ANNEX B

ENDOSULFAN

B - 7 : RESIDUE DATA

B.7 Residue data

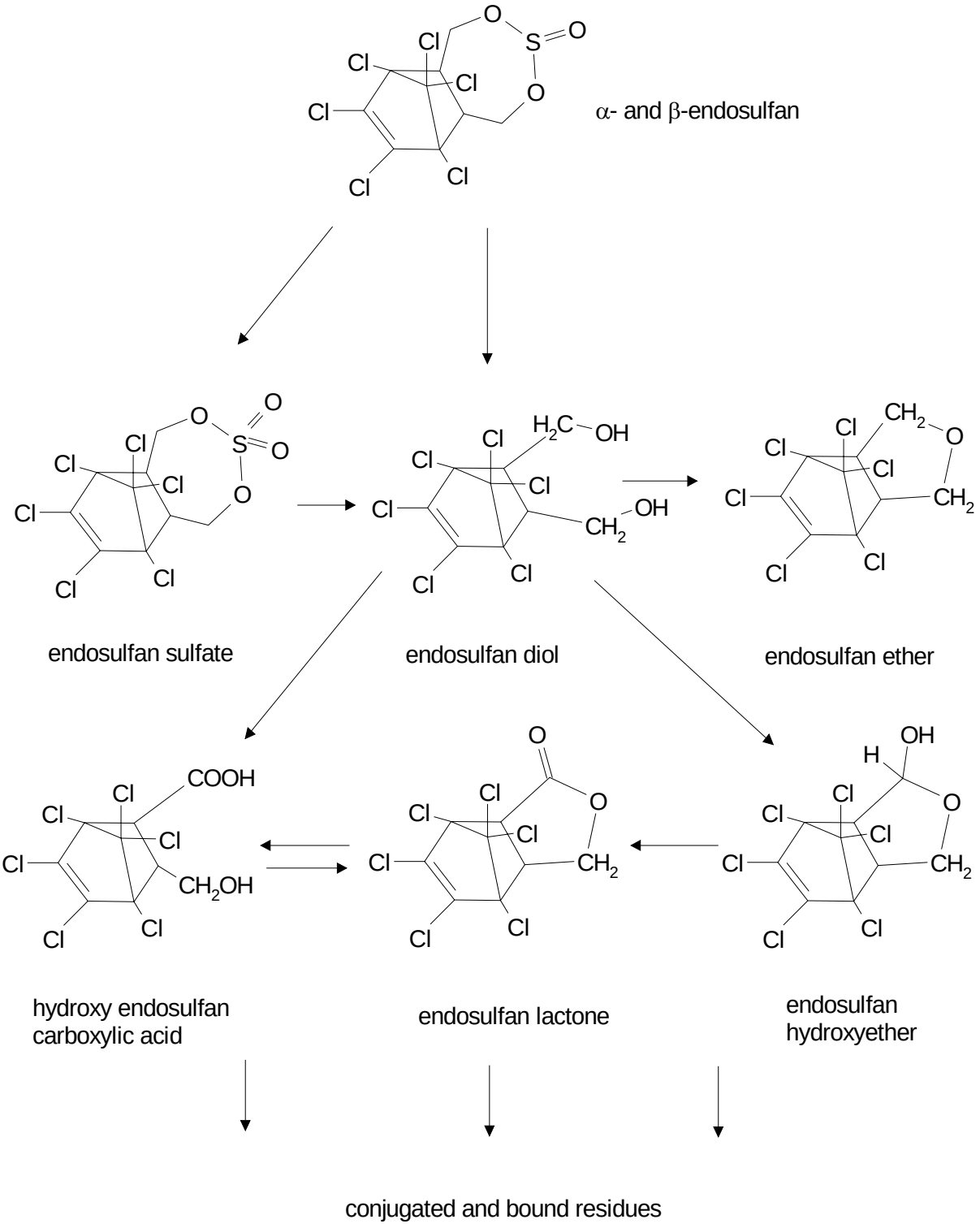
B.7.1 Metabolism, distribution and expression of residue in plants (IIA, 6.1 and IIIA, 8.1)

Investigations on the metabolism and distribution of endosulfan and its relevant but temporary metabolites in plants have been carried out with the ^{14}C-labelled active substance on relevant crops like tomato and cucumber plants and apple trees. No qualitative differences are observed in the endosulfan metabolism of the various plant species. The active substance and its major metabolite are not translocated in plants, i.e. are not systemic.

Endosulfan residues are not taken up by plants from the soil via the root in significant amounts.

The metabolic pathway of endosulfan in plants is presented in Figure 7.1-1.

Figure 7.1-1: Degradation pathway of endosulfan in plants



B.7.1.2 Endosulfan residues in tomato

Young tomato plants were treated with formulated ^{14}C-labelled endosulfan (label position: 6,7,8,9,10-u-^{14}C, isomeric mixture of α/β-endosulfan = 2/1) under outdoor conditions. The plants which had a height of approximately 1 m were treated three times, at intervals of seven days, each time at an application rate of 635 g a.s./ha (Buerkle and Würz, 1990, Doc. No.: A44894). The range of residues determined in tomato plants (fruits and leaves) at different harvest intervals are presented in Table 7.1.2-1.

Table 7.1.2-1: Total radioactive residues in tomato plants

Tomato plants	**Days after the 3rd treatment**	**Total residue content (TRR[a]) mg-equ./kg**	**Total residue content (TRR) mg-equ./kg**
plant part		**fruit**	**leaves**
	2	-	27.2
	8	0.35	26.5
	13	0.17	16.8
	21	0.28	14.1
	27	0.36	11.5
	42	0.05	13.0
	48	0.03	12.6

[a]) TRR = total radioactive residues

Additionally, the residues were characterised as presented in Table 7.1.2-2.

Table 7.1.2-2: Characterisation of the total residue on/in tomato plants [% of total radioactivity]

Plant part	**Days after the 3rd treatment**	**α-isomer**	**β-isomer**	**Endosufan sulphate**	**Endosulfan diol**	**Polar metabolite fractions**	**Non-extractable**
leaves	2	14.4	26.6	15.05	0.3	23.5	8.8
	8	12.2	18.2	21.7	-	26.8	8.5
	13	0.9	1.8	10.8	-	46.4	7.2
	21	2.3	6.3	16.7	0.6	46.1	15.0
	42	1.0	4.3	12.8	0.3	46.0	16.3
	48	1.5	5.2	11.2	-	46.5	26.4
fruit	27*	75 (α+β) isomer		15	-	-	6.8

* Due to the low radioactivity determined in tomato fruit, the residue of this sampling interval could only be analysed.

The polar fraction of the leaf extract was treated with hydrochloric acid and arylsulfatase resulting in one major peak which could be identified as endosulfan diol by HPLC/MS.

Summing up the tabulated results, endosulfan residues in tomato fruits consisted predominantly of the parent isomers (sum: 75 %) and a major metabolite, endosulfan sulphate (15 % of the total radioactive residues). The portion of non-extractable residues was low (< 10 %). The same compounds were

detected in tomato leaves, however to a lower extent. Instead of these a polar fraction was observed which contained mainly endosulfan diol in conjugated form (as sulphate).

Consequently, the relevant residues in the edible plant parts (fruits) are the parent endosulfan and the metabolite endosulfan sulphate, which should be covered by a residue analytical. Polar and a non-extractable residues did not occur in the fruits to a significant level.

B.7.1.3 Endosulfan residues in apple

^{14}C-labelled formulated endosulfan (label position: 5a, 9a-^{14}C, isomeric mixture of α/β-endosulfan = 2/1) was applied once to a young apple tree with almost mature apples at a rate which corresponded to 1.5 kg a.s./ha under outdoor conditions (Schwab, W., 1995, Doc. No.: A53662). The treated tree had been grown outdoors (up to an height of 1.5 m). After sampling at different intervals the apples were rinsed with acetone and then extracted with aqueous acetone.

The range of residues determined in apples and leaves at different harvest intervals are presented in Table 7.1.3-1.

Table 7.1.3-1: Total radioactive residues in apples and apple tree leaves

days after treatment	**total residue content (TRR[a]) mg-equ./kg**	**total residue content (TRR) mg-equ./kg**	**rinsed residues mg-equ./kg**	**extractable residues after rinse mg-equ./kg**
	Leaves	**apples**	**apples**	**apples**
0	80.6	0.44	0.21	0.23
7	35.0	1.37	0.50	0.84
14	33.3	0.74	0.08	0.65
21	24.5	0.99	0.24	0.74

[a]) TRR = total radioactive residues

The total residues in apples varied probably due to inhomogeneous spraying. The residues in/on leaves decreased quickly within the first sampling interval followed by a lower decrease. The apple rinse accounted for approximately half of the total residues at day 0 and decreased to ca. a quarter of them at day 21.

Additionally, the residues were characterised as presented in Table 7.1.3-2.

Table 7.1.3-2: Characterisation of the residues in/on apples and apple tree leaves

[% of the total radioactive residues]

plant part	days after treatment	α-isomer	β-isomer	Endosulfan sulphate	Endosulfan diol	non-extractable
Leaves	21	7.6	28.3	49.6	0.9	9.9
apples[a])	0	54.3	43.1	-	-	3.8
	7	49.7	44.0	0.9	-	4.3
	14	47.9	43.4	1.5	-	2.9
	21	50.7	43.1	1.5	-	2.0

[a]) The residues in apple rinse and extract were numerically combined

Summing up the residue composition, the endosulfan residues in apples consisted predominantly of the parent isomers and to a low extent of endosulfan sulphate. The portion of non-extractable residues was negligible and never exceeded 5 % of the total radioactive residues.

Leaves sampled on day 21 contained the same components, however in a different composition. Endosulfan sulphate proved to be the major metabolite accounting for 50 % of the total radioactive residues. In addition, endosulfan diol (0.9 %) and an unknown polar fraction (1.6 % of the total radioactive residues) were detected. The non-extractable portion did not exceed 10 %.

As a consequence, the relevant residues in apples consisted of the parent isomers α- and β-endosulfan. A residue method which covers the active substances and the main metabolite endosulfan sulphate therefore applies for ca. 95 % of the total radioactive residues in the fruits.

It should be noted that confined metabolism studies generally resulted in higher residue levels than field studies. Therefore supervised field studies are needed in order to obtain reliable residue levels.

B.7.1.4 Endosulfan residues in cucumber

Cucumber plants with small fruits were treated three times with formulated ^{14}C-labelled endosulfan (label position: 5a, 9a-^{14}C, isomeric mixture of α/β-endosulfan = 2/1) in 7-day intervals and at nominal rate of 530 g a.s./ha each (Buerkle, 1995, Doc. No.: A56011). Leaf and fruit samples were taken at different intervals after the last treatment and extracted with acetone and water without prior rinsing. The composition of the residues was only determined at the last sampling date which ensured the most progressive metabolism within the total sampling period and was orientated on the intended pre-harvest-interval

The total radioactive residues in leaves and fruits at different sampling intervals are shown in Table 7.1.4-1.

Table 7.1.4-1: Total radioactive residues in cucumber plants

days after the 3rd treatment	**total residue content (TRR[a]) mg-equ./kg**	**total residue content (TRR) mg-equ./kg**
	fruits	leaves
0	0.24	185
3	0.26	87
7	0.25	18
14	0.18	52

[a]) TRR = total radioactive residues

The total radioactive residues were practically constant in the slowly growing cucumber fruits and decreased in the leaves to approximately a quarter of the initial concentration due to an intensive increase of the foliage.

Following a first extraction of the fruit with acetone/water and evaporation of the acetone, the extracted residues were partitioned between water and dichloromethane. The extractable radioactivity in acetone/water (F3) was generally high (87.4% of TRR, run A; 89.9% of TRR, run B), and the non-extractable portion low (F2: 12.6% of TRR, run A; 10.1% of TRR, run B). Most of the extractable portion turned out to be non-polar, and was soluble in diclhoromethane (F4: 51.0% of TRR, run A; 63.4% of TRR, run B). (Table 7.1.4-2).

Table 7.1.4-2: Total radioactive residues in cucumber fruits 14 days after the third treatment with ^{14}C-endosulfan

Fraction		**% TRR**	**mg/kg**
Total Radioactive Residues (F1)	Run A	100	0.198
	Run B	100	0.077
	Average	100	
Non-extractable (F2)	Run A	12.6	0.25
	Run B	10.1	0.008
	Average	11.4	
Extractable (water/acetone) (F3)	Run A	87.4	0.173
	Run B	89.9	0.069
	Average	88.7	
- organic fraction (F4)	Run A	51.0	0.101
	Run B	63.4	0.049
	Average	57.2	
- organic fraction (F5)	Run A	34.4	0.068
	Run B	25.0	0.019
	Average	29.7	

The organo-soluble residues consisted of the parent isomers and endosulfan sulphate as shown in Table 7.1.4-3, and 6.2% of the TRR (0.012 mg/kg, run A) or 10.8% of the TRR (0.008 mg/kg, run B) remained unidentified. This unidentified portion corresponded to two HPLC peaks slightly more polar than the most polar available reference standard, endosulfan diol (average of 3.1 and 5.1%, respectively), and the remaining 1.4% of the TRR appeared only occasionally at different elution times.

Table 7.1.4-3: Characterisation of the residues in the total organic fraction (dichloromethane) obtained from cucumber fruits 14 days after the third treatment with ^{14}C-endosulfan

Run	Component	% TRR	mg/kg
A	Total organic fraction (F4)	51.0	0.101
	α-endosulfan	12.1	0.024
	β-endosulfan	12.2	0.024
	Endosulfan sulphate	20.5	0.041
	sum of identified	44.8	0.089
	sum of non identified	6.2	0.012
B	Total organic fraction (F4)	63.4	0.049
	α-endosulfan	15.4	0.012
	β-endosulfan	15.5	0.012
	Endosulfan sulphate	21.7	0.017
	sum of identified	52.6	0.041
	sum of non identified	10.8	0.008

The polar portion of the extractable radioactivity (F5: 34.4% of the TRR, run A) was purified by solid phase extraction, resulting in a purified methanolic eluate (16.5% of TRR) and the non-retarded percolate (9.8% of TRR). A radio-HPLC separation of the eluate showed approximately 10 peaks which were more polar than the known reference standards, indicating possible conjugation of endosulfan metabolites with polar endocons (probably sugar molecules).

In order to release the aglycons another moiety of the polar extractable residues (F5: 25.0% of TRR, run B) was subjected to acid hydrolysis, using HCl according to the residue analytical method. Neutralisation with NaOH caused precipitation of NaCl accompanied by co-precipitation of a considerable portion of radioactivity (9.9% TRR). The organic extract of the hydrolysate contained only a minor amount (2.7% of TRR), indicating that the portion of the endosulfan aglycons in the fruit is significantly lower than in the leaf. The remaining aqueous, polar portion (6% TRR), which was no longer considered to be conjugated was in the same range as observed in the leaves (9.3% of TRR). The losses of radioactivity during work-up (10.2% TRR) were distributed over the different working steps indicating that there was no specific loss occurring.

The composition of the residue in cucumber fruits 14 days after the third application of endosulfan is given in Table 7.1.4-4.

Table 7.1.4-4: Characterisation of the residues in cucumber fruits 14 days after the third treatment with ^{14}C-endosulfan

Components	µg-equ./g	% of TRR[1])
alpha-endosulfan	0.026	14.5
beta-endosulfan	0.026	14.6
endosulfan sulphate	0.038	21.4
sum of main residue components	0.091	50.5
non-polar fractions[2])	0.017	9.5
non-polar fraction after hydrolysis[3])	0.005	2.7
polar fractions after hydrolysis[4])	0.029	15.9
non-extractable	0.020	11.4
loss during work-up	0.018	10.2
grand total	0.180	100.2[5])

[1]) TRR: total radioactive residues (0.18 µg-equ./g)
[2]) 3 different organic subfractions with 3.1, 5.1 and 1.4 % of TRR
[3]) This fraction is likely to contain the cleaved aglycons of the directly extracted polar fraction, its radioactivity was too low for further analysis
[4]) 2 fractions, a water-soluble (6.0) and a precipitated fraction (9.9 % of TRR)
[5]) Rounded values. The sum of exact values equals 100.0 %.

The same components were detected in the leaves, at the same sampling date (14 DAT) which showed significantly higher content of residues (52 mg equ/kg). In addition, a significant portion of polar residues was observed which mainly consisted of glycosidically conjugated endosulfan diol (9.5%) and hydroxy endosulfan carboxylic acid (24.0% of the total radioactive residues). The portion of non-extractable residues amounted to 16.7% in the leaves. The leaf conjugates did not appear in the fruits (Table 7.1.4-5).

Table 7.1.4-5: Characterisation of the residues in cucumber leaves

Residues in cucumber leaves	% TRR	mg/kg
TRR	100	52.0
α-endosulfan	7.1	3.7
β-endosulfan	11.0	5.7
Endosulfan sulphate	17.7	9.2
Endosulfan diol (conjugated)	9.5	4.9
Hydroxy endosulfan carboxylic acid (free and conjug)	24.0	12.5
sum of identified	69.3	36.0
7 - non-identified medium and non-polar metabolites	9.4	4.9
Non-extractable	16.7	8.7
Procedural loss	4.6	2.4
sum of non identified	30.7	16.0

Summing up, extraction of cucumber with acetone/water released the predominant portion of the total radioactive endosulfan residues. Most of the extractable residues proved to be the parent isomers α- and β-endosulfan and endosulfan sulphate which are therefore to be considered as the relevant residue components to be covered by the residue analytical method. None of the individual fractions of the remaining non-identified residues exceeded 0.05 mg equivalent/kg.

B.7.1.5 Evaluation of plant metabolism studies

Residue data at 0 days for apples in Table 7.1.3-1 are not consistent with the data presented at 7, 14 and 21 days. They are too low compared to the residue contents at 7, 14 and 21 days

The sum of main residue components of endosulfan (i.e. α-endosulfan, β-endosulfan and endosulfan sulphate) varies greatly depending on the crop investigated. Thus, these main components reach around 95% in apple and tomato, while only reaching 50% in cucumber. Additional information should be given about the nature of metabolites found in cucumber.

Additional experiments on metabolism in plants are required for oils seeds (cotton or soybean) and root vegetables (potato or sugarbeets).

B.7.2 Metabolism, distribution and expression of residue in livestock.(IIA, 6.2 and IIIA, 8.1)

Three sheep each weighing approximately 50 kg, were given a gelatine capsule containing 15 mg endosulfan daily for 26 days corresponding to a daily dose of 10 mg/kg diet (Gorbach, 1965, Doc. No.: A14209). Approximately 20 % of the dose was excreted as unchanged parent substance with the faeces. 10 % of the daily dose was excreted as free endosulfan diol with the urine, and an additional portion of 20 % probably as conjugated diol, since it could be identified as diol after weak alkaline hydrolysis. No residues of α-endosulfan and β-endosulfan were found in organs, tissues and milk (detection limit 0.01 - 0.05 mg/kg). Muscular tissue, liver, kidney and brain tissue were also free of endosulfan sulphate residues (same detection limit) whereas kidney and intestinal fat contained up to 0.3 mg/kg of endosulfan sulphate. Milk contained also a minor residue of 0.02 to 0.3 mg/kg of endosulfan sulphate. Each residue level was lower than the concentration in the diet by more than one order of magnitude indicating that endosulfan does not accumulate.

In an additional study ^{14}C-labelled endosulfan was administered to two lactating sheep at a single dose of 0.3 mg/kg b.w. (Gorbach *et al*., 1968, Doc. No.: A14216). About 50 % of the radioactivity was excreted with the faeces, 41 % with the urine, and 1 - 2 % in the milk, most of them within the first three days after dosing.

Approximately half of faecally excreted residues consisted of the parent substance (α- and β-endosulfan). About one third proved to be bound, since it could not be extracted. Besides a major portion of unknown compounds, approximately one quarter of the renally excreted residues were extracted and identified as endosulfan diol and α-hydroxy endosulfan either at a ratio of 70 : 30.

