life is calculated.

**Conclusions**

In two soils A/B treated with [3-<sup>14</sup>C] etridiazole (3.7 mg/kg, 20°C), unextractable residues increased from 0.9/0.2% AR on day 0 to 39/30% AR on day 8 and thereafter remained between 29-40/23-33% AR. CO<sub>2</sub> was evolved from the soil to 4.8/4.7% AR on day 100. Volatile organic compounds increased to 19/26% AR on day 16/32 and thereafter remained between 16-21/26-36% AR, consisting of etridiazole (12-33% AR) and dichloro-etridiazole (~3% AR). Etridiazole dissipated (volatilisation and degradation) with SFO half-lives of 1.9 and 3.6 days (20°C) and degraded with a SFO half-life of 2.2 and 4.8 days (20°C). Dichloro-etridiazole and etridiazole acid were the most important soil metabolites with a maximum of 13.3/12.9% AR (including volatiles) on day 4/8 and 31/20% AR on day 32/64, respectively. The first-order half-lives for dissipation (ignoring formation and including degradation and volatilisation) of dichloro-etridiazole were 4.7 and 7.8 days (20°C). The study is acceptable.

**Guidelines & Limitations**

1. Soil portions (10 g dry weight) are below the currently recommended minimum of 50 grams (OECD 307). The use of such small portions may have aggravated the decline in microbial viability and increased volatilisation. Moisture loss however was adequately controlled during the study.

2. No procedural recoveries of the concentration of hexane phases of the ethylene glycol traps were reported (this is of importance since this phase contains volatile components).
3. The increase of etridiazole in the ethylene glycol trap from the sandy loam soil between day 64 and 100 (from 23 to 33% AR) does not fit with day 64 results (day 64 only 3.3% etridiazole left in the soil).
4. Evaluation of acceptability:
  - The calculation of the rate of degradation of etridiazole in soil included a correction for losses by volatilisation. Therefore, the possibly exaggerated rate of volatilisation does not affect this parameter. The rate of dissipation of etridiazole in soil (DT50 1.9-3.6 days) may have been overestimated due to the possibly exaggerated rate of volatilisation. However, the DT50 (deg) and DT90 (deg) values from this study (2.2-4.8 and 7.4-16 days, respectively) were only slightly higher than the corresponding DT50 (dis) and DT90 (dis) values, and are far below the Annex VI persistence trigger values of 60 and 365 days, respectively.
  - The maximum level of dichloro-etridiazole in soil (12/12% AR) may have been underestimated, due to the possibly exaggerated rate of volatilization. Levels of this metabolite in traps however were generally low (max. 3.7/2.9% AR). As an alternative endpoint, the maximum level in soil + traps (13.3/12.9% AR) may be selected.
  - Overall evaluation: the endpoints are acceptable.

## STUDY 5

### Characteristics

reference	:	Völkel W., 2000 (IIA 7.1.1.2.1/01)	incubation time	:	120 d
year of execution	:	1999-2000	nominal concentration	:	0.86 mg/kg
GLP statement	:	yes	temperature	:	20°C
guideline	:	SETAC, 1995	DT50	:	see results
test substance	:	[3- <sup>14</sup> C]-Etridiazole, lot no: CSL-99-866-29-13	metabolites	:	see results
purity	:	radiochem. purity >99%	acceptability	:	acceptable
soils	:	sandy loam, sandy loam, loam			

### Study design

Fresh soil (2 mm sieved, soil properties see Table B.8.1.1.1-19) was adjusted to 45% of MWHC. <sup>14</sup>C-etridiazole acid was added in water to 100 g (dry weight) soil portions at a rate of 0.86 mg/kg dry soil. Treated soil was mixed and incubated in the dark at 20°C for up to 120 days. The soil moisture content was maintained at 45% of MWHC. Aerobic conditions were maintained by passing humidified air through the incubation flasks. Volatiles and CO<sub>2</sub> were trapped in ethylene glycol and 2N NaOH, respectively.

Soil samples were analysed on days 0, 3, 7, 14, 28, 56, 84 and, for Udenhout and Zeewolde soils only, day 120 post treatment. Samples were extracted up to three times with acetonitrile/1% NH<sub>4</sub>OH in water (1:1, v/v) and once with water. Radioactivity in soil extracts and liquid traps was quantified by LSC and in post-extraction solids by combustion/LSC. Radioactivity in concentrated pooled soil

extracts was identified by RP-HPLC. Radioactivity in the NaOH traps was confirmed to be CO<sub>2</sub> by BaOH<sub>2</sub> precipitation. The identity of etridiazole acid and 3-carboxy-5-hydroxy-1,2,4-thiadiazole in soil extracts was confirmed by TLC analysis and comparison with reference standards.

**Table B.8.1.1.1-19 Soil characteristics**

Parameter	Udenhout <sup>(A)</sup> soil	Zeewolde <sup>(A)</sup> soil	RK-136 soil <sup>(B)</sup>
% sand/silt/clay <sup>(C)</sup>	69/26/5	38/45/16	56/36/8
Texture	sandy loam	loam	sandy loam
pH (KCl)	6.0	7.4	5.1
% organic carbon	2.1	3.1	3.6
CEC (meq/100 g)	7.0	14.8	9.2
MWHC (% w/w)	33.0	40.6	62.3
Moisture content	45% MWHC (14.9% w/w)	45% MWHC (18.3% w/w)	45% MWHC (28.0% w/w)
microbial biomass <sup>(D)</sup> (start)	13.8	38.5	60.0
microbial biomass <sup>(D)</sup> (end)	8.7	32.5	45.1

(A) The Netherlands

(B) Middlebury, USA

(C) USDA classification system

(D) (mg org. carbon/100 g soil)

## Results

Microbial activity of the test soils at the start and the end of aerobic incubation was >1% of organic carbon (OC) for the Zeewolde and RK-136 soils and 0.4-0.6% OC for the Udenhout soil (Table B.8.1.1.1-19).

The results for the distribution and identification of radioactivity are given in Table B.8.1.1.1-20 to 22. Total recovery of radioactivity ranged from 95 to 105% AR. The day 0 recovery confirmed the extraction to be exhaustive for the test compound. Extractable radioactivity decreased from 100% AR on day 0 to ≤2% AR at the end of the incubation period. Unextractable residues increased from 0.4% AR on day 0 to 3% AR on day 14 and thereafter remained between 3-6% AR. CO<sub>2</sub> was evolved from the soil to a maximum of 95-101% AR at the end of the incubation period (84 day value: 81/81/101% AR). Volatile organic compounds were insignificant.

Etridiazole acid degraded to 14/15/0.7% AR after 84/84/56 days (no HPLC analysis was performed at the last sampling point because extractable radioactivity was low (≤2% AR)). Four soil metabolites (of which one could be identified as 3-carboxy-5-hydroxy-1,2,4-thiadiazole) were found in low amounts (max 2.2% AR).

**Table B.8.1.1.1-20 Distribution of radioactivity after incubation at 20°C of sandy loam soil (Udenhout) treated with <sup>14</sup>C-etridiazole acid at 0.86 mg/kg (% AR, single samples)**

day	extractables		unextrac- tables	CO <sub>2</sub>	organic volatiles	mass balance
	Total <sup>(A)</sup>	etridiazole acid				
0	100	100	0.1	na	na	100
3	94	92	1.0	2.4	<0.1	97
7	88	88	1.8	5.5	<0.1	95
14	81	81	3.4	14	<0.1	98
28	60	60	3.4	34	<0.1	97
56	37	36	3.6	58	<0.1	99
84	15	14	4.3	81	<0.1	100
120	2.1	np	3.3	95	<0.1	101

na: not applicable

np: not performed

(A) includes one identified (3-carboxy-5-hydroxy-1,2,4-thiadiazole; max 2.2% AR) and three unidentified metabolites (individual max 0.3% AR)

**Table B.8.1.1.1-21 Distribution of radioactivity after incubation at 20°C of loam soil (Zeewolde) treated with <sup>14</sup>C-etridiazole acid at 0.86 mg/kg (% AR, single samples)**

day	extractables		unextrac- tables	CO <sub>2</sub>	organic volatiles	mass balance
	Total <sup>(A)</sup>	etridiazole acid				
0	97	97	1.1	na	na	98
3	95	95	1.7	0.8	<0.1	97
7	90	90	2.8	6.8	<0.1	99
14	81	81	2.5	12	<0.1	96
28	64	64	4.3	30	<0.1	99
56	35	35	4.8	57	<0.1	97
84	15	15	5.8	81	<0.1	102
120	1.3	np	4.7	96	<0.1	102

na: not applicable

np: not performed

(A) includes one identified (3-carboxy-5-hydroxy-1,2,4-thiadiazole; max 0.6% AR) and one unidentified metabolite (max 0.2% AR)

**Table B.8.1.1.1-22 Distribution of radioactivity after incubation at 20°C of sandy loam soil (RK-136) treated with <sup>14</sup>C-etridiazole acid at 0.86 mg/kg (% AR, single samples)**

day	extractables		unextrac- tables	CO <sub>2</sub>	organic volatiles	mass balance
	Total <sup>(A)</sup>	etridiazole acid				
0	100	100	0.8	na	na	101
3	79	79	2.1	18	<0.1	99
7	53	52	2.9	40	<0.1	96
14	34	32	3.3	63	<0.1	100
28	3.5	2.6	4.5	93	<0.1	101
56	1.3	0.7	3.0	97	<0.1	101
84	np	np	4.1	101	<0.1	105

na: not applicable

np: not performed

(A) includes one identified (3-carboxy-5-hydroxy-1,2,4-thiadiazole; max 1.3% AR) and one unidentified metabolite (max 0.7% AR)

DT<sub>50</sub> values were calculated following the recommendations and procedures of the “Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration” (SANCO/10058/2005). Calculations were based on the individual measurements and the time zero values for etridiazole acid were adjusted for unextractables. All calculations were performed with ModelMaker v 4.0 software. SFO and FOMC models were evaluated by the RMS for etridiazole acid levels in soil, and the results for the best fit model are presented in Table B.8.4.3.2-23.

**Table B.8.1.1.1-23 Half-lives for etridiazole acid in soil treated with [3-<sup>14</sup>C]-etridiazole acid at 0.86 mg/kg and incubated in the dark at 20°C.**

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> 20°C	DT <sub>90</sub> 20°C	DT <sub>50</sub> 20°C	DT <sub>90</sub> 20°C
Udenhout sandy loam	degradation	SFO	3.49	0.990	36.0	120	36.0	120
Zeewolde loam	degradation	SFO	3.88	0.988	36.5	121	36.5	121
RK-136 sandy loam	degradation	SFO	5.11	0.994	7.64	25.4	7.64	25.4

SFO: single first order

## Conclusions

In 3 soils A/B/C treated with <sup>14</sup>C-etridiazole acid at 0.86 mg/kg and incubated at 20°C, DT<sub>50</sub>/DT<sub>90</sub> values of etridiazole acid were 36.0/120, 36.5/121 and 7.64/25.4 days (1st order). The study is acceptable.

## Guidelines & Limitations

1. None.

### B.8.1.1.2 Anaerobic studies

Data on anaerobic degradation of etridiazole are not required for the representative uses included in the Annex I dossier. Two studies were submitted and summarised below.

## STUDY 1

### Characteristics

reference	:	Thomas R.J., 1976 (IIA 7.1.1.1.2/01)	incubation time	:	up to 20 d
year of execution	:	1975-1976	nominal concentration	:	1.2 mg/kg
GLP statement	:	no	temperature	:	25°C
guideline	:	not indicated	DT50	:	see results
test substance	:	(a) [3- <sup>14</sup> C]-Etridiazole, lot no: not provided (b) Etridiazole, lot no: not provided	metabolites	:	see results
purity	:	(a) radiochem. purity not provided, chem. purity ≥97.2% (b) purity 98.3%	acceptability	:	not acceptable
soils	:	sandy loam, silt loam			

### Study design

Field soil from 2 locations (3 mm sieved, soil properties see Table B.8.1.1.2-04) was adjusted to 75% of field capacity. [ $3\text{-}^{14}\text{C}$ ]-etridiazole mixed with unlabelled etridiazole was added in methanol to 50 g soil portions at a rate of 1.2 mg/kg. Methanol was evaporated with nitrogen. Soils were flooded (2 cm water layer) and the head space flushed with nitrogen. Incubation flasks were air-tight closed. Treated soil was incubated in the dark at 25°C or 38°C for up to 20 days. Anaerobic conditions were not confirmed. Volatiles and CO<sub>2</sub> were trapped in hexane and 0.1N NaOH, respectively, at each sampling point by flushing the head space with nitrogen.

Sampling times are shown in Table B.8.1.1.2-01 and -02. After separation of the covering water layer, duplicate samples were extracted with methanol and 1% ammonium hydroxide in methanol. Radioactivity in filtered and unfiltered covering water, soil extracts and liquid traps was determined by LSC and in PES of at least the last sampling time by combustion/LSC. Following addition of water, the methanol extract and covering water was partitioned with hexane. Radioactivity in organic and aqueous fractions was quantified by LSC. The organic fractions were analysed by GC for etridiazole and its dichloro metabolite (3-dichloromethyl-5-ethoxy-1,2,4-thiadiazole). The aqueous fractions and the methanolic ammonia extract (if containing >10% AR) were analysed by HPLC for etridiazole acid (3-carboxy-5-ethoxy-1,2,4-thiadiazole). Identification of these compounds was based on comparison with reference standards. Covering water of selected samples (silt loam soil, day 8 and 10, 38°C) were analysed for oxalic acid. Radioactivity in post-extraction solids of the two 15 d sandy loam soil samples (25°C) was fractionated into humin, fulvic and humic acids and radioactivity was determined by LSC.

### Results

The results for the distribution of radioactivity and compound identification are given in Table B.8.1.1.2-01 to B.8.1.1.2-03. Total recovery of radioactivity could be calculated for at least the last time points and was between 91 and 97% AR for both soils and temperatures. Extractable radioactivity in the silt loam soil decreased from 53/57% AR on day 2/1 to 38/22% AR on day 15/10 at 25/38°C. Extractable radioactivity in the sandy loam soil decreased from 64/43% AR on day 6/3 to 14/10% AR on day 20/10 at 25/38°C. Unextractable residues were 9.4/19% AR in the silt loam soil and 64/30% AR in the sandy loam soil at the end of the incubation period (25/38°C) (10-20 d). CO<sub>2</sub> and volatile organic compounds were insignificant (results not reported). Partitioning of the soil extracts showed main radioactivity in the organic fraction. Aqueous fractions containing max 5.8% AR. Partitioning of the covering water showed a shift of the radioactivity from the organic to the polar fraction with incubation time (maximum 25% AR at the end of incubation). Unextractable soil residues in the 15 day samples (sandy loam soil, 25°C) were shown to consist of humic acids (up to 3.7% AR), humin (29% AR) and fulvic acids (up to 25% AR).

At study end (10-20 days), etridiazole had dissipated to 0-21% AR (range for both soils and temperatures). Dichloro-etridiazole was the most important soil metabolite with a maximum of 50% AR after 10 days (soil and covering water combined, 25°C, silt loam soil). For etridiazole acid, only results



of a single sample at 8 and 10 days in the polar phase of the covering water were reported: 36/47% AR (the latter value is unreliable and in contradiction with the reported total amount of radioactivity in the polar phase of the covering water (13% AR)). Oxalic acid in the covering water was 2.9/3.4% AR (day 8/10, silt loam soil, 38°C)

Due to the numerous deviations from the guideline, the study was not acceptable and no half-lives were calculated.

**Table B.8.1.1.2-01** Distribution of radioactivity after anaerobic incubation at 25 or 38°C of silt loam soil treated with  $^{14}\text{C}$ -etridiazole at 1.2 mg/kg (% AR; mean of duplicate samples, unless otherwise specified)

temp [°C]	day	extractables				unextr.	Covering water				mass balance
		CH <sub>3</sub> OH extract					Before filtration	After filtration			
		total	Hexane phase	polar phase	NH <sub>3</sub> CH <sub>3</sub> OH extract			total	Hexane phase	Polar phase	
25	2	53	54	1.9	12	na	28	26	22	1.7	nc
	5	54	56	nd	4.4	na	30	25	21	3.7	nc
	10	43	43	4.4	5.9	na	38 <sup>(A)</sup>	38	31	8.6	nc
	15	38	37	3.7	8.7	9.4	39	31	22	11	97
38	1	57	66	2.2	3.6	na	23	18	21	4.2	nc
	4	37	36	1.2	7.4	na	33	33	16	10	nc
	8	25	27	5.1	7.3	na	na	37	16	24	nc
	10	22	21	3.6	6.3	19	41	42	15	13	91

(A) one sample

na: not analysed

nd: not detected

nc: can not be calculated

**Table B.8.1.1.2-02** Distribution of radioactivity after anaerobic incubation at 25 or 38°C of sandy loam soil treated with  $^{14}\text{C}$ -etridiazole at 1.2 mg/kg (% AR; mean of duplicate samples, unless otherwise specified)

temp [°C]	day	extractables				unextr.	Covering water				mass balance
		CH <sub>3</sub> OH extract					Before filtration	After filtration			
		total	Hexane phase	polar phase	NH <sub>3</sub> CH <sub>3</sub> OH extract			total	Hexane phase	Polar phase	
25	6	64	60	4.3	4.7	na	22	22	17	3.6	nc
	10	40	41	2.8	7.0	na	17	22	17	5.8	nc
	15	21	18	5.8	9.2	48	15	13	6.0	7.5	96
	20	14	15	4.0	4.0	64	8.1	8.4	2.1	4.8	95
38	3	43	43	3.8	4.5	na	39	36	18	19	nc
	5	28	27	1.9	7.8	na	27	29	15	14	nc
	10	10 <sup>(A)</sup>	10 <sup>(A)</sup>	0.4 <sup>(A)</sup>	2.0 <sup>(A)</sup>	30	33 <sup>(A)</sup>	31 <sup>(A)</sup>	7 <sup>(A)</sup>	25 <sup>(A)</sup>	93

(A) one sample

na: not analysed

nc: can not be calculated

**Table B.8.1.1.2-03 Identification of radioactivity after anaerobic incubation at 25 or 38°C of silt loam soil or sandy loam treated with  $^{14}\text{C}$ -etridiazole at 1.2 mg/kg (% AR; results of duplicate samples, unless otherwise specified)**

silt loam									
25°C					38°C				
day	Covering water (hexane phase)		CH <sub>3</sub> OH soil extract (hexane)		day	Covering water (hexane phase) <sup>(B)</sup>		CH <sub>3</sub> OH soil extract (hexane)	
	etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole		etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole
2	16/19	5.3/7.2	58/36	7.6/5.1	1	14/15	2.0/5.2	50/49	2.4/7.3
5	4.5/6.5	13/13	30/31	23/23	4	7.8/4.4	14/3.2	29/21	15/27
10	5.0/4.0	26/22	21/20	24/23	8	3.3/1.2	15/5.6	16/2.4	18/4.1
15	2.5/2.3	19/18	11/19	16/26	10	nd/nd	4.6/21	nd/10	nd/19
sandy loam									
25°C					38°C				
day	Covering water (hexane phase)		CH <sub>3</sub> OH soil extract (hexane)		day	Covering water (hexane phase)		CH <sub>3</sub> OH soil extract (hexane)	
	etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole		etridiazole	dichloro etridiazole	etridiazole	dichloro etridiazole
6	6.1/nd	7.3/21	48/19	11/35	3	13/9.8	3.4/6.3	32/29	2.7/7.0
10	nd/nd	15/14	6.6/13	29/28	5	nd/nd	10/15	4.4/2.7	18/20
15	nd/nd	5.4/4.2	3.0/nd	15/8.9	10 <sup>(A)</sup>	nd	5.6	nd	7.2
20	nd/nd	1.3/2.2	nd/nd	7.7/8.6					

(A) one sample

(B) etridiazole-acid in polar phase of covering water at day 10 of silt loam soil incubated at 38°C was 36% AR (single sample analysed).

nd: not detected

**Table B.8.1.1.2-04 Properties of soils used in anaerobic degradation study with etridiazole**

Parameter	NSD-TIAK (Pulaski County, Arkansas, USA)	AMY (Pulaski County, Arkansas, USA)
% sand/silt/clay <sup>(A)</sup>	61/22/17	13/63/24
Texture	sandy loam	silt loam
pH	4.8	5.0
% organic carbon	0.88	1.18
CEC (mval/100 g)	8.4	18
% moisture at 1/3 bar (field capacity)	13.2	29.7

(A) USDA classification system

## Conclusions

In two soils treated with [3- $^{14}\text{C}$ ]-etridiazole at 1.2 mg/kg and incubated at 25/38°C in the dark under anaerobic conditions, unextractable residues were 9.4-64% AR on day 10-20 (end of study). No significant amounts of volatiles and CO<sub>2</sub> were evolved from the soil. Dichloro-etridiazole was the most important metabolite (maximum 50% AR on day 10 in silt loam soil, 25°C). Etridiazole acid was detected, but quantification was not reliable. Due to the numerous study limitations (see below) the study is not acceptable and results will not be used in the risk assessment and are not included in the list of endpoints. For the same reason, no half-lives were calculated.

## Guidelines & Limitations

1. The report provided no information on the history of the field site of soil sampling. A pre-incubation period was not specified. Microbial activity was not measured.

2. Anaerobic conditions were not monitored.
3. Mass balances were only available for a limited number of samples. The efficiency of the system to trap volatile compounds could not be verified from the report (e.g., number of traps of each type not specified, data on radioactivity levels in second trap not available).
4. Time zero samples were not analysed.
5. No description of the GC analytical method was given, nor any detailed validation data (e.g. calibration curves, procedural recoveries). Chromatographic analysis was not based on radioactivity detection, but on GC analysis, and therefore only produced data on etridiazole and dichloro-etridiazole, for which reference compounds were included, but not on other metabolites or metabolite fractions.
6. Incubation period ( $\leq 20$  days) was insufficient to fully establish the degradation pathway of etridiazole in soil.

## STUDY 2

### Characteristics

reference	:	Lansinger J.M. and Nilgun Comezoglu S., 1994 (IIA 7.1.1.1.2/02)	incubation time	:	179 d
year of execution	:	1993-1994	nominal concentration	:	7.9 mg/L
GLP statement	:	yes	temperature	:	25°C
guideline	:	EPA N:162-3	DT50	:	see results
test substance	:	(a) [3- <sup>14</sup> C]-Etridiazole, lot no: CSL-92-359-77-25 (b) Etridiazole, lot no: AC-1322-17	metabolites	:	see results
purity	:	(a) radiochem. purity 95% (b) purity 98.7%	acceptability	:	supplementary data
soils	:	sandy loam			

### Study design

The behaviour of [3-<sup>14</sup>C]-etridiazole was studied in one anaerobic soil/water system. Soil portions (20 g dry weight) in biometer flasks were flooded with lake water (46.3 mL). Glucose (0.5 g) was added and the systems were purged with nitrogen (after 13 days) and equilibrated for 30 days at 25°C, prior to spiking. The soil/water properties are listed in Table B.8.1.1.2-05. Aliquots (80 µL) of a mixture of labelled and non-labelled etridiazole in ethanol were added to the water layer at a concentration of 7.9 mg/L. The soil/water system was mixed (hand-swirled), the head space purged with nitrogen and incubated at  $25 \pm 1^\circ\text{C}$  in the dark for 179 days. The head space was flushed with nitrogen every two weeks. CO<sub>2</sub> was trapped in 1N KOH. Soil biomass was determined at the beginning of the study. Redox potential and dissolved oxygen were measured in the water layer at various time points in the incubation phase; results were not reported.

**Table B.8.1.1.2-05 Physico-chemical characterisation of water and soil**

parameter	Paxton sandy loam (Middlebury, CT, USA)	parameter	Lake Afton water (Yardley, PA, USA)
textural class <sup>(A)</sup>	sandy loam	pH	7.0
% sand/silt/clay <sup>(A)</sup>	64/28/8		
CEC [mEq/100g]	8.9		
organic carbon [%] <sup>(B)</sup>	2.4		
pH	6.6		
microbial biomass <sup>(C)</sup>	0.431		

(A) According to USDA classification scheme.

(B) Recalculated by reviewer based on 4% organic matter.

(C) [mg/10g soil/day]; determined before start of the incubation.

Duplicate samples were taken and processed at 0, 0.5, 1, 2, 3, 7, 14, 30, 60, 91, 120 and 179 days after treatment. KOH traps were sampled and analysed by LSC at each sampling event or every ~2 weeks. Radioactivity in the water layer was determined by LSC prior and after filtration of the soil/water system. The filtrate was partitioned twice with dichloromethane (DCM). The soil was extracted with ACN:1% NH<sub>4</sub>OH (4:1 v/v) and the extract was partitioned twice with DCM. Polyplugs and stoppers were Soxhlet extracted with DCM. Radioactivity in the organic and aqueous fractions was determined by LSC; organic fractions were concentrated and analysed by reversed phase HPLC-RAM. Procedural recoveries for the concentration step were not reported. Unextractables (PES) were determined by combustion/LSC. Radioactivity in samples of the KOH traps was confirmed to be CO<sub>2</sub> by Ba(OH)<sub>2</sub> precipitation.

PES (60 and 179 day sample) were subjected to acetonitrile/water/acetic acid (80:20:2.5 v/v/v) extraction, acid hydrolysis (0.25 N HCl) and 0.5 N NaOH extraction (determination of humic/fulvic acids and humin). Selected extracts were partitioned against ethyl acetate and the organic layers were subjected to HPLC-RAM analysis.

Identification/quantification of etridiazole and metabolites was performed by HPLC-RAM and TLC and comparison with reference standards.

## Results

The distribution of radioactivity is shown in Table B.8.1.1.2-06. Mass balance was 90-107% AR. The radioactivity level in the Lake water decreased from 57% AR on day 0 to 7.5% AR on day 179. Extractable radioactivity in soil decreased from 45% AR on day 0 to 3.3% AR on day 179. The unextractable fraction in soil increased to 45% AR on day 7 and remained between 41 and 58% AR thereafter. Unextractable residues on day 60/179 consisted of mild acid extractables (3.4/1.5% AR), acid hydrolysate (9.2/9.8% AR), humins (7.9/7.1% AR), fulvic acids (11/11% AR) and humic acids (24/22% AR).

