Annex B

Glyphosat

B-8: Ecotoxicology

B.8.2 Effects on aquatic organisms (Annex IIA 8.2; Annex IIIA 10.2)

B.8.2.1 Toxicity data (Annex IIA 8.2; Annex IIIA 10.2)

The data presented below were generated in accordance with OECD- or equivalent guidelines and the appropriate GLP-requirements. Only data from valid tests are listed in the tables. Further studies which are not suitable for the risk assessment (not valid or not in accordance with guidelines etc.) are compiled under "references". The risk assessment is based on the intended uses outlined in this monograph.

Tab. B.8.2.1-1 Acute and chronic toxicity of glyphosate isopropylamin-salt to aquatic organisms (purity 61-65 %)(Annex IIA 8.2; Annex IIIA 10.2)

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish:						
L. macrochirus	96 h	560		>1000		95-00712
L. idus melanotus	96 h			>5000		94-00156
O. mykiss	24 h	>1000		>1000		94-01161
O. mykiss	96 h	>1000		>1000		94-01161
O. mykiss	96 h	517		2192		94-00157
O. mykiss	21 d	917	2200 (100%)		mortality	95-00548
		917			behaviour	
		917			growth	
Invertebrates:						
D. magna	24 h			>1000		94-01160
D. magna	48 h	320		930		94-01160
D. magna	48 h			>1000		95-00549
D. magna	21 d	455	1000 (100%)		mortality	95-00549
		455	1000 (100%)		reproduction	
Algae:						
S. subspicatus	72 h	5.0		41.1	growth	93-00002
		15.8		241	growth rate	
S. subspicatus	72 h	4.8		72.9	growth	95-00554
		24.0		166.0	growth rate	

Ref.:
Griffen, J. and Thompson, C.M., 1981, (95-00712)
Dengler, D. and Mende, P., 1994, (95-00554)
Thun, S., 1993, (93-00002)

Thun, S., 1993, (94-00157)
Thun, S., 1993, (94-00156)
Thun, S., 1993, (95-00548)
Thun, S., 1993, (95-00549)
Thompson, C.M., Griffen, J. 1981, (94-01161)
Forbis, A.D., Boudreau, P., 1981, (94-01160)

Tab. B.8.2.1-2: Toxicity of technical glyphosate (purity > 94%) to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish:						
L. macrochirus	24 h			121		95-00013
	48 h			120		
	96 h		120	120		
L. macrochirus	96 h	133	133-200	133-200		95-00012
L. macrochirus	96 h	32	56	78		95-00016
O. mykiss	96 h	>100		>100		95-00536
O. mykiss	24 h			170		95-00014
	48 h			120		95-00014
	72 h		87	86		95-00014
	96 h			50		95-00014
O. mykiss	96 h	10	18	38		95-00016
O. mykiss	96 h	95		95-171		95-00011
C. carpio	96 h			115		95-00015
O. mykiss	21 d			flow-through		94-00018
		50	100 (30%)		behaviour	
		50	100 (30%)		mortality	
		100			growth	
O. mykiss	21 d			flow-through		94-00015
		150			behaviour	
		150			mortality	
		150			growth	
P. promelas	254 d	25.7		FLC-test		95-00020
Invertebrates:						
D. magna	24 h	>100		>100		95-00537
	48 h	18		40		95-00537
D. magna	48 h			>100		96-00067
D. magna	21 d	100			mortality	95-00010
		100			reproduction	
D. magna	21 d	95	300 (100%)		mortality	94-00154

		9	30 (20%)		reproduction	
D. magna	21 d		flow-through			95-00010
		397			mortality	
		50	99 (16%)		reproduction	
D. magna	21 d	56	100 (20%)		mortality	96-00066
		56	100 (31%)		reproduction	
Algae:						
S. subspicatus	72 h	25		46	growth	95-00535
	24 h	25		60	growth rate	95-00535
S. capricornutum	72 h			48	biomass	96-00065
S. capricornutum	72 h			54	growth rate	96-00065
S. costatum	96 h			1.3	chlorophyll	96-00235
S. costatum	7 d	0.28		0.6	cell number	96-00455
N. palea	96 h	1		4.5	growth	97-00013
N. pelliculosa	7 d	34		42	cell number	96-00454
L. gibba	14 d	19	16(14%)	25	static frond counts	98-00103

Ref.: Forbis, 1989 (WAT 95-00008); McAllister, 1982 (WAT 95-00010); Wüthrich, 1990 (WAT 94-00154); Wüthrich, 1990 (WAT 94-00015); Bowman, 1989 (WAT 95-00018); Bogers, 1995 (WAT 96-00066), Bogers, 1995 (96-00067), Bogers, 1995 (96-00065); Handley, Mead and Bartlett, 1995 (95-00535) Handley, Grant-Salmon and Bartlett, 1995 (95-00536) Handley, Grant-Salmon and Bartlett, 1995 (95-00537) McAllister and Forbis, 1978 (95-00013) Rousina, Goode and Keplinger, 1973 (95-00015) Russell, Rousina, Goode and Keplinger, 1972 (95-00016) Thompson and McAllister, 1978 (95-00014) Wüthrich, 1990 (95-00011); Scheerbaum, D., 1996 (97-00013) Wüthrich, 1991 (95-00012); Hughes, J.S., 1987 (96-00454) Hollister, 1978 (96-00235); Hughes, J.S., 1987 (96-00455) Hughes, J.S., 1987 (96-00103)

Tab. B.8.2.1-3: Acute toxicity of the metabolite aminomethyl phosphenic acid (AMPA) to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish:						
O. mykiss	96 h	32		520		94-01162
O. mykiss	96 h	>8		>180		94-00499
Invertebrates:						
D. magna	48 h	>180		>180		94-00500
D. magna	48 h	320		690		94-01163

Algae:					
S. subspicatus	72 h	24.0	89.8	growth	94-00501
		0.96	452	growth rate	

Ref.: Anonym, 1994 (WAT94-00499); Anonym, 1993 (WAT94-00500); Bowman, 1991 (WAT94-01162); Burgess, 1991 (WAT94-01163); Dengler, 1994 (WAT94-00501)

Tab. B.8.2.1-4: Toxicity of Glistar to aquatic organisms (68% glyphosate a.i.)