With the exemption of the liver, large intestine, and fat, the organs and tissues were free of residues up to 0.02 mg-equiv./kg. The highest concentration (0.03 mg-equiv./kg) was detected in the liver.

In milk a maximum concentration of 0.15 mg-equiv./kg was seen shortly after the administration of the dose. After one week the concentration had fallen below one tenth of this single maximum value and on

day 17 of the dosing period only 0.002 mg-equiv./kg could be determined. After separation from skim milk, the radioactivity in milk cream revealed to be exclusively endosulfan sulphate.

The fate of endosulfan in 4 lactating diary cows was investigated in a feeding study (Stanovick, 1965, Doc. No. A14210). α- and β-endosulfan (5 mg/kg diet) and endosulfan sulphate (5 mg/kg diet) were fed daily over a total period of 30 days. At the end of this period, two cows were sacrificed and analysed for the residues. The remaining two cows were maintained for a succeeding 30 day withdrawal period and then slaughtered.

Endosulfan sulphate was the only residue component in milk, liver, kidney, and fat. Muscle tissue was free of residues (< 0.05 mg/kg). A plateau concentration was reached in milk after 2 - 8 days of feeding in the range of 0.05 to 0.16 mg/kg. The highest residue level was detected in fatty tissue (0.89 mg/kg) of animals which had been slaughtered immediately after the 30-day feeding. Even this level was lower than the level in the diet by a factor of approximately 5.

A feeding study was additionally performed with lactating goats (Indraningsih et al., 1993, Doc. No.: A51447). 12 animals were daily dosed with 1 mg/kg b.w. endosulfan for a period of 28 days. This dose corresponded to 29 mg/kg diet. Groups of 3 animals were sacrificed 1, 8, 15, and 21 days after end of feeding.

The sum of α- and β-endosulfan and endosulfan sulphate concentration in organs and tissues reached generally maximum values at the first date of sacrifice (kidney 0.29, liver 0.13, fat 0.06, muscle 0.04, G.I. tract 0.19, and milk 0.02 mg/kg). These residues decreased until the next sampling date, however with one exemption: In kidney 0.47 mg/kg were detected at day 8 followed by an decrease at days 15 and 21. The residues in milk became undetectable after one week. Half-lives of organ clearance were determined amounting to 1 - 3 days.

A comparison of the residues in milk and tissues with the dosing level seemed to indicate that endosulfan did not show a clear tendency of accumulation.

From the results of the mentioned studies it can be stated that endosulfan residues in livestock organs, in fat and muscular tissues, and milk fat consisted mainly of endosulfan sulphate and α- and β-endosulfan and in urine of endosulfan diol. Muscular tissue contained generally lower residues than offal and fatty tissues. The highest residue levels were detected in kidney and/or kidney fat. The unchanged parent substance occurred mainly in the faeces.

Studies performed are clearly insufficient and additional experiments must be carried out. Moreover, the metabolic pathway in animals should be indicated.

Only one study using radiolabelled chemicals has been carried out (Doc A14216). Besides, this was performed using a dose too low (0.3 mg/kg). A dose around 10 mg/kg would have been adequate for this study.

There is a lack of data on recoveries of radioactivity in relation of the measured radioactivity in specific tissues, and also on the extraction schemes used. Data on the extractability of residues should be given.

Studies on laying poultry (chickens) must be carried out, including residue data in different tissues and in animal products (eggs).

In conclusion, the applicants must carry out additional experiments on metabolism in livestock, and these experiments should be carried out following to the objectives and recommendations of the EU Directive.

B.7.3 Definition of the residue (IIA, 6.7; IIIA, 8.6)

The definition of the residue for both risk assessment and GAP monitoring purposes should provisionally be considered as the parent compound (α and β isomers) and its main and most toxic metabolite endosulfan sulphate. This is subject to a confirmation of the validity of the proposed plant metabolic behaviour and the metabolism in animals, which must be carried out in additional experiments that have been required to the applicants.

B.7.4 Use pattern

The applicant AgrEvo reviewed the GAP on January 1999. In this revision the use of Endosulfan in Northern EU was removed.

Table 7.4-1: Summary of Good Agricultural Practices for European Union

CROP	F/G	FORM TYPE	COUNTRY	APPLICATION			APPLICATION RATE			PHI	REMARKS
				Method	Growth stage	N	kg ai/hl	Water l/ha	kg ai/ha		
1. Fruits **(i) Citrus fruit**	F	EC (350 g/l)	Southern Europe	Medium/High vol spray	During fruiting	1-2	0.035	3000	1.05	21	Spraying interval : 14 – 21
(ii) Hazel nuts	F	EC (350 g/l)	Southern Europe	High volume spray	At any stage	2	0.08	1000	0.8	28	Spraying interval : 14-21
(iii) Pome fruit	F	EC (350 g/l)	Southern Europe	High volume spray	During fruiting	2	0.053 – 0.105	1000 – 1500	max. 1.05	14	Spraying interval : 14 – 21
(iv) Stone fruit (peaches)	F	EC (350 g/l)	Southern Europe	High volume spray	During fruiting	3	0.053	1500	0.8	21	Spraying interval : 14 – 21
(v) Berries and small fruit **(a) Table and wine grapes**	F	EC (350 g/l)	Southern Europe	Medium/High volume spray	At any syage	2	0.053-0.105	500-1000	max 1.05	28	Spraying interval : 14 – 21 days
2. Vegetables **(i) Root and tuber vegetables** **Sugar beet**	F	EC (350 g/l)	Southern Europe	High colume spraying	At any stage	2	0.125	400	0.50	25	Spraying interval: 14 – 21 days
(iii) Fruiting vegetables **(a) Solanacea (Tomatoes)**	F	EC (350 g/l)	Southern Europe	High volume spray	At any stage	2	0.053 - 0.105	500 - 1000	max. 0.53	3	Spraying interval: 14 – 21 days
	G	EC (350 g/l)	Southern Europe	High volume spray	At any stage	2	0.053	1500	0.8	3	Spraying interval: 7 – 14 days
(c) Cucurbits inedible peel	F	EC (350 g/l)	Southern Europe	High volume spray	At any stage	3	0.053	600 – 1000	0.32 – 0.53	7	Spraying interval: 7 – 14
4. Oil seed **Cotton**	F	EC (350 g/l)	Southern Europe	High volume spray	Last application: When balls are partly open	3	0.105	800	0.84	15	Spraying interval: 14-21
5. Potatoes	F	EC (350 g/l)	Southern Europe	High and low volume spray	At any stage	2	0.088	600	0.53	14	Spraying interval: 14 – 21 days

Table 7.4-2: Summary of Good Agricultural Practices for Imported crops

CROP	F/G	FORM TYPE	COUNTRY	APPLICATION			APPLICATION RATE			PHI	REMARKS
				Method	Growth stage	N	kg ai/hl	Water l/ha	kg ai/ha		
Citrus fruit	F	EC (350 g/l)	Imported crop	High volume spray	During fruiting	1-2	0.035	3000	max. 1.05	21	Outside Europe, use in citrus is registered in South Africa, Brazil, U.S.A.
Soybeans	F	EC (350 g/l)	Imported crops	High volume spray	At any stage	2	0.13 - 0.26	200 – 400	0.53	30	Outside Europe, use is registered in Brazil, Australia, Argentina a.o. countries
Cotton	F	EC (350 g/l)	Imported crops	High volume spray	Last application: When balls are partly open	1 - 3	0.105	800	0.84	15	Outside Europe registrations exist in Brazil, Columbia, Equador a.o. countries.
Tea	F	EC (350 g/l)	Imported crops	High volume spray	At any stage	3	0.126	350	0.44	7	Amongst other use is registered in India
Coffee	F	EC (350 g/l)	Imported crops	High volume spray	At any stage	3	0.175 – 1.05	100 - 600	1.05	30	Use is registered in Latin american and African countries
Cacao	F	EC (350 g/l)	Imported crops	Medium to low volume spray	At any stage	3	0.21 – 0.875	40 - 120	0.25 – 0.35	28	
Pineaples	F	EC (350 g/l)	Imported crops	Medium to low volume spray	At any stage	2	0.41 – 0.84	200 - 400	1.68	60	Spraying interval 7 –14 days

B.7.5 Identification of critical GAPs

Table 7.5-1: Summary of Critical GAP for Southern European Countries

CROP	F/G	FORM TYPE	COUNTRY	APPLICATION			APPLICATION RATE			PHI	REMARKS
				Method	Growth stage	N	kg ai/hl	Water l/ha	kg ai/ha		
1. Fruits **(i) Citrus fruit**	F	EC (350 g/l)	Southern Europe	Medium/High vol spray	During fruiting	1-2	0.035	3000	1.05	21	Spraying interval : 14 – 21
(ii) Hazel nuts	F	EC (350 g/l)	Southern Europe	High volume spray	At any stage	2	0.08	1000	0.8	28	Spraying interval : 14-21
(iii) Pome fruit	F	EC (350 g/l)	Southern Europe	High volume spray	During fruiting	2	0.053 – 0.105	1000 – 1500	1.05	14	Spraying interval : 14 – 21
(iv) Stone fruit (peaches)	F	EC (350 g/l)	Southern Europe	High volume spray	During fruiting	3	0.053	1500	0.8	21	Spraying interval : 14 – 21
(v) Berries and small fruit **(a) Table and wine grapes**	F	EC (350 g/l)	Southern Europe	Medium/High volume spray	At any syage	2	0.053-0.105	500-1000	1.05	28	Spraying interval : 14 – 21 days
2. Vegetables **(i) Root and tuber vegetables** **Sugar beet**	F	EC (350 g/l)	Southern Europe	High colume spraying	At any stage	2	0.125	400	0.50	25	Spraying interval: 14 – 21 days
(iii) Fruiting vegetables **(a) Solanacea (Tomatoes)**	F	EC (350 g/l)	Southern Europe	High volume spray	At any stage	2	0.053 - 0.105	500 - 1000	0.53	3	Spraying interval: 14 – 21 days
	G	EC (350 g/l)	Southern Europe	High volume spray	At any stage	2	0.053	1500	0.8	3	Spraying interval: 7 – 14 days
(c) Cucurbits inedible peel	F	EC (350 g/l)	Southern Europe	High volume spray	At any stage	3	0.053	600 – 1000	0.32 – 0.53	7	Spraying interval: 7 – 14
4. Oil seed **Cotton**	F	EC (350 g/l)	Southern Europe	High volume spray	Last application: When balls are partly open	3	0.105	800	0.84	15	Spraying interval: 14-21
5. Potatoes	F	EC (350 g/l)	Southern Europe	High and low volume spray	At any stage	2	0.088	600	0.53	14	Spraying interval: 14 – 21 days

Table 7.5-2: Summary of Good Agricultural Practices for Imported crops

CROP	F/G	FORM TYPE	COUNTRY	APPLICATION			APPLICATION RATE			PHI	REMARKS
				Method	Growth stage	N	kg ai/hl	Water l/ha	kg ai/ha		
Citrus fruit	F	EC (350 g/l)	Imported crop	High volume spray	During fruiting	1-2	0.035	3000	max. 1.05	21	Outside Europe, use in citrus is registered in South Africa, Brazil, U.S.A.
Soybeans	F	EC (350 g/l)	Imported crops	High volume spray	At any stage	2	0.13 - 0.26	200 – 400	0.53	30	Outside Europe, use is registered in Brazil, Australia, Argentina a.o. countries
Cotton	F	EC (350 g/l)	Imported crops	High volume spray	Last application: When balls are partly open	1 - 3	0.105	800	0.84	15	Outside Europe registrations exist in Brazil, Columbia, Equador a.o. countries.
Tea	F	EC (350 g/l)	Imported crops	High volume spray	At any stage	3	0.126	350	0.44	7	Amongst other use is registered in India
Coffee	F	EC (350 g/l)	Imported crops	High volume spray	At any stage	3	0.175 – 1.05	100 - 600	1.05	30	Use is registered in Latin american and African countries
Cacao	F	EC (350 g/l)	Imported crops	Medium to low volume spray	At any stage	3	0.21 – 0.875	40 - 120	0.25 – 0.35	28	
Pineaples	F	EC (350 g/l)	Imported crops	Medium to low volume spray	At any stage	2	0.41 – 0.84	200 - 400	1.68	60	Spraying interval 7 –14 days

B.7.6 Residue resulting from supervised trials (IIA, 6.3; IIIA, 8.2)

Results obtained in residue trials are shown in Tables 7.6.1 to 7.6.13. Although the use of endosulfan in Northern EU has removed the Rapporteur kept the results of the trials carried out in Northern EU as additional information.

Bold letters referee to residue data that have been used for the calculation of MRLs.

B.7.6.1 Citrus fruit

Table 7.6.1-1: Citrus fruit critical GAP

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Fruits and Nuts								
Citrus fruits	F	EC (350 g/l)	Southern Europe	1-2	0.035	3000	1.05	Spraying interval: 14-21
	F	EC (350 g/l)	Imported crop	2	0.035	3000	Max. 1.05	Outside Europe, use in citrus is registered in South Africa, Brazil, U.S.A.

Table 7.6.1-2: Summary of supervised trials for citrus

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref
			kg a.s/ha	conc % a.s						
Oranges Pera Coroa	Brazil 1980	EC 350 g/l	0.35	0.049	1	ripening fruit	peel	0.3 0.1 0.06 0.04	0 12 23 30	A19340 (A57130)
							pulp	0.01	0 - 30	
							juice	0.01	0 - 30	
Oranges Pera Coroa	Brazil 1980	EC 350 g/l	0.7	0.097	1	ripening fruit	peel	1.8 0.3 0.3 0.1	0 12 23 30	A19341 (A57130)
							pulp	0.05 0.01	0 12 - 30	
							juice	0.01	0 – 30	
Oranges Valencia	Spain (S) 1991-1992	EC 350 g/l	6.3	0.105	1	harvesting	fruit	1.67 0.88 0.64 0.35	0 3 7 15	A49710 (A57130)
Oranges Valencia	Spain (S) 1991-1992	EC 350 g/l	6.3	0.105	1	harvesting	fruit	2.25 0.82 0.55 0.27	0 3 7 15	A49711 (A57130)
Oranges Valencia	Spain (S) 1991-1992	EC 350 g/l	5.93	0.105	1	harvesting	fruit	2.48 0.78 0.65 0.33	0 3 7 15	A49712 (A57130)
Oranges Navel	Spain (S) 1991-1992	EC 350 g/l	7.7	0.104	1	harvesting	fruit	0.94 0.83	0 7	A49713 (A57130)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref
			kg a.s/ha	conc % a.s				0.28 **0.14**	14 **21**	
Oranges Salustiana	Spain (S) 1991-1992	EC 350 g/l	7.7	0.104	1	harvesting	Fruit	1.38 0.92 0.39 **0.3**	0 7 14 **21**	A49714 (A57130)
Oranges Valencia	Spain (S) 1991-1992	EC 350 g/l	7.7	0.104	1	harvesting	fruit	0.68 0.55 0.31 **0.23**	0 7 14 **21**	A49715 (A57130)
Oranges Navel-Late	Spain (S) 1991-1992	EC 350 g/l	7.7	0.104	1	harvesting	fruit	1.13 0.58 0.54 **0.44**	0 7 14 **21**	A49716 (A57130)
Oranges Fortuna	Spain (S) 1991-1992	EC 350 g/l	7.7	0.104	1	harvesting	fruit	1.92 0.52 0.24 **0.12**	0 7 14 **21**	A49717 (A57130)
Oranges Valencia	South Africa 1980	WP 500 g/kg	3.3	0.05	1	mature ripe fruit	pulp peel	0.205 - 0.305 0.085 - 0.165 0.115 - 0.165 0.02 - 0.09 0.015- 0.03 0.015- 0.03 0.015 1.805 - 3.405 1.105 - 2.905 0.71 - 2.61 0.65 - 1.92 0.46 - 0.93 0.245 - 0.51 0.135 - 0.295 0.165 - 0.305 0.055 - 0.305	0 1 3 5 7 10 14 - 28 0 1 3 5 7 10 14 21 28	A24306 (A57130)
Oranges Newhall	Spain (S) 1994	EC 352 g/l	3.6963 3.6963 3.6963	0.1956 0.1056 0.1056	3	35 35 35-36	fruit fruit fruit peel pulp fruit peel pulp fruit peel pulp	1.2 0.68 0.52 0.04 2.8 0.03 1.8 0.03	0 7 14 14 22 22 28 28	A55226
Oranges Navel	Spain (S) 1994	EC 352/gl	3.6963 3.6963 3.6963	0.1956 0.1056 0.1056	3	35-36 35-36 36-37	fruit fruit fruit peel pulp fruit peel pulp fruit peel pulp	2.5 1.4 4.800 0.05 4.1 0.02 4.7 0.04	0 6 13 13 20 20 26 26	A55226
Oranges Newhall	Spain (S) 1994	EC 352 g/l	1.2673 1.2673 1.2673	0.1056 0.1056 0.1056	3	36 41 41	fruit fruit pulp fruit peel fruit peel pulp pulp fruit peel	0.57 0.3 < 0.015 1.0 0.58 < 0.015 < 0.015 0.42	-> 0 7 14 14 21 21 28 28	A55226
Oranges Naveline	Italy (S) 1994	EC 352 g/l	2.429 2.4287 2.4287	0.1056 0.1056 0.1056	3	36 36-37 36-37	fruit fruit pulp fruit peel	1.5 0.88 0.08 1.4	0 7 13 13	A55226