Stopper associated radioactivity increased to 24% AR after 14 days and remained between 16 and 28% AR thereafter. Radioactivity associated to polyfoam plugs increased to 11% AR after 14 days and decreased thereafter to 1.5% AR after 179 days. CO<sub>2</sub> production started to increase from day 60 (2.0% AR) to 5.1% AR on day 179.

WARNING: This document forms part of an EC evaluation data package and should not be read in isolation. Registration must not be granted on the basis of this document.

**Table B.8.1.1.2-06 Distribution of radioactivity (% of applied) in sandy loam soil and water treated with [3-<sup>14</sup>C]-etridiazole at 7.9 mg/L and incubated at 25°C in the dark under anaerobic conditions**

days of incubation	% of applied											
	water			soil					stopper	poly-foam plug	CO <sub>2</sub>	mass balance
	Tot.	Org.	Aq.	total	extractables			unextrac- tables				
					Tot.	Org.	Aq.					
0	57	55	2.6	45	45	44	0.64	0.82	na	na	na	103
0.5	49	45	4.1	50	31	30	1.4	19	4.2	3.2	0.02	107
1	41	36	5.1	52	29	28	1.6	23	5.6	4.9	0.03	104
2	40	34	5.8	47	19	17	1.8	28	8.3	8.7	0.05	104
3	27	22	4.9	55	21	19	1.8	34	13	7.4	0.06	102
7	21	16	4.9	63	18	16	2.1	45	14	8.8	0.15	107
14	16	11	5.5	54	13	11	2.4	41	24	11	0.23	105
30	11	4.1	6.5	53	8.7	4.7	4.0	45	28	7.8	0.68	101
60	10	4.8	5.4	61	4.7	2.4	2.3	56	16	4.8	2.0	94
91	8.0	1.2	6.8	63	4.8	2.1	2.7	58	20	3.2	2.7	97
120	9.3	0.88	8.4	51	3.8	1.4	2.3	48	24	2.2	3.4	90
179	7.5	0.54	7.0	54	3.3	1.4	1.9	51	23	1.5	5.1	92

na: not applicable

tot. = total, org. = organic phase, aq. = aqueous phase

Identified radioactivity in water and soil is shown in Table B.8.1.1.2-07. The level of etridiazole in water/soil decreased from 55/44% AR on day 0 to 1.3/3.3% AR on day 3. Dichloro-etridiazole was the most important metabolite: maximum 41% AR in combined soil+water at day 2. In addition, four minor metabolites (5-hydroxy-etridiazole, monochloro-etridiazole, etridiazole acid, oxalic acid) were identified (all ≤0.9% AR). The maximum sum of unidentified components (4 in water, 11 in soil) was 2.7/2.1% AR in water/soil (with no single fraction exceeding 2.7% AR (water) or 1.1% AR (soil)).

Etridiazole in polyfoam plug + stopper increased to 16% AR on day 3 and decreased to 7.3% AR on day 179. Dichloro-etridiazole in polyfoam plug + stopper increased to 16% AR on day 14 and remained stable thereafter. Two identified (5-hydroxy-etridiazole, monochloro-etridiazole) (both ≤0.4% AR) and 6 unidentified metabolites (all ≤1.0% AR, except for M7 (stopper) which was 7.2, 5.6 and 2.6% AR on day 14, 30 and 60) were detected.

**Table B.8.1.1.2-07 Identification of radioactivity (% of applied) in sandy loam soil, water and volatile traps after anaerobic incubation at 25°C of [3-<sup>14</sup>C]-etridiazole (7.9 mg/L)**

days of incubation	% of applied							
	water (DCM fraction) <sup>(A)</sup>		soil (ACN/DCM fraction) <sup>(B)</sup>		polyfoam plug <sup>(C)</sup> + stopper <sup>(D)</sup>		total in water+soil	
	etridiazole	dichloro-etridiazole	etridiazole	dichloro-etridiazole	etridiazole	dichloro-etridiazole	etridiazole	dichloro-etridiazole
0	55	nd	44	nd	nd	nd	99	nd
0.5	24	21	19	8.8	7.0	0.17	43	30
1	12	24	15	12	6.4	3.9	28	35
2	4.6	29	5.2	12	14	2.8	10	41
3	1.3	20	3.1	16	16	3.9	4	35
7	nd	15	nd	15	12	11	nd	30
14	nd	10	nd	11	10	16	nd	21
30	nd	2.7	0.04	3.3	9.0	21	0.04	6.0
60	nd	0.10	0.03	0.49	6.6	11	0.03	0.59
91	nd	0.08	nd	0.27	7.6	16	nd	0.35
120	0.01	0.04	0.11	0.18	9.5	17	0.12	0.22
179	0.01	0.03	0.09	0.14	7.2	17	0.10	0.17

(A) in addition 4 identified (5-hydroxy-etridiazole, monochloro-etridiazole, etridiazole acid, oxalic acid) (all ≤0.9% AR) and 4 unidentified metabolites (all ≤2.7% AR) were detected

(B) in addition 4 identified (5-hydroxy-etridiazole, monochloro-etridiazole, etridiazole acid, oxalic acid) (all ≤0.4% AR) and 11 unidentified metabolites (all ≤1.1% AR) were detected

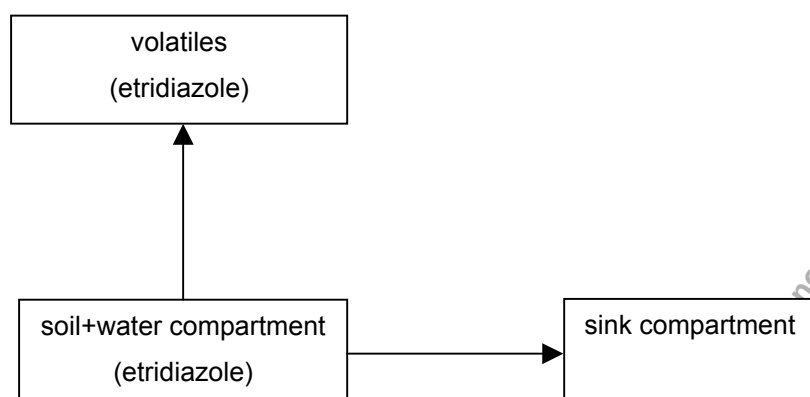
(C) in addition 2 identified (5-hydroxy-etridiazole, monochloro-etridiazole) (all ≤0.1% AR) and 2 unidentified metabolites (all ≤0.2% AR) were detected

(D) in addition 1 identified (monochloro-etridiazole) (≤0.4% AR) and 4 unidentified metabolites (all ≤1.0% AR, except for M7 which was 7.2, 5.6 and 2.6% AR at day 14, 30 and 60, respectively) were detected  
nd: not detected

DT<sub>50</sub> values were calculated following the recommendations and procedures of the "Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration" (SANCO/10058/2005). All calculations were performed with ModelMaker v 4.0 software. DT<sub>50</sub> values were calculated for etridiazole and dichloro-etridiazole.

### *Etridiazole*

SFO and FOMC models were fitted by the RMS to the data for the total system (water+soil). Both models performed well and yielded similar DT<sub>50</sub> values for dissipation (including losses through volatilisation). The results for the SFO model are presented in Table B.8.1.1.2-08. In order to obtain DT<sub>50</sub> values for degradation in the total system, a correction for volatilisation was made. This was done by fitting SFO kinetics to the etridiazole levels in the volatile traps (in agreement with the procedures in Appendix 11 of SANCO/10058/2005). Due to an observed decrease in volatilised etridiazole levels after day 3, no good fit could be obtained. In order to adequately describe volatilisation during the first phase of the experiment, the data set was limited to the first 3 days (a good fit during the first three days is considered appropriate because dissipation/degradation of etridiazole was rapid (DT<sub>50</sub> < 3 days)). Because the SFO fit of volatiles (0-3 days) was acceptable, a conceptual model containing the compartments "volatiles", "soil" and "sink" and the SFO parameters kdeg, kvol and M0 (initial etridiazole concentration) was fitted to the data (see Figure B.8.1.1.2-01). The results are presented in Table B.8.1.1.2-08.



**Figure B.8.1.1.2-01** Multicompartment model for the estimation of the degradation half-life of etridiazole

**Table B.8.1.1.2-08** Anaerobic half-lives for etridiazole in sandy loam soil treated with [3-<sup>14</sup>C]-etridiazole at 7.9 mg/L and incubated in the dark at 25°C.

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> (25°C)	DT <sub>90</sub> (25°C)	DT <sub>50</sub> (25°C)	DT <sub>90</sub> (25°C)
Soil+water	dissipation	SFO	8.73	0.98	0.50	1.67	-	-
Soil+water	degradation	SFO	9.65	0.98	0.59 <sup>1</sup>	1.97	0.59 <sup>1</sup>	1.97

SFO: single first order

<sup>1</sup> 0.88 days at 20°C.

#### *Dichloro-etridiazole*

In order to estimate a half-life for dichloro-etridiazole, a SFO model was fit to the data points starting from the maximum percentage of occurrence of dichloro-etridiazole onwards. Because the SFO fit was good and there was no indication of a biphasic dissipation pattern, no further models were investigated. The thus obtained half-life does not include corrections for volatilisation of dichloro-etridiazole (up to 21% AR), nor does it take the formation out of etridiazole into account and can be considered a worst-case half-life for dissipation. The results are given in Table B.8.1.1.2-09.

**Table B.8.1.1.2-09** Anaerobic half-lives for dichloro-etridiazole in sandy loam soil treated with [3-<sup>14</sup>C]-etridiazole at 7.9 mg/L and incubated in the dark at 25°C.

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub> (25°C)	DT <sub>90</sub> (25°C)	DT <sub>50</sub> (25°C)	DT <sub>90</sub> (25°C)
Soil+water	dissipation (formation, degradation, volatilisation)	SFO	5.92	0.99	11.51	38.23	11.51 <sup>1</sup>	38.23

<sup>1</sup> worst-case value for anaerobic dissipation. 17.2 days at 20°C.

SFO: single first order



## Conclusions

In an anaerobic soil/water system, treated with [3-<sup>14</sup>C]-etridiazole at a concentration of 7.9 mg/L and incubated at 25°C in the dark, etridiazole dissipated with a half-life of 0.59 days. CO<sub>2</sub> production was 5.1% AR after 179 days. Unextractables were maximum 58% AR (day 91). Dichloro-etridiazole was the most important metabolite (maximum 41% AR on day 2) and dissipated with a half-life of 11.51 days. No other metabolites >10% AR were observed.

## Guidelines & Limitations

1. Soil portions were 20g dry weight (OECD 308 recommends at least 50g).
2. As the results for redox potential and oxygen concentration in the water layer were not reported, anaerobic conditions can not be confirmed.
3. No procedural recoveries for the concentration step were reported.

### B.8.1.1.3 Soil Photolysis

#### STUDY 1

##### Characteristics

reference	:	Wu D., 1994 (IIA 7.1.1.1.2/03)	incubation time	:	30 d, 12 hr dark-light cycle
year of execution	:	1993-1994	nominal concentration	:	10 mg/kg dw
GLP statement	:	yes	temperature	:	20°C
guideline	:	EPA N:161-3	light intensity	:	151.7 W/m <sup>2</sup> (330-800 nm)
test substance	:	[3- <sup>14</sup> C]-Etridiazole, lot no: CSL-92-359-77-25	DT50	:	12.6 d
purity	:	radiochem. purity 98%	metabolites	:	see results
soil	:	sandy loam	acceptability	:	acceptable

##### Study design

[3-<sup>14</sup>C] etridiazole was added in ethanol to the surface of thin sandy loam soil layers (thickness not specified, 10.4 cm<sup>2</sup> in sealed Pyrex glass tubes) at a rate of 10 mg/kg dry weight. Treated soil was irradiated by a Xenon light source (equipped with UV-filter with cut-off at 290 nm). Light intensity was measured in the beginning, halfway and at the end of the irradiation period and was 151.7 W/m<sup>2</sup> (330-800 nm). Dark controls were included. The soil properties are given in Table B.8.1.1.3-3. The initial soil moisture content was not reported and was not adjusted during the irradiation period. Treated soil layers were placed in an irradiation chamber with Pyrex glass lid. Irradiation took place in 12-hour light-dark cycles. The Pyrex tubes holding the sample were purged at sampling with CO<sub>2</sub>-free humidified air. CO<sub>2</sub> and volatiles were trapped by ethylene glycol, 0.1 N KOH, 0.1N H<sub>2</sub>SO<sub>4</sub> and polyurethane traps. Temperature in the irradiation chamber was monitored twice a day throughout the test period and was 20.5 ± 1.1°C (stdev).

Duplicate irradiated samples were analysed on days 0, 3, 7, 14, 21 and 30 post treatment. Dark samples were analysed on days 14 and 30 post treatment. Samples were extracted with MeOH, 1% ammonium hydroxide in MeOH, and MeOH again. Polyurethane plugs were extracted with MeOH.

Radioactivity in the combined soil extracts, the polyurethane extracts and liquid traps was determined by LSC and radioactivity in the post-extraction solids (PES) by combustion/LSC. The combined soil extract was partitioned against hexane. Radioactivity in organic and aqueous fractions was quantified by LSC and identified (hexane phase only) by HPLC and TLC. PES (30 day sample) were subjected to acetonitrile/water/acetic acid extraction, acid hydrolysis (0.25 N HCl) and 0.5 N NaOH extraction (determination of humic/fulvic acids and humin). Selected extracts were partitioned against ethyl acetate and subjected to chromatographic analysis (HPLC and TLC)

Compound identification was by co-chromatography with unlabelled reference standards.

## Results

The results for the distribution and identification (etridiazole and metabolites >10% AR) of radioactivity are given in Table B.8.1.1.3-1 (irradiated soil) and B.8.1.1.3-2 (dark control). Total recovery in irradiated soil ranged from 92 to 103% AR. Extractables in irradiated soil decreased from 91 to 59% AR at day 30. Unextractable residues in irradiated soil gradually increased to a maximum of 40% AR at day 30. Unextractable residues on day 30 (40% AR) consisted of mild acid extractables (23% AR), acid hydrolysate (12% AR), humins (1.1% AR), fulvic acids (3.6% AR) and humic acids (1.0% AR). Amounts of  $^{14}\text{CO}_2$  and volatiles were small (sum  $\leq 1.4\%$  AR). The results for the dark soil showed higher amounts of extractables and lower amounts of unextractables compared to the irradiated soil.

In irradiated soil, etridiazole degraded to 19% AR at day 30. Etridiazole acid was the most important soil metabolite in irradiated samples: maximum 32% AR on day 30. No other metabolites >10% AR were detected. Minor identified metabolites were 5-OH-etridiazole (maximum 0.34% AR, irradiated soil only), monochloro-etridiazole (maximum 0.28% AR, irradiated soil only) and dichloro-etridiazole (maximum 2.5% AR, irradiated and dark soil). Unidentified fractions (two) were each  $\leq 7.6\%$  AR. The mild acid extract (irradiated day 30 sample) contained etridiazole (0.24% AR), dichloro-etridiazole (0.12% AR), oxalic acid (1.5% AR) and etridiazole acid (6.7% AR). Levels of etridiazole were higher in the dark soil compared to the irradiated soil. Etridiazole acid observed in irradiated soil was also present in the dark soil (at lower levels). The higher levels of etridiazole acid in the irradiated soil indicate that this metabolite may also be formed as the result of photodegradation.

**Table B.8.1.1.3-1 Distribution and identification of radioactivity after irradiation of soil treated with  $[3-^{14}\text{C}]$  etridiazole at 10 mg/kg**

Days	% of applied <sup>(A)</sup>					
	Extractables			Unextractables	Volatiles	Mass Balance
	Total	etridiazole	etridiazole acid			
0	91	85	0.54	1.2	-	92
3	88	72	6.3	13	0.39	102
7	77	52	15	23	0.80	100
14	70	42	18	32	0.88	103
21	61	30	23	33	1.4	96
30	59	19	32	40	1.4	101

(A) Mean of duplicate samples

**Table B.8.1.1.3-2 Distribution and identification of radioactivity in soil (dark control) treated with [3-<sup>14</sup>C] etridiazole at 10 mg/kg**

Days	% of applied <sup>(A)</sup>					
	Extractables			Unextractables	Volatiles	Mass Balance
	Total <sup>(B)</sup>	etridiazole	etridiazole acid			
0	91	85	0.54	1.2	-	92
14	84	77	3.3	9.4	0.26	94
30	96	89	6.6	11.6	0.16	107

(A) Mean of duplicate samples.

DT<sub>50</sub> values were calculated following the recommendations and procedures of the "Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration" (SANCO/10058/2005). All calculations were performed with ModelMaker v 4.0 software. Calculations were based on the individual measurements and the time zero values for etridiazole were adjusted for degradation products and unextractables. First order DT<sub>50</sub> values are shown in Table B.8.1.1.3-3. Etridiazole degraded in irradiated soil with a half-life of 12.6 days ( $r^2$  0.96). No half-life could be calculated for the dark soil and the degradation rate was set at zero. Hence, the photolytic half-life was also 12.6 days (based on  $k_{\text{photolytic}} = k_{\text{irradiated}} - k_{\text{dark}}$ ).

The mean light intensity (330-800 nm) of the Xenon lamp was 151.7 W/m<sup>2</sup>. The solar intensity in Middlebury, CT (~41°N) measured in June and August was 138.1 W/m<sup>2</sup> (time of day not given). The study duration of 30 days was equivalent to ~33 days in summer at 41°N (latitude of Middlebury, CT).

**Table B.8.1.1.3-3 Estimated DT<sub>50</sub> and DT<sub>90</sub> for degradation of etridiazole in irradiated and dark sandy loam soil**

Parameter	Middlebury, CT		
% sand/silt/clay <sup>(A)</sup>	64/28/8		
Texture	sandy loam		
pH	6.6		
% organic carbon	2.3		
CEC (meq/100 g)	8.9		
moisture content	dried soil slurry (moisture content not reported)		
microbial biomass (start/end)	not determined		
	etridiazole		
	irradiated	dark	photolytic <sup>(B)</sup>
DT <sub>50</sub> (d)	12.6	-	12.6
DT <sub>90</sub> (d)	41.9	-	41.9
order / $r^2$ / $\chi^2$ error	SFO / 0.96 / 6.35	-	-

(A) Soil classification system USDA

(B) Calculated by reviewer as  $\ln 2 / k_{\text{photolytic}} = \ln 2 / (k_{\text{irradiated}} - k_{\text{dark}})$ 

SFO = single first order

## Conclusions

The half-life of etridiazole in irradiated (330-800 nm: 151.7 W/m<sup>2</sup>, 12 hour dark-light cycles) soil was 12.6 days (1<sup>st</sup> order,  $r^2$  0.96). No significant degradation was observed in dark soil. Etridiazole acid was the most important soil metabolite in irradiated soil: maximum 32% AR (6.6% AR in dark soil). No other metabolites exceeded 10% AR. In conclusion, the degradation of etridiazole is accelerated under irradiated conditions but no specific (i.e. not occurring in dark samples) photodegradation products were observed. The study is acceptable.

### Guidelines & Limitations

1. Soil moisture was not determined/controlled during the experiment. Because the experiment was performed in sealed Pyrex tubes, moisture loss is considered minimal.
2. The extraction procedure was not exhaustive for the metabolite etridiazole acid as indicated by the results of the further fractionation of PES. The levels of etridiazole acid are therefore underestimated and unextractables were overestimated.
3. Temperature was determined in the irradiation chamber and not in the soil layers. Soil tubes were placed in a waterbath of 25°C. It can therefore be assumed that the temperature in the soil layers did not exceed 25°C.

#### B.8.1.2 Field studies (Annex IIA 7.1.1.2.2; Annex IIIA 9.1.1.2)

Field studies were not submitted. The laboratory  $DT_{50}$  of etridiazole and the major soil metabolite etridiazole acid at 20°C is <60 days. The  $DT_{50}$  (lab, 20°C) of the major soil metabolite dichloro-etridiazole (4.66-178 days, mean 63.5 days) however is >60 days. Therefore field studies (or more reliable laboratory studies) are required for this metabolite.

### B.8.1.3 Summary route and rate of degradation in soil

#### Aerobic degradation

Study 1 and 2 of section B.8.1.1.1 (aerobic studies) were not acceptable and are therefore not included in the summary below. In laboratory studies on aerobic incubation of etridiazole at 20°C (two soils) and 25°C (one soil) (pH 6.0-7.4, 2.1-3.1% oc), etridiazole degraded with DT<sub>50</sub> and DT<sub>90</sub> values (recalculated to 20°C) of 2.22-67.9 days (mean 25.0 days) and 7.37-289 days (mean 104 days). The DT<sub>50</sub> and DT<sub>90</sub> values were derived from the best fit model (FOMC for the soil at 25°C and SFO for the soils at 20°C) and were corrected for volatilisation of etridiazole from soil. Hence, they represent half-lives for degradation and can be used as worst case endpoints to assess persistence (under practical use conditions volatilisation of etridiazole may contribute to its dissipation from treated soil).

Major metabolites (exceeding 10% AR at any time point or 5% AR at 2 consecutive time points) were etridiazole acid (maximum 31% AR on day 32) and dichloro-etridiazole (maximum 13.3% AR on day 4, including 1.3% AR volatilised dichloro-etridiazole). No other metabolite fractions >5% AR were observed.

DT<sub>50/90</sub> values for dichloro-etridiazole were obtained from studies with etridiazole and were 4.66-178/33.3-590 days at 20°C with a mean of 63.5/224 days (3 soils). The DT<sub>50</sub> and DT<sub>90</sub> values were derived from the best fit model (SFO for the soil at 25°C and FOMC for the soils at 20°C). These values should be considered worst case values for dissipation (degradation and volatilisation), as dissipation and formation may have occurred simultaneously. Since no correction for volatile losses of dichloro-etridiazole could be made, no DT<sub>50</sub> values for degradation of this metabolite are available. DT<sub>50/90</sub> values for etridiazole acid were obtained from studies with the metabolite and were (at 20°C) 7.64-36.5/25.4-121 days with a mean of 26.7/88.8 days (3 soils). The DT<sub>50</sub> and DT<sub>90</sub> values were derived from the best fit model (SFO for all soils). These values represent degradation of etridiazole acid.

Table B.8.1.3-1 presents a summary of the available DT<sub>50</sub> and DT<sub>90</sub> values of etridiazole and major metabolites (to be used as persistence endpoints). Persistence endpoints can be used for modelling when obtained from SFO kinetics and when describing "degradation" (not dissipation). Modelling endpoints (for PECgw and STEP 3/4 PECsw) are given in Table B.8.1.3-2.

**Table B.8.1.3-1 Laboratory DT<sub>50</sub> and DT<sub>90</sub> values (persistence) for the aerobic degradation or dissipation of etridiazole and major metabolites in soil, at 20°C (SFO unless indicated differently)**

substance	soil	pH	% oc	mois- ture	dose (mg/kg)	temp. (°C)	DT <sub>50</sub> (d)	DT <sub>90</sub> (d)	DT <sub>50</sub> (20°C, d)	DT <sub>90</sub> (20°C, d)
Etridiazole	sandy loam	6.6	2.4	75% FC	5.0	25	45.5 <sup>1</sup>	194 <sup>1</sup>	67.9	289
	loam	7.4	3.1	pF 2.5	3.6	20	2.22	7.37	2.22	7.37
	sandy loam	6.0	2.1	pF 2.5	3.7	20	4.80	16.0	4.80	16.0
	<b>mean</b>								<b>25.0</b>	<b>104</b>
Dichloro- etridiazole	sandy loam	6.6	2.4	75% FC	5.0 <sup>2</sup>	25	119 <sup>3</sup>	395	178	590
	loam	7.4	3.1	pF 2.5	3.6 <sup>2</sup>	20	7.76 <sup>1,3</sup>	47.7 <sup>1</sup>	7.76	47.7
	sandy loam	6.0	2.1	pF 2.5	3.7 <sup>2</sup>	20	4.66 <sup>1,3</sup>	33.3 <sup>1</sup>	4.66	33.3
	<b>mean</b>								<b>63.5</b>	<b>224</b>
Etridiazole acid	sandy loam	6.0	2.1	45% MWHC	0.86	20	36.0	120	36.0	120
	loam	7.4	3.1	45% MWHC	0.86	20	36.5	121	36.5	121
	sandy loam	5.1	3.6	45% MWHC	0.86	20	7.64	25.4	7.64	25.4
	<b>mean</b>								<b>26.7</b>	<b>88.8</b>

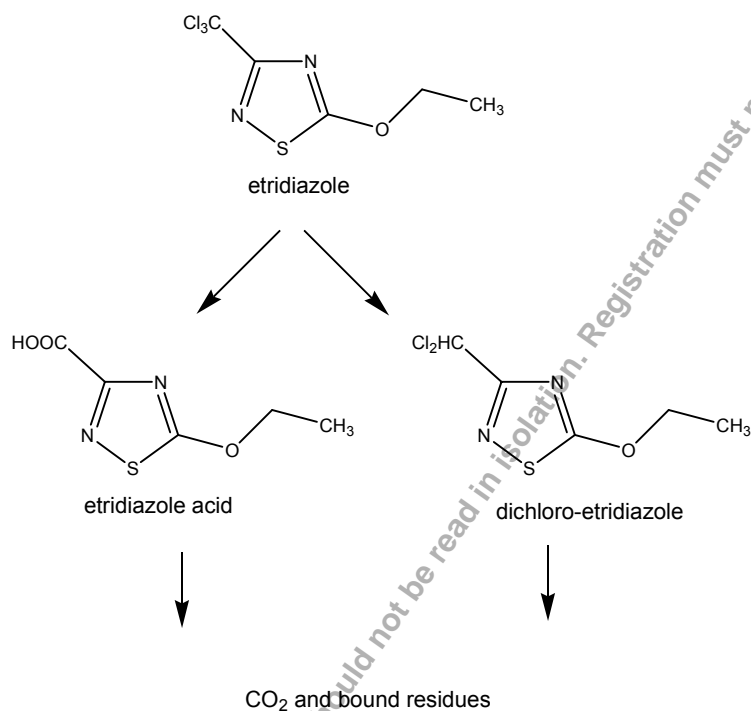
<sup>1</sup> based on first order multicompartment model (FOMC)<sup>2</sup> this represents the dose of the parent compound etridiazole<sup>3</sup> worst-case half-life for dissipation (degradation plus volatilisation)**Table B.8.1.3-2 Laboratory DT<sub>50</sub> values (modelling) for the aerobic degradation or dissipation of etridiazole and major metabolites in soil, at 20°C (SFO unless indicated differently)**

substance	soil	pH	% oc	mois- ture	dose (mg/kg)	temp. (°C)	DT <sub>50</sub> (d)	DT <sub>50</sub> (20°C, d), pF 2/10 kPa
Etridiazole	sandy loam	6.6	2.4	75% FC	5.0	25	58.4 <sup>1</sup>	71.2
	loam	7.4	3.1	pF 2.5	3.6	20	2.22	2.22
	sandy loam	6.0	2.1	pF 2.5	3.7	20	4.80	4.80
	<b>geometric mean</b>							<b>9.12</b>
Dichloro- etridiazole	sandy loam	6.6	2.4	75% FC	5.0 <sup>2</sup>	25	- <sup>3</sup>	-
	loam	7.4	3.1	pF 2.5	3.6 <sup>2</sup>	20	- <sup>3</sup>	-
	sandy loam	6.0	2.1	pF 2.5	3.7 <sup>2</sup>	20	- <sup>3</sup>	-
	<b>geometric mean</b>							-
Etridiazole acid	sandy loam	6.0	2.1	45% MWHC	0.86	20	36.0	30.4
	loam	7.4	3.1	45% MWHC	0.86	20	36.5	29.3
	sandy loam	5.1	3.6	45% MWHC	0.86	20	7.64	7.64
	<b>geometric mean</b>							<b>19.0</b>

<sup>1</sup> based on first order multicompartment model (FOMC)<sup>2</sup> this represents the dose of the parent compound etridiazole<sup>3</sup> no half-life for degradation is available

Mineralisation of etridiazole was observed in all soils: 8.2-22% AR on day 90-120 (25°C), maximum 8.7% on day 64, 4.8% AR on day 100 (soil 1, 20°C) and maximum 4.7% AR on day 100 (soil 2, 20°C). Non-extractable residues were also formed but never exceeded 70% AR: for etridiazole incubated at 25°C maximum 6.0% AR after 90 days and for etridiazole incubated at 20°C, maximum 40% and 33% AR after 100 and 32 days.