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish:						
L. idus melanotus	96 h	100		>100		95-00770
Algae:						
S. capricornutum	72 h			16	growth rate	95-00768
S. capricornutum	72 h	<6.25		50	growth	95-00768

Ref.: Neven, B., 1994, (95-00768); Neven, B., 1994, (95-00770)

Tab. B.8.2.1-5: Toxicity of MON 44068 to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish						
C. carpio	96 h	957		>957		95-00717
O. mykiss	96 h	1020		>1020		95-00718
Invertebrates						
D. magna	48 h	970		>970		95-00719
Algae						
S. capricornutum	72 h	320		588	a growth	95-00720
S. capricornutum	72 h	320		936	a growth rate	95-00720
S. capricornutum	72 h	320		355	c growth	95-00720
S. capricornutum	72 h	320		1118	c growth rate	95-00720

Ref.:

Lintott, D.R., 1992, (94-00717)
Lintott, D.R., 1992, (94-00718)
Lintott, D.R., 1992, (94-00719)
Neven, B., 1992, (95-00720)

Tab. B.8.2.1-6: Toxicity of MON 52276 to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish						
C. carpio	96 h			>895		94-00020
O. mykiss	96 h	989		>989		94-00019
Invertebrates						
D. magna	48 h	356		676		94-00021
Algae						
S. capricornutum	72 h	90		149.9	growth	94-00022
S. capricornutum	72 h	90		392.9	growth rate	94-00022

Ref.:

Lintott, D.R., 1992, (94-00019)
Lintott, D.R., 1992, (94-00021)
Lintott, D.R., 1992, (94-00020)
Neven, B., 1991, (95-00022)

Tab. B.8.2.1-7: Toxicity of Glyphosan 360 SL to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish						
O. mykiss	96 h	6.53		35.9		97-00056
Invertebrates						
D. magna	48 h	26.3		80.9		97-00057
Algae						
S. capricornutum	72 h	3.13		1.4	biomass	97-00058
S. capricornutum	5 days	6.25		2.5	biomass	97-00058

Ref.:

van der Kolk, 1996, (97-00056)
van der Kolk, 1996, (97-00057)
van der Kolk, 1996, (97-00058)

Tab. B.8.2.1-8: Toxicity of Taifun to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.

Fish					
O. mykiss	96 h	2.6	3.6		95-00553
0. mykiss	21 d	3.6	10.0(100%)		95-00551
Invertebrates					
D. magna	21 d	5.4	17.0(100%)	mortality	95-00552
		5.4	17.0(100%)	reproduction	
Algae					
S. subspicatus	72 h	1.7	5.6	biomass	95-00553

Ref.:
Thun, S, 1991, (WAT 95-00553, WAT 95-00552, WAT 95-00550, WAT-00551)

Tab. B.8.2.1-9: Toxicity of Roundup to aquatic organisms

Testorganism	DURATION	NOEC mg/l	LOEC mg/l	LC50 mg/l	Remark	Ref.
Fish						
O. mykiss	96 h			8.2		98-00108
L. macrochirus	96 h			5.8		98-00179
0. mykiss	21 d	3.5	7.0 (80%)		flow-thr mortality	98-00183
		3.5			behaviour	
Invertebrates						
D. magna	48 h			5.3		98-00180
D. magna	21 d	3.5	7.0(45%)		mortality	98-00182
		3.5			reproduction	
Algae						
S. capricornutum	72 h	0.7	1.5	2.1	biomass	98-00181
		0.7	1.5	8.0	growth rate	98-00181

Ref.:
Forbis, A.D.; Boudreau, P. and Schofield, M.; 1982; (WAT 98-00108)
Forbis, A.D.; 1982; (WAT 98-00179)
Suprenant, D.C.; LeBlanc, G.A.; Sleight, B.H. and Bentley, R.E.; 1980 (WAT 98-00180)
Neven, B.; 1989; (WAT 98-00181)
Forbis, A.D.; 1989; (WAT 98-00182)
Bowman, J.H.; 1989; (WAT 98-00183)

B.8.2.2 Comments on the toxicity data

The toxicity data show that the IPA-salt and AMPA are less toxic than glyphosate tech.. Regarding algae as the most sensitive organisms formulated products like "MON 52276" are also less toxic than glyphosate but the products "Taifun" or "Roundup" for example show a higher toxicity. Skeletonema costatum is the most sensitive organism with an EC50 of 0.6 mg/l and a NOEC of 0.28 mg/l. It is a

marine species but marine and freshwater organisms are usually of equal sensitivity and therefore Skeletonema is regarded also as representative for freshwater algae. Relevant for the acute risk assessment are the EC50 for Daphnia (glyphosate) of 40 mg/l. In general the toxicity to fish and Daphnia is very low with the exception of Taifun and Roundup. Acute values of 3.6 mg/l (fish, Taifun) and 40 mg/l (Daphnia, glyphosate) are to be taken into account for TER calculations. With respect to the chronic risk NOECs of 3.5 mg/l (Roundup, fish) and 3.5 mg/l (Roundup, Daphnia) are relevant. Member states should consider whether additional studies with the most sensitive algae species are necessary on those formulated products which are more toxic than the a.s..

As Glyphosate tech. and Gyphosate Isopropylamine salt are of comparable toxicity to algae and a Lemna test and a study with a second algae species are available for Glyphosate tech. no further data a required for the isopropylamine salt.

A study with sediment-dwelling organisms must not be submitted because the chronic toxicity of glyphosate to invertebrates is < 0.1 mg/l. As AMPA is less toxic than the aforementioned substances the latter statement is also true for this metabolite.

B.8.2.3 Bioaccumulation in fish (Annex IIA 8.2.3)

There exist several studies regarding the bioaccumulation of glyphosate in different species, in marine and freshwater systems and with applications of the test substance into the watercolumn or into the sediment. The calculated BCF-values were low. The risk for bioaccumulation is considered as low .

B.8.2.4 Exposure and risk assessment for water organisms

Special uses like wiping, injection or spot uses should lead to low risks for aquatic organisms and were not evaluated but final decisions should be made on member state level. As the notifiers do not submit data regarding the exposure of aquatic organisms from the use of glyphosate in rice the risk assessment is preliminary in this regard.