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref
			kg a.s/ha	conc % a.s						
							pulp fruit peel pulp fruit peel	0.02 1.1 0.02 2.0	21 21 -> 27 -> 27	
Oranges	Italy (S) 1994	EC 352 g/l	2.1119 2.1122	0.1056 0.1056	2	36 36-37	fruit fruit pulp fruit peel pulp fruit peel pulp fruit peel	1.6 2.1 0.08 3.1 **0.03** **1.9** 0.06 3.8	0 7 13 13 **21** **21** -> 27 -> 27	A55226
Lemons Eureka	South Africa 1981	WP 475 g/kg	6.27	0.048	1	fruit turning from green to yellow	pulp peel	0.015 - 0.165 0.035 - 0.085 0.015 - 0.075 0.02 - 0.03 0.03 - 0.04 0.015 - 0.03 0.015 - 0.02 0.015 - 0.115 2.3 - 3.9 1.2 - 2.4 1.3 - 1.8 1.2 - 1.6 1.0 - 1.2 0.79 - 1.0 0.52 - 0.72	0 1 3 5 7 10 14 21 0 1 3 5 7 10 21	A24305 (A57130)
Mandarin Clemenvilla	Spain (S) 1994	EC 352 g/l	3.6963 3.6963 3.6963	0.1056 0.1056 0.1056	3	35-36 35-36 36	pulp fruit peel pulp fruit peel pulp fruit peel pulp fruit peel pulp fruit peel	0.22 15.1 0.06 6.5 0.07 6.6 0.05 4.7 0.05 4.2	0 0 7 7 14 14 -> 22 -> 22 28 28	A55213
Mandarin Fortuna	Spain (S) 1994	EC 352 g/l	3.6963 3.6963 3.6963	0.1056 0.1056 0.1056	3	35-36 35-36 37	pulp fruit peel pulp fruit peel pulp fruit peel pulp fruit peel pulp fruit peel	0.3 12.0 0.11 5.6 0.08 5.6 0.06 3.9 0.05 3.4	0 0 6 6 13 13 -> 20 -> 20 26 26	A55213
Mandarin Clemenville	Spain (S) 1994	EC 352 g/l	3.6963 3.6963 3.6963	0.1056 0.1056 0.1056	3	35-36 35-36 37	pulp fruit peel pulp fruit peel pulp fruit peel pulp fruit peel pulp fruit peel	0.15 10.5 0.04 6.4 0.06 5.9 0.04 4.9 0.03 5.2	0 0 6 6 13 13 -> 20 -> 20 26 26	A55213
Mandarin Clemenvilla	Spain (S) 1995	EC 352 g/l	1.848 1.848 1.848	0.0528 0.0528 0.0528	3	75 75 77	fruit fruit pulp fruit fruit peel	2.5 1.2 < 0.03 0.9 4.5	0 7 14 14 14	A56786 (A57130)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref
			kg a.s/ha	conc % a.s						
							pulp	< 0.03	21	
							fruit peel	4.800	21	
							fruit	0.93	21	
							pulp	< 0.03	-> 28	
							fruit	0.82	-> 28	
							fruit peel	4.1	-> 28	
Mandarin Clemenvilla	Spain (S) 1995	EC 352 g/l	3.6963	0.1056	3	75	fruit	5.0	0	A56786
			3.6963	0.1056		75	fruit	2.1	7	(A57130)
			3.6963	0.1056		77	pulp	0.12	14	
							fruit	1.5	14	
							fruit peel	6.6	14	
							pulp	0.05	21	
							fruit	1.2	21	
							fruit peel	5.9	21	
							pulp	0.05	-> 28	
							fruit	1.1	-> 28	
							fruit peel	5.7	-> 28	
Mandarin Satsuma	Spain (S) 1995	EC 352 g/l	1.848	0.0528	3	75	fruit	1.8	0	A56786
			1.848	0.0528		75	fruit	0.86	7	(A57130)
			1.848	0.0528		77	pulp	0.04	14	
							fruit	0.61	14	
							fruit peel	2.1	14	
							pulp	< 0.03	21	
							fruit	0.58	21	
							fruit peel	2.2	21	
							pulp	< 0.03	-> 28	
							fruit	0.41	-> 28	
							fruit peel	1.5	-> 28	
Mandarin Satsuma	Spain (S) 1995	EC 352 g/l	3.6963	0.1056	3	75	fruit	3.1	0	A56786
			3.6963	0.1056		75	fruit	1.5	7	(A57130)
			3.6963	0.1056		77	pulp	0.06	14	
							fruit	1.3	14	
							fruit peel	4.1	14	
							pulp	< 0.03	21	
							fruit	1.1	21	
							fruit peel	3.7	21	
							pulp	0.03	-> 28	
							fruit	0.88	-> 28	
							fruit peel	2.90	-> 28	
Mandarin Clemenvilla	Spain (S) 1995	EC 352 g/l	1.848	0.0528	3	75	fruit	1.6	0	A56786
			1.848	0.0528		77	fruit	0.92	7	(A57130)
			1.848	0.0528		77	pulp	0.06	14	
							fruit	1.5	14	
							fruit peel	7.6	14	
							pulp	< 0.03	21	
							fruit	1.2	21	
							fruit peel	5.5	21	
							pulp	< 0.03	-> 28	
							fruit	0.94	-> 28	
							fruit peel	4.5	-> 28	
Mandarin Clemenvilla	Spain (S) 1995	EC 352 g/l	3.6963	0.1056	3	75	fruit	3.0	0	A56786
			3.6963	0.1056		77	fruit	2.400	7	(A57130)
			3.6963	0.1056		77	pulp	0.06	14	
							fruit	2.3	14	
							fruit peel	9.8	14	
							pulp	0.04	21	

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref
			kg a.s/ha	conc % a.s						
							fruit fruit peel pulp fruit fruit peel	1.8 7.7 0.04 1.7 7.0	21 21 -> 28 -> 28 -> 28	
Mandarin Klimentines R 63	Greece (S) 1995	EC 352 g/l	2.3754 2.3754 2.3754	0.0528 0.0528 0.0528	3	85 85 85	fruit fruit pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel	1.0 0.94 0.04 0.58 1.8 0.03 0.93 2.90 < 0.03 0.88 2.6	0 7 14 14 14 21 21 21 -> 29 -> 29 -> 29	A56786 (A57130)
Mandarin Klimentines R 63	Greece (S) 1995	EC 352 g/l	4.7508 4.7508 4.7508	0.1056 0.1056 0.1056	3	85 85 85	fruit fruit pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel	2.6 2.3 0.14 2.400 7.2 0.13 1.9 5.7 0.08 1.4 4.300	0 7 14 14 14 21 21 21 -> 29 -> 29 -> 29	A56786 (A57130)
Mandarin Klimentines R 63	Greece (S) 1995	EC 352 g/l	2.3754 2.3754 2.3754	0.0528 0.0528 0.0528	3	85 85 85	fruit fruit pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel	1.6 1.1 0.06 1.1 3.5 0.06 0.84 2.90 0.03 0.58 1.8	0 7 14 14 14 21 21 21 -> 29 -> 29 -> 29	A56786 (A57130)
Mandarin Klimentines R 63	Greece (S) 1995	EC 352 g/l	4.7508 4.7508 4.7508	0.1056 0.1056 0.1056	3	85 85 85	fruit fruit fruit pulp fruit peel pulp fruit fruit peel pulp fruit fruit peel	3.5 2.1 2.400 0.25 7.1 0.17 1.9 5.4 0.08 1.6 4.7	0 7 14 14 14 21 21 21 -> 29 -> 29 -> 29	A56786 (A57130)

B.7.6.2 Hazel nuts

Table 7.6.2-1: Hazel nut critical GAP

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Hazel nuts	F	EC (350 g/l)	Southern Europe	2	0.08	1000	0.8	Spraying interval: 14-21

No trial were submitted.

B.7.6.3 Pome fruit

Table 7.6.3-1: Pome fruit critical GAP

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Pome Fruits	F	EC (350 g/l)	Southern Europe	2	0.053-0.105	1000-1500	1.05	Spraying intervals: 14-21

Table 7.6.3-2: Summary of supervised trials for pome fruit

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Apple Cox Orange	Germany (N) 1985	EC 352-5 g/l	0.53	0.106	4	21 days before harvest	fruit	2.63 0.69 0.77 **0.63**	0 7 14 **21**	A33345 (A57131)
Apple Viktoria	Germany (N) 1985	EC 352-5 g/l	0.53	0.106	4	21 days before harvest	fruit	0.83 0.46 0.48 **0.44**	0 7 14 **21**	A33346 (A57131)
Apple James Grieve	Germany (N) 1985	EC 352-5 g/l	0.53	0.106	4	21 days before harvest	fruit	1.18 0.77 0.56 **0.46**	0 7 14 **21**	A33347 (A57131)
Apple Jonathan	Germany (N) 1989	EC 352-5 g/l	1st and 4th 0.40 2nd and 3rd 0.47	treatment 0.035 treatment 0.035	4	fruit size: 50-60 mm diameter / 14 days before ripeness	fruit mash juice pomace washings	0.415 **0.055** 0.015 0.006 0.075 0.006	0 **21** 21 21 21 21	A49973 (A57131)
Apple James Grieve	Germany (N) 1989	EC 352-5 g/l	0.53	0.035	4		fruit mash juice pomace washings	0.76 **0.11** 0.02 0.006 0.175 0.006	0 **21** 21 21 21 21	A49972 (A57131)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Apple Klarapfel	Germany (N) 1976	WP 329-350 g/kg	0.7	0.035	3	28 days before harvest	fruit	0.8 0.04 **0.03** 0.02	0 14 **21** 28	A10213 (A57131)
Apple James Grieve	Germany (N) 1976	WP 329-350 g/kg	0.7	0.035	3	28 days before harvest	fruit	0.5 0.2 **0.1** 0.02	0 14 **21** 28	A10214 (A57131)
Apple Stark Earliest	Germany (N) 1976	WP 329-350 g/kg	0.7	0.035	3	28 days before harvest	fruit	0.6 0.04 **0.1** 0.03	0 14 **21** 28	A10215 (A57131)
Apple James Grieve	Germany (N) 1976	WP 329-350 g/kg	0.7	0.035	3	28 days before harvest	fruit	0.4 0.04 **0.015** 0.015	0 14 **21** 28	A10216 (A57131)
Apple Cox Orange	Germany (N) 1984	WP 329-350 g/kg	0.49	0.099	4	3 quaters of normal fruit size	fruit	0.305 0.055 0.07 **0.06**	0 7 14 **21**	A30911 (A57131)
Apple Klarapfel	Germany (N) 1984	WP 329-350 g/kg	0.49	0.099	4	21 days before harvest	fruit	1.2 0.3 0.28 **0.36**	0 7 14 **21**	A30912 (A57131)
Apple Goldparmaen	Germany (N) 1984	WP 329-350 g/kg	0.74	0.148	4	22 days before harvest	fruit	1.76 1.2 0.89 **0.7**	0 7 14 **22**	A30913 (A57131)
Apple Ingrid Marie	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	green fruit	fruit	**0.015**	**21**	A21279 (A57131)
Apple Cox Orange pippin	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	green fruit	fruit	**0.19**	**20**	A21280 (A57131)
Apple Ida Red	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	green fruit	fruit	**0.045**	**20**	A21281 (A57131)
Apple Cox Orange pippin	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	fruit size: 6 cm diam.	fruit	**0.095**	**21**	A21282 (A57131)
Apple Golden Smuthe	Spain (S) 1994	EC 352 g/l	0.528 0.528	0.0528 0.0528	2	78 81	fruit fruit fruit fruit fruit	0.15 0.05 **0.03** < 0.03 < 0.03	0 7 **12** 21 -> 28	A55874
Apple Golden Smuthe	Spain (S) 1994	EC 352 g/l	1.056 1.056	0.1056 0.1056	2	78 81-81	fruit fruit fruit fruit fruit	0.52 0.14 **0.08** 0.07 0.04	0 7 **12** 21 -> 28	A55874
Apple Starking son	Spain (S) 1994	EC 352 g/l	0.528 0.528	0.0528 0.0528	2	78 81	fruit fruit fruit fruit	0.17 0.04 **0.05** 0.06	0 7 **12** 21	A55874

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
							fruit	< 0.03	-> 28	
Apple Starking son	Spain (S) 1994	EC 352 g/l	1.0567 1.0567	0.1057 0.1057	2	78 81	fruit fruit fruit fruit fruit	0.37 0.12 **0.08** 0.06 0.06	0 7 **12** 21 -> 28	A55874
Apple Golden Spur	France (S) 1994	EC 352 g/l	0.528 0.528	0.0533 0.0533	2	76-77 80-81	fruit fruit fruit fruit fruit	< 0.03 0.07 **< 0.03** < 0.03 < 0.03	0 7 **13** 21 -> 28	A55874
Apple Golden Spur	France (S) 1994	EC 352 g/l	1.0561 1.0561	0.1067 0.1109	2	76-77 80-81	fruit fruit fruit fruit fruit	0.67 0.12 **< 0.03** 0.13 0.12	0 7 **13** 21 -> 28	A55874
Apple Golden Delicious	Italy (S) 1994	EC 352 g/l	0.7922 0.7922	0.0528 0.0528	2	77-78 78	fruit fruit fruit fruit fruit	0.68 0.18 **0.23** 0.14 0.11	0 7 **14** 21 -> 28	A55874
Apple Golden Delicious	Italy (S) 1994	EC 352 g/l	1.5848 1.5841	0.1057 0.1057	2	77-78 78	fruit fruit fruit fruit,washed fruit,unwash cider (perry) mash pomace wash water fruit fruit	1.8 0.41 **0.26** 0.22 0.270 < 0.03 0.06 0.69 < 0.03 0.47 0.25	0 7 **14** 14 14 14 14 14 14 21 -> 28	A55874
Apple Imperatore	Italy (S) 1994	EC 352 g/l	0.7922 0.7919	0.0528 0.0528	2	76-77 78-81	fruit fruit fruit fruit fruit	0.52 0.07 **0.04** 0.08 0.03	0 7 **14** 21 -> 28	A55874
Apple Imperatore	Italy (S) 1994	EC 352 g/l	1.5848 1.5841	0.1057 0.1056	2	76-77 78-81	fruit fruit fruit fruit,washed fruit,unwashe cider (perry) mash pomace wash water fruit fruit	0.9 0.25 **0.270** 0.16 0.19 < 0.03 < 0.03 0.5 < 0.03 0.1 0.16	0 7 **14** 14 14 14 14 14 14 21 -> 28	A55874
Apple Starking	Spain (S) 1993	EC 352 g/l	1.0419 1.0238	0.0528 0.0528	2	77 81	fruit fruit fruit fruit,washed fruit,unwashed	0.52 0.12 **0.06** 0.09 0.08	0 7 **-> 14** -> 14 -> 14	A54359

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
							cider	< 0.03	14	
							mash	0.03	-> 14	
							pomace	0.17	-> 14	
							wash water	< 0.03	-> 14	
Apple	Spain (S)	EC 352 g/l	2.307	0.1056	2	77	fruit	0.92	0	
Starking	1993		2.4428	0.1056		81	fruit	0.31	7	
							fruit	0.14	-> 14	
							fruit,washed	0.1	-> 14	
							fruit,unwashed	**0.14**	**-> 14**	
							cider	< 0.03	-> 14	
							mash	0.04	-> 14	
							pomace	0.270	-> 14	
							wash water	< 0.03	-> 14	
Apple	France	EC 352 g/l	0.528	0.0528	2	76-77	fruit	0.14	0	A54359
Golden	(S)		0.528	0.0528		81	fruit	0.06	7	
Delicious	1993						fruit	**0.07**	**-> 13**	
							fruit,washed	0.03	-> 13	
							fruit,unwashed	0.06	-> 13	
							cider	< 0.03	-> 13	
							mash	< 0.03	-> 13	
							pomace	0.11	-> 13	
							wash water	< 0.03	-> 13	
Apple	France	EC 352 g/l	1.0561	0.1056	2	76-77	fruit	0.65	0	A54359
Golden	(S)		1.0561	0.1056		81	fruit	0.22	7	
Delicious	1993						fruit	**0.08**	**-> 13**	
							fruit,washed	0.05	-> 13	
							fruit,unwashed	0.13	-> 13	
							cider	< 0.03	-> 13	
							mash	0.03	-> 13	
							pomace	0.2	-> 13	
							wash water	< 0.03	-> 13	
Apple	France	EC 352 g/l	0.528	0.0528	2	77-78	fruit	0.19	0	A54359
Canada Gris	(S)		0.528	0.0528		81	fruit	0.26	7	
	1993						fruit	**0.21**	**-> 13**	
							fruit,washed	0.11	-> 13	
							fruit,unwashed	0.25	-> 13	
							cider	< 0.03	-> 13	
							mash	0.04	-> 13	
							pomace	0.36	-> 13	
							wash water	< 0.03	-> 13	
Apple	France	EC 352 g/l	1.0561	0.1056	2	77-78	fruit	0.48	0	A54359
Canada Gris	(S)		1.0561	0.1056		81	fruit	0.86	7	
	1993						fruit	**0.46**	**-> 13**	
							fruit,washed	0.270	-> 13	
							fruit,unwashed	0.34	-> 13	
							cider	< 0.03	-> 13	
							mash	0.11	-> 13	
							pomace	1.4	-> 13	
							wash water	< 0.03	-> 13	
Apple	Italy (S)	EC 352 g/l	0.7922	0.0528	2	77-78	fruit	0.32	0	A54359
Golden	1993		0.7922	0.0528		81	fruit	0.16	7	
Delicious							fruit	**0.08**	**-> 14**	
							fruit,washed	0.15	-> 14	
							fruit,unwashed	0.14	-> 14	
							cider	< 0.03	-> 14	
							mash	0.04	-> 14	

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
							pomace wash water	0.13 < 0.03	-> 14 -> 14	
Apple Golden Delicious	Italy (S) 1993	EC 352 g/l	1.5841 1.5841	0.1056 0.1056	2	76-77 81	fruit fruit fruit fruit,washed fruit,unwashed cider mash pomace wash water	1.1 0.29 **0.21** 0.11 0.18 < 0.03 0.04 0.4 < 0.03	0 7 **-> 14** -> 14 -> 14 -> 14 -> 14 -> 14 -> 14	A54359
Apple Cooper 4	Italy (S) 1993	EC 352 g/l	0.66 0.66	0.0528 0.0528	2	76-77 81	fruit fruit fruit fruit,washed fruit,unwashe cider mash pomace wash water	0.3 0.08 **0.11** 0.06 0.11 < 0.03 0.03 0.12 < 0.03	0 7 **-> 14** -> 14 -> 14 -> 14 -> 14 -> 14 -> 14	A54359
Apple Cooper 4	Italy (S) 1993	EC 352 g/l	1.3199 1.3199	0.1056 0.1056	2	76-77 81	fruit fruit fruit fruit,washed fruit,unwashe cider mash pomace wash water	0.86 0.21 **0.1** 0.08 0.13 < 0.03 0.03 0.29 < 0.03	0 7 **-> 14** -> 14 -> 14 -> 14 -> 14 -> 14 -> 14	A54359
Pear Commice	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	green fruit	total fruit	**0.07**	**21**	A21283 (A57131)
Pear Conference	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	fruit: 5 cm diameter	total fruit	**0.1**	**21**	A21284 (A57131)
Pear William	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	green fruit	total fruit	**0.6**	**22**	A21285 (A57131)
Pear William	Great Britain (N) 1980	SC 427 g/l	0.85	0.043	2	green fruit	total fruit	**0.03**	**21**	A21286 (A57131)

B.7.6.4 Stone fruit

Table 7.6.4-1: Stone fruit critical GAP

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Stone Fruit (peaches)	F	EC (350 g/l)	Southern Europe	3	0.053	1500	0.8	Spraying interval: 14-21