Aerobic metabolism of etridiazole proceeds due to microbial processes by simultaneous hydrolysis to etridiazole acid or dechlorination to dichloro-etridiazole. The ultimate breakdown products are  $\text{CO}_2$  and non-extractable residues. Figure B.8.1.3-1 shows the proposed metabolic pathway.

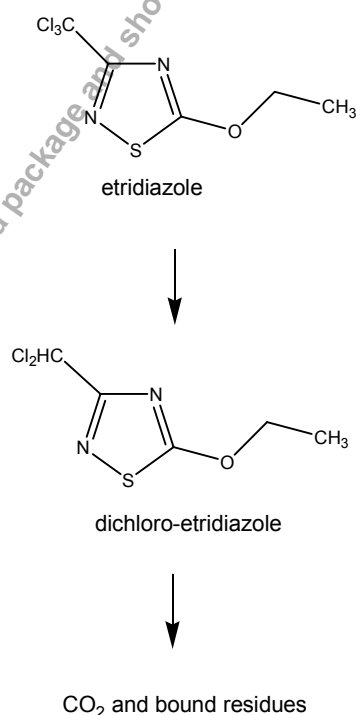


**Figure B.8.1.3-1 Aerobic metabolic pathway of etridiazole in soil**

### Anaerobic degradation

Data on anaerobic degradation of etridiazole in soil are not required because anaerobic conditions in soil treated with etridiazole are not anticipated, considering the proposed use pattern (greenhouse applications). Still, two studies were submitted, of which one was considered not acceptable (and therefore not included in the summary below).

Etridiazole degraded under anaerobic conditions in a soil/water system with a (persistence)  $DT_{50/90}$  of 0.59/1.97 (25°C) days (0.88/2.92 days at 20°C). The  $DT_{50}$  and  $DT_{90}$  values were derived from the best fit model (SFO) and were corrected for volatilisation of etridiazole from the soil. Hence, they represent the half-life for degradation and can be used as endpoint to assess persistence.  $CO_2$  production was 5.1% AR after 179 days (2.7% AR after 91 days) and unextractables were maximum 58% AR (day 91). Dichloro-etridiazole was the most important metabolite (maximum 41% AR on day 2) and dissipated with a (persistence)  $DT_{50/90}$  (25°C) of 11.5/38.2 days (17.2/57.0 days at 20°C). The  $DT_{50}$  and  $DT_{90}$  values were derived from the best fit model (SFO) and should be considered worst case values for dissipation (degradation and volatilisation), as dissipation and formation may have occurred simultaneously. No other metabolites >10% AR or 2 x >5% AR were observed. Figure B.8.1.3-2 shows the proposed metabolic pathway. The above mentioned  $DT_{50}$  values for etridiazole and dichloro-etridiazole can also be used as modelling endpoints.



**Figure B.8.1.3-2 Anaerobic metabolic pathway of etridiazole in soil**



**Soil photolysis**

The half-life of etridiazole in irradiated soil (330-800 nm: 151.7 W/m<sup>2</sup>, 12 hour dark-light cycles) was 12.6 days. No significant degradation was observed in dark soil. Etridiazole acid was the most important metabolite in irradiated soil: maximum 32% AR (6.6% AR in dark soil). No other metabolites exceeded 10% AR. The degradation of etridiazole was accelerated under irradiated conditions but no specific photodegradation products (i.e. not occurring in dark samples) were observed.

**Field dissipation trials**

Field studies were not submitted. The laboratory DT<sub>50</sub> of etridiazole and the major soil metabolite etridiazole acid at 20°C is <60 days. The DT<sub>50</sub> (lab, 20°C) of the major soil metabolite dichloro-etridiazole (4.66-178 days, mean 63.5 days) however is >60 days. Therefore field studies (or more reliable laboratory studies clearly indicating half-lives for degradation) are required for this metabolite when exposure of the soil compartment becomes relevant.

**Data requirements**

Because exposure of soil is negligible for the representative uses included in the Annex I dossier, no further data are required.

**B.8.2 Adsorption, desorption and mobility in soil (IIA 7.1.2, 7.1.3, IIIA 9.1.2)****B.8.2.1 Batch sorption****STUDY 1****Characteristics**

reference	:	Dzialo, D.G., 1994 (IIA 7.1.2/01)	soils	:	sand, sandy loam, silt loam, clay
year of execution	:	1993-1994	concentrations	:	0.2, 0.5, 1, 5, 10 mg/L
GLP statement	:	yes	temperature	:	25°C
guideline	:	EPA N:163-1	K <sub>oc</sub>	:	see results
test substance	:	[3- <sup>14</sup> C]-Etridiazole, lot no: CSL-93-452-14-23	1/n	:	see results
purity	:	radiochem. purity >97%	acceptability	:	acceptable for 3 of 4 soils

**Study design**

A batch equilibrium adsorption/desorption study with four soils was conducted on etridiazole.

Aliquots (25 mL) of <sup>14</sup>C-etridiazole in 0.01M calcium acetate were added to duplicate samples (5 g dry weight) of four soils (2 mm sieved; soil properties, see Table B.8.2.1-1) at concentrations of 0.0, 0.2, 0.5, 1, 5 and 10 mg/L. Treated slurries were shaken in teflon centrifuge tubes in the dark at 25°C for 24 hours (24 hours was found to be sufficient to reach an adsorption equilibrium). After equilibration, the supernatant was removed by centrifugation and analysed by LSC. Remaining adsorption solution was determined by reweighing the soil samples. Desorption was performed by adding 25 mL of 0.01M calcium acetate solution to the remaining soil and shaking for 24 hours at 25°C after which the supernatant was removed by centrifugation and analysed by LSC. Stability of etridiazole was verified by HPLC-RAM analysis of the supernatants obtained after the adsorption and desorption phase of the highest concentration samples. Residual radioactivity in soils after desorption was determined by combustion/LSC enabling mass balance calculations. Adsorption of etridiazole to the teflon tubes was tested, but not reported. Freundlich adsorption and desorption isotherms were calculated by linear first order regression analysis.

**Results**

Mass balances ranged from 86-108% AR. HPLC-RAM analysis indicated no significant degradation of etridiazole through the adsorption and desorption phase (90-95% recovery). The Freundlich adsorption and desorption parameters for etridiazole were taken from the report and the results are given in Table B.8.2.1-1. K<sub>OC</sub> (L/kg) values for etridiazole were 349 (sandy loam, 2.4% oc), 195 (clay, 4.2% oc), 469 (sand, 0.09% oc), and 323 (silt loam, 1.6% oc). Freundlich adsorption isotherm 1/n values were between 0.84 and 1.02 and r<sup>2</sup> values ranged from 0.998 to 1.00.

Adsorption was calculated from the difference in concentration in the application and adsorption solutions. For the sand soil, this difference was <10% for 4 out of 5 tested concentrations, and in this case calculation by difference may result in substantial errors. Moreover, the organic carbon content

of the sand soil was only 0.093%. The OECD 106 guideline (2000) recommends that the organic carbon content of test soils is 0.3% or higher, since lower levels may disturb the relationship between organic content and adsorption. Furthermore, the relative error in an organic carbon content value as low as 0.093% may be high, which would result also in a large error in the K<sub>oc</sub> value. Based on the foregoing, the K<sub>f</sub> and K<sub>oc</sub> values for the sand soil are considered to be insufficiently reliable. Although pH dependency is not expected (pK<sub>a</sub> of etridiazole: 2.77), this could not be verified from the results as the pH range of the soils is limited.

**Table B.8.2.1-1 Adsorption and desorption coefficients for etridiazole**

source	S93-886	S93-889	S93-892	S93-891
%sand/silt/clay <sup>(A)</sup>	64/28/8	35/24/41	93/4/3	13/64/23
Texture <sup>(A)</sup>	sandy loam	clay	sand	silt loam
pH	6.6	7.4	7.4	7.3
% organic carbon	2.4	4.2	0.093	1.6
CEC [meq/100 g]	8.9	27	1.0	17
Adsorption K <sub>f</sub> [L/kg]	8.21	8.24	0.441 <sup>(B)</sup>	5.06
Adsorption K <sub>oc</sub> [L/kg]	349	195	469 <sup>(B)</sup>	323
1/n	0.86	0.92	1.02	0.84
r <sup>2</sup>	1.00	1.00	0.998	1.00
Desorption K <sub>f</sub> [L/kg]	10.1	9.09	0.597 <sup>(B)</sup>	6.71
Desorption K <sub>oc</sub> [L/kg]	429	215	635 <sup>(B)</sup>	429
1/n	0.92	0.92	0.95	0.82
r <sup>2</sup>	0.999	0.997	0.981	0.994

(A) According to USDA classification system.

(B) Results considered not reliable by the RMS

## Conclusions

K<sub>OC</sub> (L/kg) values for etridiazole were 349 (sandy loam, 2.4% oc), 195 (clay, 4.2% oc) and 323 (silt loam, 1.6% oc). Freundlich adsorption isotherm 1/n values were between 0.84 and 0.92. The K<sub>oc</sub> value in the sand soil is considered to be insufficiently reliable (% oc < 0.3%, insufficient sorption)

## Guidelines & Limitations

- Because of low adsorption (<10%) in combination with low organic matter content, the results for the sand soil are considered not reliable by the RMS and will not be included in the list of endpoints.

## STUDY 2

### Characteristics

reference	Dzialo, D.G., 1994 (IIA 7.1.2/02)	soils	sand, sandy loam, silt loam, clay
year of execution	1994	concentrations	0.2, 0.5, 1, 5, 10 mg/L
GLP statement	yes	temperature	25°C
guideline	EPA N:163-1	K <sub>f</sub> oc	see results
test substance	(a) [3- <sup>14</sup> C]-Etridiazole acid, lot no: CSL-92-427-54-20 (b) Etridiazole acid, lot no: AC-1398-68)	1/n	see results
purity	(a) radiochem. purity >95% (b) purity 97.7%	acceptability	acceptable for 3 of 4 soils

### Study design

A batch equilibrium adsorption/desorption study with four soils was conducted on etridiazole acid.

Aliquots (25 mL) of a mixture of labelled and unlabeled etridiazole acid in 0.01M calcium acetate were added to duplicate samples (5 g dry weight) of four soils (2 mm sieved; soil properties, see Table B.8.2.1-2) at concentrations of 0.0, 0.2, 0.5, 1, 5 and 10 mg/L. Treated slurries were shaken in teflon centrifuge tubes in the dark at 25°C for 2 hours (2 hours was found to be sufficient to reach an adsorption equilibrium). After equilibration, the supernatant was removed by centrifugation and analysed by LSC. Remaining adsorption solution was determined by reweighing the soil samples. Desorption was performed by adding 25 mL of 0.01M calcium acetate solution to the remaining soil and shaking for 2 hours at 25°C after which the supernatant was removed by centrifugation and analysed by LSC. Stability of etridiazole acid was verified by HPLC-RAM analysis of the supernatants obtained after the adsorption and desorption phase of the highest concentration samples. Residual radioactivity in soils after desorption was determined by combustion/LSC enabling mass balance calculations. Adsorption of etridiazole acid to the teflon tubes was tested, but not reported. Freundlich adsorption and desorption isotherms were calculated by linear first order regression analysis.

## Results

Mass balances ranged from 99-104% AR. HPLC-RAM analysis indicated no significant degradation of etridiazole acid through the adsorption and desorption phase (mean recovery 97%). The Freundlich adsorption and desorption parameters for etridiazole acid were taken from the report and the results are given in Table B.8.2.1-2.  $K_{OC}$  (L/kg) values for etridiazole acid were 20 (sandy loam, 2.4% oc), 13 (clay, 4.2% oc), and 22 (silt loam, 1.6% oc); results for the sand soil ( $K_{OC} = 16$ ) are not reliable due to low amount ( $\leq 2\%$ ) adsorbed to soil. Freundlich adsorption isotherm  $1/n$  values were between 0.75 and 0.95 and  $r^2$  values ranged from 0.987 to 0.996.

Although pH dependency is not expected ( $pK_a$  of etridiazole acid: 2.44) this could not be verified from the results as the pH range of the soils is limited.

**Table B.8.2.1-2 Adsorption and desorption coefficients for etridiazole acid**

source	S93-886	S93-889	S93-892	S93-891
%sand/silt/clay <sup>(A)</sup>	64/28/8	35/24/41	93/4/3	13/64/23
Texture <sup>(A)</sup>	sandy loam	clay	sand	silt loam
pH	6.6	7.4	7.4	7.3
% organic carbon	2.4	4.2	0.09	1.6
CEC [meq/100 g]	8.9	27	1.0	17
Adsorption K <sub>f</sub> [L/kg]	0.459	0.547	-- <sup>(B)</sup>	0.344
Adsorption K <sub>oc</sub> [L/kg]	20	13	-- <sup>(B)</sup>	22
1/n	0.95	0.84	-- <sup>(B)</sup>	0.75
r <sup>2</sup>	0.996	0.995	-- <sup>(B)</sup>	0.987
Desorption K <sub>f</sub> [L/kg]	3.75	2.34	-- <sup>(C)</sup>	3.00
Desorption K <sub>oc</sub> [L/kg]	160	56	-- <sup>(C)</sup>	192
1/n	1.05	0.94	-- <sup>(C)</sup>	1.05
r <sup>2</sup>	0.996	0.998	-- <sup>(C)</sup>	0.997

(A) According to USDA classification system.

(B) Results reported (K<sub>f</sub> = 0.014; K<sub>oc</sub> = 16) not reliable due to low amount ( $\leq 2\%$ ) adsorbed to soil(C) Results reported (K<sub>f</sub> = 0.775; K<sub>oc</sub> = 861) not reliable due to low residual amount of etridiazole acid in soil

### Conclusions

K<sub>OC</sub> (L/kg) values for etridiazole acid were 20 (sandy loam, 2.4% oc), 13 (clay, 4.2% oc), and 22 (silt loam, 1.6% oc); results for the fourth (sand) soil are not reliable ( $\leq 2\%$  adsorbed). Freundlich adsorption isotherm 1/n values were between 0.75 and 0.95.

### Guidelines & Limitations

1. Because of low adsorption ( $\leq 2\%$ ) in combination with low organic matter content, the results for the sand soil are considered not reliable by the RMS and will not be included in the list of endpoints.

## STUDY 3

### Characteristics

reference	:	Dzialo, D.G., 1994 (IIA 7.1.2/03)	soils	:	sand, sandy loam, silt loam, clay
year of execution	:	1994	concentrations	:	0.2, 0.5, 1, 5, 10 mg/L
GLP statement	:	yes	temperature	:	25°C
guideline	:	EPA N:163-1	K <sub>f</sub> oc	:	see results
test substance	:	[3- <sup>14</sup> C]-dichloro-etridiazole, lot no: CSL-92-427-46-33	1/n	:	see results
purity	:	radiochem. purity 98%	acceptability	:	acceptable for 3 of 4 soils

### Study design

A batch equilibrium adsorption/desorption study with four soils was conducted on dichloro-etridiazole.

Aliquots (25 mL) of [3-<sup>14</sup>C]-dichloro-etridiazole in 0.01M calcium acetate were added to duplicate samples (5 g dry weight) of four soils (2 mm sieved; soil properties, see Table B.8.2.1-3) at concentrations of 0.0, 0.2, 0.5, 1, 5 and 10 mg/L. Treated slurries were shaken in teflon centrifuge tubes in the dark at 25°C for 24 hours (24 hours was found to be sufficient to reach an adsorption equilibrium). After equilibration, the supernatant was removed by centrifugation and analysed by LSC. Remaining adsorption solution was determined by reweighing the soil samples. Desorption was performed by adding 25 mL of 0.01M calcium acetate solution to the remaining soil and shaking for 24

hours at 25°C after which the supernatant was removed by centrifugation and analysed by LSC. Stability of dichloro-etridiazole was verified by HPLC-RAM analysis of the supernatants obtained after the adsorption and desorption phase of the highest concentration samples. Residual radioactivity in soils after desorption was determined by combustion/LSC enabling mass balance calculations. Adsorption of dichloro-etridiazole to the teflon tubes was tested, but not reported. Freundlich adsorption and desorption isotherms were calculated by linear first order regression analysis.

## Results

Mass balance ranged from 88-101% AR. HPLC-RAM analysis indicated no significant degradation of dichloro-etridiazole through the adsorption and desorption phase (mean recovery 97%). The Freundlich adsorption and desorption parameters for dichloro-etridiazole were taken from the report and the results are given in Table B.8.2.1-3.  $K_{OC}$  (L/kg) values for dichloro-etridiazole were 118 (sandy loam, 2.4% oc), 50 (clay, 4.2% oc) and 129 (silt loam, 1.6% oc). Freundlich adsorption isotherm  $1/n$  values were between 0.81 and 0.89 and  $r^2$  values ranged from 0.999 to 1.00. Results for the sand soil are unreliable (see "Guidelines and Limitations").

Although pH dependency is not expected (based on the  $pK_a$  of etridiazole (2.77); no  $pK_a$  of dichloro-etridiazole available) this could not be verified from the results as the pH range of the soils is limited.

**Table B.8.2.1-3 Adsorption and desorption coefficients for dichloro-etridiazole**

source	S93-886	S93-889	S93-892	S93-891
%sand/silt/clay <sup>(A)</sup>	64/28/8	35/24/41	93/4/3	13/64/23
Texture <sup>(A)</sup>	sandy loam	clay	sand	silt loam
pH	6.6	7.4	7.4	7.3
% organic carbon	2.4	4.2	0.09	1.6
CEC [meq/100 g]	8.9	27	1.0	17
Adsorption Kf [L/kg]	2.77	2.11	-- <sup>(B)</sup>	1.99
Adsorption Koc [L/kg]	118	50	-- <sup>(B)</sup>	128
1/n	0.81	0.89	-- <sup>(B)</sup>	0.83
$r^2$	1.00	0.999	-- <sup>(B)</sup>	0.999
Desorption Kf [L/kg]	3.41	1.77	-- <sup>(C)</sup>	1.70
Desorption Koc [L/kg]	145	42	-- <sup>(C)</sup>	109
1/n	0.74	0.92	-- <sup>(C)</sup>	0.71
$r^2$	0.996	0.978	-- <sup>(C)</sup>	0.989

(A) According to USDA classification system.

(B) Results considered not reliable (see Guidelines & Limitations)

(C) No calculation possible (no significant adsorption).

## Conclusions

$K_{OC}$  (L/kg) values for dichloro-etridiazole were 118 (sandy loam, 2.4% oc), 50 (clay, 4.2% oc) and 129 (silt loam, 1.6% oc). Freundlich adsorption isotherm  $1/n$  values were between 0.81 and 0.89 and  $r^2$  values ranged from 0.999 to 1.00.

## Guidelines & Limitations

1. Because of low adsorption in combination with low organic matter content, the results for the sand soil are considered not reliable by the RMS and will not be included in the list of endpoints.

### B.8.2.2 Column leaching studies, leaching of aged residues and field leaching studies

## (Annex IIA 7.1.3.1, 7.1.3.2, 7.1.3.3; Annex IIIA 9.1.2.1, 9.1.2.2)

**B.8.2.2.1 Column leaching****STUDY 1****Characteristics**

reference	:	Thomas R.J., 1982 (IIA 7.1.3.1/01)	soils	:	sandy loam, sandy loam
year of execution	:	1982	concentration	:	1.5 mg/kg
GLP statement	:	no	leaching	:	10 mm/day for 3 days
guideline	:	not indicated	results	:	see results
test substance	:	(a) [3- <sup>14</sup> C]-Etridiazole, lot no: not provided; (b) Etridiazole, ref. H 27883 AN (c) Etridiazole acid, ref. E 32855 R.T.	acceptability	:	not acceptable
purity	:	(a) radiochem. purity not provided (b) purity 99% (c) purity 99%			

**Study design**

Duplicate glass columns (4 cm o.d.) were packed with 25 cm of sieved (2 mm) Agawam and Cheshire sandy loam soil and saturated with 0.005M CaSO<sub>4</sub>. Etridiazole (mixture of labelled and non-labelled) or etridiazole acid was mixed with 25/27 g soil at a rate of 1.5 mg/kg. An aliquot of the treated soil (10 g) was placed on top of the conditioned soil columns. The columns were leached with ~30 mm 0.005M CaSO<sub>4</sub> (calculated by the reviewer assuming a column i.d. of 4 cm) at a rate of 6 mL/hour in 6-7 portions (equivalent to 10 mm/day) for 3 days to obtain a total leachate of 30-36 mL. The leachate was collected in 6 mL fractions. The leachate was analysed for etridiazole acid by HPLC (etridiazole experiment) or total radioactivity was determined by LSC (etridiazole experiment). After leaching, the soil columns were separated in the treated section and five sections of 5 cm and extracted with methanol/1% ammonium hydroxide (etridiazole acid experiment) or with methanol followed by hexane/water partitioning (etridiazole experiment). The methanol/1% ammonium hydroxide extract was analysed for etridiazole acid by HPLC and the hexane and aqueous phases for total radioactivity by LSC and for etridiazole by GC. Quantification and identification was by comparison with external standards.

**Results**

Mass balances were 92/101% AR (etridiazole) and 100/101% applied material (etridiazole acid). Soil properties, distribution of radioactivity, GC and HPLC results are given in Table B.8.2.2.1-1 and -2.

No detectable amount of radioactivity leached from the etridiazole treated columns. The majority of soil associated radioactivity was recovered from the treated soil layer (top): 75% (Agawam) and 65% AR (Cheshire). Soil associated radioactivity was 26-27% AR in the 0-5 cm section and ≤0.1% AR in all other soil sections. Fractionation of radioactivity in the soil layers into an organic and aqueous phase revealed limited amounts in the aqueous extract (<1% AR). Radioactivity in the hexane extract was confirmed to be etridiazole.

The leachate of the etridiazole acid treated columns contained no detectable amount of etridiazole acid. The majority of soil associated etridiazole acid was recovered from the first two soil sections (0-5 and 5-10 cm, 92/93% of applied material). The treated soil layer contained 8.7% (Agawam) and 0.7% applied material (Cheshire). 6.0% applied etridiazole acid was detected in the 10-15 cm section of the Cheshire soil column and no etridiazole acid was detected in all other soil sections (Agawam and Cheshire).

**Table B.8.2.2.1-1 Soil properties and distribution and identity of radioactivity (% AR) for [3-<sup>14</sup>C]-Etridiazole treated columns (leached with 30 mm 0.005M CaCl<sub>2</sub> over 3 days in 6-7 portions at 6 mL/hour)**

	Agawam soil		Cheshire soil	
%sand/silt/clay <sup>(A)</sup>	53/44/3		51/41/8	
Texture <sup>(A)</sup>	sandy loam		sandy loam	
pH (1:1 soil water mixture)	6.1		6.5	
% organics <sup>(B)</sup>	4.0-5.0		3.2	
	% AR <sup>(C)</sup>		% AR <sup>(C)</sup>	
Soil - treated layer	75		65	
hexane extract	75		65	
etridiazole	78		65	
aqueous extract	0.2		0.2	
0-5 cm	26		27	
hexane extract	25		26	
etridiazole	25		27	
aqueous extract	0.8		0.6	
5-10 cm	0.1		0.1	
hexane extract	<0.1		0.1	
etridiazole	<0.1		0.1	
aqueous extract	0.1		0.1	
10-15 cm	nd		nd	
15-20 cm	nd		nd	
20-25 cm	nd		nd	
Leachate	nd		nd	
Mass balance	101		92	

(A) According to USDA classification system.