Formulated products containing glyphosate should be used with maximum application rates in the range of 0.54 - 4.32 kg a.s./ha. On the basis of a worst case scenario initial PEC values in 1 m distance to the treated field for a water body with a depth of 30 cm are to be calculated. According to the drift measurements of Ganzelmeier et al. (1995), 4 % of the label rate are to be expected in that distance leading to initial PECs in the range of 0.007 - 0.058 mg/l.

The following TER values are relevant for the risk assessment:

Distance m	PEC µg/l	Toxicity µg/l	TER values

0	180	-	1440	600 (Algae)	3.33- 0.42
1	7	-	58	"	85.7 - 10.3

Taking into account the EC50 for algae (0.6 mg/l), TERs in the range of 86 - 10 are to be calculted indicating an acceptable risk for aquatic organisms. However, member states have to ensure that the distance of 1 m is kept by the farmers. Member states may come to other decisions if formulations like "Taifun" or "Roundup" are to be authorized.

With respect to aquatic uses maximum application rates in the range of 1.44 - 4.32 kg a.s. per ha are to be taken into account. Based on an overspray scenario PECs in the range of 0.5 - 1.4 mg/l are calculated leading to TERs 1.2 - 0.7. These values are lower than the relevant trigger indicating an unacceptable risk for aquatic organisms. Therefore aquatic uses should not be authorized. If the notifier wishes to remove that restriction the submission of a suitable designed microcosm study may be appropriate.

B.8.2.5 Risk management and labelling

Based on the data from acute tests with fish, Daphnia, algae and biodegradability the R 50/53 phrases must be set.

B.8.6 Effects on earthworms (Annex IIA 8.4; Annex IIIA 10.6.1)

The results presented below are considered valid. Further studies that are considered not valid, not appropriate or do not further contribute to the decision making process are disregarded below. The risk assessment is based on the use pattern and dosage outlined in this monograph. For a better comparison of the data all results are expressed in mg as/kg dry wt substrate.

B.8.6.1 Acute toxicity (Annex IIA 8.4.1, Annex IIIA 10.6.1.1)

The acute toxicity of the active substance was tested in the laboratory in several tests according to OECD-guideline no. 207 (table B.8.6.1-1).

Table B.8.6.1-1 Acute toxicity of the active substance glyphosate to earthworms

Test substance	Species	LC50	NOEC	LOEC	Ref.
		[mg as/kg dry wt substrate]			
as *	Eisenia fetida	> 1000	≥ 1000	> 1000	(1)
as	Eisenia fetida	> 1000	≥ 1000	> 1000	(2)
as	Eisenia fetida	> 1000	≥ 1000	< 1000	(3)
as *	Eisenia fetida	> 5000	158	500	(4)
as	Eisenia fetida	> 1000			(5)

* isopropylamine-salt

Ref.: (1) van der Hoeven et al., 1992, ARW 96-00091; (2) Klenner et al., 1995, ARW 96-00093; (3) Handley et al., 1995, ARW 96-00095; (4) Thun, S., ARW 96-00096; (5) Wüthrich, 1990, ARW-96-00099

Study (3) was conducted as a limit test. Study (5) can only be used as an additional information for risk assessment because test animals in the control boxes lost more than 20 % of the initial body weight, indicating that the test animals were not in a good condition.

The data available show that the active substance glyphosate is of low acute toxicity for earthworms.

Table B.8.6.1-2 Acute toxicity of glyphosate formulations to earthworms

Test substance	Species	LC50	NOEC	LOEC	Ref.
		[mg as/kg dry wt substrate]			
360 g as/l	Eisenia fetida	> 489	489	> 489	(1)

(SL form.)					
360 g as/l (SL form.)	Eisenia fetida	> 480	≤ 480	> 480	(2)
310 g as/l (SL form.)	Eisenia fetida	> 487	105	176	(3)

Ref.: (1) Candolfi, 1996, ARW 96-00089; (2) Hänisch, 1991, ARW 96-00094; (3) Hoxter et al., 1992, ARW 93-00016

Another study (ARW 96-00098) was done with a formulation containing 40.98 % glyphosate, 33 % ammonium sulfate and 17 % dodigen. The test can be used as an additional information for risk assessment. Related to the glyphosate content the LC50 was > 388 mg as/kg glyphosate.

There was a study (ARW 96-00092) with an LC50 of > 500 mg formulation which was not done according to GLP. Additionally the substance was not specified, so these results are not used for further risk assessment.

B.8.6.2 Other studies

A laboratory test was done with the species Aporrectodea caliginosa (ARW 96-00090). Test animals were reared in the laboratory. The total amount of glyphosate applied is not mentioned. Low doses corresponding to application rates of 0.7, 1.4 and 2.8 g as/ha were applied every two weeks with a test duration of 100 days. The application was done on the soil surface. The authors found a reduced growth rate of the single kept immature worms. The days needed to reach maturity were more than double with the glyphosate treatments compared to the controls. Some essential data are missing in this publication (e.g. amount and depth of soil per test container, total amount of glyphosate applied, composition of the test substrate).

In another laboratory test on growth of the species Aporrectodea caliginosa (ARW 95-00110) glyphosate was mixed into the soil in a concentration of 1, 10 and 100 mg/kg. One immature worm was added to a jar of 110 ml and kept for one week at 20°C. The growth rate was calculated after 7 days of exposure. With glyphosate no consistent effect on worm growth was found.

B.8.6.3 Risk assessment for earthworms

For risk assessment the lowest LC50 and LOEC values from the studies are used (tables B.8.6.1-1 and B.8.6.1-2). According to the EPPO risk assessment scheme the toxicity data from laboratory tests with the artificial soil substrate are not divided by a factor of two when log Pow < 2. The reason is, that for chemicals with log Pow > 2 sorption is expected to be linearly related to soil organic matter content. By correction of the toxicity data, the organic matter content of the artificial soil substrate is taken into account.