Table 7.6.4-2: Summary of supervised trials for stone fruits

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Peach Kernechter	Germany (N) 1983	EC 355 g/l	0.80	0.160	3	21 days before the harvest	fruit	4.31 0.62 0.32 **0.53**	0 7 14 **21**	A28364 (A53960)
Peach South Haven	Germany (N) 1983	EC 355 g/l	0.80	0.160	3	21 days before the harvest	fruit	1.58 0.24 0.38 **0.15**	0 7 14 **21**	A28365 (A53960)
Peach Red Haven	Germany (N) 1983	EC 355 g/l	0.80	0.160	3	21 days before the harvest	fruit	1.67 0.32 0.18 **0.085**	0 7 14 **21**	A28366 (A53960)
Peach Dixired	Germany (N) 1983	EC 355 g/l	0.80	0.160	3	21 days before the harvest	fruit	3.8 0.67 0.7 **0.4**	0 7 14 **21**	A28367 (A53960)
Peach May Crest	Spain (S) 1992	EC 350 g/l	1.68	0.0105	1	harvesting	fruit	2.67 1.00 0.98 0.73	0 3 7 15	A49700 (A53960)
Peach Spring Crest	Spain (S) 1992	EC 350 g/l	1.94	0.105	1	harvesting	fruit	3.85 0.88 0.50 0.31	0 3 7 15	A49701 (A53960)
Peach Kernechter	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	3	21 days before the harvest	fruit	1.82 0.72 0.32 **0.19**	0 7 14 **21**	A28382 (A53960)
Peach South Haven	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	3	21 days before the harvest	fruit	2.26 0.58 0.35 **0.13**	0 7 14 **21**	A28383 (A53960)
Peach Red Haven	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	3	21 days before the harvest	fruit	1.21 0.205 0.095 **0.065**	0 7 14 **21**	A28384 (A53960)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Peach Dixired	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	3	21 days before the harvest	fruit	2.73 1.52 0.51 **0.49**	0 7 14 **21**	A28385 (A53960)
Peach Red Haven	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	3	21 days before the harvest	fruit	8.65 0.94 0.89 **0.32**	0 7 14 **21**	A28386 (A53960)
Plum Purpur Gold	Germany (N) 1989	EC 352-5 g/l	0.53	0.035	5	colour of fruits well developed	fruit purée washings	0.52 **0.16** 0.045 0.015	0 **21** 21 21	A49974 (A53960)
Plum Ortenauer	Germany (N) 1989	EC 352-5 g/l	0.26 (1./2. 0.28 (3.	0.035 treatment) 0.035 treatment)	5	2/3 of normal fruit size	fruit purée washings	0.22 **0.1** 0.08 0.015	0 **21** 21 21	A49975 (A53960)
Plum Wangenheim	Germany (N) 1983	EC 352-5 g/l	0.80	0.160	5	21 days before harvest	fruit	2.4 0.5 0.35 **0.4**	0 7 14 **21**	A28362 (A53960)
Plum Buehler Zwetsche	Germany (N) 1984	EC 352-5 g/l	0.79	0.160	5	21 days before harvest	fruit	1.6 0.8 0.4 **0.26**	0 7 14 **21**	A30120 (A53960)
Plum Hauszwetsche	Germany (N) 1984	EC 352-5 g/l	0.79	0.160	5	22 days before harvest	fruit	1.49 0.5 0.26 **0.28**	0 7 14 **22**	A30121 (A53960)
Plum Zimmer + Buehler	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	5	14 days before harvest	fruit	0.29 0.15 0.045	0 7 14	A28391 (A53960)
Plum Wangenheim	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	5	21 days before harvest	fruit	0.33 0.24 0.15 **0.09**	0 7 14 **21**	A28392 (A53960)
Plum Buehler Zwetche	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	5	21 days before harvest	fruit	0.7 0.3 0.28 **0.38**	0 7 14 **21**	A30124 (A53960)
Plum Hauszwetsche	Germany (N) 1983	DP 28.2 g/kg	0.71	2.82	5	22 days before harvest	fruit	0.35 0.1 0.12 **0.1**	0 7 14 **22**	A30125 (A53960)
Greengage Reineclaude	Germany (N) 1983	EC 355 g/l	0.8	0.160	5	20 days before harvest	fruit	3.28 0.7 0.29 **0.14**	0 6 13 **20**	A28363 (A53960)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Greengage Reineclaude	Germany (N) 1983	DP 28.2 g/kg	0.705	2.820	5	20 days before harvest	fruit	0.28 0.26 0.11 **0.065**	0 6 13 **20**	A28393 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	EC 355 g/l	0.799	0.160	3	21 days before harvest	fruit	3.98 0.6 0.33 **0.2**	0 7 14 **21**	A28259 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	EC 355 g/l	0.799	0.160	3	21 days before harvest	fruit	3.7 0.45 0.075 **0.055**	0 7 14 **21**	A28261 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	EC 355 g/l	0.799	0.160	3	21 days before harvest	fruit	1.47 0.35 0.055 **0.105**	0 7 14 **21**	A28260 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	EC 355 g/l	0.799	0.160	3	21 days before harvest	fruit	1.5 1.1 1.4 **0.44**	0 7 14 **21**	A28258 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	DP 28.5 g/kg	0.705	2.82	3	21 d before harvest	fruit	0.08 0.21 0.02 **0.03**	0 7 14 **21**	A28378 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	DP 28.5 g/kg	0.705	2.82	3	21 d before harvest	fruit	0.105 0.015 0.015 **0.015**	0 7 14 **21**	A28379 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	DP 28.5 g/kg	0.705	2.82	3	21 d before harvest	fruit	0.115 0.02 0.015 **0.125**	0 7 14 **21**	A28380 (A53960)
Morello Cherry Schatten morelle	Germany (N) 1983	DP 28.5 g/kg	0.705	2.82	3	21 d before harvest	fruit	0.015 0.015 0.015 **0.015**	0 7 14 **21**	A28381 (A53960)

B.7.6.5 Berries and small fruits

Table 7.6.5-1: Berries and small fruits critical GAPs

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Berries and small fruits Table and wine grapes	F	EC (350 g/l)	Southern Europe	2	0.053-0.105	500-1000	1.05	Spraying interval: 14-21 days

Table 7.6.5-2: Summary of supervised trials for berries and small fruit

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (day)	Ref.
			kg a.s/ha	conc % a.s						
Grape Silvaner	Germany (N) 1974	EC 352 g/l	0.14 (g / grape vine)	0.07	1	28 days before the harvest	fruit	2.005 0.805 0.605 1.405 0.305	0 7 14 21 28	A02382 (A57132)
Grape Silvaner	Germany (N) 1974	EC 352 g/l	0.14 (g / grape vine)	0.07	2	fruit size like peas	fruit	2.205 0.105 0.65 0.17 0.105	0 7 14 21 28	A02596 (A57132)
Grape Riesling	Germany (N) 1974	EC 352 g/l	0.14 (g / grape vine)	0.07	2	fruit size like peas	fruit	4.64 4.45 0.97 0.34 0.56 **0.28**	0 7 14 21 28 **80**	A02599 (A57132)
Grape Riesling	Germany (N) 1974	EC 352 g/l	2.8	0.07	1	28 days before harvest	fruit	5.14 4.96 2.02 0.71 0.305	0 7 14 21 28	A02597 (A57132)
Grape Portugieser	Germany (N) 1974	EC 352 g/l	2.8	0.07	1	28 days before harvest	fruit	4.2 0.9 0.24 0.2 0.18	0 7 14 21 28	A02889 (A57132)
Grape Müller Thurgau	Germany (N) 1974	EC 352 g/l	2.8	0.07	1	28 days before harvest	fruit	2.9 0.7 0.3 0.25 0.16	0 7 14 21 28	A02893 (A57132)
Grape Portugieser	Germany (N) 1976	EC 352 g/l	2.8	0.07	2	42 days before harvest	fruit	2.4 0.6 0.4 0.26 0.16 0.14	0 7 14 21 28 42	A02887 (A57132)
Grape Müller Thurgau	Germany (N) 1976	EC 352 g/l	2.8	0.07	2	42 days before harvest	fruit	5.2 1.2 0.6 0.39 0.28 --	0 7 14 21 28 42	A02891 (A57132)
Grape Müller Thurgau	Germany (N) 1987	EC 352 g/l	0.56	0.07	1	2-3 leaves unfold	fruit	**0.015** 0.015 0.015	**85** 103 152	A38806 (A57132)
Grape Portugieser	Germany (N) 1987	EC 352 g/l	0.56	0.07	1	2-3 leaves unfold	fruit	**0.015** 0.015 0.015	**78** 99 141	A38807 (A57132)
Grape Riesling	Germany (N) 1987	EC 352 g/l	0.56	0.07	1	2-3 leaves unfold	fruit	**0.015** 0.015 0.015	**78** 106 162	A38808 (A57132)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (day)	Ref.
			kg a.s/ha	conc % a.s						
Grape Spaet-burgunder	Germany (N) 1987	EC 352 g/l	0.56	0.07	1	2-3 leaves unfold	fruit	**0.015** 0.18 0.015	**77** 104 160	A38809 (A57132)
Grape Silvaner	Germany (N) 1974	WP 350 g/kg	0.14 (g / grape vine)	0.07	1	28 days before harvest	fruit	2.305 0.805 0.505 0.405 0.305	0 7 14 21 28	A02383 (A57132)
Grape Riesling	Germany (N) 1974	WP 350 g/kg	0.21 (g / grape vine)	0.07	1	28 days before harvest	fruit	4.02 2.02 2.005 0.805 0.505	0 7 14 21 28	A02595 (A57132)
Grape Riesling	Germany (N) 1974	WP 350 g/kg	0.21 (g / grape vine)	0.07	2	fruit size like peas	fruit	2.73 1.33 0.63 0.23 0.105 0.035	0 7 14 21 28 80	A02598 (A57132)
Grape Portugieser	Germany (N) 1974	WP 350 g/kg	2.8	0.07	1	28 days before harvest	fruit	2.7 1.4 0.4 0.27 0.22	0 7 14 21 28	A02890 (A57132)
Grape Müller Thurgau	Germany (N) 1974	WP 350 g/kg	2.8	0.07	1	42 days before harvest	fruit	3 0.4 0.3 0.26 0.18	0 7 14 21 28	A02894 (A57132)
Grape Portugieser	Germany (N) 1974	WP 350 g/kg	2.8	0.07	2	42 days before harvest	fruit	2.1 1.1 0.6 0.4 0.37 0.15	0 7 14 21 28 42	A02888 (A57132)
Grape Müller Thurgau	Germany (N) 1974	WP 350 g/kg	2.8	0.07	2	42 days before harvest	fruit	2.2 1.2 0.7 0.4 0.26 0.19	0 7 14 21 28 42	A02892 (A57132)
Grape Müller Thurgau	Germany (N) 1984	WP 329 g/kg	0.592 (1 st 1.184 (2 nd	0.197 treatment 0.197 treatment	2	berries nearly fully devel.	fruit must wine	9.2 1.88 0.68 0.55 0.04 0.015	0 14 35 60 60 60	A30914 (A57132)
Grape Müller Thurgau	Germany (N) 1984	WP 329 g/kg	1.184	0.197	2	post flowering	fruit must wine	12.2 1.26 0.7 0.49 0.03 0.015	0 19 35 62 62 62	A30915 (A57132)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (day)	Ref.
			kg a.s/ha	conc % a.s						
Grapevine Cencibel	Spain (S) 1994	EC 352 g/l	0.7922 0.7922 0.7926	0.1056 0.1056 0.1057	3	35 35 35	fruit fruit fruit fruit fruit	0.39 < 0.15 < 0.15 < 0.15 **< 0.15**	0 8 15 22 **-> 29**	A55225 (A57132)
Grapevine Bobal	Spain (S) 1994	EC 352 g/l	0.7922 0.7922 0.7926	0.1056 0.1056 0.1057	3	33-35 33-35 35-38	fruit fruit fruit fruit fruit	< 0.15 < 0.15 < 0.15 < 0.15 **< 0.15**	0 8 15 22 **-> 29**	A55225 (A57132)
Grapevine Garrida	Spain (S) 1994	EC 352 g/l	0.3168 0.3168 0.3168	0.1056 0.1056 0.1056	3	33 33 35	fruit fruit fruit fruit	0.25 < 0.15 < 0.15 **< 0.15**	0 7 13 **-> 20**	A55225 (A57132)
Grapevine Sangiovese	Italy (S) 1994	EC 352 g/l	1.2673 1.2673 1.2673	0.1056 0.1056 0.1056	3	35 35-38 35-38	fruit fruit fruit fruit fruit	1.565 1.625 0.38 0.17 **0.21**	0 7 13 21 **-> 28**	A55225 (A57132)
Grapevine Trebbiano TR 3T	Italy (S) 1994	EC 352 g/l	1.5845 1.5845 1.5845	0.1056 0.1056 0.1056	3	33-35 33-35 35-38	fruit fruit fruit fruit fruit	1.6 0.66 0.530 0.31 **0.34**	0 7 -> 14 21 **28**	A55225 (A57132)
Strawberry Senga Sengana	Germany (N) 1976	WP 350 g/kg	0.7	0.035	1	before flowering	fruit	**0.02**	**42**	A09339 (A57132)
Strawberry Senga Sengana	Germany (N) 1976	WP 350 g/kg	0.7	0.035	1	before flowering	fruit	**0.06**	**44**	A09340 (A57132)
Strawberry Senga Sengana	Germany (N) 1976	WP 350 g/kg	0.7	0.035	1	before flowering	fruit	**0.07**	**37**	A09341 (A57132)
Strawberry Senga Sengana	Germany (N) 1976	WP 350 g/kg	0.7	0.035	1	before flowering	fruit	**0.02**	**66**	A09342 (A57132)
Blackberries Himalaya	Great Britain (N) 1979	EC 186 g/l	0.84	0.050	3	pre flower	fruit	0.034	92	A20799 (A57132)
Blackberries Bedford	Great Britain (N) 1979	EC 186 g/l	0.84	0.050	3	pre flower	fruit	0.044	92	A20800 (A57132)
Blackberries Black Satin	Germany (N) 1985	EC 352 g/l	0.79	0.158	3	21 days before harvest	fruit	1.79 0.35 0.21 **0.04**	0 7 14 **21**	A33482 (A57132)
Blackberries Black Satin	Germany (N) 1987	EC 352 g/l	0.53	0.106	3	1 st harvest stage	fruit	3.205 0.63 0.4 **0.32**	0 7 14 **21**	A38548 (A57132)
Blackberries Theodor Reimers	Germany (N) 1987	EC 352 g/l	0.53	0.106	3	1 st harvest stage	fruit	0.97 0.37 0.26 **0.23**	0 7 14 **21**	A38549 (A57132)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (day)	Ref.
			kg a.s/ha	conc % a.s						
Raspberry Schoenemanns	Germany (N) 1983	WP 329 g/kg	0.49	0.099	3	21 days before harvest	fruit	3.99 0.85 0.3025 **0.32**	0 7 14 **21**	A28262 (A57132)
Raspberry Himbostar	Germany (N) 1983	WP 329 g/kg	0.49	0.099	4	21 days before harvest	fruit	2.07 0.47 0.29 **0.3**	0 7 14 **21**	A28263 (A57132)
Raspberry Schoenemanns	Germany (N) 1983	WP 329 g/kg	0.49	0.099	3	22 days before harvest	fruit	1.4 0.1925 0.12 **0.035**	0 7 14 **21**	A28264 (A57132)
Raspberry Multiraspa	Germany (N) 1983	WP 329 g/kg	0.49	0.099	3	21 days before harvest	fruit	1.5 0.1425 0.035 **0.045**	0 7 14 **21**	A28265 (A57132)
Raspberry Himbostar	Germany (N) 1985	EC 352 g/l	0.79	0.158	3	21 days before harvest	fruit	3.41 1.12 0.42 **0.16**	0 7 14 **21**	A33478 (A57132)
Raspberry Multiraspar	Germany (N) 1985	EC 352 g/l	0.79	0.158	3	21 days before harvest	fruit	3.94 0.77 0.29 **0.18**	0 7 14 **21**	A33479 (A57132)
Raspberry Himbostar	Germany (N) 1985	EC 352 g/l	0.53	0.106	3	fruit setting	fruit	9.36 2.6 0.48 **0.22**	0 7 14 **21**	A38550 (A57132)
Raspberry Zewa 2	Germany (N) 1985	EC 352 g/l	0.53	0.106	4	1 st harvest stage	fruit	1.135 0.37 0.17	0 7 14	A38551 (A57132)
Black current Sivergietters	Germany (N) 1975	WP 350 g/kg	1.05	0.053	3	fruit setting	fruit	21.30 2.20 1.00 0.70 0.60 0.60	0 21 28 35 42 49	A04834 (A57132)
Black current Sivergietters	Germany (N) 1975	EC 352 g/l	1.05	0.053	3	fruit setting	fruit	24.60 1.20 0.90 0.70 0.20 0.20	0 21 28 35 42 49	A04833 (A57132)
Blank current Silvergieters	Germany (N) 1981	EC 355 g/l	0.80	0.053	2	full bloom	fruit	1.60 1.00 **0.58**	33 55 **72**	A27653 (A57132)
Blank current Silvergieters	Germany (N) 1981	EC 355 g/l	0.80	0.053	3	70 % of petal fall	fruit	2.50 1.40 1.60	21 43 60	A27656 (A57132)
Blank current Silvergieters	Germany (N) 1981	EC 355 g/l	0.80	0.053	2	full bloom	fruit	0.40 0.22 **0.15**	33 55 **72**	A27652 (A57132)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (day)	Ref.
			kg a.s/ha	conc % a.s						
Blank current Silvergieters	Germany (N) 1981	EC 355 g/l	0.80	0.053	3	70 % of petal fall	fruit	0.60 0.90 1.49	21 43 60	A27655 (A57132)
Blank current Silvergieters	Germany (N) 1981	EC 355 g/l	0.80	0.053	2	full bloom	fruit	0.80 0.90 **0.43**	29 49 **69**	A27654 (A57132)
Blank current Silvergieters	Germany (N) 1981	EC 355 g/l	0.80	0.053	3	70 % of petal fall	fruit	10.70 3.70 2.40	21 41 61	A27657 (A57132)

B.7.6.6 Root and tuber vegetables

Table 7.6.6-1: Root and tuber vegetables critical GAPs

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Root and tuber Vegetables Sugar beet	F	EC (350 g/l)	Southern Europe	2	0.125	400	0.50	Spraying interval: 14-21 days

B.7.6.7 Fruiting vegetables

Table 7.6.7-1: Fruiting vegetables critical GAPs

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Fruiting Vegetables								
Solanacea (Tomatoes)	F	EC (350 g/l)	Southern Europe	2	0.053-0.105	500-1000	0.53	Spraying interval: 14-21 days
	G	EC (350 g/l)	Southern Europe	2	0.053	1500	0.8	Spraying interval: 7-14 days
<u>Cucurbitaceae</u> Curcubits – inedible peel	F	EC (350 g/l)	Southern Europe	3	0.053	600-1000	0.32-0.53	Spraying interval: 7-14 days

Table 7.6.7-2: Summary of supervised trials for fruiting vegetables

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Nova	Germany (N) 1974	F	EC 350-5 g/l	0.53	0.035	1	2 days before harvest	fruit	0.035 0.032 0.05 0.03	0 1 2 4	A02605 (A57139)
Tomato Nova	Germany (N) 1974	F	EC 350-5 g/l	0.53	0.035	1	2 days before harvest	fruit	0.042 0.02 0.029 0.032	0 1 2 4	A02607 (A57139)
Tomato Tiptop	Germany (N) 1974	F	EC 350-5 g/l	0.70	0.035	1	2 days before harvest	fruit	0.994 0.244 0.124 0.114	0 1 2 4	A03081 (A57139)
Tomato Hellfrucht	Germany (N) 1974	F	EC 350-5 g/l	0.21	0.035	1	2 days before harvest	fruit	0.9 0.5 0.3 0.1	0 1 2 4	A02392 (A57139)
Tomato Hellfrucht	Germany (N) 1974	F	EC 350-5 g/l	0.21	0.035	1	2 days before harvest	fruit	0.602 0.402 1 0.7	0 1 2 4	A02394 (A57139)
Tomato Rheinlands Ruhm	Germany (N) 1974	F	EC 350-5 g/l	0.21	0.035	1	2 days before harvest	fruit	0.802 0.502 0.202 0.032	0 1 2 4	A02396 (A57139)
Tomato Hellfrucht	Germany (N) 1974	F	EC 350-5 g/l	0.21	0.035	3	14 days before harvest	fruit	0.4 **0.2** 0.07 0.03	0 **7** 10 14	A08854 (A57139)
Tomato Rheinlands Ruhm	Germany (N) 1976	F	EC 350-5 g/l	1st 0.21 2nd , 3rd 0.28	treatment 0.035 treatment 0.035	3	14 days before harvest	fruit	0.1 **0.09** 0.05 0.02	0 **7** 10 14	A08855 (A57139)
Tomato Hoffmanns Rentita	Germany (N) 1982	F	EC 350-5 g/l	0.85	0.1065	1	first fruits ripening	fruit fruitpeel pulp (interior) pulp(exterior)	0.205 0.075 0.055 0.045 **0.035** 0.045 1.01 0.025 0.015	0 1 3 5 **7** 10 5 5 5	A24861 (A57139)
Tomato Reva	Germany (N) 1983	F	EC 350-5 g/l	0.32	0.035	3	7 days before harvest	fruit	0.505 0.92 0.72 **1.02**	0 3 5 **7**	A28256 (A57139)