(B) Not further specified as organic carbon or organic matter.

(C) Mean values of duplicate columns.

nd: not detected.



**Table B.8.2.2.1-2 Distribution of etridiazole acid (% of applied) for etridiazole acid treated columns (leached with 30 mm 0.005M CaCl<sub>2</sub> over 3 days in 6-7 portions at 6 mL/hour)**

	Agawam soil	Cheshire soil
	% of applied <sup>(A)</sup>	% of applied <sup>(A)</sup>
Soil - treated layer MeOH/1%NH <sub>4</sub> OH extract etridiazole acid	8.7	0.7
0-5 cm MeOH/1%NH <sub>4</sub> OH extract etridiazole acid	52	43
5-10 cm MeOH/1%NH <sub>4</sub> OH extract etridiazole acid	40	50
10-15 cm MeOH/1%NH <sub>4</sub> OH extract etridiazole acid	nd	6.0
15-20 cm	nd	nd
20-25 cm	nd	nd
Leachate	nd	nd
Mass balance	101	100

(A) Mean values of duplicate columns.  
nd: not detected.

### Conclusions

Soil columns treated with etridiazole or etridiazole acid at a rate of 1.5 mg/kg (incorporated in soil top layer) leached with ~30 mm 0.005M CaSO<sub>4</sub> (6 mL/hour in 6-7 portions over 3 days, equivalent to 10 mm/day) showed no detectable amounts of radioactivity/applied material in the leachate of Agawam and Cheshire sandy loam soil. The results are not reliable (major deviations from current OECD/SETAC guidelines, see below).

### Guidelines & Limitations

1. Leaching was performed with 0.005M CaSO<sub>4</sub> instead of 0.01M CaCl<sub>2</sub>.
2. Leaching was 10 mm/day for 3 days. SETAC/OECD guidelines prescribe 100 mm/day for 2 days.
3. No description of the analytical method was given, nor any detailed results (e.g. calibration curves, procedural recoveries).
4. No reference substance was applied; hence no evaluation of the relative mobility was possible.
5. Overall evaluation: the leaching rate was insufficient, and verification of the reliability of the analytical results was not possible. The study results are therefore not acceptable.

### B.8.2.2.2 Aged residue column leaching

No studies submitted and not required.

**B.8.2.2.3 Field leaching studies****STUDY 1****Characteristics**

reference	:	Mol J.G.J., 2003 (IIA 7.1.3.3/01)	soils	:	sand, loamy sand
year of execution	:	2000-2001	concentration	:	7 kg a.i./ha
GLP statement	:	yes	results	:	see results
guideline	:	not indicated	acceptability	:	Reliable with limitations; not relevant for the intended uses
test substance	:	Aaterra ME lot no: AEF017 40800, 1H55 A101			
purity	:	700 g etridiazole/L			

**Study design**

A field study (soil bound Chrysanthemum crop under glass) was conducted to monitor leaching of etridiazole and two metabolites.

The study was conducted at two glasshouse locations in the Westland region, The Netherlands, one with a sand and one with a loamy sand soil, each with a single 4.5 x 30 m (sand) or 4.5 x 20 m (loamy sand) plot marked out within a 7.5 x 50.8 m (sand) or a 6.0 x 31.8 m (loamy sand) treated plot. Both sites, with Chrysanthemum grown for the past 5 years, had a drainage system installed with drains at 80 cm depth. Table B.8.2.2.3-01 details the characteristics of the soil profile at each site. Before application, in each plot five wells for ground water sampling were installed to a depth of 2 m (groundwater table: >0.8 – 1.3 m). At each of the experimental sites 24 miniplots (2.5 x 1.5 m) (four replicates for each sampling point) were established for the collection of soil cores. Field history indicated the use of different pesticides, including etridiazole, in recent years.

In June (sand site) or August (loamy sand site) 2000, the Chrysanthemum crop (sand site; beginning of the growth cycle) or bare soil (loamy sand site) was treated (hand spraying) with Aaterra ME (700 g etridiazole per litre) at a rate of 10 L/ha, corresponding to 7 kg etridiazole/ha. Application was followed by sprinkling and Chrysanthemum was grown continuously (4 growth cycles per year).

Following application, the experimental sites were monitored for air temperature and irrigation water. Ground water samples were collected before application and at 0, 0.5, 1, 2, 4, 6, 8, 10 and 12 months post-treatment. Water samples from the drains were collected at the same sampling dates and also at 3 and 9 months post-treatment. Irrigation samples were collected before treatment (day 0). Water samples were stored (2-10°C) for 2-9 days (some samples for 2 to 3 months at <-18°C) prior to sample pre-treatment (acidification, SPE extraction and derivatisation (methylation of etridiazole acid)) and subsequent GC-MS analysis for etridiazole, etridiazole acid and dichloro-etr Diazole.

Four soil cores (100 cm) were removed from each plot prior to treatment and 0 (20 cm), 3, 6, 9 and 12 months post-treatment. The cores were divided into 20 cm segments and segments from similar depth were bulked and stored frozen (<-18°C for max 7 months) until water (pH 11)/hexane extraction. The aqueous phase was partitioned against dichloromethane, acidified, etridiazole acid extracted with SPE

and derivatised (methylation) before quantification by GC-MS. The hexane phase was analysed (GC-MS) for etridiazole and dichloro-etridiazole.

Procedural recoveries were run on both water and soil samples. Recovery in spiked water samples (mean, n=19-20) were for etridiazole: 88%, RSD 11%, etridiazole acid: 65%, RSD 20%, and for dichloro-etridiazole: 105%, RSD 13%. Recovery in spiked soil samples (mean, n=6-8) were for etridiazole: 102%, RSD 19%, etridiazole acid: 89%, RSD 18%, and for dichloro-etridiazole: 101%, RSD 19%.

For stability of stored water and soil samples and validation of the GC-MS method see Volume 3, B.5.3 study 2 and 4 of this DAR.

## Results

Average monthly irrigation and temperature data in the glasshouses during the trials are shown in Table B.8.2.2.3-02.

Concentrations of etridiazole, etridiazole acid and dichloro-etridiazole in groundwater samples (mean of 5 wells) are shown in Table B.8.2.2.3-03. Maximum etridiazole concentrations were 0.14 µg/L (63 DAT, Maasdijk) and 0.20 µg/L (176 DAT, Honselersdijk); residues of etridiazole in all other groundwater samples of both soils were <0.10 µg/L. Etridiazole-acid was present before treatment (2.0/0.89 µg/L for Maasdijk/Honselersdijk), increased to 3.7/1.9 µg/L at 176/239 DAT and declined to 0.56/0.45 µg/L at 365/364 DAT. Residues of dichloro-etridiazole in all groundwater samples of both soils were at or below the limit of detection (LOD, ≤0.05 µg/L).

Concentrations of etridiazole, etridiazole acid and dichloro-etridiazole in irrigation and drainage water samples are shown in Table B.8.2.2.3-04. Etridiazole was detected in the Maasdijk irrigation water (0.17 µg/L) and not in the Honselersdijk irrigation water. The presence of etridiazole in irrigation water may be an indication of volatilisation of etridiazole after application followed by deposition outside the glasshouse.

Up to 6 months, etridiazole was detectable in the Maasdijk drainage water samples (between <0.05 and 0.39 µg/L (at 6 months)), but not in the Honselersdijk drainage samples. Etridiazole acid was detected at 0.25/0.26 µg/L in the Maasdijk/Honselersdijk irrigation water sample. In the Maasdijk drainage samples, the concentration of etridiazole acid was between 0.4 and 2.6 µg/L (1.8 µg/L before treatment). In the Honselersdijk drainage samples, the concentration of etridiazole acid was maximum 18 µg/L (8 months after treatment) (0.25 µg/L before treatment) and decreased to 2.2 µg/L at 12 months. Dichloro-etridiazole was not detectable in the Honselersdijk irrigation and drain water samples; in the Maasdijk irrigation sample, the concentration was 0.11 µg/L and in the drainage samples 0.14/0.05 at 2 wks/3 months and <LOD for all other samples.

Residues of etridiazole, etridiazole acid and dichloro-etridiazole were not detected in pre-treatment soil and in all segments of treated soil, except for the 0-20 cm segment at the day of treatment in

which etridiazole (1.3/3.1 mg/kg dw for Maasdijk/Honselersdijk) and dichloro-etridiazole (0.02 mg/kg dw, Honselersdijk) was detected. 9 months samples (Honselersdijk) and 12 months samples were not analyzed.

**Table B.8.2.2.3-01 Properties of soils used in field monitoring study with etridiazole**

Parameter	Maasdijk					Honselersdijk				
	0-20	20-40	40-60	60-80	80-100	0-20	20-40	40-60	60-80	80-100
% sand/silt/clay <sup>(A)</sup>	91/5/4	92/5/4	94/4/2	91/5/4	88/7/5	74/17/10	74/15/10	71/17/11	43/37/21	39/40/21
texture(A)	sand	sand	sand	sand	sand	loamy sand	loamy sand	loamy sand	sandy loam	sandy loam
pH (KCl)	7.2	7.4	7.7	8.1	7.6	7.2	7.2	7.5	8.0	8.0
% organic carbon	3.7	3.6	1.4	1.8	2.2	2.5	3.9	2.1	0.8	0.3
CEC (mEq/100 g)	<0.05	<0.05	<0.05	<0.05	<0.05	1.4	13.1	<0.05	<0.05	<0.05

(A) BBA classification system (sand: >63 µm; silt: 2-63 µm; clay: <2 µm)

**Table B.8.2.2.3-02 Monthly mean temperature and total irrigation during field monitoring study with etridiazole**

month	irrigation (mm)		temperature (°C)	
	Maasdijk	Honselersdijk	Maasdijk	Honselersdijk
Jun-2000	10 <sup>(A)</sup>	-	19 <sup>(A)</sup>	-
Jul-2000	86	-	21	-
Aug-2000	110	12 <sup>(B)</sup>	22	19 <sup>(B)</sup>
Sep-2000	50	91	23	22
Oct-2000	84	59	19	19
Nov-2000	70	30	18	18
Dec-2000	98	31	20	18
Jan-2001	90	70	18	19
Feb-2001	69	29	18	19
Mar-2001	95	36	20	19
Apr-2001	89	53	20	20
May-2001	187	58	22	22
Jun-2001	86	41	23	21
Jul-2001	-	70	-	23
Aug-2001	-	62	-	23
Total	1112	629		

(A) measuring period: June 27-30

(B) measuring period: August 28-31

**Table B.8.2.2.3-03 Concentrations of etridiazole, etridiazole acid and dichloro-etridiazole in groundwater (average(A) of 5 wells, µg/L) collected from sand (Maasdijk) or loamy sand (Honselersdijk) soil treated at 7 kg a.s./ha**

DAT <sup>(B)</sup>	date of sampling <sup>(B)</sup>	Maasdijk			Honselersdijk		
		etridiazole	etridiazole acid	dichloro-etridiazole	etridiazole	etridiazole acid	dichloro-etridiazole
before	27-06-00/29-08-00	<LOD <sup>(C)</sup>	2.0 <sup>(C)</sup>	<LOD <sup>(C)</sup>	<LOD	0.89	<LOD
0/0	27-06-00/29-08-00	0.05 <sup>(C)</sup>	2.3 <sup>(C)</sup>	<LOD <sup>(C)</sup>	0.04	0.63	<LOD
14/16	11-07-00/14-09-00	<LOD <sup>(C)</sup>	2.6 <sup>(C)</sup>	<LOD <sup>(C)</sup>	0.06	0.70	<LOD
30/30	27-07-00/28-09-00	<LOD <sup>(D)</sup>	2.4 <sup>(D)</sup>	0.04 <sup>(D)</sup>	<LOD	0.72	<LOD
63/58	29-08-00/26-10-00	0.14	2.9	<LOD	0.08	0.87	<LOD
121/113	26-10-00/20-12-00	<LOD	2.3	<LOD	0.04	1.8	<LOD
176/176	20-12-00/21-02-01	0.09	3.7	<LOD	0.20	1.3	<LOD
239/239	21-02-01/25-04-01	<LOD	2.2	<LOD	0.08	1.9	<LOD
302/302	25-04-01/27-06-01	0.05	3.3	0.05	0.05	0.48	<LOD
365/364	27-06-01/28-08-01	<LOD	0.56	<LOD	<LOD	0.45	<LOD
mean		0.05	2.46	0.03	0.07	0.98	0.03

(A) samples <LOD (0.05 µg/L) were assigned 0.5xLOD

(B) for Maasdijk/Honselersdijk respectively

(C) samples stored for ~3 months at <-18°C

(D) samples stored for ~2 months at <-18°C

**Table B.8.2.2.3-04 Concentrations of etridiazole, etridiazole acid and dichloro-etridiazole in irrigation and drainage water (µg/L) collected from sand (Maasdijk) or loamy sand (Honselersdijk) soil treated at 7 kg a.s./ha**

time after application	date of sampling <sup>(B)</sup>	Maasdijk			Honselersdijk		
		etridiazole	etridiazole acid	dichloro-etridiazole	etridiazole	etridiazole acid	dichloro-etridiazole
0 (IW) <sup>(A)</sup>	27-06-00/29-08-00	0.17 <sup>(C)</sup>	0.26 <sup>(C)</sup>	0.11 <sup>(C)</sup>	<LOD	0.25	<LOD
before	27-06-00/29-08-00	<LOD <sup>(C)</sup>	1.8 <sup>(C)</sup>	<LOD <sup>(C)</sup>	na	na	na
0	27-06-00/29-08-00	0.21 <sup>(D)</sup>	2.0 <sup>(D)</sup>	<LOD <sup>(D)</sup>	na	na	na
2 wks	11-07-00/14-09-00	0.27	2.6	0.14 <sup>(C)</sup>	<LOD	2.5	<LOD
1 month	27-07-00/28-09-00	<LOD <sup>(E)</sup>	1.9 <sup>(E)</sup>	<LOD <sup>(E)</sup>	<LOD	2.5	<LOD
2 months	29-08-00/26-10-00	0.08	0.50	<LOD	<LOD	1.9	<LOD
3 months	28-09-00/28-11-00	0.12	1.2	0.05	<LOD	4.0	<LOD
4 months	26-10-00/20-12-00	<LOD	0.40	<LOD	<LOD	6.2	<LOD
6 months	20-12-00/21-02-01	0.39	2.3	<LOD	<LOD	12	<LOD
8 months	21-02-01/25-04-01	<LOD	1.3	<LOD	<LOD	18	<LOD
9 months	23-03-01/31-05-01	<LOD	2.3	<LOD	<LOD	5.1	<LOD
10 months	24-04-01/27-06-01	<LOD	2.0	<LOD	<LOD	5.2	<LOD
12 months	27-06-01/28-08-01	<LOD	1.1	<LOD	<LOD	2.2	<LOD

(A) irrigation water (all other data refer to drainage water); mixture of rain water and water regional ditches (Maasdijk) or regional ditches only (Honselersdijk)

(B) for Maasdijk/Honselersdijk respectively

(C) samples stored for ~3 months at <-18°C

(D) samples stored for ~6 months at <-18°C

(E) samples stored for ~2 months at <-18°C

na: not available (no water in drainage tank)

## Conclusions

A field study (soil bound Chrysanthemum in glasshouse, 1 x 7 kg a.i./ha) was conducted in a sand and a loamy sand soil to monitor the leaching of etridiazole and its metabolites etridiazole acid and dichloro-etridiazole. The recent use of etridiazole on the test plots was confirmed by the presence of etridiazole acid in ground and drainage water prior to treatment. Analysis of groundwater up to 12 months post-treatment revealed etridiazole at maximum 0.20 µg/L (176 DAT loamy sand soil) and <0.10 µg/L for all other samples. Etridiazole-acid was present before treatment (2.0/0.89 µg/L for sand/loamy sand), increased to 3.7/1.9 µg/L at 176/239 DAT and declined to 0.56/0.45 µg/L at 365/364 DAT. Dichloro-etridiazole was <0.05 µg/L at all time points. Average groundwater concentrations were 0.05-0.07 µg/L (etridiazole), 0.98-2.46 µg/L (etridiazole acid), and <0.05 µg/L (dichloro-etridiazole). Maximum concentrations in drainage water were 0.39 µg/L (etridiazole), 2.6-18 µg/L (etridiazole acid) and 0.14 µg/L (dichloro-etridiazole). Analysis of soil samples (100 cm) up to 9 months post-treatment revealed etridiazole and dichloro-etridiazole immediately after treatment, but not thereafter. The presence of etridiazole in irrigation water (0.17 µg/L) of Maasdijk may be an indication of volatilisation of etridiazole after application followed by deposition outside the glasshouse. The study demonstrates exposure of groundwater to etridiazole (mean 0.07 µg/L) and etridiazole acid (mean 2.46 µg/L). Exposure of surface water (etridiazole, etridiazole acid and dichloro-etridiazole) will occur via drainage water and possibly via volatilisation/deposition of etridiazole. The study is not relevant for the proposed intended uses (non soil bound ornamentals and substrate grown peppers/tomatoes/cucumbers with (drip) irrigation) and will therefore not be used in the further risk assessment. Some measurements were not reliable (see comment 3 and 4 below).

## Guidelines & Limitations

1. Application (spraying to bare soil or Chrysanthemum crop) was not according to the proposed GAP ((drip) irrigation).
2. Field history indicated the use of different pesticides, including etridiazole, in recent years. Although this will have influenced the outcome of the study, results are considered to represent a worst case situation. In addition, the use of etridiazole in adjacent fields may have resulted in contamination of the test plots.
3. Based on the analytical study (see B.5.3 study 4) a maximum storage for water samples of 1 month (<-18°C) is considered acceptable for etridiazole, etridiazole acid and dichloro-etridiazole. For the Maasdijk study, the samples before treatment and 0, 14 and 30 days after treatment were stored for 2 to 6 months at <-18°C. Results of these analyses are considered not reliable (only acceptable as best case values), unless storage stability is demonstrated.
4. Procedural recoveries for the water samples were determined in the range of 0.1 – 0.8 µg/L. Several etridiazole acid sample concentrations (up to 18 µg/L) were outside this range.

### B.8.2.3 Summary Adsorption, desorption and mobility in soil

#### Batch sorption

Table B.8.2.3-1 presents a summary of the adsorption coefficients of etridiazole and the metabolites dichloro-etridiazole and etridiazole acid determined in batch sorption studies at 25°C and a soil:water ratios of 1:5. The results of a fourth tested soil (sand soil) were considered not reliable and therefore not included in Table B.8.2.3-1.

**Table B.8.2.3-1 Adsorption coefficients of etridiazole and metabolites from batch sorption studies**

substance	Soil	pH	% oc	CEC (meq/100 g)	% clay	K <sub>F</sub> (L/kg)	1/n	K <sub>Foc</sub> (L/kg)
Etridiazole	Sandy loam	6.6	2.4	8.9	8	8.21	0.86	349
	Clay	7.4	4.2	27	41	8.24	0.92	195
	Silt loam	7.3	1.6	17	23	5.06	0.84	323
	<b>Mean</b>					<b>7.17</b>	<b>0.87</b>	<b>289</b>
Dichloro-etridiazole	Sandy loam	6.6	2.4	8.9	8	2.77	0.81	118
	Clay	7.4	4.2	27	41	2.11	0.89	50
	Silt loam	7.3	1.6	17	23	1.99	0.83	128
	<b>Mean</b>					<b>2.29</b>	<b>0.84</b>	<b>99</b>
Etridiazole acid	Sandy loam	6.6	2.4	8.9	8	0.459	0.95	20
	Clay	7.4	4.2	27	41	0.547	0.84	13
	Silt loam	7.3	1.6	17	23	0.344	0.75	22
	<b>Mean</b>					<b>0.45</b>	<b>0.85</b>	<b>18</b>

No pH dependency of adsorption at the environmental relevant pH range is expected (based on pKa values of 2.77 for etridiazole and dichloro-etridiazole (set equal to parent) and 2.44 for etridiazole acid, charge transitions will only be significant outside of the environmental relevant pH range).

#### Non-aged column leaching

Reliable data were not submitted and are not required.

#### Aged column leaching

No studies submitted and not required.

#### PEC<sub>gw</sub> estimations

Exposure of groundwater is not relevant for the intended uses (glasshouse, application through (drip-) irrigation system to non-soil bound ornamentals and substrate grown peppers/tomatoes/cucumbers).

**Data requirements**

Because exposure of soil is negligible for the representative uses included in the Annex I dossier, no further data are required.

**B.8.3 Predicted environmental concentrations in soil (PECs) (Annex IIIA 9.1.3)**

Exposure of soil is not relevant for the intended uses (glasshouse, application through (drip-) irrigation system to non-soil bound ornamentals and substrate grown peppers, tomatoes and cucumbers).

**B.8.4 Fate and behaviour in water (Annex IIA 7.2.1; Annex IIIA 9.2.1/9.2.3)****B.8.4.1 Hydrolysis (Annex IIA 7.2.1.1)**

Hydrolysis data are summarised in Volume 3, B.2.

**B.8.4.2 Photolytic degradation (Annex IIA 7.2.1.2)**

No study is submitted and not required (because the molar absorption coefficient was  $<10 \text{ L mol}^{-1} \text{ cm}^{-1}$  (see volume 3, B.2), an aqueous photolysis study is not needed).



**B.8.4.3 Biological degradation****B.8.4.3.1 Ready biodegradability (Annex IIA 7.2.1.3.1)****STUDY 1****Characteristics**

reference	:	Seyfried B., 2001 (IIA 7.2.1.3.1/01)	incubation time	:	28 d
year of execution	:	2001	nominal concentration	:	7.7 mg/L
GLP statement	:	yes	temperature	:	22°C
guideline	:	OECD 301D; EC C.4-E	result	:	not readily biodegradable
test substance	:	Etridiazole, batch No. AC-1322-17	acceptability	:	acceptable
purity	:	purity 99.6%			
test system	:	activated sludge, closed bottle test			

**Study design**

The ready biodegradability of etridiazole was studied in a closed bottle test according to OECD 301D and EC C.4-E.

Test solutions containing etridiazole (7.7 mg/L) and inoculum prepared from aerobic activated sludge from a municipal sewage treatment plant (0.7 mL/L) were kept in completely full, closed bottles in the dark for 28 days at 22°C (in a temperature controlled room; temperature measured at the start of the incubation period). Inoculum blank controls (inoculum, no test substance), the reference substance (sodium benzoate, 3.1 mg/L) and the toxicity control (etridiazole, 3.9 mg/L and sodium benzoate, 1.5 mg/L) were included. Oxygen concentrations were determined in duplicate flasks using an oxygen electrode on day 0, 2 (no toxicity control), 5 (no toxicity control), 7 (toxicity control: single flask), 14, 21 (toxicity control: single flask) and 28 days.

**Results**

Oxygen depletion in the inoculum control was 0.98-1.06 mg/L after 28 days. Table B.8.4.3.1-01 summarises the other results. The pass level for the reference substance (60% ThOD) was reached within 5 days. Etridiazole was not readily biodegradable in this test (1% biodegradation after 28 days). No inhibitory effects of the test substance were observed (>25% degradation within 14 days).

**Table B.8.4.3.1-01 Biodegradation of etridiazole and sodium benzoate (% ThOD, duplicate means) corrected for degradation in the inoculum blank) in a closed bottle test.**

time (day)	etridiazole, 7.7 mg/L	sodium benzoate, 3.1 mg/L	toxicity control
2	-1	27	nd
5	1	61	nd
7	0	66	31
14	1	74	33
21	2	75	35
28	1	81	38

nd: not determined

## Conclusions

Etridiazole was not readily biodegradable in a closed bottle test. The study is acceptable.

## Guidelines & Limitations

The temperature was only measured at the start of the incubation period.

### B.8.4.3.2 Water-sediment studies (Annex IIA 7.2.1.3.2)

## STUDY 1

### Characteristics

reference	:	Schanné C., 1998 (IIA 7.2.1.3.2/01)	incubation time	:	104 d
year of execution	:	1997-1998	nominal concentration	:	0.84 mg/L
GLP statement	:	yes	temperature	:	20°C
guideline	:	OECD draft 308, 1997; BBA IV:5-1	DT50	:	see results
test substance	:	[3- <sup>14</sup> C]-Etridiazole, lot no: CSL-96-647-62-30	metabolites	:	see results
purity	:	radiochem. purity >97%	acceptability	:	acceptable
test system	:	sandy loam and silt water/sed			

### Study design

The behaviour of [3-<sup>14</sup>C]-etridiazole was studied in two water/sediment systems.

Sediment (top 5 to 10 cm) and associated water were sampled from two locations, sieved over 2 mm (sediment) and 0.2 mm (water) and stored for 4 weeks at 4°C before use. The water/sediment properties are listed in Table B.8.4.3.2-01. Water/sediment systems (2.4:1 ratio v/v; 195 or 65.8 g dry weight sediment + 550 mL water) were equilibrated for 3 weeks under continuous aeration at  $20 \pm 2^\circ\text{C}$  in the dark, prior to spiking. Aliquots (410 µL) of [3-<sup>14</sup>C]-etridiazole in ethanol were added to the water layer (<0.1% v/v) at a concentration of 839 µg/L (equivalent to a surface application of 2.5 kg as/ha distributed in a 30 cm deep water layer). Controls (410 µL ethanol, no test substance) were included to monitor pH, dissolved oxygen concentration and redox status. The water/sediment systems were incubated at  $20 \pm 2^\circ\text{C}$  in the dark. Humidified air was continuously passed over the water surface. The top-layer of the water surface was gently stirred. Volatiles and CO<sub>2</sub> were trapped in two ethylene-glycol and one 2M NaOH trap. Sediment biomass was determined at the beginning and end of the study. Redox potential (sediment and water), pH (water), dissolved oxygen (water) and temperature (incubation) were measured at various time points. During incubation water redox potentials were +107 to +233 mV (Rohrspitz) and +112 to +219 mV (Espel); sediment redox potentials were -92 to -236 mV (Rohrspitz) and -147 to -263 mV (Espel); oxygen concentration in the water (% saturation) was 22 to 79% (Rohrspitz) and 16 to 76% (Espel); pH was 7.1 to 8.2 (Rohrspitz) and 7.7 to 8.2 (Espel). The measurements indicate aerobic conditions in the water layer and anaerobic conditions in the sediment throughout the test in both water/sediment systems.