Table B.8.6.3-1 Short-term exposure assessment for earthworms for one application according to EPPO (assumptions: 5 cm soil depth, depending on the plant cover of the soil 50 % or 100 % of applied amount reaches the soil surface)

Use	Max. application rate/ treatment (kg as/ha)	PEC initial for one application (mg as/kg)	Short-term TER for one application *
Cereals	2.16	3.1	> 155
Maize	3.6	5.2	> 92
Vegetables**	4.32	3.1	> 155
Beets	2.16	3.1	> 155
Pasture, stubble**	4.32	6.2	> 77
Vineyards, orchards	5.07	7.2	> 67
Home & gardens	4.32	6.2	> 77
Pre-drilling (diff. field crops)	3.6	5.2	> 92
Working the soil	2.16	3.1	> 155
Total herbicide	3.6	5.2	> 92
Forestry	5.0	7.2	> 67

* LC50 > 480 mg as/kg
** soil coverage assumed 50 %, for all others 0 %

The short-term toxicity-exposure ratio (TER) with LC50 > 480 mg as/kg is at least more than 67 (> 480/7.2) for one application. The factor NOEC/PIEC is at least 14.6 (105/7.2).

For double treatments the initial PEC after the last application amounts to 4.6 up to 8.1 mg as/kg (see chapter B.7.3). The short-term toxicity-exposure ratio therefore amounts to at least 59 (> 480/8.1). Using the PEC data for 100 days after the last application with double treatment the longterm toxicity-exposure ratio amounts to at least 94 (> 480/5.1).

The laboratory test on growth of Aporrectodea caliginosa indicates a risk for earthworms at low doses of glyphosate. As the test has some essential lacks and there are no comparable hints from other

publications, the fact is considered acceptable.

B.8.7 Effects on other soil non-target macro-organisms (Annex IIIA 10.6.2)

Eijsackers summarizes literature on effects of glyphosate on soil fauna (ARW 95-00109). Concerning effects on isopods and litter decomposition no decrease in litter consumption by isopods was found. Concerning mortality of the isopods in this test no overall dose-related effect occurred.

B.8.8 Effects on soil non-target micro-organisms (Annex IIA 8.5; Annex IIIA 10.7)

Laboratory tests were performed to examine the effect of glyphosate on microbial activities in soil. Four tests were carried out mainly by several investigation laboratories with SL formulations and one test with the active substance.

B.8.8.1 Carbon conversion (Annex IIA 8.5; Annex IIIA 10.7)

The effects on dehydrogenase activity and short-term respiration were tested with different SL formulations (but all contain 360 g glyphosate/l) and with various application rates.

Tab. B.8.8.1-1: Results of dehydrogenase activity

type of soil	sand		loamy sand	
application rate	single	fivefold	single	fivefold
in l/ha	10	50	10	50
in % to untreated:	98	95	93	89
influence tolerable:	yes	yes	yes	yes
after days:	28	28	28	28

Ref.: Todt, 1990, BMF 95-00093, according to BBA-guideline 1-1, part VI, March 1990.

Tab. B.8.8.1-2: Results of dehydrogenase activity

type of soil	loamy sand		clay loam	
application rate	single	fivefold	single	fivefold
in l/ha	10	50	10	50
in % to untreated:	109	92	104	115
influence tolerable:	yes	yes	yes	yes
after days:	28	28	28	28

Ref.: Maas, 1990, BMF 95-00095, according to BBA-guideline 1-1, part VI, March 1990.

Tab. B.8.8.1-3: Results of dehydrogenase activity

type of soil	loamy sand		silt loam	
application rate	single	fivefold	single	fivefold
in l/ha	5	25	5	25
in % to untreated:	109	94	100	96
after days:	30	30	30	30
in % to untreated:	95	96	95	93
after days:	89	89	56	56
influence tolerable:	yes	yes	yes	yes

Ref.: Andre, 1991, BMF 95-00060, according to BBA-guideline 1-1, part VI, March 1990.

Tab. B.8.8.1-4: Results of short-term respiration

type of soil	loamy sand
application rate	double
in l/ha	12
in % to untreated:	102
influence tolerable:	yes
after days:	28

Ref.: McLaughlin and Schannee, 1996, BMF 96-00032, according to EPPO-guideline, 1994.

B.8.8.2 Nitrogen conversion (Annex IIA 8.5; Annex IIIA 10.7)

The effects on nitrogen mineralization were tested with different SL formulations (but all contain 360 g glyphosate/l) and with various application rates.

Tab. B.8.8.2-1: Results of nitrogen mineralization

type of soil	sand		loamy sand	
application rate	single	fivefold	single	fivefold
in l/ha	10	50	10	50
in % to untreated:	99	92	103	109
influence tolerable:	yes	yes	yes	yes
after days:	28	28	28	28

Ref.: Todt, 1990, BMF 95-00093, according to BBA-guideline 1-1, part VI, March 1990.

Tab. B.8.8.2-2: Results of nitrogen mineralization

type of soil	loamy sand	clay loam

application rate	single	fivefold	single	fivefold
in l/ha	10	50	10	50
in % to untreated:	100	113	93	105
influence tolerable:	yes	yes	yes	yes
after days:	28	28	28	28

Ref.: Maas, 1990, BMF 95-00095, according to BBA-guideline 1-1, part VI, March 1990.

Tab. B.8.8.2-3: Results of nitrogen mineralization

type of soil	loamy sand		silt loam	
application rate	single	fivefold	single	fivefold
in l/ha	5	25	5	25
in % to untreated:	100	105	96	94
after days:	28	28	28	28
in % to untreated:	97	106	101	102
after days:	89	89	56	56
influence tolerable:	yes	yes	yes	yes

Ref.: Andre, 1991, BMF 95-00060, according to BBA-guideline 1-1, part VI, March 1990.

Tab. B.8.8.2-4: Results of nitrogen mineralization

type of soil	loamy sand
application rate	double
in l/ha	12
in % to untreated:	105
influence tolerable:	yes
after days:	28

Ref.: McLaughlin and Schannee, 1996, BMF 96-00032, according to EPPO-guideline, 1994.

B.8.8.3 Risk assessment for soil micro-organisms

The test results presented show that when applying glyphosate containing products according to the mentioned amounts no negative effects on microbial activities are to be expected. Many published papers on glyphosate confirm that when applying according to the recommended pattern of use the microflora will not be affected.