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Hoffmanns Rentita	Germany (N) 1983	F	EC 350-5 g/l	0.21	0.035	3	7 days before harvest	fruit	0.185 0.085 0.045 **0.085**	0 3 5 **7**	A28257 (A57139)
Tomato Master	Germany (N) 1985	F	EC 350-5 g/l	0.32	0.035	4	7 days before harvest	fruit	0.24 0.07 0.06 **0.06**	0 3 5 **7**	A33348 (A57139)
Tomato Matita	Germany (N) 1985	F	EC 350-5 g/l	0.32	0.035	3	7 days before harvest	fruit	0.31 0.14 0.16 **0.21**	0 3 5 **7**	A33349 (A57139)
Tomato Master	Germany (N) 1985	F	EC 350-5 g/l	0.32	0.035	3	7 days before harvest	fruit	0.46 0.15 0.07 **0.08**	0 3 5 **7**	A33350 (A57139)
tomato Rheinglut	Germany (N) 1989	F	EC 350-5 g/l	1st 0.21 2nd 0.28 3rd , 4th 0.42	treatment 0.035 treatment 0.035 treatment 0.035	4	first fruits developing - first green fruits	fruit washings cooking water fruit (cooked) purée juice	0.6 **0.035** 0.015 0.015 0.04 0.015 0.015	0 **7** 7 7 7 7 7	A49970 (A57139)
Tomato Hellfrucht	Germany (N) 1989	F	EC 350-5 g/l	1st 0.21 2nd 0.235 3rd 0.308 4th 0.42	treatment 0.035 treatment 0.035 treatment 0.035 treatment 0.035	4	first fruits ripening	fruit washings cooking water fruit (cooked) purée juice	0.715 **0.095** 0.015 0.015 0.095 0.015 0.015	0 **7** 7 7 7 7 7	A49971 (A57139)
Tomato Hellfrucht	Germany (N) 1974	F	WP 350 g/kg	0.21	0.035	1	2 days before harvest	fruit	0.6 0.4 0.1 0.07	0 1 2 4	A02393 (A57139)
Tomato Hellfrucht	Germany (N) 1974	F	WP 350 g/kg	0.21	0.035	1	2 days before harvest	fruit	0.6 0.3 0.092 0.102	0 1 2 4	A02395 (A57139)
Tomato Rheinlands Ruhm	Germany (N) 1974	F	WP 350 g/kg	0.21	0.035	1	2 days before harvest	fruit	0.61 0.405 0.202 0.052	0 1 2 4	A02397 (A57139)

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Nova	Germany (N) 1974	F	WP 350 g/kg	0.53	0.53	1	2 days before harvest	fruit	0.044 0.037 0.032 0.012	0 1 2 4	A02604 (A57139)
Tomato Nova	Germany (N) 1974	F	WP 350 g/kg	0.53	0.53	1	2 days before harvest	fruit	0.1 0.032 0.012 0.15	0 1 2 4	A02606 (A57139)
Tomato Triptop	Germany (N) 1974	F	WP 350 g/kg	0.70	0.035	1	2 days before harvest	fruit	0.364 0.124 0.094 0.084	0 1 2 4	A03082 (A57139)
Tomato Rheinlands Ruhm	Germany (N) 1976	F	WP 350 g/kg	1st 0.21 2nd , 3rd 0.28	treatment 0.035 treatment 0.035	3	14 d before harvest	fruit	0.05 **0.04** 0.015 0.015	0 **7** 10 14	A08852 (A57139)
Tomato Hellfrucht	Germany (N) 1974	F	WP 350 g/kg	0.21	0.035	3	14 days before harvest	fruit	0.5 **0.2** 0.06 0.03	0 **7** 10 14	A08853 (A57139)
Tomato Daniela	Spain (S) 1992	G	EC 350 g/l	2.63	0.105	1	harvesting	fruit	0.92 **1.1** 0.42 0.18	0 **3** 7 15	A49689 (A57139)
Tomato Daniela	Spain (S) 1992	G	EC 350 g/l	2.10	0.105	1	harvesting	fruit	1.36 **1.8** 0.48 0.75	0 **3** 7 15	A49690 (A57139)
Tomato Daniela	Spain (S) 1992	G	EC 350 g/l	2.31	0.105	1	harvesting	fruit	1.47 **1.25** 0.43 0.36	0 **3** 7 15	A49691 (A57139)
Tomato Daniela	Spain (S) 1992	G	EC 350 g/l	2.26	0.105	1	harvesting	fruit	2.18 **1.78** 1.02 1.02	0 **3** 7 15	A49688 (A57139)
Tomato Prieto	Spain (S) 1993	G	EC 352 g/l	0.5376 0.5376	0.0528 0.0528	2		fruit fruit fruit fruit	0.2 **0.1** 0.05 0.03	0 **-> 3** 7 14	A54361
Tomato Prieto	Spain (S) 1993	G	EC 352 g/l	1.0752 1.0752	0.1056 0.1056	2		fruit fruit fruit fruit	0.38 **0.2** 0.13 0.09	0 **->3** 7 14	A54361
Tomato Maiorca	Italy (S) 1993	G	EC 352 g/l	0.8975 0.8975	0.0528 0.0528	2	11-19 11-19	fruit fruit fruit fruit	0.31 **0.08** 0.32 0.07	0 **-> 3** 7 14	A54361

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Maiorca	Italy (S) 1993	G	EC 352 g/l	1.7954 1.7954	0.1056 0.1056	2	11-19 11-19	fruit fruit fruit fruit	0.8 **0.37** 0.08 0.01	0 **-> 3** 7 14	A54361
Tomato Presto	Spain (S) 1994	G	EC 352 g/l	1.074 0.809	0.0528 0.0528	2	22 23	fruit fruit fruit fruit fruit fruit	0.22 **0.11** 0.1 0.05 < 0.03 < 0.03	0 **-> 3** 7 14 21 29	A54360
Tomato Presto	Spain (S) 1994	G	EC 352 g/l	1.919 1.655	0.1056 0.1056	2	22 23	fruit fruit fruit fruit fruit fruit	0.32 **0.29** 0.23 0.15 0.13 0.05	0 **->3** 7 14 21 29	A54360
Tomato Caruso	Spain (S) 1994	G	EC 352 g/l	0.616 0.720	0.0528 0.0528	2	22 23	fruit fruit fruit fruit fruit fruit	0.14 **0.06** 0.04 0.04 < 0.03 < 0.03	0 **-> 3** 7 14 21 29	A54360
Tomato Caruso	Spain (S) 1994	G	EC 352 g/l	1.168 1.121	0.1056 0.1056	2	22 23	fruit fruit fruit fruit fruit fruit	0.17 **0.21** 0.13 0.07 0.04 < 0.03	0 **->3** 7 14 21 29	A54360
Tomato Vemone	Italy (S) 1994	G	EC 352 g/l	0.898 0.898	0.0528 0.0528	2	11-17 11-21	fruit fruit fruit fruit fruit fruit	0.38 **0.27** 0.14 0.05 < 0.03 < 0.03	0 **->3** 7 14 21 28	A54360
Tomato Vemone	Italy (S) 1994	G	EC 352 g/l	1.795 1.795	0.1056 0.1056	2	11-17 11-21	fruit fruit fruit fruit fruit fruit	0.86 **0.72** 0.48 0.21 0.07 0.05	0 **->3** 7 14 21 28	A54360
Tomato San Marzano (Italdor)	Italy (S) 1994	G	EC 352 g/l	1.056 1.056	0.0528 0.0528	2	15-17 15-21	fruit fruit fruit fruit fruit fruit	0.31 **0.12** 0.08 0.11 0.06 < 0.03	0 **->3** 7 14 21 27	A54360
Tomato San Marzano (Italdor)	Italy (S) 1994	G	EC 352 g/l	2.112 2.112	0.1056 0.1056	2	15-17 15-21	fruit fruit fruit fruit fruit fruit	0.72 **0.6** 0.13 0.25 0.11 0.06	0 **-> 3** 7 14 21 27	A54360

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Ipanema	Spain (S) 1993	F	EC 352 g/l	0.2642 0.2642	0.0528 0.0528	2	17 19	fruit fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water	0.19 **0.08** 0.05 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 0.1 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato Ipanema	Spain (S) 1993	F	EC 352 g/l	0.528 0.528	0.1056 0.1056	2	17 19	fruit fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water	0.26 **0.2** 0.06 0.05 < 0.03 0.07 0.04 0.03 < 0.03 < 0.03 0.2 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato Justar	Spain (S) 1993	F	EC 352 g/l	0.2642 0.2642	0.0528 0.0528	2	21 21	fruit fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water	0.19 **0.07** 0.07 0.05 < 0.03 0.06 0.09 0.03 < 0.03 < 0.03 0.19 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato Justar	Spain (S) 1993	F	EC 352 g/l	0.528 0.528	0.1056 0.1056	2	21 21	fruit fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water	0.43 **0.2** 0.1 0.08 < 0.03 0.07 0.06 0.04 < 0.03 0.03 0.35 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Marcoro	Italy (S) 1993	F	EC 352 g/l	0.2642 0.2642	0.0377 0.0377	2	11-17 17-19	fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water fruit	0.1 **< 0.03** < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 0.07 < 0.03 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato Marcoro	Italy (S) 1993	F	EC 352 g/l	0.528 0.528	0.0754 0.0754	2	11-17 17-19	fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water fruit	0.21 **0.04** < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 0.15 < 0.03 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato V.C. 82 B.	Italy (S) 1993	F	EC 352 g/l	0.2642 0.2642	0.0264 0.0264	2	17-19 19-21	fruit fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water	0.22 **< 0.03** < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 < 0.03 0.07 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato V.C. 82 B.	Italy (S) 1993	F	EC 352 g/l	0.528 0.528	0.0528 0.0528	2	17-19 19-21	fruit fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice (steril.) tomato paste (steril.) pomace wash water	0.24 **0.04** 0.06 0.03 < 0.03 < 0.03 0.03 0.03 < 0.03 < 0.03 0.14 < 0.03	0 **3** -> 7 14 14 14 14 14 14 14 14 14	A54363
Tomato Red Zetor	Spain (S) 1994	F	EC 352 g/l	0.264 0.264	0.0755 0.0755	2	17 19	fruit fruit fruit fruit fruit fruit	0.1 **0.07** 0.08 < 0.03 < 0.03 < 0.03	0 **3** -> 7 14 20 27	A54362

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato Red Zetor	Spain (S) 1994	F	EC 352 g/l	0.528 0.528	0.1509 0.1509	2	17 19	fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice pomace wash water fruit fruit fruit fruit	0.28 **0.12** < 0.03 0.09 0.09 0.09 < 0.03 0.61 < 0.03 0.09 0.05 < 0.03 < 0.03	0 **3** 6 6 6 6 6 6 6 -> 7 14 20 27	A54362
Tomato Pluton	Spain (S) 1994	F	EC 352 g/l	0.264 0.264	0.0755 0.0755	2	17-19 21	fruit fruit fruit fruit	0.09 **< 0.03** 0.03 < 0.03	0 **3** -> 7 14	A54362
Tomato Pluton	Spain (S) 1994	F	EC 352 g/l	0.528 0.528	0.1509 0.1509	2	17-19 21	fruit fruit fruit fruit	0.37 **0.06** 0.05 0.04	0 **3** -> 7 14	A54362
Tomato Petto 95	Spain (S) 1994	F	EC 352 g/l	0.264 0.264	0.0755 0.0755	2	17-19 19	fruit fruit fruit fruit fruit fruit	0.14 **0.04** < 0.03 < 0.03 < 0.03 < 0.03	0 **3** -> 8 14 21 28	A54362
Tomato Petto 95	Spain (S) 1994	F	EC 352 g/l	0.528 0.528	0.1509 0.1509	2	17-19 19	fruit fruit fruit fruit fruit fruit	0.18 **0.08** 0.04 < 0.03 < 0.03 < 0.03	0 **3** -> 8 14 21 28	A54362
Tomato Loni	Italy (S) 1994	F	EC 352 g/l	0.264 0.264	0.0264 0.0264	2	17-19 17-19	fruit fruit fruit fruit fruit fruit	0.04 **< 0.03** < 0.03 < 0.03 < 0.03 < 0.03	0 **3** -> 7 14 21 29	A54362
Tomato Loni	Italy (S) 1994	F	EC 352 g/l	0.528 0.528	0.0528 0.0528	2	17-19 17-19	fruit fruit fruit fruit fruit fruit	0.13 **0.06** 0.03 0.03 < 0.03 < 0.03	0 **3** -> 7 14 21 29	A54362
Tomato U. C. 82	Italy (S) 1994	F	EC 352 g/l	0.264 0.264	0.022 0.022	2	15-17 15-19	fruit fruit fruit fruit fruit fruit	0.07 **0.07** 0.07 0.04 < 0.03 < 0.03	0 **3** -> 7 14 21 28	A54362

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Tomato U. C. 82	Italy (S) 1994	F	EC 352 g/l	0.528 0.528	0.044 0.044	2	15-17 15-19	fruit fruit fruit canning liquid fruit, unwashed fruit, washed fruit, preserved juice pomace wash water fruit fruit fruit	0.3 **0.1** 0.08 < 0.03 0.07 0.07 0.07 < 0.03 0.29 < 0.03 0.08 0.05 0.04	0 **3** -> 7 -> 7 -> 7 -> 7 -> 7 -> 7 -> 7 -> 7 14 21 28	A54362
Squash Elite	Spain (S) 1992	F	EC 350 g/l	1.09	0.105	1	before harvest	fruit	1.14 0.46 0.23 0.03	0 3 7 15	A49706 (A57139)
Squash Senator	Spain (S) 1992	F	EC 350 g/l	1.21	0.105	1	before harvest	fruit	1.02 0.53 0.05 0.04	0 3 7 15	A49707 (A57139)
Squash Senator	Spain (S) 1992	F	EC 350 g/l	1.37	0.105	1	before harvest	fruit	0.11 < 0.01 0.05 0.02	0 3 7 15	A49708 (A57139)
Squash Diamante	Spain (S) 1992	F	EC 350 g/l	1.02	0.105154 639	1	before harvest	fruit	0.32 0.13 0.02 0.02	0 3 7 15	A49709 (A57139)
Melon Futuro	Spain (S) 1992	G	EC 350 g/l	0.82	0.105	1	before harvest	fruit	0.81 0.28 0.23 0.11	0 3 7 15	A49702 (A57139)
Melon Amarillo canario	Spain (S) 1992	G	EC 350 g/l	0.71	0.105	1	before harvest	fruit	0.38 0.05 0.02 0.02	0 3 7 15	A49703 (A57139)
Melon Galia	Spain (S) 1992	G	EC 350 g/l	0.76	0.105	1	before harvest	fruit	0.97 0.63 0.5 0.22	0 3 7 15	A49704 (A57139)
Melon Amarillo canario	Spain (S) 1992	G	EC 350 g/l	0.87	0.105	1	before harvest	fruit	0.09 < 0.01 < 0.01 0.04	0 3 7 15	A49705 (A57139)

Crop/ Variety	Country/ Year	For G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Musk melon Rixan	Spain (S) 1994	F	EC 352 g/l	0.528 0.528 0.528	0.176 0.132 0.132	3	70 70 70	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel fruit fruit peel pulp	< 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 **< 0.15** < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15 < 0.15	0 0 0 3 3 3 -> 7 **-> 7** -> 7 14 14 14 21 21 21 29 29 29	A54358
Musk melon Rixan	Spain (S) 1994	F	EC 352 g/l	1.0561 1.0561 1.0561	0.352 0.264 0.264	3	70 70 70	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel fruit peel fruit peel fruit peel	< 0.15 0.16 0.23 < 0.15 < 0.15 0.15 < 0.15 **< 0.15** < 0.15 < 0.15 < 0.15 < 0.15	0 0 0 3 3 3 -> 7 **-> 7** -> 7 14 21 29	A54358
Musk melon Daimiel	Spain (S) 1994	F	EC 352 g/l	0.528 0.528 0.528	0.132 0.132 0.132	3	69-70 69-70 69-70	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel	< 0.15 0.19 0.29 < 0.15 < 0.15 0.15 < 0.15 **< 0.15** 0.17	0 0 0 3 3 3 -> 7 **-> 7** -> 7	A54358
Musk melon Daimiel	Spain (S) 1994	F	EC 352 g/l	1.0561 1.0561 1.0561	0.264 0.264 0.264	3	69-70 69-70 69-70	fruit peel	0.35	0	A54358
Musk melon Daimiel	Spain (S) 1994	F	EC 352 g/l	0.528 0.528 0.528	0.132 0.132 0.132	3	69-70 69-70 69-70	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel	< 0.15 < 0.15 < 0.15 < 0.15 0.15 0.21 < 0.15 **< 0.15** < 0.15	0 0 0 3 3 3 -> 7 **-> 7** -> 7	A54358
Musk melon Daimiel	Spain (S) 1994	F	EC 352 g/l	1.0561 1.0561 1.0561	0.264 0.264 0.264	3	69-70 69-70 69-70	fruit peel	0.44	0	A54358

Crop/ Variety	Country/ Year	F or G	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
				kg a.s/ha	conc % a.s						
Musk melon Tamaris	Italy (S) 1994	F	EC 352 g/l	0.528 0.528 0.528	0.0528 0.0528 0.0528	3	64-80 69-81 70-82	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel fruit peel fruit peel	0.3 0.46 0.75 < 0.15 < 0.15 0.22 < 0.15 **< 0.15** 0.29 < 0.15 < 0.15	0 0 0 -> 3 -> 3 -> 3 7 **7** 7 14 21	A54358
Musk melon Tamaris	Italy (S) 1994	F	EC 352 g/l	1.0561 1.0561 1.0561	0.1056 0.1056 0.1056	3	64-80 69-81 70-82	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel fruit peel fruit peel	< 0.15 0.5 1.28 < 0.15 0.2 0.42 < 0.15 **< 0.15** 0.15 < 0.15 < 0.15	0 0 0 -> 3 -> 3 -> 3 7 **7** 7 14 21	A54358
Musk melon Calipso	Italy (S) 1994	F	EC 352 g/l	0.528 0.528 0.528	0.0528 0.0528 0.0528	3	69-75 69-80 69-81	pulp fruit fruit peel pulp fruit fruit peel pulp fruit fruit peel	< 0.15 0.47 1.01 < 0.15 0.22 0.48 < 0.15 **0.19** 0.49	0 0 0 3 3 3 -> 7 **-> 7** -> 7	A54358
Musk melon Calipso	Italy (S) 1994	F	EC 352 g/l	1.0561 1.0561 1.0561	0.1056 0.1056 0.1056	3	69-75 69-80 69-81	fruit peel	1.61	0	A54358

B.7.6.8 Oilseed

Table 7.6.8-1: Oilseed critical GAPs

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Oilseeds								
Cotton	F	EC (350 g/l)	Southern Europe	3	0.105	800	0.84	Spraying interval: 14-21 days
	F	EC (350 g/l)	Imported crops	1-3	0.105	800	0.84	Outside Europe, registrations exist in Brazil, Columbia, Equador a.o. countries.
Soybeans	F	EC (350 g/l)	Imported crops	2	0.13-0.26	200-400	0.53	Outside Europe, use is registered in Brazil, Australia, Argentina, a.o. countries.