**Table B.8.4.3.2-01 Physico-chemical characterisation of water and sediment (prior to application, unless otherwise indicated)**

parameter	Rohrspitz, Lake Constance, Austria		Espel National Reserve Area, Gossau, Switzerland	
	water	sediment	water	sediment
textural class <sup>(A)</sup>	na	sandy loam	na	silt
% sand/silt/clay <sup>(A)</sup>	na	54/39/7	na	12/81/7
temperature <sup>(B)</sup> [°C]	6.1	5.9	3	3
CEC [meq/100 g] (start/end)	na	28/13	na	45/8
organic carbon [%]	na	1.0	na	5.7
TOC [mg C/L]	4	na	7	na
pH	8.1 <sup>(B)</sup>	7.5 <sup>(B)</sup>	8.0 <sup>(B)</sup>	7.7 <sup>(B)</sup>
microbial biomass <sup>(C)</sup> (start/end)	na	108/66	na	219/104
redox potential [mV]	126 <sup>(B)</sup>	-193 <sup>(B)</sup>	143 <sup>(B)</sup>	-226 <sup>(B)</sup>
dissolved oxygen [% saturation]	11 <sup>(B)</sup>	na	13 <sup>(B)</sup>	na

(A) according to USDA classification scheme

(B) on site

(C) mg microbial C/100 g

na = not applicable

Duplicate samples were taken at 0 (immediately and 6 h after dosing), 1, 2, 7, 14, 30, 62 and 104 days after treatment. Samples were either processed immediately or stored at -20°C (<2 months). Radioactivity in the water layer was determined by LSC, prior to analysis by HPLC-RAM (reversed phase). The sediment was extracted (Accelerated Soxhlet Extraction) three times with ACN/1%NH<sub>4</sub>OH (ratio not provided) and once with acetone, at 80°C or ambient temperature (first ACN/1%NH<sub>4</sub>OH extraction). Radioactivity in the extracts was determined by LSC. The combined ACN/1%NH<sub>4</sub>OH (80°C) extracts and the ACN/1%NH<sub>4</sub>OH (ambient temperature) extract were partitioned three times with dichloromethane. The remaining aqueous phase and dichloromethane extracts were concentrated prior to analysis by HPLC-RAM (reversed phase). The remaining sediment (of day 7 and day 104) was fractionated into fulvic and humic acids and humin. Unextractables were determined by combustion/LSC. Radioactivity in trapping solutions was determined by LSC; ethylene glycol was further analysed by HPLC-RAM (reversed phase) if containing >1% AR. Radioactivity in selected NaOH traps was confirmed to be CO<sub>2</sub> by Ba(OH)<sub>2</sub> precipitation. The recoveries of the concentration procedure of the aqueous samples was 95.3%±3.9% (Rohrspitz) and 93.9%±5.0% (Espel); for the dichloromethane phases 96.5%±7.8% (Rohrspitz) and 99.9%±8.4% (Espel).

Identification/quantification of etridiazole and metabolites was performed by HPLC-RAM analysis and comparison with reference standards. Etridiazole, etridiazole acid (3-COOH-T) and dichloro etridiazole (3-DCM-T) were confirmed by TLC; etridiazole acid was further confirmed by MS analysis.

## Results

The distribution of radioactivity is shown in Table B.8.4.3.2-02 and -03. Mass balances were 91-102% AR. The radioactivity level in the Rohrspitz/Espel water decreased from 100/99% AR on day 0 to 27/23% AR on day 7 and further to 14/15% AR on day 104. The amount of radioactivity partitioning into the Rohrspitz/Espel sediment increased to 48/55% AR on day 14 and was 34/42% AR on day 104. The unextractable fraction in the Rohrspitz/Espel sediment increased to 21/26% AR on day 14

and was 16/24% AR on day 104. Volatiles from the Rohrspitz/Espel system increased to 46/36% AR on day 104. CO<sub>2</sub> production was not significant ( $\leq 3.1\%$  AR). Of the unextractable sediment radioactivity of the Rohrspitz sediment, fulvic and humic acids were 19/14% AR (with fulvic acids 16/10% AR and humic acids 3.3/4.5% AR) while humins were 1.6/4.4% AR on day 7/104. Of the unextractable sediment radioactivity of the Espel sediment, fulvic and humic acids were 22/18% AR (with fulvic acids 20/14% AR and humic acids 2.3/4.1% AR) while humins were 2.2/2.1% AR on day 7/104.

**Table B.8.4.3.2-02 Distribution of radioactivity (% of applied) in Rohrspitz, Lake Constance water and sediment treated with [3-<sup>14</sup>C]-etridiazole at 839 µg/L and incubated at 20°C in the dark<sup>(A)</sup>**

days of incubation	% of applied						
	water (total)	sediment			CO <sub>2</sub>	volatiles	mass balance
		total	extractables	unextractables			
0	100	np	np	np	np	np	100
0.25	87	5.0	3.1	1.8	0.0	6.8	100
1	66	15	10	4.5	0.0	17	98
2	50	30	19	11	0.1	18	98
7	27	46	27	20	0.1	26	100
14	20	48	28	21	0.3	32	101
30	15	40	23	16	1.0	36	91
62	15	37	20	17	2.4	41	95
104	14	34	18	16	3.1	46	97

(A) mean of duplicate measurements

np: not performed

**Table B.8.4.3.2-03 Distribution of radioactivity (% of applied) in Espel National Reserve Area water and sediment treated with [3-<sup>14</sup>C]-etridiazole at 839 µg/L and incubated at 20°C in the dark<sup>(A)</sup>**

days of incubation	% of applied						
	water (total)	sediment			CO <sub>2</sub>	volatiles	mass balance
		total	extractables	unextractables			
0	99	np	np	np	np	np	99
0.25	79	4.3	1.5	2.8	0.0	15	99
1	65	22	14	8.0	0.0	15	102
2	49	27	16	11	0.0	22	98
7	23	51	27	25	0.1	26	100
14	20	55	29	26	0.1	26	101
30	15	49	27	23	0.6	29	93
62	14	42	21	20	1.3	36	92
104	15	42	18	24	2.3	36	92

(A) mean of duplicate measurements

np: not performed

Identified compounds in water, sediment or ethylene glycol (volatiles) are shown in Table B.8.4.3.2-04 and -05. Only metabolites (fractions) which were  $\geq 5\%$  of AR in any compartment are included in the tables. The level of etridiazole in water fell from 98/97% AR (Rohrspitz /Espel) on day 0 to 0.3/0.8% AR on day 7. The amount of etridiazole in ethylene glycol increased to 38/29% AR on day 104. 3-COOH-T was the most important metabolite in both water/sediment systems: maximum 13/7.1/<0.1% AR in water/sediment/volatiles of Rohrspitz system on day 62/62/104 and maximum 13/8.3/<0.1% AR in water/sediment/volatiles of Espel system on day 62-104/30/104. Other metabolites exceeding 5% AR in any compartment were 3-DCM-T (maximum 9.5/1.4/3.2% AR in water/sediment/volatiles of Rohrspitz system on day 2/2/104 and maximum 6.5/1.4/2.8% AR in water/sediment/volatiles of Espel system on day 2/2/14). Other identified metabolites never exceeding 5% AR in any compartment were

3-OHM-T ( $\leq 3.4\%$  AR in any compartement,  $\leq 4.9\%$  AR in total system) and 3-MCM-T ( $\leq 4.0\%$  AR in any compartement,  $\leq 6.2\%$  AR in total system). No single fraction of the 18 unidentified components exceeded  $4.8\%$  AR (total system) (except for unidentified M5 in the Rohrspitz system; see Table B.8.4.3.2-04). Unresolved radioactivity was  $\leq 7.6/\leq 7.1\%$  AR in the Rohrspitz/Espel system.

**Table B.8.4.3.2-04 Identification of radioactivity (% of applied) in Rohrspitz, Lake Constance water/sediment system treated with  $[3-^{14}\text{C}]$ -etridiazole at  $839 \mu\text{g/L}$  and incubated at  $20^\circ\text{C}$  in the dark<sup>(A) (B)</sup>**

Days of incubation	% of applied							
	water		sediment		ethylene glycol <sup>(C)</sup>		water+sediment	
	etridiazole	3-COOH-T	etridiazole	3-COOH-T	etridiazole	3-COOH-T	etridiazole	3-COOH-T
0	98	0.9	< 0.1	< 0.1	< 0.1	< 0.1	98	0.9
0.25	83	2.3	0.2	0.8	6.0	< 0.1	83	3.1
1	59	2.7	0.1	2.4	17	< 0.1	59	5.1
2	32	4.8	0.1	3.9	17	< 0.1	32	8.7
7	0.3	8.6	< 0.1	4.2	23	< 0.1	0.3	13
14	0.1	11	0.1	6.5	28	< 0.1	0.2	18
30	0.1	12	< 0.1	6.3	31	< 0.1	< 0.1	18
62	< 0.1	13	< 0.1	7.1	36	< 0.1	< 0.1	20
104	< 0.1	12	0.1	6.8	38	< 0.1	< 0.1	19
	3-DCM-T	M5 <sup>(D)</sup>	3-DCM-T	M5	3-DCM-T	M5	3-DCM-T	M5
0	0.2	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.2	< 0.1
0.25	0.6	< 0.1	1.0	0.1	< 0.1	< 0.1	1.6	0.2
1	3.5	< 0.1	1.1	0.7	< 0.1	< 0.1	4.1	0.8
2	9.5	0.9	1.4	1.0	0.3	< 0.1	11	1.9
7	0.8	4.8	0.4	2.9	1.5	0.5	1.1	7.7
14	< 0.1	1.7	0.3	2.9	1.5	1.6	0.3	4.6
30	< 0.1	0.9	0.2	2.5	1.9	0.9	0.2	3.4
62	< 0.1	0.1	0.1	2.5	2.0	1.0	0.2	2.6
104	< 0.1	< 0.1	0.1	0.9	3.2	1.2	0.2	1.0

(A) mean of duplicate measurements

(B) other identified fractions: 3-OHM-T ( $\leq 3.4\%$  AR in any compartement,  $\leq 4.7\%$  AR in total system), 3-MCM-T ( $\leq 4.0\%$  AR in any compartement,  $\leq 6.2\%$  AR in total system); 17 unidentified metabolites (all  $\leq 2.9\%$  AR); unresolved radioactivity ( $\leq 7.6\%$  AR)

(C) 0.2 to  $3.8\%$  AR was not characterised

(D) unidentified

**Table B.8.4.3.2-05 Identification of radioactivity (% of applied) in Espel National Reserve Area water/sediment system treated with [3-<sup>14</sup>C]-etridiazole at 839 µg/L and incubated at 20°C in the dark<sup>(A) (B)</sup>**

Days of incubation	% of applied							
	water		sediment		ethylene glycol <sup>(C)</sup>		water+ sediment	
	etridiazole	3-COOH-T	etridiazole	3-COOH-T	etridiazole	3-COOH-T	etridiazole	3-COOH-T
0	97	1.3	< 0.1	< 0.1	< 0.1	< 0.1	97	1.4
0.25	77	1.6	< 0.1	0.8	11	< 0.1	77	2.4
1	55	3.3	0.2	4.1	15	< 0.1	55	7.4
2	35	4.5	0.5	3.5	22	< 0.1	35	8.0
7	0.8	8.4	0.1	5.5	23	< 0.1	0.9	14
14	0.1	10	0.2	7.8	21	< 0.1	0.3	18
30	< 0.1	12	0.2	8.3	24	< 0.1	0.2	20
62	< 0.1	13	0.1	7.2	31	< 0.1	0.1	20
104	< 0.1	13	< 0.1	7.2	29	< 0.1	< 0.1	20
	3-DCM-T	-	3-DCM-T	-	3-DCM-T	-	3-DCM-T	-
0	0.1	-	< 0.1	-	< 0.1	-	0.1	-
0.25	0.4	-	0.3	-	< 0.1	-	0.7	-
1	4.3	-	1.0	-	< 0.1	-	5.3	-
2	6.5	-	1.4	-	0.2	-	7.8	-
7	2.1	-	0.4	-	2.1	-	2.5	-
14	< 0.1	-	0.3	-	2.8	-	0.3	-
30	< 0.1	-	0.4	-	1.8	-	0.4	-
62	< 0.1	-	0.1	-	2.0	-	< 0.1	-
104	< 0.1	-	< 0.1	-	1.6	-	< 0.1	-

(A) mean of duplicate measurements

(B) other identified fractions: 3-OHM-T (≤3.3% AR in any compartment, ≤4.9% AR in total system), 3-MCM-T (≤2.7% AR in any compartment, ≤3.5% AR in total system); 18 unidentified metabolites (all ≤4.8% AR); unresolved radioactivity (≤7.1% AR)

(C) 0.1 to 2.6% AR was not characterised

DT<sub>50</sub> values were calculated following the recommendations and procedures of the “Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration” (SANCO/10058/2005). All calculations were performed with ModelMaker v 4.0 software. Level P-I and M-I DT<sub>50</sub> values were calculated for etridiazole and metabolites ≥5% AR in any compartment (i.e. 3-COOH-T, 3-DCM-T and M5).

#### Etridiazole

SFO and FOMC models were evaluated by the RMS, and the results for the best fit model are presented in Table B.8.4.3.2-06. In order to obtain DT<sub>50</sub> values for degradation in the total system, a correction for volatilisation was made. This was done by fitting a conceptual model containing the compartments “volatiles” and “water+sediment” and the parameters k<sub>vol</sub> (volatilisation rate), k<sub>deg</sub> (degradation rate total system) and Pini (initial concentration). For sediment, no DT<sub>50</sub> values were calculated due to the low amounts of etridiazole present in the sediment.

**Table B.8.4.3.2-06** Half-lives for etridiazole in various compartments of Espel and Rohrspitz water/sediment systems treated with [3-<sup>14</sup>C]-etridiazole at 839 µg/L and incubated in the dark at 20°C.

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub>	DT <sub>90</sub>	DT <sub>50</sub>	DT <sub>90</sub>
Espel system (water+sediment)	degradation	SFO	6.75	0.977	1.78	5.91	1.78	5.91
Rohrspitz system (water+sediment)	degradation	SFO	2.88	0.981	1.92	6.38	1.92	6.38
Espel water column	degradation volatilisation mass transfer	SFO	5.29	0.994	1.33	4.41	1.78 <sup>1</sup>	5.91
Rohrspitz water column	degradation volatilisation mass transfer	SFO	2.91	0.996	1.29	4.29	1.92 <sup>1</sup>	6.38
Espel sediment	dissipation	na	na	na	-	-	1.78 <sup>1</sup>	-
Rohrspitz sediment	dissipation	na	na	na	-	-	1.92 <sup>1</sup>	-

SFO: single first order

<sup>1</sup> DT<sub>50/90</sub> for total system are taken (because volatilisation/mass transfer are included in the SFO DT<sub>50/90</sub> for dissipation from the water column)

#### *Etridiazole acid (3-COOH-T)*

DT<sub>50</sub> values for 3-COOH-T could not be calculated as a plateau value was reached at the end of the incubation period.

#### *Dichloro-etridiazole (3-DCM-T)*

SFO and FOMC models were evaluated by the RMS, and the results for the best fit model are presented in Table B.8.4.3.2-07. Data points were taken from the maximum percentage of occurrence of 3-DCM-T onwards. No corrections for volatilisation (≤3.2% AR) were made. For sediment, no DT<sub>50</sub> values were calculated due to the low amounts of 3-DCM-T present in the sediment.

**Table B.8.4.3.2-07 Half-lives for 3-DCM-T in various compartments of Espel and Rohrspitz water/sediment systems treated with [3-<sup>14</sup>C]-etridiazole at 839 µg/L and incubated in the dark at 20°C.**

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub>	DT <sub>90</sub>	DT <sub>50</sub>	DT <sub>90</sub>
Espel system (water+sediment)	degradation volatilisation formation	SFO	7.01	0.995	2.99	9.33	2.99	9.33
Rohrspitz system (water+sediment)	degradation volatilisation formation	SFO	5.38	0.995	1.55	5.14	1.55	5.14
Espel water column	degradation volatilisation mass transfer formation	SFO	6.21	0.992	2.92	9.71	2.99 <sup>1</sup>	9.33
Rohrspitz water column	degradation volatilisation mass transfer formation	SFO	0.51	0.996	1.38	4.59	1.55 <sup>1</sup>	5.14
Espel sediment	dissipation	na	na	na	-	-	2.99 <sup>1</sup>	-
Rohrspitz sediment	dissipation	na	na	na	-	-	1.55 <sup>1</sup>	-

SFO: single first order

<sup>1</sup> DT<sub>50/90</sub> for total system are taken (because volatilisation/mass transfer are included in the SFO DT<sub>50/90</sub> for dissipation from the water column)

#### M5

SFO, FOMC and DFOP models were evaluated by the RMS, and the results for the best fit model are presented in Table B.8.4.3.2-08. Data points were taken from the maximum percentage of occurrence of M5 onwards. No corrections for volatilisation (≤1.6% AR) were made. Calculations were only performed for the Rohrspitz system (in the Espel system, only low levels of M5 were observed). For sediment, no DT<sub>50</sub> values were calculated due to the low amounts of M5 present in the sediment.

**Table B.8.4.3.2-08 Half-lives for M5 in various compartments of Espel and Rohrspitz water/sediment systems treated with [3-<sup>14</sup>C]-etridiazole at 839 µg/L and incubated in the dark at 20°C.**

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub>	DT <sub>90</sub>	DT <sub>50</sub>	DT <sub>90</sub>
Rohrspitz system (water+sediment)	degradation (volatilisation)	DFOP	5.70	0.933	17.20	132	39.76 <sup>1</sup>	-
Rohrspitz water column	degradation volatilisation mass transfer	DFOP	5.20	0.988	2.15	35.50	39.76 <sup>2</sup>	-
Rohrspitz sediment	dissipation	na	na	na	-	-	39.76 <sup>2</sup>	-

DFOP: double first-order in parallel model

<sup>1</sup> according to FOCUS guidance, DT<sub>50</sub> is based on the slow phase of the DFOP degradation curve

<sup>2</sup> DT<sub>50</sub> for total system are taken (because volatilisation/mass transfer are included in the DT<sub>50</sub> for dissipation from the water column)

#### Conclusions

In two water/sediment systems, treated with [3-<sup>14</sup>C]-etridiazole at a concentration of 839 µg/L and incubated at 20°C in the dark, etridiazole degraded in the total water/sediment system with half-lives of 1.78 d (r<sup>2</sup> 0.977) and 1.92 d (r<sup>2</sup> 0.981). No half-life for the sediment could be calculated. The half-lives for dissipation from the water layer were 1.33 d (r<sup>2</sup> 0.994) and 1.29 d (r<sup>2</sup> 0.996). CO<sub>2</sub> production



was low ( $\leq 3.1\%$  after 104 days). Significant amount of volatiles were trapped (up to 36-46% AR on day 104), containing mostly etridiazole. Unextractables were maximum 21 and 26% AR (day 14) and 16-24% AR on day 104. Etridiazole acid was the most important metabolite in both water/sediment systems: maximum 13/8.3/ $<0.1\%$  AR in water/sediment/volatiles on day 62/30/104. Other metabolites exceeding 5% AR in any compartment were dichloro-etridiazole (maximum 9.5/1.4/3.2% AR in water/sediment/volatiles on day 2/2/104) and M5 (maximum 4.8/2.9/1.6% AR in water/sediment/volatiles on day 7/7-14/14). Other identified metabolites never exceeding 5% AR in any compartment were 3-OHM-T and 3-MCM-T. No other unidentified fractions exceeded 4.8% AR (total system). Dichloro-etridiazole dissipated in the total water/sediment system with half-lives of 1.55 d ( $r^2$  0.995) and 2.99 d ( $r^2$  0.995). M5 dissipated in the total water/sediment system with a half-life of 17.2 d ( $r^2$  0.933). No half-life for the sediment could be calculated. The study is considered acceptable (see comments below).

### Guidelines & Limitations

1. The water: sediment volume ratio was 2.4:1. OECD 308 recommends a ratio of 3:1 to 4:1.
2. In the Rohrsplitz system, etridiazole in the volatile traps increased from 23% AR to 38% AR from day 7 to day 104. However, total etridiazole contents in water+sediment were only 0.3% AR on day 7. For the Espel system, a similar observation was made. These results are not in agreement with each other, but the author of the report did not comment on this peculiar fact. Because the quantification of etridiazole in water en volatile traps did not require any extraction/concentration procedures, the analytical results for these compartments are considered reliable. Sediment was extracted first with cold ACN/1%NH<sub>4</sub>OH and thereafter at high temperatures (80°C) with the same solvent and with acetone, and after partitioning with dichloromethane further concentrated prior to analysis. The extraction efficiency should have been adequate, considering the good mass balances, but the stability of etridiazole through the extraction and concentration procedures was not proven. However, in various studies on degradation of etridiazole in soil (e.g. study 4 of B.8.1.1.1), cold extraction with MeOH and MeOH/NH<sub>4</sub>OH was employed, and this resulted in complete extraction of etridiazole without evidence of instability of etridiazole during cold extraction. Concentration of dichloromethane extracts, into which etridiazole is assumed to have partitioned, is unlikely to have caused quantitative degradation (e.g., this did not occur during concentration of extracts in the validation of the analytical method for determination of residues in soil, study 1 of section B.5.3). In the present study, the first cold extraction removed a significant portion of the radioactivity in sediment. Although etridiazole is assumed to be stable through the cold extraction and concentration steps, the sediment extracts never contained any significant amounts of etridiazole. This indicates that etridiazole is rapidly degraded in sediment, and the very low levels of etridiazole in sediment are due to degradation in sediment and not the result of degradation during extraction or work-up of samples. It is thought unlikely therefore, that the increase of etridiazole levels in volatile traps collected at later time points during the study is the result of back partitioning of etridiazole from sediment into water followed by volatilisation. A possible explanation is a systematic bias in the sampling scheme. Each flask had its own volatile traps. In the experimental set-up, the incubation and in particular the aeration conditions for the

flasks sampled late during the study may have differed from those sampled early. There is insufficient ground to ask additional questions to clarify this matter, since the main parameters (degradation rates of parent and metabolites and maximum formation percentages of metabolites) were either sufficiently established by the data obtained up to day 14 of incubation, or were independent of the appearance of parent material in the traps at later sampling times (e.g. the plateau levels achieved by 3-COOH-T in water, sediment and total system). The study is therefore acceptable.

## STUDY 2

### Characteristics

reference	:	Völkel W., 2000 (IIA 7.2.1.3.2/02)	incubation time	:	180 d
year of execution	:	1999-2000	nominal concentration	:	0.17 mg/L
GLP statement	:	yes	temperature	:	20°C
guideline	:	SETAC, 1995	DT50	:	see results
test substance	:	[3- <sup>14</sup> C] Etridiazole acid, lot No.: CSL-99-866-29-13	metabolites	:	see results
purity	:	radiochem. purity ≥97%	acceptability	:	acceptable
test system	:	loamy sand and sandy loam water/sed			

### Study design

The behaviour of [3-<sup>14</sup>C] etridiazole acid was studied in two water/sediment systems.

Sediment and associated water were sampled from two locations, sieved over 2 mm and 0.2 mm and stored for ~1 week at 7-8°C before use. The water/sediment properties are listed in Table B.8.4.3.2-09. Water/sediment systems (v/v ratio between 2.3:1 and 2.0:1: 156 g/58 g (river/pond) dry weight sediment + 550 mL water) were equilibrated for 2 weeks under continuous aeration and gently stirring, prior to spiking. Aliquots (520 µL) of [3-<sup>14</sup>C] etridiazole acid in water:acetone (1:1 v/v) (<0.1% v/v) were added to the water layer at a concentration of 167 µg/L. The water/sediment systems were incubated at 20 ± 2°C in the dark. Humidified air was continuously passed through the surface-layer of the water. The water layer was gently agitated. Volatiles and CO<sub>2</sub> were trapped in ethylene-glycol and 2N NaOH traps. Sediment biomass was determined at the beginning, after 120 days and at the end of the study. Redox potential (sediment and water), pH (water) and dissolved oxygen (water) were measured at various time points in the equilibration and incubation phase of the study. Results show that equilibration was reached. Water redox potentials (incubation phase) were +109 to +217 mV (River) and +144 to +211 mV (Pond). Sediment redox potentials (incubation phase) were -112 to -151 mV (River) and -66 to -115 mV (Pond). Oxygen concentration in the water (incubation phase) was 5.2 to 8.1 mg/L (River) and 4.2 to 8.3 mg/L (Pond). PH was 8.0 to 8.4 (River) and 7.6 to 8.3 (Pond).

**Table B.8.4.3.2-09 Physico-chemical characterisation of water and sediment**

parameter	River Rhine, Rheinsulz, Switzerland		Pond Ormalingen BL, Switzerland	
	water	sediment	water	sediment
textural class <sup>(A)</sup>	na	loamy sand	na	sandy loam
% sand/silt/clay <sup>(A)</sup>	na	76/18/6	na	50/47/3
CEC [mVal/kg]	na	5.30	na	32.61
organic carbon [g C/100 g dry sediment]	na	0.77	na	5.38
pH <sup>(B)</sup>	8.3	7.5	8.4	7.3
microbial biomass [g/kg] (start/120d/end)	na	0.44/0.31/0.30	na	1.03/0.82/0.50
redox potential [mV] <sup>(C)</sup>	186	-157	178	-137
dissolved oxygen [mg/L] <sup>(B)</sup>	7.1	na	5.1	na

(A) According to USDA classification scheme

(B) Determined at the end of acclimatisation (water) or before acclimation (sediment)

(C) Determined at the end of acclimatisation

na = not applicable

One sample of each system was taken and processed at 0, 1, 8, 16, 33, 64, 125 and 180 days after treatment. Volatiles were sampled at each sampling event during the first month of incubation and every 2 to 4 weeks thereafter. Radioactivity in the water layer was determined by LSC. If required (not specified in report), water samples were concentrated (~35°C, reduced pressure) prior to HPLC-RAM (reversed phase) analysis. The sediment was extracted up to three times with acetonitrile:1% ammonium hydroxide 1:1 and once with water if necessary (not specified in report). Day 64 (Pond) and day 125 and 180 (River and Pond) sediments were further extracted with acetonitrile:water (9:1) under reflux for 4 hours. Radioactivity in extracts was determined by LSC. Extracts containing >1% AR were combined and concentrated (~35°C, reduced pressure) prior to LSC and HPLC-RAM (reversed phase) analysis. Unextractables were determined by combustion/LSC. Radioactivity in trapping solutions was determined by LSC. Radioactivity in combined aliquot samples of the NaOH traps was confirmed to be CO<sub>2</sub> by Ba(OH)<sub>2</sub> precipitation. The recoveries of the concentration procedure and the HPLC recoveries were reported and were acceptable.