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	AVS95-00223.				
EG:AIIA-8.1.3	1980. Batt, D.J.B., Black, J.A. and Cowan, W.F. The effects of glyphosate herbicide on chicken egg hatchability. Can. J. Zool., 58, 1980, 1940-1942. AVS96-00135.	N	Y		
EG:AIIA-8.1.3	1978. Beavers, J.B. and Fink, R. One-generation reproduction study - mallard duck - glyphosate tech nical. WI 78-53 ! 139-143. AVS93-00045.	N	N	MOD MOT	
EG:AIIA-8.1.3	1978. Beavers, J.B. and Fink, R. One-generation reproduction study - bobwhite quail - glyphosate technical. WI 78-52 ! 139-141. AVS93-00044.	N	N	MOD MOT	
EG:AIIA-8.1.3	1984. Hoffman, D.J. and Albers, P.H. Evaluation of potential embryotoxicity and teratogenicity of 42 herbicides, insecticides, and petroleum contaminants to mallard eggs. Arch. Environ. Contam. Toxicol., 13, 1984, 15-27. AVS96-00134.	N	Y		
EG:AIIA-8.2.1	1985. Bhide, M.B. and Naik, P.Y. Report on the acute toxicity of glyphosate (tech) of EXCEL Industries Limited, Bombay to fresh water fish (Tilapia mossambica). WAT95-00592.	N	N	BCL	
EG:AIIA-8.2.1	1987. Bowman, J.H. Acute toxicity of SC-0224 4LC-E to Bluegill sunfish (Lepomis macrochirus). 35637. WAT96-00234.	N	N	ZNC	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
EG:AIIA-8.2.1	1990. Dickhaus, S. and Heisler, E. Examination for acute toxicity of compound glyphosate TCN in trouts at exposition for 96 hours in the bath fluid. 1-7-48-90. WAT95-00545.	N	N	FSG	
EG:AIIA-8.2.1	1976. Folmar, L.C. Overt avoidance reaction of Rainbow trout fry to nine herbicides. Bull. Environ. Contam. Toxicol., 15 (5), 1976, 509-514. WAT96-00213.	N	Y		
EG:AIIA-8.2.1	1979. Folmar, L.C., Sanders, H.O. and Julin A.M. Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. Arch. Environ. Contam. Toxicol., 8(3), 1979, 269-278. WAT96-00210.	N	Y		
EG:AIIA-8.2.1; EG:AIIA-8.2.2; EG:AIIA-8.2.3; EG:AIIIA-10.2.1	1979. Folmar, L.C., Sanders, H.O. and Julin, A.M. Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. Arch. Environm. Contam. Toxicol., 8, 1979, 269-278. WAT95-00593.	N	Y		
EG:AIIA-8.2.1; EG:AIIIA-10.2.1	1979. Folmar, L.C., Sanders, H.O. and Julin, A.M. Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. Arch. Environmental Contam. Toxicol., 8, 1979, 269-278. L641. WAT95-00558.	N	Y		
EG:AIIA-8.2.1	1981.	N	N	MOD	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner data prot
	Griffen, J. and Thompson, C.M. Acute toxicity of MON 0139 to Bluegill sunfish. AB-81-073. WAT95-00712.			MOT
EG:AIIA-8.2.1	1995. Handley, J.W., Grant-Salmon, D. and Bartlett, A.J. The akute toxicity of glyphosate to Rainbow trout (Oncorhynchus mykiss). 710/21. WAT95-00536.	Y	N	HPQ
EG:AIIA-8.2.1	1978. Heitmüller, T. Toxicity of seven test materials to sheepshead minnows, Cyprinodon variegatus. BP-78-4-029. WAT95-00742.	N	N	MOD
EG:AIIA-8.2.1	1987. Holck, A.R. and Meek, C.L. Dose-mortality responses of Crawfish and Mosquitoes to selected pesticides. J. Am. Mosq. Control Assoc., 3 (3), 1987, 407-411. WAT96-00217.	N	Y	
EG:AIIA-8.2.1; EG:AIIA-8.2.8	1988. Holdway, D.A. and Dixon, D.G. Acute toxicity of permethrin or glyphosate Pulsa exposure to Larval White sucker (Catostomus sommersoni) and juvenile Flagfish (Jordanelle ...). Environ. Toxicol. Chem., 7 (1), 1988, 63-68. WAT96-00216.	N	Y	
EG:AIIA-8.2.1	1990. Holland, M.E. Results of analysis of AMPA in a 96 hour acute study with Rainbow trout. MSL 10855/ML-90-403. WAT95-00713.	N	N	MOD MOT
EG:AIIA-8.2.1	1980. Johnson, W.W. and Finley, M.T.	N	Y	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	Handbook of acute toxicity of chemicals to fish and aquatic invertebrates. Resour. Publ. 137, Fish Wildl. Serv., U.S.D.I., Washington,, 137, 1980, 98. WAT96-00211.				
EG:AIIA-8.2.1; EG:AIIA-8.2.3	1990. Kaul, I. Translation of registration document from the Danish NAEP (Bekaempelsesmiddelkontoret) to: Monsanto-Searle A/S Concerning Roundup, nr. 48-1. Monsanto-Searle A/S. WAT95-00600.	N	Y		
EG:AIIA-8.2.1	1981. Li, G.C. and Chen, C.Y. Study on the akute toxicities of commonly used pesticides to two kinds of fish. K'O Hsueh Fa Chan Yueh K'an, 9 (2), 1981, 146-152. WAT96-00215.	N	Y		
EG:AIIA-8.2.1	1987. Sun, F. and Wong, S.-S. Acute toxicity of SN-750721 to common carp. 87AQC015. WAT95-00649.	N	N	MAR	
EG:AIIA-8.2.1	1981. Thompson, C.M., Griffen, J. Acute toxicity of MON 0139 (Lot LURT 12011) (AB-81-072) to Rainbow trout (Salmo gairdneri). #27202. WAT94-01161.	Y	N	MOT MOD	
EG:AIIA-8.2.1	1980. Tooby, T.E., Lucey, J. and Stott, B. The tolerance of Grass carp, Ctenopharyngodon idella Val., to aquatic herbicides. J. Fish Biol., 16 (5), 1980, 591-597. WAT96-00218.	N	Y		