Table 7.6.8-2: Summary of supervised trials for oilseeds

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Rape Petranova	Germany (N) 1977	EC 350-2 g/l	0.42	0.07	2	post flowering	seed	**0.3**	**39**	A12344 (A53965)
Rape Petranova	Germany (N) 1976	EC 350-2 g/l	0.42	0.07	2	8 weeks before harvest (fruits developing)	seed	**0.3**	**56**	A13206 (A53965)
Rape Lihoraps	Germany (N) 1976	EC 350-2 g/l	0.42	0.07	2	8 weeks before harvest (fruits developing)	seed	0.03	55	A13207 (A53965)
Rape Kroko	Germany (N) 1984	EC 350-2 g/l	0.21 (1st 0.42 (2nd	0.053 treatment) 0.105 treatment)	2	56 days before harvest	shoot fruit seed	11.8 0.49 0.06 **0.11**	0 21 42 **56**	A30122 (A53965)
Rape Petranova	Germany (N) 1984	EC 350-2 g/l	0.21 (1st 0.42 (2nd	0.053 treatment) 0.105 treatment)	2	flowering / end of flow.	shoot fruit seed	11.7 0.41 0.03 0.02 0.02	0 21 42 56 76	A30123 (A53965)
Rape Belina	Germany (N) 1984	EC 350-2 g/l	0.21 (1st 0.42 (2nd	0.053 treatment) 0.105 treatment)	2	flowering / end of flow.	shoot fruit seed	8.1 0.8 0.12 0.06 0.015	0 22 42 56 70	A31482 (A53965)
Rape Jef Neuf	Germany (N) 1984	EC 350-2 g/l	0.21 (1st 0.42 (2nd	0.053 treatment) 0.105 treatment)	2	mature seeds in first pod	shoot fruit seed	5.8 0.6 0.13 0.1 **0.06**	0 21 42 56 **67**	A31483 (A53965)
Rape Quinta	Germany (N) 1984	EC 350-2 g/l	0.21 (1st 0.42 (2nd	0.053 treatment) 0.105 treatment)	2	mature seeds in first pod	shoot fruit seed	6.30 0.4 0.11 **0.015** 0.015	0 21 42 **56** 69	A31484 (A53965)
Rape Komet	Germany (N) 1977	DP 30 g/kg	0.75	3	3	post flowering	seed	0.5	40	A12220 (A53965)
Rape Petranova	Germany (N) 1977	DP 30 g/kg	0.75	3	3	post flowering	seed	0.03	28	A12221 (A53965)
Rape Petranova	Germany (N) 1977	DP 30 g/kg	0.75	3	4	post flowering	seed	0.04	26	A12219 (A53965)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	beginning of flower period	straw seed	0.075 0.045	70 70	A02467 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	beginning of flower period	straw seed	0.13 0.07	69 69	A02470 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	beginning of flower period	seed	0.045	53	A02473 (A53965)
Rape Zöller Gold	Germany (N) 1974	DP 30 g/kg	0.9	3	1	beginning of flower period	seed	0.03	53	A02474 (A53965)
Rape Zöller Gold	Germany (N) 1974	DP 30 g/kg	0.9	3	1	28 days before harvest	seed	1.93 0.4 0.5 0.4 0.09	0 7 14 21 28	A02475 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	beginning of flower period	seed	0.03	53	A02476 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	28 days before harvest	seed	2.42 0.24 0.35 0.34 0.13	0 7 14 21 28	A02477 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	28 days before harvest	seed	10.14 0.33 0.09 0.14 0.33	0 7 14 21 28	A02610 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	1	28 days before harvest	seed	6.52 -- 0.67 -- 0.14	0 7 14 21 28	A02611 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	2	80 % flowering	straw seed	0.13 0.5	54 54	A02469 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	2	80 % flowering	straw seed	0.59 0.57	54 54	A02472 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	2	80 % flowering	seed	0.07	42	A02612 (A53965)
Rape Zöller gold	Germany (N) 1974	DP 30 g/kg	0.9	3	2	80 % flowering	seed	0.09	47	A02895 (A53965)
Rape Petranova	Germany (N) 1974	DP 30 g/kg	0.9	3	2	80 % flowering	seed	0.03	47	A02896 (A53965)
Rape Petranova	Germany (N) 1976	DP 30 g/kg	0.9	3	4	8 weeks before harvest (fruit dev.)	seed	0.09	56	A13208 (A53965)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Rape Lihoraps	Germany (N) 1976	DP 30 g/kg	0.9	3	4	8 weeks before harvest (fruit dev.)	seed	0.06	55	A13209 (A53965)
Soybean Santa Rosa	Brazil 1974	EC 352-5 g/l	0.42	0.105	3	formation of shucks	seeds	0.22	62	A01813 (A53965)
Soybean Santa Rosa	Brazil 1974	EC 352-5 g/l	0.42	0.105	4	maduration of shucks	seeds	0.17	13	A01812 (A53965)
Soybean Davies	Brazil 1975	EC 352-5 g/l	0.53	0.131	1	formation of seeds	seeds	0.23	21	A07560 (A53965)
Soybean IAC-3	Brazil 1977	EC 352-5 g/l	0.53	0.075	1	vegetative stage	seeds	0.09	103	A13732 (A53965)
					2	flowering stage	seeds	0.33	66	A13733 (A53965)
					3	stage of maturation	seeds	**0.45**	**36**	A13735 (A53965)
					1	flowering stage	seeds	0.33	66	A13734 (A53965)
					2	stage of maturation	seeds	**0.42**	**36**	A13731 (A53965)
					1	stage of maturation	seeds	0.15	36	A13730 (A53965)
Soybean Santa Rosa	Brazil 1977	EC 352-5 g/l	0.53	0.075	1	stage of maturation	seeds	**0.09**	**22**	A13738 (A53965)
					2	stage of maturation	seeds	0.25	22	A13736 (A53965)
					3	stage of maturation	seeds	0.31	22	A13737 (A53965)
Soybean Santa Rosa	Brazil 1978	EC 352-5 g/l	0.53	0.075	1	vegetative stage	seeds	0.03	90	A16115 (A53965)
					2	flowering stage	seeds	0.50	62	A16114 (A53965)
					3	stage of maturation	seeds	**0.40**	**31**	A16111 (A53965)
					2	stage of maturation	seeds	**0.10**	**31**	A16113 (A53965)
					1	flowering stage	seeds	0.20	62	A16116 (A53965)
					2	stage of maturation	seeds	0.**30**	**31**	A16112 (A53965)
					1	stage of maturation	seeds	**0.10**	**31**	A16117 (A53965)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Soybean Santa Rosa	Brazil 1978	EC 352-5 g/l	0.53	0.075	1	vegetative stage	seeds	0.05	90	A16124 (A53965)
					2	flowering stage	seeds	0.20	61	A16121 (A53965)
					3	stage of maturation	seeds	**0.30**	**29**	A16118 (A53965)
					2	stage of maturation	seeds	**0.20**	**29**	A16120 (A53965)
					1	flowering stage	seeds	0.20	61	A16123 (A53965)
					2	stage of maturation	seeds	**0.20**	**29**	A16119 (A53965)
					1	stage of maturation	seeds	**0.08**	**29**	A16122 (A53965)
Soybean Santa Rosa	Brazil 1979	EC 352-5 g/l	0.53	0.075	1	vegetative stage	seeds	0.105	101	A17983 (A53965)
					2	flowering stage	seeds	0.345	71	A17982 (A53965)
					3	stage of maturation	seeds	0.34	41	A17979 (A53965)
					3	stage of maturation	crude oil	1.40	41	A17978 (A53965)
							press cake	0.015	41	
Soybean Santa Rosa	Brazil 1979	EC 352-5 g/l	0.53	0.075	2	stage of maturation	seeds	0.28	41	A17981 (A53965)
					1	flowering stage	seeds	0.31	71	A17984 (A53965)
					2	stage of maturation	seeds	0.56	41	A17980 (A53965)
					1	stage of maturation	seeds	0.27	41	A17985 (A53965)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Soybean Santa Rosa	Brazil 1979	EC 352-5 g/l	0.53	0.075	1	vegetative stage	seeds	0.015	91	A17993 (A53965)
					2	flowering stage	seeds	0.255	62	A17990 (A53965)
					3	stage of maturation	seeds	**0.60**	**30**	A17986 (A53965)
					3	stage of maturation	crude oil	0.70	30	A17987 (A53965)
							press cake	0.015	30	
					2	stage of maturation	seeds	**0.015**	**30**	A17989 (A53965)
					1	flowering stage	seeds	0.11	62	A17992 (A53965)
					2	stage of maturation	seeds	**0.21**	**30**	A17988 (A53965)
					1	stage of maturation	seeds	**0.06**	**30**	A17991 (A53965)
Soybeans Forrest	Australia 1981	EC 352-5 g/l	0.74	3.675	1	last set	seeds	0.015 **0.03**	21 **28**	A30088 (A53965)
			3.675	3.675	1	last set	seeds	0.04 0.155	21 28	
Soybean Paraná	Brazil 1978	ULV 242-250 g/l	0.50	25	2	soybeans formation	seeds	0.30	32	A16110 (A53965)
							presscake	0.03	32	
							crude oil	1.30	32	
Soybeans Forrest	Australia 1981	ULV 242-250 g/l	0.72	24	1	last set	seeds	0.015 0.02	21 28	A30088 (A53965)
			1.44	24	1	last set	seeds	0.02 0.02	21 28	
Soybean	Germany (N)	EC 352-5 g/l	1.40				oil (after refining)	0,01	---	A18481 (A53965)
							oil (after refining)	0.01	---	
Soybean	Germany (N)	EC 352-5 g/l	0.10 0.30 0.30	mixed with crude soybean oil	---	---	oil (after refining)	0.01	---	A18482 (A53965)
			0.10 0.70 0.60	mixed with crude soybean oil	---	---	oil (after refining)	0.01	---	

Crop/ Variety	Country/ Year	Form.	Application rate kg a.s/ha	conc % a.s	Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
Soybean	Germany (N)	EC 352-5 g/l	0.10 0.70 0.60	mixed with soybeans, superhea-ted steam passed into beans for 60 minutes	--- ---	--- ---	steam condensa te	0.220 0.045	in the first 650-ml condensate in the 2nd 650-ml condensate	A18484 (A53965)
Soybean	Germany (N)	EC 352-5 g/l	0.02 0.02 0.30	added to soybean flower, mixed with 100ml water and a pinch of baking powder	---	---	entire specimen after 2 h of baking at 200 degrees	0.074 0.019	Test A Test B)	A18653 (A53965)
Soybean	Germany (N)	EC 352-5 g/l	0.02 0.02 0.30 0.02 0.02 0.30	added to soybean flower, mixed with 100ml water and a pinch of salt added to soybean flower, pasted up with water and a pinch of baking powder	--- ---	--- ---	entire specimen after 2 h of baking at 200 degrees entire specimen after 2 h of baking at 200 degrees	0.134 0.02 0.074 0.019	Test A Test B) Test A Test B)	A18426 (A53965)
Soybean	Brazil	EC 352-5 g/l	0.18 - 0.50	not recorded	1 - 2 x (no dates recor.)	-----	cruched grain bran crude oil refined oil poor cake rich cake	min. - max. 0.015-0.11 0.015-0.21 0.04 -0.295 0.015-0.21 0.015 0.015	--- --- --- --- ---	A26358 (A53965)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Soybean	Brazil	EC 352-5 g/l	---	---	---	---		min. - max.		A19004 (A53965)
							coarse meal	0.075-0.12	---	
							crude oil	0.10 - 0.13	---	
							refined oil	0.075-0.12	---	
							refinded, neutr.oil	0.13	---	
							press cake	0.075-0.11	---	
Cotton Delta Pine	Australia 1974	EC 350 g/l	0.74	3.7-7.4	13	just before boll opening	seeds	0.02	44	A02015 (A53965)
Cotton Delta Pine	Australia 1974	EC 350 g/l	0.74	6.727	15	10 % bolls open	seeds	0.035	25	A02016 (A53965)
Cotton Crema 111	Spain (S) 1992	EC 350 g/l	0.63	0.105	1	60 % bolls open	seeds	2.99 0.78 0.27 **0.05**	0 3 7 **15**	A49593 (A53965)
Cotton Stoneville 506	Spain (S) 1992	EC 350 g/l	0.63	0.105	1	75 % bolls open	seeds	2.96 0.35 0.3 **0.05**	0 3 7 **15**	A49594 (A53965)
Cotton Crema 111	Spain (S) 1992	EC 350 g/l	1.00	0.105	1	75 % bolls open	seeds	0.91 0.2 0.17 **0.02**	0 3 7 **15**	A49595 (A53965)
Cotton Cocker 310	Spain (S) 1992	EC 350 g/l	1.00	0.105	1	70 % bolls open	seeds	0.86 0.22 0.22 **0.25**	0 3 7 **15**	A49596 (A53965)
Cotton Stoneville 443	Spain (S) 1992	EC 350 g/l	1.00	0.105	1	75 % bolls open	seeds	0.79 0.62 0.25 0	0 3 7 15	A49597 (A53965)
Cotton Crema 111	Spain (S) 1992	EC 350 g/l	1.00	0.105	1	80 % bolls open	seeds	0.68 0.1 0.1 **0.12**	0 3 7 **15**	A49598 (A53965)
Cotton Max 9	Spain (S) 1992	EC 350 g/l	1.11	0.105	1	20 % bolls open	seeds	1.39 0.24 0.11 **0.07**	0 3 7 **15**	A49599 (A53965)
Cotton Cocker 310	Spain (S) 1992	EC 350 g/l	1.11	0.105	1	15 % bolls open	seeds	1.83 0.4 0.11 **0.1**	0 3 7 **15**	A49600 (A53965)
Sunflower (Variety not recorder)	Sudan 1988	ULV 524 g/l	0.84	52.4	1	flowering	seed	0.008-0.018	109	A41153 (A53965)
Sunflower (Variety not recorder)	Sudan 1988	ULV 524 g/l	0.84	52.4	1	flowering	seed	0.033-0.036	109	A41154 (A53965)
Sunflower California Dwarf	USA 1965	EC 240 g/l	1.12	0.143	2	beginning of flowering	seed	0.43-0.61	69	A38683 (A53965)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
					3	beginning of flowering	seed	0.44-0.60	63	
Sunflower California Dwarf	USA 1965	EC 240 g/l	1.12	0.143	1	beginning of flowering	seed	0.09	88	A38684 (A53965)
					2	beginning of flowering	seed	0.04	81	
					3	beginning of flowering	seed	0.39	74	

B.7.6.9 Potatoes

Table 7.6.9-1: Potatoes critical GAPs

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Potatoes	F	EC (350 g/l)	Southern Europe	2	0.088	600	0.53	Spraying interval: 14-21 days

Table 7.6.9-2: Summary of supervised trials for potatoes

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Potato Frigga	Germany (N) 1976	WP 350 g/kg	0.21	0.035	2	28 days before harvest	tuber	**0.01** 0.01 0.01 0.01	**13** 19 23 28	A08862 (A57135)
Potato Erstling	Germany (N) 1976	WP 350 g/kg	0.21	0.035	2	28 days before harvest	tuber	0.015 **0.015** 0.015 0.015	0 **13** 20 28	A08863 (A57135)
Potato Marion	Germany (N) 1976	WP 350 g/kg	0.21	0.035	2	28 days before harvest	peel tuber (without peel)	0.015 0.015 0.015 0.015 0.015 0.015	20 24 28 20 24 28	A08864 (A57135)
Potato Hollers	Germany (N) 1976	WP 350 g/kg	0.21	0.035	2	28 days before harvest	tuber	0.015 **0.015** 0.015 0.015	0 **14** 20 28	A08865 (A57135)
Potato Nicola	Germany (N) 1983	DP 28.2 g/kg	0.705	2.82	2	14 days before harvest	tuber	0.015 0.015 0.015 **0.015**	0 5 10 **14**	A28588 (A57135)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Potato Grata	Germany (N) 1983	DP 28.2 g/kg	0.705	2.82	3	14 days before harvest	tuber	0.015 0.015 0.015 **0.015**	0 6 10 **14**	A28589 (A57135)
Potato Grata	Germany (N) 1983	DP 28.2 g/kg	0.705	2.82	2	14 days before harvest	tuber	0.015 0.015 0.015 **0.015**	0 5 11 **14**	A28590 (A57135)
Potato Quebec	Spain (S) 1994	EC 352 g/l	0.528 0.528	0.176 0.176	2	59-61 65-71	α-Endosulfan tuber tuber tuber tuber tuber β-Endosulfan tuber tuber tuber tuber tuber HOE 051327 tuber tuber tuber tuber tuber	 < 0.01 < 0.01 **< 0.01** < 0.01 < 0.01 < 0.01 < 0.01 **< 0.01** < 0.01 < 0.01 < 0.01 < 0.01 **< 0.01** < 0.01 < 0.01	 0 7 **13** 21 27 0 7 **13** 21 27 0 7 **13** 21 27	A55214
Potato Spunta	Spain (S) 1994	EC 352 g/l	0.528 0.528	0.176 0.176	2	35 39	α-Endosulfan tuber tuber tuber tuber tuber β-Endosulfan tuber tuber tuber tuber tuber HOE 051327 tuber tuber tuber tuber tuber	 < 0.01 < 0.01 **< 0.01** < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01 < 0.01	 0 7 **14** 21 -> 28 0 7 14 21 -> 28 0 7 14 21 -> 28	A55214

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Potato Nicola	France (S) 1994	EC 352 g/l	0.528	0.264	2	31-35	α-Endosulfan			A55214
							tuber	< 0.01	0	
			0.528	0.264		39-41	tuber	< 0.01	7	
							tuber	**< 0.01**	**15**	
							tuber	< 0.01	22	
							tuber	< 0.01	-> 29	
							β-Endosulfan			
							tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	< 0.01	15	
							tuber	< 0.01	22	
							tuber	< 0.01	-> 29	
							HOE 051327			
							tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	< 0.01	15	
							tuber	< 0.01	22	
							tuber	< 0.01	-> 29	
Potato Singude	Italy (S) 1994	EC 352 g/l	0.528	0.0587	2	41-51	α-Endosulfan			A55214
							tuber	< 0.01	0	
			0.528	0.0528		69-75	tuber	< 0.01	7	
							tuber	**< 0.01**	**14**	
							tuber	< 0.01	-> 21	
							β-Endosulfan			
							tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	< 0.01	14	
							tuber	< 0.01	-> 21	
							HOE 051327			
							tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	< 0.01	14	
							tuber	< 0.01	-> 21	
Potato Liseta	Italy (S) 1994	EC 352 g/l	0.528	0.176	2	59-61	α-Endosulfan			A55214
			0.528	0.176		61-71	tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	**< 0.01**	**14**	
							tuber	< 0.01	21	
							tuber	< 0.01	-> 28	
							β-Endosulfan			
							tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	< 0.01	14	
							tuber	< 0.01	21	
							tuber	< 0.01	-> 28	
							HOE 051327			
							tuber	< 0.01	0	
							tuber	< 0.01	7	
							tuber	< 0.01	14	
							tuber	< 0.01	21	
							tuber	< 0.01	-> 28	

B.7.6.10 Tea, Coffee and cacao

Table 7.6.10-1: Critical GAP for tea, coffee and cacao

CROP	F/G	FORM TYPE	COUNTRY	N	APPLICATION RATE			REMARKS
					Kg ai/hl	Water l/ha	Kg ai/ha	
Tea	F	EC (350 g/l)	Imported crops	3	0.126	350	0.44	Amongst other use is registered in India
Coffee	F	EC (350 g/l)	Imported crops	3	0.175-1.05	100-600	1.05	Use is registered in Latin American and African countries.
Cacao	F	EC (350 g/l)	Imported crops	3	0.21-0.875	40-120	0.25-0.35	

Table 7.6.10-2: Summary of supervised trials for tea

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Tea	India	EC 350 g/l	0.44	0.125	3	16 months from last pruning / ready for plucking	dried green tea	2.2 - 4.2 **1.1 - 5.0** 0.7 - 1.2	1 **7** 15	A31719 (A53967)
							proc. black tea	7.8 -15.6 4.5 -16.1 0.8 - 1.6	1 7 15	
							tea infusion (from green dried tea)	0.016 0.006 0.003	1 7 15	
							tea infusion (from processed black tea)	0.043	1	

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Tea	India	EC 350 g/l	0.88	0.25	3	16 months from last pruning / ready for plucking	dried green tea	6.0 -18.2 2.1 - 4.8 0.7 - 1.2	1 7 15	A31719 (A57135) (continued)
							proc. black tea	8.4 -29.6 16.3 -35.0 2.4 -11.4	1 7 15	
							tea infusion (from green dried tea)	0.013 0.016 0.006-0.007	1 7 15	
							tea infusion (processed black tea)	0.014	1	
Tea	India	EC 350 g/l	0.44	0.125	3	16 months from last pruning / ready for plucking	dried green tea	6.2 -37.5 **16.2 -24.1** 2.5 - 4.0	1 **7** 15	A31719 (A57135) (continued)
							proc. black tea	15.0 -36.4 4.0 -12.7 2.7 - 3.3	1 7 15	
							tea infusion (from green dried tea)	0.027 0.041	1 1	
							tea infusion (from processed black tea)	0.086	1	
Tea	India	EC 350 g/l	0.88	0.25		16 months from last pruning / ready for plucking	dried green tea	14.4 - 49.7 3.9 - 13.6 1.9 - 5.3	1 7 15	A31719 (A57135) (continued)
							proc. black tea	31.1 - 84.0 6.8 - 14.8 3.2 - 9.9	1 7 15	
							tea infusion (from green dried tea)	0.101 0.062	1 1	
							tea infusion (processed black tea)	0.107	1	