Identification/quantification of etridiazole acid and metabolite T-08 (3-carboxy-5-hydroxy-1,2,4-thiadiazole) was performed by HPLC-UV/RAM and 1D TLC analysis and comparison with reference standards.

## Results

The distribution of radioactivity is shown in Tables B.8.4.3.2-10 and -11. Mass balances were 95-104% AR. The radioactivity level in the River water decreased from 101% AR on day 0 to 63% AR on day 180. The radioactivity level in the Pond water decreased from 104% AR on day 0 to 49% AR on day 180. The amount of radioactivity partitioning into sediment increased to 19/35% AR on day 8/16 (River/Pond) and remained stable thereafter (up to day 180). The unextractable fraction in sediment increased to 2.5/4.3% AR (River/Pond) on day 180. CO<sub>2</sub> production started to increase from day 33 (2.8/1.6% AR in River/Pond) to 15% AR (both systems) on day 180. Volatiles were not significant (<0.1% AR).

**Table B.8.4.3.2-10 Distribution of radioactivity (% of applied) in River Rhine water and sediment treated with [3-<sup>14</sup>C] etridiazole acid at 167 µg/L and incubated at 20°C in the dark**

days of incubation	% of applied						
	water (total)	sediment			CO <sub>2</sub>	volatiles	mass balance
		total	extractables	unextractables			
0	101	2.8	2.3	0.6	np	np	103
1	93	8.1	7.6	0.5	0.1	<0.1	102
8	78	19	19	0.9	0.7	<0.1	98
16	76	21	20	1.5	0.6	<0.1	98
33	75	21	20	1.8	2.8	<0.1	99
64	67	22	19	3.3	7.4	<0.1	97
125	66	18	16 <sup>(A)</sup>	2.4	14	<0.1	97
180	63	17	15 <sup>(B)</sup>	2.5	15	<0.1	95

np: not performed

(A) includes 0.6% AR of reflux extraction

(B) includes 0.7% AR of reflux extraction

**Table B.8.4.3.2-11 Distribution of radioactivity (% of applied) in Pond Ormalingen water and sediment treated with [3-<sup>14</sup>C] etridiazole acid at 167 µg/L and incubated at 20°C in the dark**

days of incubation	20 °C in the dark						
	water (total)	% of applied			CO <sub>2</sub>	volatiles	mass balance
		total	extractables	unextractables			
0	104	0.8	0.7	0.2	np	np	104
1	89	11	11	0.5	<0.1	<0.1	100
8	75	25	25	0.9	0.4	<0.1	101
16	62	35	34	1.1	0.6	<0.1	98
33	60	36	35	1.7	1.6	<0.1	98
64	55	37	34 <sup>(A)</sup>	3.1	3.8	<0.1	95
125	55	36	34 <sup>(B)</sup>	2.1	12	<0.1	104
180	49	34	29 <sup>(C)</sup>	4.3	15	<0.1	97

np: not performed

(A) includes 4.6% AR of reflux extraction

(B) includes 0.5% AR of reflux extraction

(C) includes 0.8% AR of reflux extraction

Identified compounds in water or sediment are shown in Table B.8.4.3.2-12. The level of etridiazole acid in water fell from 99/104% AR on day 0 to 62/49% AR on day 180 (River/Pond). One metabolite was identified (T-08) (maximum 0.6/0.5/1.1% AR in water/sediment/total system on day 64/64/64 (River) and 0.6/0.5/0.8% AR in water/sediment/total system on day 1/64/64 (Pond)). The maximum sum of unidentified components (3 in River; 4 in Pond) was 1.5/0.1/1.6% AR in water/sediment/total system (with no single fraction exceeding 1.6% AR).

**Table B.8.4.3.2-12 Identification of radioactivity (% of applied) in water and sediment treated with [3-<sup>14</sup>C] etridiazole acid at 167 µg/L and incubated at 20°C in the dark**

Days of incubation	% of applied					
	River Rhine (etridiazole acid) <sup>(A)</sup>			Pond Ormalingen (etridiazole acid) <sup>(B)</sup>		
	water	sediment	total	water	sediment	total
0	99	2.3	101	104	nd	104
1	92	7.5	99	88	11	98
8	78	18	96	75	25	99
16	76	20	96	62	34	96
33	75	19	94	60	34	95
64	66	18	84	54	33	87
125	65	15	80	55	33	88
180	62	14	76	49	28	77

(A) in addition 4 metabolites were detected (all ≤1.5% AR), one of which was identified to be T-08.

(B) in addition 5 metabolites were detected (all ≤0.9% AR), one of which identified to be T-08

nd: not detected

DT<sub>50</sub> values were calculated following the recommendations and procedures of the “Guidance document on estimating persistence and degradation kinetics from Environmental Fate studies on pesticides in EU registration” (SANCO/10058/2005). All calculations were performed with ModelMaker v 4.0 software. (SFO = single first-order, FOMC = first-order multi-compartment, DFOP = double first-order parallel model, HS = Hockey stick model)

#### *Etridiazole acid*

SFO and FOMC models were evaluated by the RMS. In the case that the FOMC model gave the best fit, also HS and DFOP models were evaluated. The results for the best fit model are presented in Table B.8.4.3.2-13. For sediment, no DT<sub>50</sub> value was calculated for the Pond system because only two data points (day 125 and 180) were available for the decline phase. For River Rhine, data points were taken from the maximum percentage of occurrence of etridiazole acid onwards (day 16).

**Table B.8.4.3.2-13 Half-lives for etridiazole acid in various compartments of River and Pond water/sediment systems treated with [3-<sup>14</sup>C]-etridiazole acid at 167 µg/L and incubated in the dark at 20°C.**

compartment	process	best fit kinetics	Chi <sup>2</sup> (error)	r <sup>2</sup>	endpoints			
					persistence		modelling	
					DT <sub>50</sub>	DT <sub>90</sub>	DT <sub>50</sub>	DT <sub>90</sub>
River water+sediment	degradation	SFO	1.90	0.941	427	1417	427	1417
Pond water+sediment	degradation	SFO	2.23	0.889	517	1718	517	1718
River water column	degradation mass transfer	DFOP	2.08	0.981	320	1547	427 <sup>1</sup>	-
Pond water column	degradation mass transfer	DFOP	4.23	0.968	189	1649	517 <sup>1</sup>	-
River sediment	dissipation	SFO	1.89	0.972	291	968	427 <sup>1</sup>	-
Pond sediment	dissipation	na	na	na	-	-	517 <sup>1</sup>	-

SFO: single first order

<sup>1</sup> DT<sub>50</sub> for total system taken (because mass transfer is included in the DFOP persistence DT<sub>50/90</sub> for the water column)

#### **Conclusions**

In two water/sediment systems, treated with [3-<sup>14</sup>C]-etridiazole acid at a concentration of 167 µg/L and incubated at 20°C in the dark, etridiazole acid degraded in the total water/sediment system with half-lives of 427 d (r<sup>2</sup> 0.941) and 517 d (r<sup>2</sup> 0.889). The half-life in sediment (one system) was 291 d (r<sup>2</sup> 0.972). The half-lives for dissipation from the water layer were 320 d (r<sup>2</sup> 0.981) and 189 d (r<sup>2</sup> 0.968). CO<sub>2</sub> production was 15% AR after 180 days. Unextractables were maximum 3.3 and 4.3% AR (day 64 and 180, respectively).

#### **Guidelines & Limitations**

1. The water:sediment volume ratio was 2.3:1 to 2.0:1. OECD 308 recommends 3:1 to 4:1. As the water layer was ~6 cm, this was sufficient to establish a redox gradient in the system. The study is therefore considered acceptable.

**STUDY 3****Characteristics**

reference	:	Muttzall P.I. and De Kreuk J.F., 1987 (IIA 7.2.1.3.2/03)	incubation time	:	84 d
year of execution	:	1986-1987	nominal concentration	:	0.3 and 1.0 mg/L
GLP statement	:	no	temperature	:	20°C
guideline	:	Not indicated	DT50	:	see results
test substance	:	(a) Etridiazole, lot No. not indicated (b) [3- <sup>14</sup> C]-Etridiazole, lot No: NEN 2176-286	metabolites	:	see results
purity	:	(a) purity 99.8% (b) radiochem. purity 98%	acceptability	:	supplementary
test system	:	silty clay loam water/sed (2x)			

**Study design**

The biodegradation of [3-<sup>14</sup>C]-etridiazole was studied in two water/sediment systems (non-GLP).

Sediment and associated water were sampled from two locations, sieved (sediment; diameter not specified) and stored (non-specified conditions) for ~2 days before use. The sediment properties are listed in Table B.8.4.3.2-14; pH of the water was 7.7. The water (6 L) was treated with non-radiolabelled etridiazole in 100 µL of DMSO. Aliquots (96.4 mL) of the treated water were added to a flask containing 3.6 mL of sediment, and each flask was then treated with 10 µL of [3-<sup>14</sup>C]-Etridiazole in DMSO. The nominal test concentrations were 1.0 and 0.3 mg etridiazole/L. Water/sediment systems were incubated under continuous shaking (100 rpm) at 20°C (actual temperature and light/dark scheme not provided). Air above the water/sediment system was refreshed every two weeks. CO<sub>2</sub> was trapped in one 10M NaOH trap. pH (water) was measured at various time points during incubation.

**Table B.8.4.3.2-14 Physico-chemical characterisation of sediment**

parameter	ditch at Delft, The Netherlands ("TNO sediment system")	river "Kromme Rijn", The Netherlands <sup>(B)</sup>
textural class <sup>(A)</sup>	silty clay loam	silty clay loam
% sand/silt/clay <sup>(A)</sup>	19/49/32	16/44/40
Organics (%)	29.6	7.4
pH (KCl)	7.0	7.0

(A) According to USDA classification scheme

(B) The report stated that this sediment is considered to be polluted with biocides (no further details provided)

Samples (duplicate for the 1.0 mg/L and single for the 0.3 mg/L) were taken at 0, 1, 2, 4, 6, 8, 10 and 12 weeks after treatment. The water and sediment phase were separated by centrifugation. Radioactivity in the aqueous phase was determined by LSC. Each aqueous phase was freeze dried and redissolved in methanol prior to TLC analysis (if containing >5% AR). The sediment was extracted sequentially with acetonitrile, methanol and water. Radioactivity in extracts was determined by LSC. The organic extracts were combined, concentrated and analyzed by TLC (if containing >5% AR). Sediment unextractables were determined by combustion/LSC. Radioactivity in the NaOH trapping solutions was determined by LSC.

Analysis of etridiazole and metabolites was performed by TLC, but apart from etridiazole no reference standards were used and further attempts to identify the metabolites were not made.

## Results

The distribution of radioactivity is shown in Table B.8.4.3.2-15 and 16. Mass balances were 82-97% AR in the 1.0 mg/L incubation and could not be calculated for the 0.3 mg/L incubation (no unextractable radioactivity measured). The radioactivity level in the water phase of the "Kromme Rijn" system decreased from ~73% AR in week 0 to ~55% after 4 weeks and remained stable at ~54% AR thereafter. The radioactivity level in the water phase of the TNO sediment did not change during the incubation period (~55% AR). The extractable radioactivity in the "Kromme Rijn" sediment decreased from 13% AR in week 0 to ~4% AR after 12 weeks. The extractable radioactivity in the TNO sediment decreased from ~33% AR in week 0 to ~8% AR after 12 weeks. The unextractable fraction in the "Kromme Rijn" sediment increased to 11% AR after 12 weeks (1.0 mg/L incubation). The unextractable fraction in the TNO sediment increased to 18% AR after 4 weeks and was 15% AR after 12 weeks (1.0 mg/L incubation). CO<sub>2</sub> production increased until week 12 to ~25% AR and ~20% AR in the "Kromme Rijn" and TNO sediment system, respectively.

**Table B.8.4.3.2-15 Distribution of radioactivity (% AR) in "Kromme Rijn" water and sediment treated with etridiazole / [3-<sup>14</sup>C]-etridiazole at 0.3 mg/L and 1.0 mg/L and incubated at 20°C on a rotary shaker (100 rpm)**

weeks of incubation	water		Sediment				CO <sub>2</sub>		Mass balance	
	0.3 mg/L	1.0 mg/L	extractables		unextractables		0.3 mg/L	1.0 mg/L	0.3 mg/L	1.0 mg/L
			0.3 mg/L	1.0 mg/L	0.3 mg/L	1.0 mg/L				
0	71	75	13	13	nd	1	-	-	na	89
1	59	61	17	14	nd	6	3	3	na	84
2	59	60	11	12	nd	8	6	7	na	87
4	57	53	8	10	nd	8	12	11	na	82
6	58	51	9	9	nd	9	15	15	na	84
8	55	52	7	6	nd	10	18	20	na	88
10	56	52	5	5	nd	12	24	23	na	92
12	56	49	5	3	nd	11	21	29	na	92

nd: not determined

na: not applicable

**Table B.8.4.3.2-16 Distribution of radioactivity (% AR) in "TNO" water and sediment treated with etridiazole / [3-<sup>14</sup>C]-etridiazole at 0.3 mg/L and 1.0 mg/L and incubated at 20°C on a rotary shaker (100 rpm)**

weeks of incubation	water		Sediment				CO <sub>2</sub>		mass balance	
	0.3 mg/L	1.0 mg/L	extractables		unextractables		0.3 mg/L	1.0 mg/L	0.3 mg/L	1.0 mg/L
			0.3 mg/L	1.0 mg/L	0.3 mg/L	1.0 mg/L				
0	55	55	34	31	nd	4	-	-	na	90
1	47	46	32	33	nd	7	2	2	na	88
2	52	50	17	21	nd	13	5	5	na	89
4	55	54	16	14	nd	18	8	9	na	95
6	54	55	12	11	nd	18	11	12	na	96
8	54	55	6	11	nd	15	16	14	na	95
10	51	54	4	9	nd	15	24	16	na	94
12	57	57	7	8	nd	15	20	17	na	97

nd: not determined

na: not applicable

Etridiazole and unidentified compounds in water or sediment as reported are shown in Table B.8.4.3.2-16. The level of Etridiazole fell from 84/41% AR in week 0 to 4/2% AR in week 2/2 ("Kromme Rijn"/TNO total system concentration). In water a metabolite at  $R_f=0.1$  increased to a maximum after approximately 2 weeks and remained stable at ~50% AR thereafter. In sediment, a metabolite at  $R_f=0.60$  increased to a maximum after 1 to 2 weeks (12 to 29% AR) and decreased to 2 to 6% AR after 12 weeks. Two other metabolites in the TNO sediment decreased from 5% to 1% AR or increased to 11% AR during the incubation period.

**Table B.8.4.3.2-16 Identification of radioactivity (% of applied) in "Kromme Rijn" and TNO water and sediment treated with etridiazole/[3-<sup>14</sup>C]-etridiazole<sup>(A)</sup> and incubated at 20°C on a rotary shaker (100 rpm)**

weeks of incubation	% of applied							
	Water <sup>(B)</sup>		sediment				system (etridiazole)	
	$R_f=0.10$ ("Kromme Rijn")	$R_f=0.10$ (TNO)	$R_f=0.60$ ("Kromme Rijn")	$R_f=0.60$ (TNO)	$R_f=0.00$ (TNO)	$R_f=0.1$ (TNO)	"Kromme Rijn"	TNO
0	5	13	-	26	5	-	84	41
1	51	41	9	29	5	-	14	5
2	53	44	12	17	3	1	4	2
4	55	49	10	14	3	1	-	2
6	51	49	10	8	2	2	-	-
8	49	51	5	8	1	2	-	-
10	50	48	6	5	1	4	-	-
12	43	46	2	6	1	11	-	-

(A) not specified from which test concentration (1.0 mg/L or 0.3 mg/L)

(B) "Kromme Rijn" included at  $R_f=0.67$  one metabolite at 2 weeks (1% AR). Both systems included one metabolite at  $R_f=0.24$  up to 4% AR.

## Conclusions

In two water/sediment systems (1% w/w sediment), treated with etridiazole/[3-<sup>14</sup>C]-etridiazole at 0.3 mg/L or 1.0 mg/L and incubated for 12 weeks at 20°C on a rotary shaker (100 rpm), 17% to 29% mineralization of etridiazole was observed. One main (>10%) unidentified metabolite fraction was present in water (max 55% at 4 weeks). In sediment two main (>10%) metabolite fractions were observed (max 29% AR after 1 week and max 11% AR after 12 weeks). Two minor metabolites (≤4% AR) were detected in the water phase and one minor metabolite (≤5% AR) in the sediment. The study is considered supplementary and will not be further used.

## Guidelines & Limitations

1. The test design deviates significantly from OECD 308 (e.g. continuous agitation of water and sediment at 100 rpm, 1% sediment, no redox gradient). The results are therefore considered supplementary and will not be included in the List of Endpoints.
2. Bound residues in the 0.3 mg/L experiments were not determined.
3. A record of actual measured temperature during incubation was not reported.
4. The light regime during the study was not reported.
5. Radioactivity in the NaOH trapping solutions was not confirmed to be CO<sub>2</sub>.
6. The percentage organics in the TNO sediment (29.6%) is considered to be high.



#### B.8.4.4 Summary and assessment

##### Hydrolysis

The study is summarised in Volume 3, B.2. The hydrolysis half-lives at 25°C in distilled water, 0.01M phosphate buffered solutions of pH 5.2, 7.1 and 8.9 in the dark were 98, 92, 98 and 88 days, respectively. Etridiazole-acid was the only product of hydrolysis (65-72% AR). In additional experiments (start concentration ~6 mg/L) half-lives of 96, 98 and 97 days were obtained at pH 3, 6 and 9 at 25°C; 32, 31 and 24 days at 35°C and 11, 12 and 5.9 days at 45°C. Similar half-lives were observed at start concentrations of ~45 mg/L. At pH 9 and 45°C (conditions giving highest hydrolysis rate), oxalic acid (<5% AR) was identified in addition to etridiazole acid.

##### Photolysis

No study was submitted. A study is not required because the molar absorption coefficient of etridiazole was  $<10 \text{ L mol}^{-1} \text{ cm}^{-1}$  (see volume 3, B.2).

##### Biodegradability

###### Ready biodegradability

Etridiazole was not readily biodegradable in a closed bottle test.

###### Aerobic water/sediment studies

Standard (in the dark) water/sediment studies with etridiazole and etridiazole acid were submitted. In addition a water/sediment study in a continuously mixed water:sediment suspension was submitted. Because this test system deviates from the appropriate guidelines, the latter study is not summarised below and results are not included in the list of endpoints.

In two water/sediment systems, treated with  $[3\text{-}^{14}\text{C}]$ -etridiazole at a concentration of 839  $\mu\text{g/L}$  and incubated at 20°C in the dark, etridiazole *degraded* in the total water/sediment system with (persistence & modelling) half-lives of 1.78 and 1.92 d. No half-life for the sediment could be calculated. The (persistence) half-lives for *dissipation* from the water layer were 1.33 and 1.29 d.  $\text{CO}_2$  production was low ( $\leq 3.1\%$  after 104 days). Significant amount of volatiles were trapped (up to 36-46% AR on day 104), containing mostly etridiazole. Unextractables were maximum 21 and 26% AR (day 14) and were 16-24% AR on day 104. Etridiazole acid was the most important metabolite in both water/sediment systems: maximum 13/8.3/<0.1% AR in water/sediment/volatiles on day 62/30/104. Other metabolites exceeding 5% AR in any compartment or total system were dichloro-etridiazole (maximum 9.5/1.4/3.2% AR in water/sediment/volatiles on day 2/2/104) and unidentified M5 (maximum 4.8/2.9/1.6% AR in water/sediment/volatiles on day 7/7-14/14). Other identified metabolites never exceeding 5% AR in any compartment were 3-OHM-T and 3-MCM-T. No other unidentified fractions exceeded 4.8% AR (total system). Dichloro-etridiazole dissipated in the total water/sediment

system with (persistence & modelling) half-lives of 1.55 and 2.99 d. M5 dissipated in the total water/sediment system of one system with a (persistence) half-life of 17.2 d (no value could be calculated for the other system). For dichloro-etridiazole and M5, no half-life for the sediment could be calculated.

In two water/sediment systems, treated with [ $3\text{-}^{14}\text{C}$ ]-etridiazole acid at a concentration of 167  $\mu\text{g/L}$  and incubated at 20°C in the dark, etridiazole acid degraded in the total water/sediment system with (persistence & modelling) half-lives of 427 and 517 days. The (persistence) half-life in sediment (one system) was 291 days. The (persistence) half-lives for dissipation from the water layer were 320 and 189 days.  $\text{CO}_2$  production was 15% AR after 180 days. Unextractables were maximum 3.3 and 4.3% AR (day 64 and 180, respectively).

The (persistence) half-lives of etridiazole and of the relevant (>10% AR in water) water/sediment metabolite etridiazole acid are listed in Table B.8.4.4-1.  $\text{DT}_{50}$  values for modelling are listed in Table B.8.4.4-2.

**Table B.8.4.4-1 Persistence  $\text{DT}_{50}$  and  $\text{DT}_{90}$  values (20°C) of etridiazole and etridiazole acid in water-sediment systems.**

compound	System	$\text{DT}_{50}$			$\text{DT}_{90}$		
		water <sup>1</sup>	sediment <sup>1</sup>	total <sup>2</sup>	water	sediment	Total
Etridiazole	Espel	1.33 <sup>3</sup>	- <sup>5</sup>	1.78 <sup>3</sup>	4.41	-	5.91
	Rohrspitz	1.29 <sup>3</sup>	-	1.92 <sup>3</sup>	4.29	-	6.38
	<b>mean</b>	<b>1.31</b>		<b>1.85</b>	<b>4.35</b>		<b>6.15</b>
Etridiazole acid	River	320 <sup>4</sup>	291 <sup>3</sup>	427 <sup>3</sup>	1547	968	1417
	Pond	189 <sup>4</sup>	-	517 <sup>3</sup>	1649	-	1718
	<b>mean</b>	<b>255</b>	<b>291</b>	<b>472</b>	<b>1598</b>	<b>968</b>	<b>1568</b>

<sup>1</sup> half-lives for dissipation

<sup>2</sup> half-lives for degradation

<sup>3</sup> based on SFO model

<sup>4</sup> based on DFOP model

<sup>5</sup> - : could not be calculated

**Table B.8.4.4-2 Modelling  $\text{DT}_{50}$  values (20°C) of etridiazole and etridiazole acid in water-sediment systems.**

compound	System	$\text{DT}_{50}$		
		water	sediment	total
Etridiazole	Espel	1.78 <sup>1</sup>	1.78 <sup>1</sup>	1.78
	Rohrspitz	1.92 <sup>1</sup>	1.92 <sup>1</sup>	1.92
	<b>mean</b>	<b>1.85</b>	<b>1.85</b>	<b>1.85</b>
Etridiazole acid	River	427 <sup>1</sup>	427 <sup>1</sup>	427
	Pond	517 <sup>1</sup>	517 <sup>1</sup>	517
	<b>mean</b>	<b>472</b>	<b>472</b>	<b>472</b>

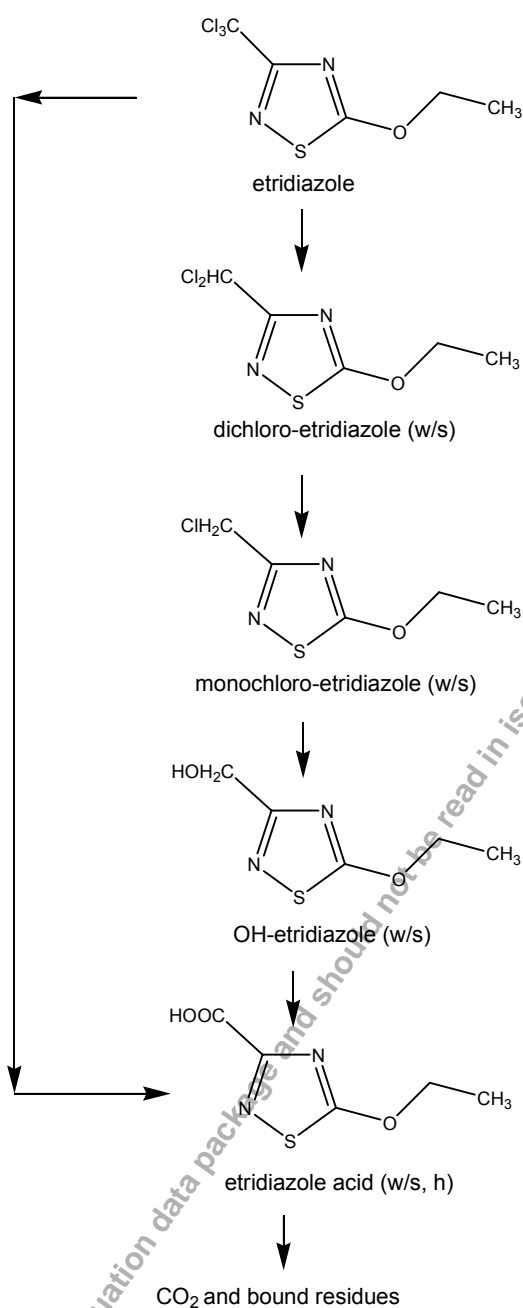
<sup>1</sup> values for total system are used for water and sediment

#### Anaerobic water/sediment studies

No study submitted (and not required).