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
EG:AIIA-8.2.1	1989. Wan, M.T., Watts, R.G. and Moul, D.J. Effects of different dilution water types on the acute toxicity to juvenile Pacific Salmonids and Rainbow trout of glyphosate and its formulated products. Bull. Environ. Contam. Toxicol., 43, 1989, 378-385. WAT96-00209.	N	Y		
EG:AIIA-8.2.1	1989. Wan, M.T., Watts, R.G. and Moul, D.J. Effects of Different Dilution Water Types on the Acute Toxicity to Juvenile Pacific Salmonids and Rainbow Trout of Glyphosate and its Formulated Products. Bull. Environ. Contam. Toxicol., 43, 1989, 378-385. WAT95-00648.	N	Y		
EG:AIIA-8.2.1	1989. Wan, W.T., Watts, R.G. and Moul, D.J. Effects of different dilution water types on the acute toxicity to juvenile Pacific salmonids and Rainbow trout of glyphosate and its formulated products. Bull. Environ. Contam. Toxicol., 43 (3), 1989, 378-385. WAT96-00214.	N	Y		
EG:AIIA-8.2.1	1990. Wüthrich, V. Glyphosate technical: 96-hour acute toxicity study (LC50) in the rainbow trout. 271631. WAT95-00011.	Y	N	CHE	MOD
EG:AIIA-8.2.1	1991. Wüthrich, V. Glyphosate Technical: 96-hour acute toxicity study (LC50) in the Bluegill sunfish. 271642 (RCC NR.). WAT94-00012.	N	N	CHE	MOD
EG:AIIA-8.2.2	1975. Anonym Chronic toxicity of glyphosate to the	N	N	MOD	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner data prot
	Fathead minnow (Pimephales promelas). BDN-75-129. WAT95-00020.			
EG:AIIA-8.2.2	1989. Bowman, J.H. Flow-through toxicity of glyphosate to Rainbow trout (Salmo gairdneri) for a 21-day duration period. AB-89-36. WAT95-00018.	N	N	MOT MOD
EG:AIIA-8.2.2	1990. Wüthrich, V. Glyphosate technical: 21-DAY PROLONGED TOXICITY STUDY IN THE RAINBOW TROUT UNDER FLOW-THROUGH CONDITIONS. 271620 (RCC NR.). WAT94-00015.	N	N	CHE MOD
EG:AIIA-8.2.2.2	1983. Darhens and Lottman Roundup herbicide forest ecosystem study - Part III. Residues of glyphosate aminomethylphosphonic acid and N-nitroso-glyphosate in small mammals anf fish from a forest watershed after aerial application of Roundup herbicide. MSL 3128. WAT95-00714.	N	N	MOT MOD
EG:AIIA-8.2.2.2	1978. Kramer, R.M. and Beasley, R.K. CP 67573, Residue and Metabolism Part 28: Determination of residues of glyphosate and its metabolite in fish. MSL-0569. WAT95-00021.	N	N	MOD MOT
EG:AIIA-8.2.2.2	1989. Wan, M.T., Watts, R.G. and Moul, D.J. Efects of different dilution water types on the acute toxicity juvenile pacific salmonids and rainbow trout of glyphosate and its formulated products. Bull. Environ. Contam. Toxicol., 43, 1989, 378-385. WAT95-00741.	N	Y	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
EG:AIIA-8.2.3	1985. Anonym Static marine mollusk bioconcentration study with water- applied 14C-glyphosate and "non-aged" sandy loam soil substrate, Part I. MSL 5018. WAT95-00729.	N	N	MOD	
EG:AIIA-8.2.3	1995. Bogers, M. Acute toxicity study in Daphnia magna with Glyfosaat. R486. WAT96-00067.	Y	N	GTT	
EG:AIIA-8.2.3	1991. Burgess, D. Acute toxicity of AMPA to Daphnia magna. AB-90-401. WAT94-01163.	Y	N	MOD MOT	
EG:AIIA-8.2.3	1981. Forbis, A.D., Boudreau, P. Acute toxicity of MON 0139 (Lot LURT 12011) (AB-81-074) to Daphnia magna. #27203. WAT94-01160.	Y	N	MOD MOT	
EG:AIIA-8.2.3	1981. Grabiak, M.C. A reinvestigation of the static exposure of channel catfish to 14C-labeled glyphosate, N-(phosphonomethyl)glycine. MSL 2056. WAT95-00724.	N	N	MOD	
EG:AIIA-8.2.3	1990. Holland, M.E. Results of analysis of AMPA in a 48 hour acute study with Daphnia magna. MSL 10854. WAT95-00715.	N	N	MOD MOT	
EG:AIIA-8.2.3	1985. Mc Allister, et al. Static crayfish bioconcentration study	N	N	MOD	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner data prot
	with waterapplied 14C-glyphosate and "non-aged" sandy loam soil substrate, Part I. MSL 5019. WAT95-00727.			
EG:AIIA-8.2.3	1983. Purdum and Grabiak Bioconcentration of non-aged residues of 14C-labelled glyphosate in crayfish under static conditions. MSL 2937. WAT95-00726.	N	N	MOD
EG:AIIA-8.2.3	1983. Purdum and Grabiak, M.C. Bioconcentration of non-aged residues of 14C-labelled glyphosate in mollusks (Rangia cureata) under static conditions. MSL-2952. WAT95-00728.	N	N	MOD
EG:AIIA-8.2.3	1989. Ridley, W.P. and Chottt, K.A. Uptake, depuration and bioconcentration of 14C-glyphosate to bluegill sunfish Part II: Characterisation and quantitation of glyphosate and its metabolites. MSL 9303. WAT95-00725.	N	N	MOD
EG:AIIA-8.2.4	1993. Anonym AMPA: Acute toxicity to Daphnia magna. BL5061/B. WAT94-00500.	Y	N	ZNC
EG:AIIA-8.2.4	1973. Bentley, R.E. Acute toxicity of Roundup (technical) to grass shrimp (Palaemonetes vulgaris) and Fiddler crab (Uca pugilator). BN-73-80. WAT95-00004.	N	N	MOD
EG:AIIA-8.2.4	1973. Bentley, R.E.	N	N	MOD