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Tea Burma (Assam)	India	EC 350 g/l	0.88	0.88		ready for plucking	dry tea tea infusion	9.7 - 25.6 15.4 - 18.1 4.9 - 8.4 2.3 - 4.2 0.028-0.030 0.014-0.017 0.003-0.007 0.001-0.002	1 2 4 7 1 2 4 7	A31718 (A57135)
Tea Burma (Assam)	India	EC 350 g/l	1.75	1.75		ready for plucking	dry tea tea infusion	93 -108 22.9 - 42.7 6.3 - 9.0 2.1 - 2.3 0.097-0.158 0.026-0.032 0.008-0.016 0.001-0.002	1 2 4 7 1 2 4 7	A31718 (A57135)

Table 7.6.10-3: Summary of supervised trials for coffee

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	0.88	**4.375**	2	young small green berries	green beans: - surface - interior	 0.025 0.035	 174 174	A04390 (A53972)
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	0.70	0.175	2	young small green berries	green beans: - surface - interior	 0.025 0.04	 100-200 100-200	A04391 (A53972)
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	1.05	2.1	1	young small green berries	green beans: - surface - interior	 0.05 0.035	 135-165 135-165	A04392 (A53972)
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	1.05	0.13125	4	berries: 10% green 40% red 50% dry	green beans: - surface - interior	 0.025 0.035	 60-90 60-90	A04393 (A53972)
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	0.53	0.131	2	berries: 20% green 50% red 30% dry	green beans: - surface - interior	 0.07 0.05	 45-140 45-140	A04394 (A53972)
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	0.70	0.175	3	berries: 60% green 30% red 10% dry	green beans: - surface - interior	 0.17 0.035	 90-180 90-180	A04395 (A53972)
Coffee arabica Mundo Novo	Brazil 1974	EC 350 g/l	0.70	0.28	1	berries: 30% green 50% red 20% dry	green beans: - surface - interior	 0.025 0.035	 65 65	A04396 (A53972)
Coffee arabica Bourbon 16 years old	Guatemala 1974	EC 350 g/l	0.81	0.140	1	60% of berries ripe for harvest	green beans: - surface **- interior**	 0.041 **0.028**	 30 **30**	A04379 (A53972)
Coffee arabica Bourbon 12 years old	Guatemala 1974	EC 350 g/l	0.81	0.140	1	50% of berries ripe for harvest	green beans: - surface **- interior**	 0.041 **0.028**	 34 **34**	A04380 (A53972)
Coffee arabica Bourbon 20 years old	Guatemala 1974	EC 350 g/l	0.76	0.131	2	40% of berries ripe for harvest	green beans: **- surface** **- interior**	 0.041 **0.028**	 39 **39**	A04381 (A53972)

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Coffee arabica Bourbon 16 years old	Guatemala 1974	EC 350 g/l	0.76	0.131	2	50% of berries ripe for harvest	green beans: - surface **- interior**	 0.041 **0.028**	 36 **36**	A04382 (A53972)
Coffee caneph. Robusta Cameroon, 5 yrs. old	Cameroon 1974	EC 350 g/l	1.05	1.050	1	green berries	green beans: - surface - interior	 0.044 0.028	 180 180	A04383 (A53972)
Coffee caneph. Robusta Cameroon, 5 yrs. old	Cameroon 1974	EC 350 g/l	1.05	1.050	1	green berries	green beans: - surface - interior	 0.041 0.028	 180 180	A04384 (A53972)
Coffee arabica Java, 10-20 years old	Cameroon 1974	EC 350 g/l	0.88	0.875	1	green berries	green beans: - surface - interior	 0.041 0.028	 180-205 180-205	A05785 (A53972)
Coffee arabica Java, 10-20 years old	Cameroon 1974	EC 350 g/l	0.88	0.875	1	green berries	green beans: - surface - interior	 0.119 0.028	 180-205 180-205	A05786 (A53972)
Coffee arabica Java, 10-20 years old	Cameroon 1974	EC 350 g/l	0.88	0.875	1	green berries	green beans: - surface - interior	 0.041 0.028	 180-205 180-205	A05787 (A53972)
Coffee caneph. Robusta Cameroon, 5 yrs. old	Cameroon 1974	EC 350 g/l	1.05	1.050	2	green berries	green beans: - surface - interior	 0.044 0.028	 150 150	A05788 (A53972)
Coffee arabica Java, 10-20 years old	Cameroon 1974	EC 350 g/l	0.88	0.875	1	green berries	green beans: - surface - interior	 0.041 0.028	 180 180	A05789 (A53972)

Table 7.6.10-4: Summary of supervised trials for cacao

Crop/ Variety	Country/ Year	Form.	Application rate		Nº	Growth Stage	Portion analysed	Residue (mg/kg)	PHI (days)	Ref.
			kg a.s/ha	conc % a.s						
Cacao Forasteiro	Brazil 1982	EC 350 g/l	0.35	0.292	2	beginning of maturity	fruit	**0.015** 0.015	**30** 45	A25749 (A53973)
Cacao Forasteiro	Brazil 1982	EC 350 g/l	0.35	0.292	3	beginning of maturity	fruit	**0.015** 0.02	**30** 45	A25747 (A53973)
Cacao Forasteiro	Brazil 1982	EC 350 g/l	0.7	0.583	2	beginning of maturity	fruit	**0.015** 0.015	**30** 45	A25748 (A53973)
Cacao Forasteiro	Brazil 1982	EC 350 g/l	0.7	0.583	3	beginning of maturity	fruit	**0.015** 0.015	**30** 45	A25746 (A53973)
Cacao (variety not recorded)	Brazil 1983	EC 500 g/kg	0.25	0.625	2	28 days before harvest	seed	**0.015** 0.015	**28** 28	A28024 (A53973)
Cacao (variety not recorded)	Brazil 1983	EC 500 g/kg	0.25	0.625	2	10 days before harvest	seed	0.02 0.015	10 10	A28025 (A53973)
Cacao (variety not recorded)	Brazil 1983	EC 500 g/kg	0.25	0.625	2	2 days before harvest	seed	0.145 0.02	2 2	A28026 (A53973)

B.7.7 Effects of industrial processing and/or household preparation (IIA, 6.5; IIIA, 8.4)

The fate of endosulfan residues during processing of raw agricultural commodities was investigated in several major registered crops and for the important processing procedures.

B.7.7.1 Steam treatment and oil extraction of soybeans, oil refining, cooking and baking of soybean meal

Krebs, B., 1994c; Doc. No.: A53965

Untreated soybeans were spiked with a mixture of α- and β-endosulfan and endosulfan sulphate and subsequently **steamed** for 60 minutes. The steam condensate contained afterwards about 50 % and 25 % of the applied α/β-endosulfan and endosulfan sulphate, respectively. Therefore, steaming seems to be a helpful measure to reduce the level of endosulfan residues in raw agricultural commodities.

Soybean samples from residue trials in Brazil were taken, either for analysis of the raw beans or for grinding and **solvent extraction of oil**. Initial residues in the beans before processing were 0.3, 0.34 and 0.6 mg/kg. The crude oil contained residues of 1.3, 1.4 and 0.7 mg/kg, whereas the press cake was free of residues down to the limits of determination (0.01 and 0.06 mg/kg). **These results indicate a transfer of endosulfan residues at least to the crude oil.**

The fate of the residues during **refining** was investigated in two laboratory studies in which mixtures of α- and β-endosulfan and mixtures of α- and β-endosulfan and endosulfan sulphate were spiked to crude soybean oil. Refining was done as much as possible according to industrial processing procedures. In

both studies the refined oil did not contain endosulfan residues. They could efficiently be extracted from the oil during the refining procedures.

In order to get an overview on the residue situation in soybeans in Brazil three **oilmills** were **monitored** in regions where endosulfan is most intensively used in the crop and samples of crushed grain, bran, crude oil and refined oil were taken for analysis. Sampling was carried out over three sampling periods. In general, results confirmed the extraction of the residues during the refining procedure. But, in one mill the refined oil contained residues more or less at the same level as the crude oil samples. Nevertheless, the level of residues from the monitored mills were still below the recommended MRL for soybean seed.

Untreated soybeans were ground and the meal spiked with mixtures of α- and β-endosulfan as well as with mixtures of α- and β-endosulfan and endosulfan sulphate. The samples were either **cooked** in salt water for 4 hours or moistened with water and **baked** for two hours at 200 degrees centigrade. During cooking endosulfan residues are reduced to about 30 to 50 % of the initially spiked amount. During baking residues are reduced to less than 10 % of the initially spired amount.

B.7.7.2 Preparation of juice and mash from apples

Krebs *et. al.*, 1996b, Doc No.: A57131

In two studies in 1989, fruit samples containing residues were processed to mash, juice and pomace (A49973 ,A49972 part of Doc.: Huth and Wurm, 1996b; Doc. No.: A57138).

Calculation of the contribution factors from the fruit samples to the processed fractions was slightly hampered by the fact that in many samples at least one analyte did not show up above the limit of determination, although the apple trees were treated at normal recommended rates. Therefore the residue levels in processed fractions were partly based on theoretical calculations.

As a general result it can be stated, compared with the initial level in fresh fruits, the residue was reduced to 5 to 30 % in juice and mash and increased to 140 to 160 % in pomace. Some low residues could also be found in the wash water.

In an earlier study with unwashed apples containing 0.23 mg/kg of endosulfan residues, the residue pattern was in principle similar. Whereas the residues in various fractions of peel and core samples and in pomace were several times as high as in the raw commodity, the peeled apples and apple cider (juice) were totally free of residues (Shuttleworth, J. M., 1972; Doc. No.: A30341, part of Doc. No.: A57138)

In order to obtain further information additional studies were conducted in the years 1993 and 1994 at different locations in Italy, France and Spain (Idstein *et al*., 1996b, Doc No.: A55874, Sonder *et al*., 1996a, Doc No.: A54359). In all trials apple trees were sprayed twice at concentrations of 0.053 and 0.105 %. The amount of spraying solution was in the range of 1000 - 2000 l/ha. Apples for processing

were harvested two weeks after the last application. Residues in unwashed apples ranged from 0.06 - 0.34 mg/kg. Washing of apples reduced the amount of residues to about 70% in average, if all trials were taken into account. In the sterilised apple cider (LOD 0.03 mg/kg) no residues were found in all twelve processing studies. If residues were calculated within a processing scheme, in apple cider only 15% of the initial residues were present, whereas an increase of residues in pomace takes place.

In the case that apple mash is prepared also a reduction in residues to about 31% in mean of the initial amount occurs. Residues determined were below or in the range of the limit of quantification in nearly all cases. The highest value found in one case was 0.11 mg/kg.

B.7.7.4 Preparation of orange juice

Huth und Wurm, 1996a; Doc. No.: A57134, Krebs *et al.*, 1996a, Doc No.: A57130

Two residue studies in Brazil (Thier, W., 1980, Doc. No.: A19340; Thier, W., 1980, Dok. No.: A19341, part of Doc. No.: A57134) demonstrated very clearly the retention of endosulfan residues in the fruit peel throughout a 30 day sampling period. Juice was free of detectable residues at all times and pulp contained only once a minor residue of 0.05 mg/kg at the day of application, most probably caused by contamination from the peel during sample preparation.

B.7.7.5 Preparation of purée from plums

Krebs, B., 1994a; Doc. No.: A53960

After 5 applications at the recommended rate and a 21 day pre-harvest interval plum samples from 2 studies contained residues of 0.16 and 0.10 mg/kg. After processing, the purée samples contained 28 and 80 % of the residue level in the fruit samples.

B.7.7.6 Cooking of tomatoes and preparation of purée and juice

Krebs, *et al.*, 1996d, Doc. No.: A57133; Huth & Wurm, 1996d, Doc No.: A57140

Two raw tomato fruit samples containing residues of 0.035 and 0.095 mg/kg were processed into cooked fruits, purée and juice. Whereas the cooked fruits contained more or less the same residue concentration as the raw samples, purée and juice in both studies were free of residues. (Doc. No.: A49970 and A49971, part of doc Huth and Wurm, 1996d, Doc No.: A57140

Two further processing studies were conducted in the United States. In both studies, immediately after the last of 5 applications of 1.12 kg a.s./ha, two fruit samples were taken out of each field trial and processed to various fractions.

In the study from Florida the raw tomatoes were processed into:

- chopped tomatoes,
- seeds & peel (wet pomace),
- dry pomace,
- thin purée (juice)
- purée (10 to 11 % solids)
- purée (16 % solids).

Raw tomatoes contained endosulfan residues of 0.12 and 0.14 mg/kg after double analysis of the same sample (Doc. No.: A32878 - part of Doc. No.: A57140). After processing of this sample, 0.17, 1.16, 2.71, 0.05, 0.045 and 0.05 mg/kg were found in the chopped tomatoes, the wet pomace, the dry pomace, the juice, the 10 - 11% dry matter purée and the 16 % dry matter purée, respectively (Doc. No.: A32879; A32881 - part of Doc. No.: A 57140).

In a second study, from California, the raw tomato sample contained 0.11 and 0.16 mg/kg after double analysis (Doc. No.: A32877 - part of Doc. No.: 57140). Tomato juice, paste, skins & seeds and dried skins & seeds contained 0.05, 0.09, 3.94 and 4.56 mg/kg, respectively (Doc. No.: A32880 - part of Doc. No.: A57140).

Nine additional studies in tomatoes were carried out in 1993 and 1994 in Spain and Italy (Sonder et al., 1996b, Doc Nr.: A54363, Sonder et al., 1996c, Doc No.: A54362)

Field tomatoes were sprayed two times at concentrations between 0.026 - 0.15 % in the spray solution. The amount of spraying solution varied between 350 and 1200 l/ha. According to the agricultural practice for industrial tomatoes, the fruits were harvested 14 days after the last application with one exception (7 days).

In order to make a statement about the residue distribution, the following fractions were analysed in the course of the processing studies:

- fruit unwashed
- fruit washed
- fruit canned (tin)
- fruit juice
- tomato paste
- pomace

In 4 trials, no residues at harvest were found, tomatoes from the other trials showed residues in the range of 0.06 - 0.09 mg/kg. It can be concluded, that washing of the fruits does not reduce the amount of residues. Canning of the fruits does not result in a reduction of the traces of residues if present. The

canning liquid never contained any residues. In all trials, tomato juice was free of residues (<0.03 mg/kg).

Tomato paste was also free of residues (<0.03 mg/kg) with one exception (0.03 mg/kg). Residues accumulate in pomace, where concentrations between 0.07 - 0.61 mg/kg were determined.

Taking all studies with endosulfan into account it can be clearly shown that, if present, the residues declined in the major foodstuff parts, i.e. tomato juice, purée and paste, and increased in the waste and feeding parts, i.e. wet and dry pomace.

B.7.7.7 Preparation of grape juice and fermentation to wine

Krebs *et al*, 1996c, Doc. No.: A 57132, Huth & Wurm, 1996c; Doc. No.: A57139

After two applications of the recommended and double the recommended rate and pre-harvest intervals of 60 to 62 days, residues of 0.55 and 0.49 mg/kg were generated in wine grapes. Must produced from these samples contained 0.04 and 0.03 mg/kg, or 7 and 6 percent of the initial residues, respectively. After fermentation to wine no residues above the limit of determination could be found in both wine samples (Doc A30914 and A30915 part of Doc.No.: A57139)

B.7.7.8 Tea infusion

Krebs, B., 1994d; Doc. No.: A53967

In a study from India endosulfan residues were determined in processed tea and in tea infusions. In general only less than 10 percent of the residues in manufactured tea were translocated to infusions.

These results were confirmed by a subsequent study in which of green dried tea, processed black tea and tea infusions were analysed. In this study a number of samples showed even less transfer of residues to tea infusions than the first study. Thus, at the recommended application rate of 0.44 kg a.s./ha, residue levels of 0.006 or 0.041 mg/kg were found in the tea infusions from green dried tea containing residues of 1.1-5.0 and 16.2-24.1 mg/kg, respectively. Residue levels of 0.043 or 0.086 mg/kg were obtained in the tea infusions from dried black tea containing residues of 7.8-15.6 and 15.0-36.4 mg/kg, respectively.

B.7.7.9 Summary and evaluation of effects of industrial processing

The extent of carry over of endosulfan residues from raw crop material to the various produces from the processing studies are summarised in Table 7.7.9.

Table 7.7.9: Transfer of residues from raw commodities to processed commodities

Crop	Kind of processing	Produce	Transfer factor
Soybeans	steaming solvent extraction refining cooking of soyb. meal baking of soyb. meal	- Crude oil Refined oil - Bread	0.25 - 0.5 1.2 - 4.3 about 0.01 0.3 - 0.5 < 0.1
Apples	steaming/cooking	Juice mash	0.05 - 0.3
Plums	cooking and separation	Puree´	0.3 - 0.8
Tomato	cooking	Fruit Puree´ Juice Pomace (wet and dry)	about 1 0.16 - 0.43 **10 - 20**
Grape	juice production	must Wine	0.06 - 0.07 < 0.38
Tea	infusions	Tea infus.	< 0.1

In conclusion, endosulfan residues are effectively reduced in various commodities by heating processes. The remaining residues are most often found in waste or feedingstuff fractions. Concurrently, the fractions for human consumption contain considerably less residues than the raw crop material.

After solvent extraction of oil containing crop material the residue may concentrate in the crude oil, but is effectively removed during the refining process.

Two studies were performed for oranges, which can be considered valid for orange juice. However, residue data on pomace, essential oils and marmalade must also be presented by the applicant.

Regarding to the grapes studies, residue data on raisins are needed.

Regarding to the plums studies, residue data on prunes are needed.

Residue data on tea are also required.

High deviations in the residue data for dried tea were found in the residue trials performed, which lead to excessive MRLs. Although data available seem to demonstrate a small transfer of residues to tea infusions, the high residue levels found in some of the trials together with the importance of the tea infusion in the diet make advisable to perform additional residue trials and processing studies in tea.

Special attention should be given to the high concentration factor found in pomace (about 10-20), due to the important part that this product can have in animal feeding. Therefore, residue data

on orange pomace should also be presented and results on livestock feeding must be considered carefully.

It is important to emphasise the high transfer factor found in soybean crude oil, which can reach a value up to 4.3 and would lead to high residue levels. Although experiments demonstrate that refined oil did not contain endosulfan residues, it is convenient to consider the unfavourable situation for crude oil.

B.7.8 Livestock feeding studies (IIA, 6.4; IIIA, 8.3)

The relevant constituents for residue analysis in food of animal origin are the parent substance (α- and β- endosulfan) and endosulfan sulphate.

The fate of endosulfan in animal organisms was investigated in lactating dairy cows (Stanovick, 1965, Doc. No.: A14210). Four cows received dose levels of 5 mg/kg of α- and β -endosulfan and 5 mg/kg endosulfan sulphate (total 10 mg/kg fresh fodder) in the daily diet (approx. 46 kg fresh or 20 kg dry fodder/day) over a period of 30 days. Based on an animal weight of approx. 500 kg this dose corresponded to approx. 1 mg/kg/day body weight. At the end of the feeding period two animals were slaughtered while the other two animals were kept for another 30 days and slaughtered afterwards. During the last 30 days no fodder contaminated with endosulfan was administered.

Milk, fat, liver, kidneys, and muscular tissue were examined for residues. Results are summarised in Table 7.8-1).