The main transformations of etridiazole in the aquatic environment are shown in Figure B.8.4.4-1.

WARNING: This document forms part of an EC evaluation data package and should not be read in isolation. Registration must not be granted on the basis of this document.



**Figure B.8.4.4-1** Metabolic pathway of etridiazole in water (h = hydrolysis, w/s = water/sediment)

## Data requirements

No data requirements were identified.

### B.8.5 Impact on water treatment procedures (Annex IIIA 9.2.2)

Given the nature of the proposed uses, it is unlikely that etridiazole will reach sewage treatment works in significant levels to have an impact on water treatment procedures (taking into consideration 30 min and 3 hour EC<sub>50</sub> values for bacterial respiration of 105 and 32 mg a.s./L). Discharge of contaminated water from greenhouses may vary within the EU. This issue should be further addressed at MS level.

### B.8.6 Predicted environmental concentrations in surface water, in sediment and in groundwater (PEC<sub>sw</sub>, PEC<sub>sed</sub>, PEC<sub>gw</sub>) (Annex IIIA 9.2.1, 9.2.3)

#### B.8.6.1 Predicted concentrations in surface water (Annex IIIA 9.2.3)

Predicted environmental concentrations in surface water (PEC<sub>sw</sub>) of etridiazole and the major (>10%) water/sediment metabolite etridiazole acid were calculated according STEP 2 procedures outlined in Sanco/4802/2001 rev.2 final (May 2003) "FOCUS surface water scenarios in the EU evaluation process under 91/414/EEC" using FOCUS 1-2 software, version 1.1. Calculations for dichloro-etridiazole were also performed, although this metabolite is not a major water/sediment metabolite (<10%). STEP 1 calculations were not performed because the STEP 1 default scenario is not applicable for greenhouse applications. In order to mimic a greenhouse application, inputs through runoff and drainage were set equal to zero. For soil, the mean (persistence) soil DT<sub>50,lab</sub> and the mean K<sub>om</sub> was used in agreement with the guidance. For water and sediment, no individual DT<sub>50</sub> values for degradation are available. Therefore the mean of the available (persistence) DT<sub>50</sub> values for the whole water/sediment system was used for water and sediment.

All of the proposed uses on ornamentals, tomatoes, peppers and cucumbers involve greenhouse applications with limited exposure of surface water. An accepted EU scenario for emission from greenhouses to surface water is not available. An emission rate to surface water of 0.1% of the applied dose was used for greenhouse applications. The acceptance of this emission rate should be further evaluated at EU and/or MS level. STEP 2 calculations have a default drift value of 2.438% (2 applications). Therefore, the STEP 2 results were divided by a factor of 24.38 to obtain PEC<sub>sw</sub> and PEC<sub>sed</sub> concentrations relevant for a total assumed loading of 0.1% of the dose for greenhouse applications.

#### STEP 2:

The following substance specific input data were used to run the model:

Application rate:	7000 g ai/ha (ornamentals, cGAP); 560 g ai/ha (peppers/tomatoes) and 280 g ai/ha (cucumbers)
Application/crop type:	vegetables, fruiting (has no influence because interception was set at zero)
Application number:	2 (ornamentals, peppers, tomatoes, cucumbers)
Application interval:	14 d (ornamentals, peppers, tomatoes, cucumbers)
Water solubility:	Etridiazole: 117.1 mg/L; etridiazole acid and dichloro-etridiazole: set equal to parent because no experimentally determined value was available
K <sub>OC</sub> :	Etridiazole: 289 L/kg; etridiazole acid: 18 L/kg; dichloro-etridiazole: 99 L/kg.
DT <sub>50</sub> water/sediment:	Etridiazole: 1.85 d; etridiazole acid: 472 d; dichloro-etridiazole: 2.27 d.
DT <sub>50</sub> water:	Values for total system were used
DT <sub>50</sub> sediment:	Values for total system were used
DT <sub>50</sub> soil:	Etridiazole: 25.0 d; etridiazole acid: 26.7 d; dichloro-etridiazole: 63.5 d.
Max % occurrence:	Etridiazole acid: 13% (water/sediment) and 31% (soil) dichloro-etridiazole: 9.5% (water/sediment) and 13.3% (soil)
MW:	Etridiazole: 247.5; etridiazole acid: 174.2; dichloro-etridiazole: 213.1

Besides the data presented above the following additional information is considered in STEP 2:

Region and season of application: No Runoff/Drainage

Crop interception: No interception (to simulate application by (drip)-irrigation)

The default model data selection in STEP 2 used for the calculations is:

Distance to water body:	1 m
Spray drift (multiple application):	2.4380% (note: STEP 2 results were divided by a factor 24.38 to simulate a loading of 0.1%)
Ratio of field to water body:	10 : 1
Water depth:	30 cm
Sediment depth:	5 cm
Effective sediment for sorption:	1 cm
Sediment organic carbon:	5 %
Sediment bulk density:	0.8 kg/L

Under the above assumptions, application of etridiazole formulated as Aaterra ME 700 g/L according to to cGAP will lead to PEC<sub>SW</sub> values of etridiazole, etridiazole acid and dichloro-etridiazole listed in Table B.8.6.1-1 to -9.

**Table B.8.6.1-1** Calculated etridiazole concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on ornamentals (2 x 7 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	2.343	-	2.244	-
1	1.313	1.828	1.685	1.965
2	0.884	1.464	1.168	1.695
4	0.417	1.046	0.552	1.263
7	0.135	0.706	0.179	0.866
14	0.010	0.377	0.013	0.465
21	0.001	0.253	0.001	0.312
28	0.000	0.190	0.000	0.234
42	0.000	0.126	0.000	0.156
50	0.000	0.106	0.000	0.131
100	0.000	0.053	0.000	0.065

**Table B.8.6.1-2** Calculated etridiazole acid concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on ornamentals (2 x 7 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.419	-	0.050	-
1	0.415	0.417	0.050	0.050
2	0.415	0.416	0.050	0.050
4	0.414	0.415	0.049	0.050
7	0.412	0.414	0.049	0.050
14	0.408	0.412	0.049	0.049
21	0.403	0.410	0.048	0.049
28	0.399	0.408	0.048	0.049
42	0.391	0.403	0.047	0.048
50	0.387	0.401	0.046	0.048
100	0.359	0.387	0.043	0.046

**Table B.8.6.1-3** Calculated dichloro-etridiazole concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on ornamentals (2 x 7 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.193	-	0.083	-
1	0.132	0.162	0.064	0.073
2	0.097	0.138	0.047	0.064
4	0.052	0.106	0.026	0.050
7	0.021	0.075	0.010	0.036
14	0.002	0.042	0.001	0.020
21	0.000	0.028	0.000	0.013
28	0.000	0.021	0.000	0.010
42	0.000	0.014	0.000	0.007
50	0.000	0.012	0.000	0.006
100	0.000	0.006	0.000	0.003

**Table B.8.6.1-4** Calculated etridiazole concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on tomatoes/peppers (2 x 0.56 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.187	-	0.180	-
1	0.105	0.146	0.135	0.157
2	0.071	0.117	0.093	0.136
4	0.033	0.084	0.044	0.101
7	0.011	0.057	0.014	0.069
14	0.001	0.030	0.001	0.037
21	0.000	0.020	0.000	0.025
28	0.000	0.015	0.000	0.019
42	0.000	0.010	0.000	0.012
50	0.000	0.008	0.000	0.010
100	0.000	0.004	0.000	0.005

**Table B.8.6.1-5** Calculated etridiazole acid concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on tomatoes/peppers (2 x 0.56 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.034	-	0.004	-
1	0.033	0.033	0.004	0.004
2	0.033	0.033	0.004	0.004
4	0.033	0.033	0.004	0.004
7	0.033	0.033	0.004	0.004
14	0.033	0.033	0.004	0.004
21	0.032	0.033	0.004	0.004
28	0.032	0.033	0.004	0.004
42	0.031	0.032	0.004	0.004
50	0.031	0.032	0.004	0.004
100	0.029	0.031	0.003	0.004

**Table B.8.6.1-6** Calculated dichloro-etridiazole concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on tomatoes/peppers (2 x 0.56 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.015	-	0.007	-
1	0.011	0.013	0.005	0.006
2	0.008	0.011	0.004	0.005
4	0.004	0.008	0.002	0.004
7	0.002	0.006	0.001	0.003
14	0.000	0.003	0.000	0.002
21	0.000	0.002	0.000	0.001
28	0.000	0.002	0.000	0.001
42	0.000	0.001	0.000	0.001
50	0.000	0.001	0.000	0.000
100	0.000	0.000	0.000	0.000



**Table B.8.6.1-7** Calculated etridiazole concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on cucumbers (2 x 0.28 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.094	-	0.090	-
1	0.053	0.073	0.067	0.079
2	0.035	0.059	0.047	0.068
4	0.017	0.042	0.022	0.051
7	0.005	0.028	0.007	0.035
14	0.000	0.015	0.001	0.019
21	0.000	0.010	0.000	0.012
28	0.000	0.008	0.000	0.009
42	0.000	0.005	0.000	0.006
50	0.000	0.004	0.000	0.005
100	0.000	0.002	0.000	0.003

**Table B.8.6.1-8** Calculated etridiazole acid concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on cucumbers (2 x 0.28 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.017	-	0.002	-
1	0.017	0.017	0.002	0.002
2	0.017	0.017	0.002	0.002
4	0.017	0.017	0.002	0.002
7	0.016	0.017	0.002	0.002
14	0.016	0.016	0.002	0.002
21	0.016	0.016	0.002	0.002
28	0.016	0.016	0.002	0.002
42	0.016	0.016	0.002	0.002
50	0.015	0.016	0.002	0.002
100	0.014	0.015	0.002	0.002

**Table B.8.6.1-9** Calculated dichloro-etridiazole concentrations in the water body (STEP 2) for greenhouse application (0.1% drift emission) on cucumbers (2 x 0.28 kg a.s./ha; cGAP)

Time (d)	PEC <sub>sw</sub> (µg/L)		PEC <sub>sed</sub> (µg/kg dry sediment)	
	Actual	TWA	Actual	TWA
0	0.008	-	0.003	-
1	0.005	0.006	0.003	0.003
2	0.004	0.006	0.002	0.003
4	0.002	0.004	0.001	0.002
7	0.001	0.003	0.000	0.001
14	0.000	0.002	0.000	0.001
21	0.000	0.001	0.000	0.001
28	0.000	0.001	0.000	0.000
42	0.000	0.001	0.000	0.000
50	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000

**B.8.6.2 Predicted concentrations in sediment (Annex IIIA 9.2.3)**

For calculations of sediment concentrations of etridiazole and etridiazole acid after application of etridiazole formulated as Aaterra ME 700 g/L in ornamentals, tomatoes, peppers and cucumbers, see B 8.6.1.

**B.8.6.3 Predicted concentrations in groundwater (Annex IIIA 9.2.1)**

Exposure of groundwater is not relevant for the intended uses (glasshouse, application through (drip-) irrigation system to non-soil bound ornamentals and substrate grown peppers/tomatoes/cucumbers).

**B.8.7 Fate and behaviour in air (Annex IIA 7.2.2; Annex IIIA 9.3)**

The following results are available from Volume 3, B.2:

Etridiazole

Vapour pressure: 1.43 Pa at 25 °C

Henry's law constant: 3.02 Pa m<sup>3</sup> mol<sup>-1</sup> at 25 °C

Half-life in air based on hydroxyl radical concentration of 1.56x10<sup>6</sup> OH/cm<sup>3</sup> (12-h day time): 1.556 days (18.674 hours).

Etridiazole-acid

For this metabolite a low vapour pressure is predicted compared to etridiazole and dichloro-etridiazole. In combination with the high solubility in water this metabolite is not considered relevant for volatilisation.

The notifier presented an estimation of concentrations of etridiazole and its major metabolite dichloro-etridiazole in air.

Concentrations of etridiazole and its major metabolite 3-DCM-T in air resulting from volatilisation and concentrations in soil and surface water based on successive deposition of parent and metabolite were calculated based on the models EVA 1.1 and EVA 2.0 (Exposure via Air) developed by the German Federal Environmental Agency (UBA) for registration purposes in Germany. Due to the intended application regime, etridiazole may enter the different compartments only via volatilisation and deposition, whereas 3-DCM-T may additionally be formed in soils and surface waters following deposition of the parent substance.

Estimated concentrations of etridiazole in the air of glasshouses reached maximum values of 134.48 µg ai/m<sup>3</sup> for the intended use in ornamental crops and of 10.76 µg ai/m<sup>3</sup> for application to vegetables (tomatoes, peppers, cucumbers). For 3-DCM-T, maximum concentrations of 15.06 µg ai/m<sup>3</sup> (ornamental crops) and 1.21 µg ai/m<sup>3</sup> (vegetable crops) are encountered.

The initial predicted environmental concentrations of etridiazole in soil following application to ornamental crops at a rate of 7 kg ai/ha were estimated to be < 52.7 µg ai/kg soil. For application to

vegetables at a rate of 0.56 kg ai/ha, initial values of < 4.21 µg ai/kg were encountered. Time weighted average PECS (based on the assumption that dissipation of etridiazole follows a first-order kinetic with a DT50 in soil of 8.98 days) ranged from 5.9 to 6.8 µg/kg after 100 days for application to ornamental crops and from 0.47 to 0.55 µg/kg for application to vegetable crops. Initial PEC<sub>s</sub> of the metabolite 3-DCM-T resulting from both deposition of 3-DCM-T and on formation of 3-DCM-T outside the application area following deposition of etridiazole amounted to ≤ 11.80 and ≤ 0.95 µg/kg for the different application scenarios.

The initial predicted environmental concentrations of etridiazole in surface water following application to ornamental crops and vegetables were estimated to be ≤ 13.17 µg ai/L and ≤ 1.05 µg ai/L, respectively. Based on the assumption that dissipation of etridiazole follows a first-order kinetic with a DT50 of 1.85 days actual PEC<sub>SW</sub> values were determined to be ≤ 0.01 µg/L after 21 and 14 days in the different application scenarios. Total initial PEC<sub>SW</sub> of the metabolite 3-DCM-T were estimated to be ≤ 2.712 and ≤ 0.218 µg/L for application to ornamental crops and vegetables, respectively. The estimation of concentrations of etridiazole and its major metabolite dichloro-etridiazole in air presented by the notifier was acceptable for RMS.

#### **B.8.8 Predicted environmental concentrations in air (PECa) (Annex IIIA 9.3)**

Given the high volatility of etridiazole (as indicated by the high vapour pressure and high Henry's law constant), and the atmospheric DT<sub>50</sub> of 1.556 days, occurrence of etridiazole in air and subsequent deposition cannot be excluded *a priori*. Significant losses of etridiazole through volatilisation were also observed in soil and water/sediment studies (see B.8.1.1 and B.8.4.3). The notifier is therefore requested to submit a risk assessment for the air compartment. The RMS realises that currently no final "FOCUS air" guidance is available. However, EPPO guidance is currently available for air (EPPO Bulletin 33, 115-129).

The notifier presented an estimation of concentrations of etridiazole and its major metabolite dichloro-etridiazole in air.

##### **General Assumptions**

According to the application regime etridiazole may reach the compartments air, soil and surface water only via volatilisation and successive atmospheric deposition in the case of soil and surface water.

Volatilisation of etridiazole and resulting concentrations in the air of the glasshouse was estimated based on assumptions according to the models EVA 1.10 and EVA 2.0 (Winkler & Koch, 2002 and 2005). PEC for soil and surface water were estimated using the model EVA 2.0. As a worst case, calculations were conducted for maximum application rates for ornamental crops (7 kg ai/ha) and the group of vegetable crops (tomatoes, peppers and cucumbers: 0.56 kg ai/ha) separately.

The metabolite 3-DCM-T was found in soil at maximum rate of 10-13 % of applied radioactivity 4-30 days after application. It can be reasonably assumed that only part of the amount formed would be

available for volatilisation due to adsorption processes in soil. However, as the extent of this limitation cannot be assessed and due to the rather low  $K_{ow}$  values of both etridiazole (195-349) and 3-DCM-T (50-129), it was assumed that the maximum amount of 3-DCM-T formed is available for volatilisation. Besides the maximum formation rate of 3-DCM-T, the ratio between the molar masses of 3-DCM-T and etridiazole was taken into account for the calculation of concentrations in the different compartments: 3-DCM-T represents a molar fraction of  $213 / 247.5 (= 0.861)$  relative to etridiazole. Therefore, the following theoretical application rates of 3-DCM-T were derived for calculation purposes:

- Ornamental crops:  $7 \text{ kg ai/ha} * 13 \% * 0.861 = 0.784 \text{ kg ai/ha}$
- Vegetable crops:  $0.56 \text{ kg ai/ha} * 13 \% * 0.861 = 0.063 \text{ kg ai/ha}$

Emission rates were estimated according to EVA 1.1, due to the fact that the more recent version of the model, EVA 2.0, is based on empirical results on deposition of pesticides and accordingly, volatilisation data is not determined. However, indoor application scenarios are not implemented in EVA 1.1. Parameters referring to greenhouses were thus derived from EVA 2.0.

The calculation of the emission rate with EVA 1.1 is based on the assumption that the main factor influencing the emission of a compound is its vapour pressure. Default values for greenhouse dimensions from the model EVA 2.0 were used for the calculation of concentrations in air:

- floor space of buildings =  $300 \text{ m}^2$
- volume of building =  $1000 \text{ m}^3$

For a reasonable worst-case assessment, air exchange must be considered. The default air exchange rate in EVA 2.0 is  $24.5 \text{ V/h}$  (referring to air shutters being opened to an angle of  $45^\circ$ ), corresponding to an exchange rate of  $0.41 \text{ V/min}$ . Calculations with these default values resulted in the following estimated air concentrations (same table taken up as in Appendix 3 of B.6 - Appendix Table 4.1.1):

**Table 8.8.1 Estimation of maximum concentrations in air for etridiazole and dichloro-etr Diazole**

Time after application (hours)	Air concentration etridiazole ( $\mu\text{g a.s./m}^3$ ) after application in ornamentals (app. rate $7 \text{ kg a.s./ha}$ )	Air concentration etridiazole ( $\mu\text{g a.s./m}^3$ ) after application in vegetables (app. rate $0.56 \text{ kg a.s./ha}$ )	Air concentration dichloro-etr Diazole ( $\mu\text{g a.s./m}^3$ ) after application in ornamentals (app. rate $0.784 \text{ kg a.s./ha}$ )	Air concentration dichloro-etr Diazole ( $\mu\text{g a.s./m}^3$ ) after application in vegetables (app. rate $0.063 \text{ kg a.s./ha}$ )
0 - 4	134.48	10.76	15.06	1.21
4 - 12	66.99	5.36	7.50	0.60
12 - 24	33.75	2.70	3.78	0.30
>24	0	0	0	0

It should be noted that these are very worst-case estimates, since it is assumed that the applied dose of etridiazole and the formed amount of dichloro-etridiazole is completely available for volatilisation. However, part of the applied dose will not be available for volatilisation due to adsorption processes in soil/substrate, but the amount cannot be quantified.

According to the RMS the FOCUS Air approach is not final therefore this approach should be discussed in an expert meeting.

Moreover because this approach was taken for the calculation of  $PEC_s$  and  $PEC_{sw}$  concentrations, The impact on the environmental risk assessment needs to be discussed.

### 8.8.1 Calculation of initial $PEC_s$ and $PEC_{sw}$ of Etridiazole

The calculation of initial PEC in soil and surface water was conducted using the model EVA 2.0 (Winkler & Koch, 2005) that uses empirical results on deposition of pesticides. Accordingly, volatilisation is not included as a separate step in the calculations.

As a first step, some basic questions have to be answered within the model as indicated in Table 8.8.1.

**Table 8.8.1 Basic information on Etridiazole and its use pattern for the model EVA 2.0**

#### Basic question

#### Etridiazole

Does the possibility exist that the plant protection product can reach the atmosphere via spray drift and / or volatilisation due to its proper outdoor or indoor use?	Yes
Is the treatment of plant protection product conducted indoors? (Treatments are judged to be indoors if the natural ventilation rate of the enclosed space in which the plant protection product is applied is less than 25 exchanges of air to the outdoors per hour)	Yes
Is significant emission of particles to air during application (spray drift) considered to be likely?	No

The input parameters for the model EVA 2.0 for calculation of  $PEC_{sw}$  and  $PEC_s$  of the parent compound etridiazole are presented in Table 8.8.2 for application to ornamental crops and Table 8.8.3 for application to vegetable crops.

**Table 8.8.2 Input parameters of Etridiazole for the model EVA 2.0 for application to ornamental crops**

Parameters	Unit	Etridiazole	Remarks/ Reference
1. Use pattern			
Number of applications <sup>1)</sup>	[-]	2	GAP
Interval between applications	[d]	14	GAP
Area of use	[-]	Indoor	Default

Crop	[-]	Ornamentals	GAP
Technique of application	[-]	Via drip irrigation	GAP
Selection of building type	[-]	Greenhouse	GAP
Floor space of building	[m <sup>2</sup> ]	300.0	Default
Volume of building	[m <sup>3</sup> ]	1000.0	Default
Rate of air exchange	[V <sub>g</sub> /h]	24.5	Default
Single application rate	[g ai/ha]	7000	GAP
II. Properties of compound (ai) and further relevant data			
Vapour pressure at 20 °C	[Pa]	1.43	at 25 °C
Solubility in water	[mg/L]	117	at 25 °C
DT <sub>50</sub> water (water/sediment study)	[d]	1.85	Schanne, 1998 (whole system)
DT <sub>50</sub> water (hydrolysis)	[d]	94	DAR
III. Foliar interception (retention values) for use in field			Not relevant
IV. Ecotoxicological data for relevant aquatic species			Not relevant
V. Ecotoxicological data for relevant etc. terrestrial species, foliar interception in non-target area			
Distribution of deposition between plant and soil in %	[-]	Plant: 0 % Soil: 100%	Worst-case assumption
VI. Data from experimental studies for short range transport - deposition			Not relevant

1) In case of multiple applications only 1 volatilisation following the last use of pesticide is generally considered (realistic worst case).

Table 8.8.3 Input parameters of Etridiazole for the model EVA 2.0 for application to vegetable crops

Parameters	Unit	Etridiazole	Remarks/ Reference
I. Use pattern			
Number of applications <sup>1)</sup>	[-]	2	GAP
Interval between applications	[d]	14	GAP
Area of use	[-]	Indoor	Default
Crop	[-]	Vegetables	GAP
Technique of application	[-]	Via drip irrigation	GAP
Selection of building type	[-]	Greenhouse	GAP
Floor space of building	[m <sup>2</sup> ]	300.0	Default
Volume of building	[m <sup>3</sup> ]	1000.0	Default
Rate of air exchange	[V <sub>g</sub> /h]	24.5	Default
Single application rate	[g ai/ha]	560	GAP
II. Properties of compound (ai) and further relevant data			
Vapour pressure at 20 °C	[Pa]	1.43	at 25 °C
Solubility in water	[mg/L]	117	at 25 °C
DT <sub>50</sub> water (water/sediment study)	[d]	1.85	Schanne, 1998 (whole system)
DT <sub>50</sub> water (hydrolysis)	[d]	94	DAR
III. Foliar interception (retention values) for use in field			Not relevant
IV. Ecotoxicological data for relevant aquatic species			Not relevant
V. Ecotoxicological data for relevant etc. terrestrial species, foliar interception in non-target area			

Distribution of deposition between plant and soil in %	[-]	Plant: 0 % Soil: 100%	Worst-case assumption
VI. Data from experimental studies for short range transport deposition	-		Not relevant

1) In case of multiple applications only 1 volatilisation following the last use of pesticide is generally considered (realistic worst case).

Results for atmospheric deposition are calculated for distances of 1, 3, and 5 m for soil and 1, 3, 5, 10, 15, and 20 m for surface waters.

EVA 2.0 output values are given as "g ai/ha". Regarding deposition on surface waters, initial PEC<sub>sw</sub> (ug ai/L) are additionally displayed based on a 0.3 m deep, static water body.

For soil, PECs were determined assuming that the deposited etridiazole is evenly distributed in the top 5 cm of the soil profile with a soil bulk density of 1.5 g/cm<sup>3</sup>.

#### Calculation of initial PECS and PEC<sub>sw</sub> of 3-DCM-T

The calculation of initial PEC in soil and surface water for 3-DCM-T was conducted similarly to calculations for the parent substance etridiazole using a theoretical application rate for the metabolite.

The input parameters for the model EVA 2.0 (Winkler & Koch, 2005) for calculation of PEC<sub>sw</sub> and PECs of 3-DCM-T are presented in Table 8.8.4 for application to ornamental crops and Table 8.8.5 for application to vegetable crops.

Table 8.8.4 Input parameters of the 3-DCM-T for the model EVA 2.0 for application of etridiazole to ornamental crops

Parameters	Unit	3-DCM-T	Remarks/ Reference
1. Use pattern			
Number of applications <sup>1)</sup>	[-]	2	GAP
Interval between applications	[d]	14	GAP
Area of use	[-]	Indoor	Default
Crop	[-]	Ornamentals	GAP
Technique of application	[-]	-	Not applicable
Selection of building type	[-]	Greenhouse	GAP
Floor space of building	[m <sup>3</sup> ]	300.0	Default
Volume of building	[m <sup>2</sup> ]	1000.0	Default
Rate of air exchange	[V <sub>e</sub> /h]	24.5	Default
Single application rate	[g ai/ha]	784	GAP
II. Properties of compound and further relevant data			
Vapour pressure at 20 °C	[Pa]	0.151	EPI SUITE
Solubility in water	[mg/L]	192	EPI SUITE
DT <sub>50</sub> water (water/sediment study)	[d]	2.27	Schanne, 1998 (whole system)
DT50 water (hydrolysis)	[d]	Not available	-
III. Foliar interception (retention values) for use in field			Not relevant
IV. Ecotoxicological data for relevant aquatic species			Not relevant

V. Ecotoxicological data for relevant terrestrial species, foliar interception in non-target area etc.			
Distribution of deposition between plant and soil in %	[-]	Plant: 0 % Soil: 100%	Worst-case assumption
VI. Data from experimental studies for short range transport - deposition			Not relevant

1) In case of multiple applications only 1 volatilisation following the last use of pesticide is generally considered (realistic worst case).