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	Acute toxicity of Roundup (technical) to atlantic oyster (Crassostrea virginica). BN-73-79. WAT95-00005.				
EG:AIIA-8.2.4	1995. Bogers, M. Protocol Acute toxicity study in Daphnia magna with glyphosate. 141863. WAT95-00559.	Y	N	AGC	
EG:AIIA-8.2.4	1995. Bogers, M. Daphnia magna, Reproduction Test with Glyfosaat. R484. WAT96-00066.	Y	N	GTT	
EG:AIIA-8.2.4	1990. Dickhaus, S. and Heisler, E. Acute toxicological study of compound glyphosate TCN in Daphnia magna with 48 hours acute immobilisation test. 1-7-47-90. WAT95-00546.	N	N	FSG	
EG:AIIA-8.2.4; EG:AIIA-8.2.7	1979. Folmar, L.C., Sanders, H.O. and Julin, A.M. Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. Arch. Environ. Contam. Toxicol., 8 (3), 1979, 269-278. WAT96-00212.	N	Y		
EG:AIIA-8.2.4	1990. Folmar, L.C., Sanders, H.O. and Julin, A.M. Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. WAT95-00740.	N	N	MOD	
EG:AIIA-8.2.4	1995. Handley, J.W., Grant-Salmon, D. and Bartlett, A.J.	Y	N	HPQ	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	The akute toxicity of glyphosate to Daphnia magna. 710/22. WAT95-00537.				
EG:AIIA-8.2.4; EG:AIIA-8.2.8	1984. Hartman, W.A. and Martin, D.B. Effect of suspended bentonite clay on the acute toxicty of glyphosate to Daphnia pulex and Lemna minor. Bull. Environm. Contam. Toxicol., 33, 1984, 355-361. WAT95-00594.	N	Y		
EG:AIIA-8.2.4	1979. Linden, E., Bengtsson, B.E., Svanberg, O. and Sundstrom, G. The acute toxicity of 78 chemicals and pesticide formulations against two brackish water organism, the bleak (Alburnus alburnus) and the harpacticoid. Chemosphere, 8 (11/12), 1979, 843-851. WAT96-00219.	N	Y		
EG:AIIA-8.2.4	1978. McAllister, W.A. and Forbis, A.D. Acute toxicity of technical glyphosate to Daphnia magna. AB-78-201. WAT95-00730.	Y	N	MOD	
EG:AIIA-8.2.4	1979. Richardson, J.T., Frans, R.E. and Talbert, R.E. Reactions of Euglena gracilis to Fluometuron, MSMA, Metribuzin, and Glyphosate. Weed Sci., 27 (6), 1979, 619-624. WAT96-00220.	N	Y		
EG:AIIA-8.2.4	1993. Thun, S. 21 d reproduction test in Daphnia test article: "Glyphosate isopropylamine salt". 80-91-2328-05-93. WAT95-00549.	Y	N	FSG	
EG:AIIA-8.2.4	1990.	Y	N	MOD	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner data prot
	Wüthrich, V. 48-hour acute toxicity of glyphosate technical to Daphnia magna. 272968. WAT95-00006.			CHE
EG:AIIA-8.2.5	1995. Bogers, M. PROTOCOL Daphnia magna, reproduction test with glyphosat (Semi-static). 141874. WAT95-00557.	Y	N	AGC
EG:AIIA-8.2.5	1995. Bogers, M. Fresh water algal growth inhibition test with glyphosate. R481. WAT96-00065.	Y	N	GTT
EG:AIIA-8.2.5	1989. Forbis, D.A. 21-day prolonged static renewal toxicity of glyphosate technical to Daphnia magna. AB-89-58. WAT95-00008.	Y	N	MOT MOD
EG:AIIA-8.2.5	1982. McAllister, W.A. and McKee, M.C. Chronic toxicity of glyphosate to Daphnia magna under flow- through test conditions. AB-82-036. WAT95-00010.	N	N	MOD MOT
EG:AIIA-8.2.5	1990. Wüthrich, V. Influence of glyphosate on the reproduction of Daphnia magna. 250795. WAT95-00733.	N	N	MOD
EG:AIIA-8.2.6	1993. Anton, F.A. Aritz, M. and Alia, M. Ecotoxic effects of four herbicides (glyphosate, alachlor, chlortoluron and isoproturon) on the algae Chlorella pyrenoidosa Chick.	N	Y	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	The Science of the Total Environment, 1993. WAT95-00652.				
EG:AIIA-8.2.6	1993. Anton, F.A., Ariz, M. and Alia, M. Ecotoxic effects of four herbicides (glyphosate, alachlor, chlortoluron and isoproturon) on the algae Chlorella pyrenoidosa Chick. The Science of the Total Environment, 1993. WAT96-00231.	N	Y		
EG:AIIA-8.2.6	1984. Blanck, H., Wallin, G. and Wangberg, S.A. Species-dependent variation in algal sensitivity to chemical compounds. Ecotoxicol. Environ. Saf., 8, 1984, 339-351. WAT96-00221.	N	Y		
EG:AIIA-8.2.6	1995. Bogers, M. Protocol Fresh water algal growth inhibition test with glyphosate. 141896. WAT95-00560.	Y	N	AGC	
EG:AIIA-8.2.6	1989. Bozeman, J., Koopman, B. and Bitton, G. Toxicity testing using immobilized algae. Aquatic Toxicology, 14, 1989, 345-352. WAT96-00230.	N	Y		
EG:AIIA-8.2.6	1989. Bozeman, J., Koopman, B. and Bitton, G. Toxicity testing using immobilized algae. Aquatic Toxicology, 14, 1989, 345-352. WAT95-00651.	N	Y		
EG:AIIA-8.2.6	1994. Dengler, D. and Mende, P. Testing of toxic effects of aminomethylphosphonic acid (AMPA) on the single cell green alga Scenedesmus subspicatus. XX-93-271.	Y	N	MOT MOD	