Table 8.8.5 Input parameters of 3-DCM-T for the model EVA 2.0 for application of etridiazole to vegetable crops

Parameters	Unit	3-DCM-T	Remarks/Reference
<b>1. Use pattern</b>			
Number of applications <sup>1)</sup>	[-]	2	GAP
Interval between applications	[d]	14	GAP
Area of use	[-]	Indoor	Default
Crop	[-]	Vegetables	GAP
Technique of application	[-]	-	Not applicable
Selection of building type	[-]	Greenhouse	GAP
Floor space of building	[m <sup>3</sup> ]	300.0	Default
Volume of building	[m <sup>2</sup> ]	1000.0	Default
Rate of air exchange	[Vo/h]	24.5	Default
Single application rate	[g ai/ha]	63	GAP
<b>II. Properties of compound and further relevant data</b>			
Vapour pressure at 20 °C	[Pa]	0.151	EPI SUITE
Solubility in water	[mg/L]	192	EPI SUITE
DT <sub>50</sub> water (water/sediment study)	[d]	2.27	Schanne, 1998 (whole system)
DT <sub>50</sub> water (hydrolysis)	[d]	Not available	-
<b>III. Foliar interception (retention values) for use in field</b>			Not relevant
<b>IV. Ecotoxicological data for relevant aquatic species</b>			<b>Not relevant</b>
V. Ecotoxicological data for relevant terrestrial species, foliar interception in non-target area etc.			
Distribution of deposition between plant and soil in %	[-]	Plant: 0 % Soil: 100%	Worst-case assumption
VI. Data from experimental studies for short range transport - deposition			Not relevant

1) In case of multiple applications only 1 volatilisation following the last use of pesticide is generally considered (realistic worst case).

Results for atmospheric deposition are calculated for distances of 1, 3, and 5 m for soil and 1, 3, 5, 10, 15, and 20 m for surface waters.

The initial PEC values determined by EVA 2.0 calculations refer to the amount of 3-DCM-T deposited in soil and surface water outside the application area after metabolite formation and volatilisation within the greenhouse application area. The amounts of 3-DCM-T formed outside the application area following deposition of etridiazole were added to these initial values (please refer to Table 10 and



Table 15), as the worst case refers to the assumption that maximum amounts of 3-DCM-T would be formed simultaneously within and outside the application area.

Amounts of 3-DCM-T formed in soil outside the application area were determined as follows: As a worst case assumption the maximum formation rate in soil of 13 % was used. Besides the maximum formation rate of 3-DCM-T, the ratio between the molar masses of the 3-DCM-T and etridiazole was taken into account: 3-DCM-T represents a molar fraction of  $213 / 247.5 (= 0.861)$  relative to etridiazole. Therefore, initial values for etridiazole were multiplied with a transformation factor of  $0.13 * 0.861 (= 0.112)$ .

Amounts of 3-DCM-T formed in surface waters outside the application area were determined as follows: As a worst case assumption the maximum formation rate derived from the water/sediment study (10.9 % of applied radioactivity) was used. Based on the ratio between the molar masses of 3-DCM-T and etridiazole the initial values for etridiazole were multiplied with a transformation factor of  $0.109 * 0.861 (= 0.094)$ .

#### Calculation of PECact and PEC<sub>wa</sub> for Etridiazole and 3-DCM-T

Besides the initial PEC which represent the predicted environmental concentrations immediately after application, actual (PEC<sub>act</sub>) and time weighted average (PEC<sub>wa</sub>) concentrations were calculated and reported as short-term (24 hours, 2 days, and 4 days after application) and as long-term (7, 14, 21, 28, 42 and 100 days) values. For this purpose it was assumed that the dissipation of etridiazole in soil and surface water can be described by a simple first order kinetic with DT<sub>50</sub> values of 8.98 and 1.85 days, respectively. The DT<sub>50</sub> value for soil of 8.98 days is the geometric mean obtained from aerobic degradation trials with different soils (DAR on etridiazole). The DT<sub>50</sub> value for surface water of 1.85 days represents a realistic worst-case value for the dissipation of etridiazole in a water/sediment systems (Schanne, 1998). In line with EVA 2.0, only 1 volatilisation event following the last use of pesticide was taken into consideration.

The actual and time-weighted PEC at various time points were calculated using the degradation formulas given in the FOCUS report on soil persistence model and EU registration (FOCUS, 1996).

#### Predicted Environmental Concentrations in Soil (PEC<sub>s</sub>)

Actual and time weighted average environmental concentrations of etridiazole in soil due to volatilisation and successive deposition following application to ornamental crops and vegetables (tomatoes, peppers, cucumbers) are presented in Table 8.8.6 and Table 8.8.7, respectively.

The initial predicted environmental concentrations of etridiazole in soil following application to ornamental crops at a rate of 7 kg ai/ha were estimated to be 52.7, 49.0, and 45.6 ug ai/kg soil for distances to the greenhouse application area of 1, 3, and 5 m, respectively. For application to vegetables at a rate of 0.56 kg ai/ha, initial values of 4.21, 3.92, and 3.65 ug ai/kg were encountered.

Etridiazole is dissipated from soil with a geometric DT<sub>50</sub> of 8.98 days resulting in actual PEC<sub>s</sub> values  $< 0.1$  ug/kg after 100 days for distances  $> 1$  m for both application scenarios. The time weighted average PEC<sub>s</sub> for etridiazole ranged from 5.9 to 6.8 ug/kg after 100 days for application to ornamental crops and from 0.47 to 0.55 ug/kg for application to vegetable crops.

Table 8.8.6 Actual and time-weighted average (TWA) PEC<sub>s</sub> of etridiazole in soil based on the entry route atmospheric deposition following volatilisation after application of 7 kg ai/ha to ornamental crops

Time after application [d]	PECs [ug/kg]					
	Distance of 1 m		Distance of 3 m		Distance of 5 m	
	Actual	TWA	Actual	TWA	Actual	TWA
0	52.7	-	49.0	-	45.6	-
1	48.8	50.7	45.4	47.2	42.2	43.9
2	45.1	48.8	42.0	45.4	39.1	42.3
4	38.7	45.3	36.0	42.2	33.5	39.3
7	30.7	40.7	28.6	37.9	26.6	35.3
14	17.9	32.2	16.6	30.0	15.5	27.9
21	10.4	26.1	9.7	24.3	9.0	22.6
28	6.1	21.6	5.6	20.1	5.3	18.7
42	2.1	15.6	1.9	14.5	1.8	13.5
100	0.0	6.8	0.0	6.3	0.0	5.9

Table 8.8.7 Actual and time-weighted average (TWA) PEC<sub>s</sub> of etridiazole in soil based on the entry route atmospheric deposition following volatilisation after application of 0.56 kg ai/ha to vegetables (tomatoes, peppers, cucumbers)

Time after application [d]	PECs [ug/kg]					
	Distance of 1 m		Distance of 3 m		Distance of 5 m	
	Actual	TWA	Actual	TWA	Actual	TWA
0	4.21	-	3.92	-	3.65	-
1	3.90	4.05	3.63	3.77	3.38	3.51
2	3.61	3.90	3.36	3.63	3.13	3.38
4	3.09	3.62	2.88	3.37	2.68	3.14
7	2.45	3.26	2.28	3.03	2.13	2.82
14	1.43	2.58	1.33	2.40	1.24	2.23
21	0.83	2.09	0.78	1.94	0.72	1.81
28	0.49	1.72	0.45	1.61	0.42	1.49
42	0.16	1.25	0.15	1.16	0.14	1.08
100	0.00	0.55	0.00	0.51	0.00	0.47

The initial PEC<sub>s</sub> of the metabolite 3-DCM-T resulting from volatilisation and successive deposition of 3-DCM-T at 1 m distance to the application area after metabolite formation and volatilisation within the greenhouse application area were estimated to be 5.90 and 0.47 ug/kg soil for application to

ornamental and vegetable crops, respectively (Table 8.8.8). Respective PEC<sub>s</sub> values based on formation of 3-DCM-T outside the application area following deposition of etridiazole amounted to 5.90 and 0.47 ug/kg, resulting in total initial PEC<sub>s</sub> values of 11.80 and 0.95

Based on a geometric DT50 of 18.6 days, actual PEC<sub>s</sub> for 3-DCM-T amounted to < 0.28 ug/kg after 100 days for distances > 1 m for application of etridiazole to ornamental crops (Table 8.8.9) and to 0.02 ug/kg for application to vegetable crops (Table 8.8.10). The time weighted average PEC<sub>s</sub> for 3-DCM-T ranged from 2.68 to 3.09 ug/kg after 100 days for application to ornamental crops and from 0.21 to 0.25 ug/kg for application to vegetable crops.

Table 8.8.8 Initial PECS of 3-DCM-T related to atmospheric deposition following volatilisation and formation of 3-DCM-T following deposition of etridiazole and resulting total initial PECS of 3-DCM-T

PECs related to:	PECs [ug/kg]					
	Application to ornamental crops (7kg/ha etridiazole)			Application to ornamental crops (7kg/ha etridiazole)		
Distance of	1 m	3 m	5 m	1 m	3 m	5 m
Etridiazole (deposited)	52.67	49.03	45.64	4.21	3.92	3.65
Transformation factor	0.112					
3-DCM-T (formed in off-crop area)	5.90	5.49	5.11	0.47	0.44	0.41
3-DCM-T (deposited)	5.90	5.49	5.11	0.47	0.44	0.41
<b>Total 3-DCM-T</b>	<b>11.80</b>	<b>10.98</b>	<b>10.22</b>	<b>0.95</b>	<b>0.88</b>	<b>0.82</b>

Table 8.8.9 Actual and time-weighted average (TWA) PEC<sub>s</sub> of 3-DCM-T in soil after application of 7 kg/ha etridiazole to ornamental crops

Time after application [d]	PECs [ug/kg]					
	Distance of 1 m		Distance of 3 m		Distance of 5 m	
	Actual	TWA	Actual	TWA	Actual	TWA
0	11.80	—	10.98	-	10.22	-
1	11.37	11.58	10.58	10.78	9.85	10.04
2	10.95	11.37	10.19	10.58	9.49	9.85
4	10.16	10.96	9.46	10.20	8.81	9.50
7	9.09	10.38	8.46	9.67	7.88	9.00
14	7.00	9.19	6.52	8.56	6.07	7.97
21	5.39	8.18	5.02	7.62	4.67	7.09

Time after application [d]	PECs [ug/kg]					
	Distance of 1 m		Distance of 3 m		Distance of 5 m	
	Actual	TWA	Actual	TWA	Actual	TWA
28	4.16	7.32	3.87	6.82	3.60	6.35
42	2.47	5.96	2.30	5.55	2.14	5.17
100	0.28	3.09	0.26	2.88	0.25	2.68

Table 8.8.10 Actual and time-weighted average (TWA) PEC<sub>s</sub> of 3-DCM-T in soil after application of 0.56 kg/ha etridiazole to vegetables (tomatoes, peppers, cucumbers)

Time after application [d]	PECs [ug/kg]					
	Distance of 1 m		Distance of 3 m		Distance of 5 m	
	Actual	TWA	Actual	TWA	Actual	TWA
0	0.95	-	0.88	-	0.82	-
1	0.91	0.93	0.85	0.86	0.79	0.80
2	0.88	0.91	0.82	0.85	0.76	0.79
4	0.81	0.88	0.76	0.82	0.71	0.76
7	0.73	0.83	0.68	0.77	0.63	0.72
14	0.56	0.74	0.52	0.69	0.49	0.64
21	0.43	0.66	0.40	0.61	0.37	0.57
28	0.33	0.59	0.31	0.55	0.29	0.51
42	0.20	0.48	0.18	0.44	0.17	0.41
100	0.02	0.25	0.02	0.23	0.02	0.21

#### Predicted Environmental Concentrations in Surface water (PEC<sub>sw</sub>) based on volatilisation

Actual and time weighted average environmental concentrations of etridiazole in surface water due to volatilisation and successive deposition following application to ornamental crops and vegetables (tomatoes, peppers, cucumbers) are presented in Table 8.8.11 and Table 8.8.12, respectively.

The initial predicted environmental concentrations of etridiazole in surface water following application to ornamental crops were estimated to be 13.17, 12.26, 11.41, 9.54, 7.98, and 6.67 ug ai/L for distances to the greenhouse application area of 1, 3, 5, 10, 15, and 20 m, respectively. For application to vegetables, initial values of 1.05, 0.98, 0.91, 0.76, 0.64, 0.53 ug ai/L were encountered.

Etridiazole dissipated from water/sediment systems with a DT<sub>50</sub> of 1.85 days resulting in actual PEC<sub>sw</sub> values < 0.01 ug/L after 21 and 14 days for distances > 1 m in the different application

scenarios. The time weighted average PECSw for etridiazole ranged from 0.18 to 0.35 ug/L after 100 days for application to ornamental crops and from 0.01 to 0.03 ug/L for application to vegetable crops.

Table 8.8.11 Actual and time-weighted average PECSw of etridiazole in surface water based on the entry route atmospheric deposition following volatilisation after application of 7 kg ai/ha to ornamental crops

Time after application [d]	PECSw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
<b>Actual</b>						
0	13.17	12.26	11.41	9.54	7.98	6.67
1	9.05	8.43	7.84	6.56	5.48	4.59
2	6.22	5.79	5.39	4.51	3.77	<b>3.15</b>
4	2.94	2.74	2.55	2.13	1.78	1.49
7	0.96	0.89	0.83	0.69	0.58	0.48
14	0.07	0.06	0.06	0.05	0.04	0.04
21	0.01	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00
<b>Time-weighted average</b>						
1	10.98	10.22	9.52	7.96	<b>6.65</b>	5.56
2	9.27	8.63	8.03	6.71	5.61	<b>4.69</b>
4	6.82	6.35	5.91	4.94	4.13	3.46
7	4.66	4.33	4.03	3.37	2.82	2.36
14	2.50	2.32	2.16	1.81	1.51	1.26
21	1.67	1.56	1.45	1.21	1.01	0.85
28	1.26	1.17	1.09	0.91	0.76	0.64
42	0.84	0.78	0.73	0.61	0.51	0.42
100	0.35	0.33	0.30	0.25	0.21	0.18

Table 8.8.12 Actual and time-weighted average PECSw of etridiazole in surface water based on the entry route atmospheric deposition following volatilisation after application of 7 kg ai/ha to vegetables (tomatoes, peppers, cucumbers)

Time after application [d]	PECSw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
<b>Actual</b>						
0	1.05	0.98	0.91	0.76	0.64	0.53
1	0.72	0.67	0.63	0.52	0.44	0.37
2	0.50	0.46	0.43	0.36	0.30	0.25

Time after application [d]	PECsw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
4	0.24	0.22	0.20	0.17	0.14	0.12
7	0.08	0.07	0.07	0.06	0.05	0.04
14	0.01	0.01	0.00	0.00	0.00	0.00
21	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00
42	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00
Time-weighted average						
1	0.88	0.82	0.76	0.64	0.53	0.44
2	0.74	0.69	0.64	0.54	0.45	0.38
4	0.55	0.51	0.47	0.40	0.33	0.28
7	0.37	0.35	0.32	0.27	0.23	0.19
14	0.20	0.19	0.17	0.14	0.12	0.10
21	0.13	0.12	0.12	0.10	0.08	0.07
28	0.10	0.09	0.09	0.07	0.06	0.05
42	0.07	0.06	0.06	0.05	0.04	0.03
100	0.03	0.03	0.02	0.02	0.02	0.01

The initial PECSW of the metabolite 3-DCM-T resulting from volatilisation and successive deposition of 3-DCM-T at 1 m distance to the application area after metabolite formation and volatilisation within the greenhouse application area were estimated to be 1.475 and 0.119 ug/L for application to ornamental crops and vegetables, respectively (Table 8.8.13). Respective PECsw values based on formation of 3-DCM-T outside the application area following deposition of etridiazole amounted to 1.238 and 0.099 ug/L, resulting in total initial PECsw values of 2.712 and 0.218 ug/L.

Based on a DT50 of 2.27 days, actual PECsw for 3-DCM-T for distances > 1 m amounted to < 0.001 ug/L after 28 and 21 days in the different application scenarios, respectively (Table 8.8.14 and Table 8.8.15). The time weighted average PECS for 3-DCM-T ranged from 0.045 to 0.089 ug/L after 100 days for application to ornamental crops and from 0.004 to 0.007 ug/L for application to vegetable crops.

Table 8.8.13 Initial PECsw of 3-DCM-T related to atmospheric deposition following volatilisation and formation of 3-DCM-T following deposition of etridiazole and resulting total initial PECS of 3-DCM-T

Time after application [d]	PECsw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
Application to ornamental crops (7 kg/ha Etridiazole)						
Etridiazole (deposited)	13.167	12.257	11.410	9.540	7.976	6.669
Transformation factor	0.094					
3-DCM-T (formed in off-crop area)	1.238	1.152	1.073	0.897	0.750	0.627
3-DCM-T (deposited)	1.475	1.373	1.278	1.068	0.893	0.747
Total 3-DCM-T	2.712	2.525	2.350	1.965	1.643	1.374
Application to vegetable crops (0.56 kg/ha Etridiazole)						
Etridiazole (deposited)	1.053	0.981	0.913	0.763	0.638	0.534
Transformation factor	0.094					
3-DCM-T (formed in off-crop area)	0.099	0.092	0.086	0.072	0.060	0.050
3-DCM-T (deposited)	0.119	0.110	0.103	0.086	0.072	0.060
Total 3-DCM-T	0.218	0.202	0.188	0.158	0.132	0.110

Table 8.8.14 Actual and time-weighted average PECsw of 3-DCM-T in surface water after application of 0.7 kg/ha etridiazole to ornamental crops

Time after application [d]	PECsw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
<b>Actual</b>						
<b>0</b>	2.712	2.525	2.350	1.965	1.643	1.374
<b>1</b>	1.999	1.861	1.732	1.448	1.211	1.012
<b>2</b>	1.473	1.371	1.276	1.067	0.892	0.746
<b>4</b>	0.800	0.744	0.693	0.579	0.484	0.405
<b>7</b>	0.320	0.298	0.277	0.232	0.194	0.162
<b>14</b>	0.038	0.035	0.033	0.027	0.023	0.019
<b>21</b>	0.004	0.004	0.004	0.003	0.003	0.002
<b>28</b>	0.001	0.000	0.000	0.000	0.000	0.000
<b>42</b>	0.000	0.000	0.000	0.000	0.000	0.000
<b>100</b>	0.000	0.000	0.000	0.000	0.000	0.000
<b>Time-weighted average</b>						
<b>1</b>	2.337	2.176	2.026	1.694	1.416	1.184

Time after application [d]	PECsw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
2	2.030	1.890	1.759	1.471	1.230	1.028
4	1.566	1.458	1.357	1.135	0.949	0.793
7	1.119	1.042	0.970	0.811	0.678	0.567
14	0.626	0.582	0.542	0.453	0.379	0.317
21	0.422	0.393	0.366	0.306	0.256	0.214
28	0.317	0.295	0.275	0.230	0.192	0.161
42	0.211	0.197	0.183	0.153	0.128	0.107
100	0.089	0.083	0.077	0.064	0.054	0.045

Table 8.8.15 Actual and time-weighted average PECsw of 3-DCM-T in surface water after application of 0.56 kg/ha etridiazole to vegetables (tomatoes, peppers, cucumbers)

Time after application [d]	PECsw [ug/L]					
	Distance of					
	1 m	3 m	5m	10 m	15m	20m
<b>Actual</b>						
0	0.218	0.202	0.188	0.158	0.132	0.110
1	0.160	0.149	0.139	0.116	0.097	0.081
2	0.118	0.110	0.102	0.086	0.072	0.060
4	0.064	0.060	0.056	0.046	0.039	0.032
7	0.026	0.024	0.022	0.019	0.016	0.013
14	0.003	0.003	0.003	0.002	0.002	0.002
21	0.000	0.000	0.000	0.000	0.000	0.000
28	0.000	0.000	0.000	0.000	0.000	0.000
42	0.000	0.000	0.000	0.000	0.000	0.000
100	0.000	0.000	0.000	0.000	0.000	0.000
<b>Time-weighted average</b>						
1	0.187	0.174	0.162	0.136	0.114	0.095
2	0.163	0.152	0.141	0.118	0.099	0.082
4	0.126	0.117	0.109	0.091	0.076	0.064
7	0.090	0.084	0.078	0.065	0.054	0.045
14	0.050	0.047	0.043	0.036	0.030	0.025
21	0.034	0.032	0.029	0.025	0.021	0.017
28	0.025	0.024	0.022	0.018	0.015	0.013
42	0.017	0.016	0.015	0.012	0.010	0.009
100	0.007	0.007	0.006	0.005	0.004	0.004



**B.8.9 Definition of the residue (Annex IIA 7.3)**

Detailed guidance to define the environmental residue is not available. Provisionally therefore, the active substance and major metabolites are listed in the definition. The metabolites etridiazole acid and dichloro-etridiazole were formed at >10% AR under aerobic laboratory conditions in soil treated with etridiazole. The metabolite etridiazole acid was formed at >10% AR in the water phase and at >5% AR at two consecutive time points in the sediment of water/sediment systems treated with etridiazole. The metabolite dichloro-etridiazole was <10% AR at any time and never >5% AR at two consecutive time points in any compartment of water/sediment systems and therefore not included in the residue definition for water or sediment. No additional major photolysis or hydrolysis degradation products were observed. Dichloro-etridiazole and etridiazole are provisionally included in the residue definition for air (pending on the outcome of additional data requirements listed under B.8.8).

The major components of the environmental residue are therefore as follows:

Soil: etridiazole, etridiazole acid  
Surface Water: etridiazole, etridiazole acid  
Sediment: etridiazole, etridiazole acid  
Ground water: - (no exposure of groundwater)  
Air: etridiazole, dichloro-etridiazole

**B.8.10 References relied on**

Annex point / reference number	Author(s)	Year	Title, Source, Company, Report No GLP or GEP status (where relevant), Published or not	Data Protection Claimed Y/N	Owner
IIA 7.1.1.1.1/ 03	Nag, J.K., Yu, W.C.	1994	Aerobic soil metabolism of [3-14C] Terrazole Report Uniroyal, Middlebury, U.S.A., No.9309 TER - 216 GLP, Unpublished	Y	CHEM
IIA 7.1.1.1.1/ 04	Nag, J.K., Regis, R.R.	1998	Determination of aerobic degradation rates of [3-14C]etridiazole in two soils Report Uniroyal, Middlebury, Springborn Laboratories Inc. U.S.A., No.97095 TER - 218 GLP, Unpublished	Y	CHEM
IIA 7.1.1.1.2/ 02	Lansinger, J.M., Comezoglu, S.N.	1994	Anaerobic aquatic metabolism of [3-14C]Terrazole Report Xenobiotic Laboratories Inc. U.S.A., No.RPT00168 TER - 219 GLP, Unpublished	Y	CHEM
IIA 7.1.1.1.2/ 03	Wu, D.	1994	Soil photolysis of [3-14C]Terrazole Report Xenobiotic Laboratories Inc. U.S.A., No.RPT00148 TER - 200 GLP, Unpublished	Y	CHEM
IIA 7.1.1.2.1/ 01	Volkel, W.	2000	Degradation rate of 14C-etridiazole acid in three soils incubated under aerobic conditions Report RCC Ltd Environmental Chemistry & Pharmanalytics Division, Switzerland No.743128 TER - 201 GLP, Unpublished	Y	CHEM
IIA 7.1.2/01	Dzialo, D.G.	1994	Adsorption/desorption of etridiazole Report Uniroyal, Middlebury, U.S.A., No.93127 TER - 196 GLP, Unpublished	Y	CHEM
IIA 7.1.2/02	Dzialo, D.G.	1994	Adsorption/desorption of 5-ethoxy-1,2,4- thiadiazole-3- carboxylic acid a soil metabolite of etridiazole Report Uniroyal, Middlebury, U.S.A., No.9456 TER - 197 GLP, Unpublished	Y	CHEM
IIA 7.1.2/03	Dzialo, D.G.	1994	Adsorption/desorption of 5-ethoxy-3- dichloromethyl 1,2,4- thiadiazole: a soil metabolite of etridiazole Report Uniroyal, Middlebury, U.S.A., No.9457 TER - 202 GLP, Unpublished	Y	CHEM
IIA 7.2.1.3.1/ 01	Seyfried, B.	2001	Ready biodegradability of etridiazole in a closed bottle test Report RCC Ltd Environmental Chemistry & Pharmanalytics Division, Switzerland, Switzerland, No.816772 TER - 205 GLP, Unpublished	Y	CHEM

Annex point / reference number	Author(s)	Year	Title, Source, Company, Report No GLP or GEP status (where relevant), Published or not	Data Protection Claimed Y/N	Owner
IIA 7.2.1.3.2/ 01	Schanne, C.	1998	[14C]-Etridiazole: Aerobic aquatic metabolism Report Springborn Laboratories (Europe) A.G., Switzerland No.98-003-1055 TER - 198 GLP, Unpublished	Y	CHEM
IIA 7.2.1.3.2/ 02	Volkel, W.	2000	14C-Etridiazole acid route and rate of degradation in aerobic aquatic systems Report RCC Ltd Environmental Chemistry & Pharmanalytics Division, Switzerland, No.742465 TER - 199 GLP, Unpublished	Y	CHEM
IIIA -	Klein, Chr.	2006	Estimation of concentrations of etridiazole and its major metabolite 3_DCM-T in air due to volatilisation and subsequent deposition in soil and surface water, SCC Project-NO.: 282-004	Y	CHEM

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