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	WAT95-00716.			
EG:AIIA-8.2.6	1990. Dickhaus, S. and Heisler, E. Algal growth inhibition test with compound glyphosate TCN. 1-7-46-90. WAT95-00547.	N	N	FSG
EG:AIIA-8.2.6	1989. Domröse, A.M., Schmerse, G.C. and Zschaler, R. Growth inhibition test with algae according to OECD-guideline 201 from June 7th 1984. NA 899654/II. WAT95-00001.	Y	N	MOT MOD AHM
EG:AIIA-8.2.6	1988. Felix, H.R., Chollet, R. and Harr, J. Use of the cell wall-less alga Dunaliella bioculata in herbicide screening tests. Ann. Appl. Biol., 113 (1), 1988, 55-60. WAT96-00228.	N	Y	
EG:AIIA-8.2.6	1985. Grossbard, E. Effects of glyphosate on the microflora with reference to the decomposition of treated vegetation and interaction with some plant pathogenes. The Herbicide Glyphosate, 11, 1985, 159-185. WAT95-00595.	N	Y	
EG:AIIA-8.2.6	1995. Handley, J.W., Mead, C. and Bartlett, A.J. Glyphosate: Algal inhibition test. 710/12. WAT95-00535.	Y	N	HPQ
EG:AIIA-8.2.6	1980. Hess, F.D. A chlamydomonal algal bioassay for detecting growth inhibitor herbicides. Weed Sci., 28 (5), 1980, 515-520.	N	Y	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	WAT96-00227.				
EG:AIIA-8.2.6	1978. Hollister, T.A. Toxicity of seven test materials to the marine alga, Skeletonema costatum. BP-78-4-031. WAT95-00736.	N	N	MOD	
EG:AIIA-8.2.6	1987. Hughes, J.S. The toxicity of glyphosate technical to Navicula pelliculosa. XX-88-413. WAT95-00737.	N	N	MOD	
EG:AIIA-8.2.6	1987. Hughes, J.S. The toxicity of glyphosate technical to Anabaena flos-aquae. XX-88-415. WAT95-00738.	N	N	MOD	
EG:AIIA-8.2.6	1987. Hughes, J.S. The toxicity of glyphosate technical to Skeletonema costatum. XX-88-414. WAT95-00722.	N	N	MOD	
EG:AIIA-8.2.6	1987. Hughes, J.S. The toxicity of glyphosate technical to Selenastrum capricornutum. XX-88-412. WAT95-00735.	N	N	MOD	
EG:AIIA-8.2.6	1989. Kreutzweiser, D.P., Kingsbury, P.D. and Feng, J.C. Drift response of stream invertebrates to aerial applications of glyphosate. Bull. Environ. Contam. Toxicol., 42 (3), 1989, 331-338. WAT96-00223.	N	Y		
EG:AIIA-8.2.6	1992. St-Alurent, D., Blaise, C., MacQuarrie,	N	Y		

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner	data prot
	P., Scroggins, R. and Trottier, B. Comparative Assessment of Herbicide Phytotoxicity to Selenastrum capricornutum Using Microplate and Flask Bioassay Procedure. Environmental Toxicology and Water Quality: An International Journal, 7, 1992, 35-48. WAT96-00232.				
EG:AIIA-8.2.6	1992. St-Laurent, D. and Blaise, C. Comparative Assessment of Herbicide Phytotoxicity to Selenastrum capricornutum Using Microplate and Flask Bioassay Procedures. Environmental Toxicology and Water Quality, 7, 1992, 35-48. WAT95-00650.	N	Y		
EG:AIIA-8.2.6	1993. Thun, S. Algae growth inhibition test Test article: "Glyphosate isopropylamine salt". 80-91-2328-01-93. WAT93-00002.	Y	N	FSG	
EG:AIIA-8.2.6	1986. Turbak, S.C., Olson, S.B. and Mcfeters, G.A. Comparison of algal assay systems for detecting waterborne herbicides and metals. Water Res., 20 (1), 1986, 91-96. WAT96-00222.	N	Y		
EG:AIIA-8.2.6	1990. Wüthrich, V Acute toxicity of glyphosate to Scenedesmus subspicatus. 250773. WAT95-00002.	Y	N	MOD CHE	
EG:AIIA-8.2.6	1990. Zschaler, R. Growth inhibition test with algae according to OECD-guideline 201 - Addendum. NA 899654/II.	Y	N	MOD	

Annex point(s) (91/414/EEC);	year. author(s). title. source. report number registration number.	GLP GEP Y/N	publ. Y/N	owner data prot
	WAT95-00734.			
EG:AIIA-8.2.6	1979. o'Brien, M.C. and Prendeville, G.N. Effect of herbicides on cell membrane permeability in Lemna minor. Weed Res., 19 (6), 1979, 331-334. WAT96-00224.	N	Y	
EG:AIIA-8.2.7	1989. Buhl and Faerber Acute toxicity of selected herbicides and surfactants to larvae of the midge Chironomus riparius. Arch. Environ. Contam. Toxicol., 18, 1989, 530-536. 18, (1989): 530-536. WAT95-00732.	N	Y	
EG:AIIA-8.2.7	1989. Buhl, K.J. and Faerber, N.L. Acute toxicity of selected herbicides and surfactants to larvae of the midge Chironomus riparius. Arch. Environ. Contam. Toxicol., 18 (4), 1989, 530-536. WAT96-00226.	N	Y	
EG:AIIA-8.2.8	1981. Davis, D.E. Effects of herbicides on submerged seed plants. Office of Water research and technology, U.S.D.I., Washington, D.C, 1981, 1-19. WAT96-00225.	N	Y	
EG:AIIA-8.2.8	1978. Hollister, T.A. Toxicity of seven test materials to the white sea urchin, Tripneustes esculentus. BP-78-4-030. WAT95-00723.	N	N	MOD
EG:AIIA-8.2.8	1978. Hollister, T.A. Toxicity of seven test materials to mysid shrimp, Mysidopsis bahia. BP-78-4-032.	Y	N	MOD

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	Kühner, C. Assessment of side effects of TAIFUN 360 on the rove beetle, Aleocchara bilineata Gyll. (Coleoptera, Staphilinidae) in the laboratory. 94073/01-NLAB. ANA96-00068.				
EG:AIIA-8.3.2	1990. Mead Briggs An evaluation of the toxicity of Roundup to the carabid beetle, Bembidion lampros under semi-field conditions. MON-90-1. ANA96-00074.	Y	N	MOD	
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EG:AIIA-8.4.1	1995. Klenner, D. and Bathelt, A. Acute toxicity of glyphosate to Eisenia fetida - laboratory test. RL502. ARW96-00093.	Y	N	FSG	
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EG:AIIA-8.5; EG:AIIIA-10.7.1	Todt, K. Effect of Roundup on the activity of microflora of soil. Monsanto Company. NA 90 9151. BMF95-00093.	Y	Y		
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