Table 7.8-1: Endosulfan residues in lactating cows which were fed with 5 mg/kg endosulfan and 5 mg/kg endosulfan sulphate per day at the end of a 30-day feeding period and ratio of residues in tissues/organs to the concentration in the diet

organ/tissue[1)]	endosulfan (α and β) [mg/kg][#]	endosulfan sulphate [mg/kg][#]	ratio total endosulfan residue/ dose in diet[*]
liver	<0.05	0.56	0.056
kidney	<0.05	0.06	0.006
fat	<0.05	0.89	0.089
muscle	<0.05	<0.05	<0.005
milk	<0.05	0.08	0.008

[1)]milk: mean value of 4 cows during a period of 8 - 30 days,
animal tissue: residues of 2 cows killed on day 30.
[#] mean value

In all major organs or matrices the residues of endosulfan (both isomers) were below the limit of determination (<0.05 mg/kg). Endosulfan sulphate was the only residue detected in milk and animal tissues.

A feeding study on lactating goats (Indraningsik et al., 1992, Doc. No.: A51447) was undertaken to estimate the possible accumulation of endosulfan in body tissues. Adult goats were dosed orally once daily with unlabelled endosulfan (in a gelatine capsule without solvent) at a rate of 1 mg/kg body weight for 28 days (1576 g/day). On days 1, 8, 15, and 21 after the last treatment, groups of adult animals and their respective kids were euthanased and necropsied for tissue collection.

Samples of milk and venous blood were taken from each animal before being killed. Total residues of α- and β-endosulfan and endosulfan sulphate were detected in kidney (0.29 mg/kg), gastro-intestinal tract (0.20), liver (0.13), fat (0.06), muscle and spleen (0.04), lung and heart (0.01) and milk (0.02) on the day after the first dosing. But within 15 days, concentrations had fallen to values below 0.01 mg/kg in all tissues except kidney (0.20 mg/kg). Residues in the milk could only be detected on day 1 of sampling.

During the entire dosing period no clinical signs of toxicity in the goat could be observed.

In order to assess the residue situation in food of animal origin after feeding of fodder contaminated with endosulfan, a hypothetical feeding ratio was composed and a theoretical residue concentration in the daily diet calculated as outlined in Table 7.8-2.

Table 7.8-2: Composition of a feeding ratio for ruminants and calculation of the theoretical residue in the daily diet

Crop	Proportion in ratio (%)	Quantity (kg DM)	% DM	Quantity (kg FM)	Expected residue in animal diet (mg/kg FM)	Residues (mg)
Rape seed	15	3	92	3.3	0.5	1.65
Potatoes	30	6	20	30	0.05	1.5
Wheat	55	11	85	12.9	0.1	1.29
Total	100	20		46.2		4.44

DM = Dry mass
FM = Fresh mass

According to the above calculation the total endosulfan residue in the daily diet will be in the range of 0.1 mg/kg (4.44/46.2).

Because animal feeding diets vary enormously, and the composition of animal feed varies from one country to another, different diets should be considered by the applicant trying to construct a worst case diet in calculating the 1x dose for relevant domestic animals.

The results of residue intake by the animals must be obtained for different diets and should be expressed as "mg/animal/day" and also as "mg/kg bw/day", which is the basis for the 1x dose.

The feeding trials should comprise a control group, a group treated with the expected residue level (1x dose), and groups treated with excess doses (3-5x dose and 10x dose). Therefore, additional experiments on livestock feeding are required in compliance with the EU Directive.

Studies on poultry (laying hens) are needed, including dosage groups of at least 9 animals. In this case, residue data on eggs should also be included

B.7.9 Residues in succeeding or rotational crops (IIA, 6.6; IIIA, 8.5)

The stepwise approach developed by the German BBA in their guideline Part IV, 3-10, May 1988, was followed for the theoretical estimate of the residues in rotational crops:

Stage 1 (degradation rate in soil):

The total residue of the compounds relevant for the residue situation in soil, i.e. α-endosulfan, β-endosulfan and endosulfan sulphate, have a DT_{90} of >100 days. Therefore, an uptake by rotational crops can not be excluded in principle and a continuation of the evaluation at Stage 2 is necessary.

Stage 2 (calculation of the residues in soil and rotated crops):

For crops grown in rotation a maximum rate reaching the soil of 1 kg a.s./ha may to be taken into consideration. This rate is equal to a theoretical residue concentration of 0.33 mg/kg in case of a distribution of the residue in a 0 - 20 cm soil layer (initial residues in soil).

The actual residues in soil at the moment of sowing and harvest of the rotated crops can be calculated using the following conditions:

- The total endosulfan residues were used. These are defined as sum of α- and β-endosulfan and endosulfan sulphate.

- First order degradation kinetics are assumed.

- The half-life of degradation in soil was calculated using the measured concentrations of two field dissipation studies which were conducted in 1989/1990 in Germany (Baedelt *et. al*., 1992a and 1992b, Doc. No.: A53554 and A54025). The resulting half-life DT_{50} amounted to **164 days** (Northern Europe).

- Four intervals are proposed in the mentioned guideline: 30 days (crop failure), 70 days (growing of vegetables), 150 days (crop rotation in the year of application), and 360 days (rotation in the following year) .

- Typical growth periods: spinach and little radish 42 days; carrots 133 days.

Considering the mentioned conditions the following soil residues were calculated:

Table 7.9-1: Calculated residues in soil after application of endosulfan at a rate of 1 kg a.s./ha

Calculated residues of total endosulfan in soil					
time after application[days]	**residues [mg/kg]**	**time + 42 days[a])**	**residues [mg/kg]**	**time + 133 days[b])**	**residues [mg/kg]**
0	0.33	42	0.28	133	0.19
30	0.29	72	0.24	163	0.17
70	0.25	112	0.21	203	0.14
150	0.18	192	0.15	283	0.10
360	0.07	402	0.06	493	0.04

[a]) Spinach and little radish were harvested 42 days after sowing.
[b])Carrots were harvested 133 days after sowing (Doc. No.: A53399).

The mentioned guideline proposes three uptake factors (residue ratio soil/plant) for calculation of the theoretical residues in rotated crops: 10/1 (only marginal uptake), 1/1 (significant uptake), and 1/10 (accumulation in the rotated crop). Depending on these theoretical uptake factors the following residues are to be expected in plants. They are presented in Table 7.9-2. Bold values represent residues in spinach/little radish (42 days growth interval) and carrots (133 days growth interval).

Table 7.9-2: Theoretical residues in crops rotated after treatment soil at an application rate of 1 kg a.s./ha

Theoretical residues in rotated crops						
uptake factor	**time after application [days]**	**residues [mg/kg]**	**time + 42 days[a])**	**residues [mg/kg]**	**time + 133 days[b])**	**residues [mg/kg]**
10/1 (low uptake)	0	0.03	42	0.03	133	0.02
	30	0.03	72	**0.02**	163	0.02
	70	0.03	112	0.02	203	0.01
	150	0.02	192	0.02	283	0.01
	360	0.01	402	0.01	493	0.004
1/1 (significant uptake)	0	0.33	42	0.28	133	0.19
	30	0.29	72	0.24	163	0.17
	70	0.25	112	0.21	203	0.14
	150	0.18	192	0.15	283	0.10
	360	0.07	402	0.06	493	0.04
1/10 (accumulation)	0	3.30	42	2.76	133	1.88
	30	2.91	72	**2.43**	163	1.66
	70	2.45	112	2.06	203	1.40
	150	1.75	192	1.47	283	1.00
	360	0.72	402	0.60	493	0.41

[a]) Spinach and little radish were harvested 42 days after sowing.
[b]) Carrots were harvested 133 days after sowing (Doc. No.: A53399).

The residue data should be interpreted as shown with the following example: If spinach or little radish are sown 30 days after application of endosulfan and harvested at maturity (after a growth interval of 42 days resulting in a total of 72 days), a residue level of 0.02 mg/kg would be expected using the low uptake factor 10/1 and 2.43 mg/kg using the factor 1/10 for accumulation (values in bold type).

Stage 3 (experimentally determined uptake factors):

In 1985 a trial (non-labelled material) was conducted under simulated conditions of normal agricultural practice to determine whether tree-bark treated with formulated endosulfan (Thiodan 35 EC) for control of bark-beetle and subsequently used as tree-bark compost for soil improvement might result in endosulfan residues in vegetable crops. Immediately after application of 18.8 litres of Thiodan 35 EC/ha (6.6 kg a.s./ha) and incorporation in soil (depth 25 cm), spinach, carrots, and little radishes were sown and harvested at maturity after 28/42 and 106/133 days depending on the different crops (Krebs *et al*., 1986, Doc. No.: A53399).

Table 7.9-3: Total residues of endosulfan (mg-equ./kg) in crops rotated 0 days after application of 6.6 kg a.s./ha

Crop	Total residues[a]) in soil[b])	Total residues[a]) in plants	Sampling days after application resp. sowing
Spinach	0.24	-	0
leaf	0.44	0.16	42
Carrot	0.58	-	0
foliage	0.96	0.14	133
root	0.96	0.18	133
Little radish	0.96	-	0
foliage	0.66	0.025	42
tuber	0.66	0.05	42

[b]) 0 - 20 cm depth

[a]) (α + β) isomer and endosulfan sulphate

The initial soil residue concentration (day 0) varied already considerably ranging from 0.24 to 0.96 mg equ./kg probably due to incomplete incorporation during soil treatment. Consequently, this variation was found to be continued at later sampling intervals. Therefore it is rather difficult to calculate a transfer factor soil/plant on the basis of the individual residue values determined in both types of matrices. However, a common finding was generally observed. At harvest, the crops contained lower residue concentrations than the corresponding soil samples (see Table 7.9-3). The uptake factors (concentration ratio soil/crop) for the different crops were attempted to calculate on the base of the measured residue levels:

Table 7.9-4: Uptake factors (ratio of residues soil/plant)

Uptake factors (soil/plant)		
spinach		2.75/1
carrot	- leaf	6.9/1
	- root	5.3/1
little radish	- leaf	26.4/1
	- tuber	13.2/1
overall mean		10.9/1

The uptake factors (soil/plant) found for different crops show significative variations. Field testing which provides information on the actual residue situation in rotational crops are required for selected leafy vegetables in different types of soil and climatic conditions.

B.7.10 Proposed pre -harvest intervals for envisaged uses, or withholding periods, in case of post-harvest uses (IIA, 6.8; IIIA, 8.7)

Table 7.10-1: Pre-harvest interval

Crop	PHI (days) Southern Europe
Citrus	21
Tree nuts	28
Pome fruit	14
Stone Fruit	21
Grapes (table and wine)	28
Currants	-
Solanacea (Tomatoes)	3 (F-G)
Cucurbits (inedible peel)	7 (F)
Cotton	15
Potatoes	14
Sugar beet	25

B.7.11 Community MRLs and MRLs in EU Member States (IIIA, 12.2)

The current position concerning EU MRL legislation, based on Council Directive 96/32/CE and 96/33/CE, is indicated in Table 7.11-1.

Table 7.11-1: EU MRLs for endosulfan

CROP	MRL (ppm)
1. Fruit, fresh, dried or uncooked preserved by freezing not containing added sugar; nuts	
I) CITRUS FRUITS	1 (a)
II) TREE NUTS	0.1 (*)
III) POME FRUIT	1 (a)
IV) STONE FRUIT	1 (a)
VI) BERRIES & SMALL FRUIT	
a) Grapes (table & wine)	1 (a)
b) Strawberries (not wild)	(*)
c) Cane fruit (not wild)	
- Black berry	(*)
- Rasp berry	1 (a)
- Others	0.05 (*)
d) Other berries and small fruit (not wild)	
- Currants	(*)
- Gooseberry	(*)
- Others	0.05 (*)
e) Wild berries and wild fruit	0.05 (*)
VI) MISCELLANEOUS FRUIT	
Kiwi	1 (a)
Olives	1 (a)
Other	0.05 (*)
2. Vegetable, fresh and uncooked, frozen or dry	
I) ROOT AND TUBER VEG	
Beet root	0.2 (a)
Carrot	0.2 (a)
Celeriac	0.2 (a)
Radish	0.2 (a)
Kolhrabi	0.2 (a)

CROP	MRL (ppm)
Turnip	0.2 (a)
Other	0.05*
II) BULB VEG	
Onions	1 (a)
Other	0.05 (*)
FRUITING VEG	
Solanaceae	1 (a)
Cucurbits (edible peel)	1 (a)
Cucurbits (inedible peel))	1 (a)
Sweet corn	0.05 (*)
IV) BRASSICA VEG	
Flowering brassica	1 (a)
Head brassica	1 (a)
Leafy brassica	1 (a)
Horseradish	0.05 (*)
LEAFY VEG & FRESH HERBS	
Lettuce and similar	1 (a)
Spinach and similar	1 (a)
Watercress	0.05 (*)
Witloof (Endivias)	0.05 (*)
Herbs	0.05 (*)
VI) LEGUME VEG	1 (a)
VII) STEM VEG	
Edible Thistles	1 (a)
Celerys	1 (a)
Artichokes	1 (a)
Leeks	1 (a)
Others	0.05 (*)
VIII) FUNGI	
Mushroom	1 (a)
Wild Mushroom	0.05 (*)
3. Pulses	0.05 (*)
4. Oil seeds	
Leenseed	(a)
Sunflower	(a)
Rape seed	(a)
Soybean	(a)
Mushtard	(a)
Cotton seed	0.3
Others	0.1 (*)
5. Potatoes	(a)
6. Tea	30 (see Directive 93/58/CEE)
7. Hops	(c)
Cereals :	
Wheat, rye, triticale, barley, oat	0.1 (a)
Corn	0.2 (a)
Other	0.05 (*)
Animal products	
Fat	
- Poultry meat	(a)
- Others	0.1
Milk	0.004
Eggs	(a)

(a) LOD

(b) See the article 1 and the point 2 of the article 2 of the 96/32/CE Directive.

(a) (b) (c) (d) In case other limit have been not establish on April 30th of 2000, the following LMR will be apply: (a) 0.05 (*); (b) 0.02 (*); (c) 0.1 (*); (d) 0.01 (*)

B.7.12 Proposed MRLs and justification for the acceptability of those MRLs (IIA, 6.7; IIIA, 8.6)

Citrus fruit

Registered uses in S. Europe and in imported crops.

Critical GAP (2 applications of 0.035 kg as/hl, 1.05 kg as/ha, 21 days PHI)-

Insufficient data to set an EU MRL.

Tree nuts

Registered uses in S. Europe.

Critical GAP (2 applications of 0.08 kg as/hl, 0.8 kg as/ha, 21 days PHI).

Insufficient data to set an EU MRL.

Pome fruit

Registered uses in S. Europe.

Critical GAP -S. Europe (2 applications of 0.105 kg as/hl, 1.05 kg as/ha, 14 days PHI). Sufficient at-harvest trials.

South Europe, 14 days PHI.

0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.08	0.10
0.11	0.14	0.21	0.21	0.23	0.26	0.27	0.46				

Method I (Normal distribution)

Number:	20
Mean:	0.13
Standard deviation:	0.11
k:	2.4
Rmax:	**0.40**

Method II (Percentage)

Number:	20
P:	0.75
(N+1)p:	15.75
J:	15
G:	0.75
R(J):	0.21
R(J+1):	0.21
R(0.75):	0.21
R(ber):	**0.42**

Proposed MRL: 0.5 mg/kg.

Stone fruits

Registered uses in S. Europe.

Critical GAP (3 applications of 0.053 kg as/hl, 0.8 kg as/ha, 21 days PHI). Insufficient data in S. Europe. Residue data available for peaches (9), plums and cherries (18) in N. Europe at harvest trials.

- **Peaches**

0.065	0.085	0.13	0.15	0.19	0.32	0.40	0.49	0.53

Method I (Normal distribution)

Number:	9
Mean:	0.26
Standard deviation:	0.18
k:	3.03
Rmax:	**0.80**

Method II (Percentage)

Number:	9
P:	0.75
(N+1)p:	7.5
J:	7
G:	0.5
R(J):	0.40
R(J+1):	0.49
R(0.75):	0.445
R(ber):	**0.89**

- **Plums and cherries**

0.015	0.015	0.03	0.055	0.065	0.09	0.105	0.10	0.10	0.125	0.14	0.16
0.20	0.26	0.28	0.38	0.40	0.44						

Method I (Normal distribution)

Number:	18
Mean:	0.16
Standard deviation:	0.13
k:	2.45
Rmax:	**0.49**

Method II (Percentage)

Number:	18
P:	0.75
(N+1)p:	14.25
J:	14
G:	0.25
R(J):	0.26
R(J+1):	0.28
R(0.75):	0.265
R(ber):	**0.53**

Proposed MRL: 1.0 mg/kg.

Berries and small fruits

- **Grapes**

Registered uses in S. Europe.

Critical GAP-S. Europe (2 applications of 0.105 kg as/hl, 1.05 kg as/ha, 28 days PHI).

South Europe, 28 day PHI.

0.15	0.15	0.15

Insufficient data to set an EU MRL.

Miscellaneous fruit

- **Pineapples**

Registered uses in imported crops.

Critical GAP-2 applications of 0.84 kg as/hl, 1.68 kg as/ha, 60 days PHI

Insufficient data to set an EU MRL.

Root and tuber vegetables

- **Sugarbeet**

Registered use in S. Europe.

Critical GAP – 2 applications of 0.125 kg as/hl, 0.50 kg as/ha, 21 days PHI.

Insufficient data to set an EU MRL.

Fruiting vegetables

- **Tomatoes**

Registered uses in S. Europe.

Critical GAP – S. Europe F (2 applications of 0.105 kg as/hl, 0.53 kg as/ha, 3 days PHI) and G (2 applications of 0.053 kg as/hl, 0.8 kg as/ha, 3 days PHI).

South Europe, 3 day PHI. (F)

0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.06	0.06	0.07	0.07	0.07
0.08	0.08	0.10	0.12	0.20	0.20						

Method I (Normal distribution)

Number:	18
Mean:	0.08
Standard deviation:	0.05
k:	2.45
Rmax:	**0.21**

Method II (Percentage)

Number:	18
P:	0.75
(N+1)p:	14.25
J:	14
G:	0.25
R(J):	0.08
R(J+1):	0.10
R(0.75):	0.085
R(ber):	**0.17**

Proposed MRL: 0.5 mg/kg.

South Europe, 3 day PHI. (G)

0.06	0.08	0.10	0.11	0.12	0.20	0.21	0.27	0.29	0.37	0.60	0.72
1.10	1.25	1.78	1.80								

Method I (Normal distribution)

Number:	16
Mean:	0.57
Standard deviation:	0.60
k:	2.52
Rmax:	**2.08**

Method II (Percentage)

Number:	16
P:	0.75
(N+1)p:	12.75
J:	12
G:	0.75
R(J):	0.72
R(J+1):	1.10
R(0.75):	1.005
R(ber):	**2.01**

Due to the high residue levels at a PHI=3 days, and also to the important part that tomatoes have in most of European diets, it is not recommended the application of endosulfan in greenhouse. Consequently, it is recommended its use only in field conditions (outdoor), with an MRL = 0.5 mg/kg.

- **Cucurbits (inedible peel)**

Registered uses in S. Europe.

Critical GAP-S. Europe (3 applications of 0.053 kg as/hl, 0.53 kg as/ha, 7 days PHI).

0.15	0.15	0.15	0.15	0.15	0.15	0.19

Method I (Normal distribution)

Number:	7
Mean:	0.16
Standard deviation:	0.02
k:	3.40
Rmax:	**0.21**

Method II (Percentage)

Number:	7
P:	0.75
(N+1)p:	6.0
J:	6
G:	0
R(J):	0.15
R(J+1):	0.19
R(0.75):	0.15
R(ber):	**0.30**

Provisional MRL: 0.5 mg/kg.

<u>Oilseeds</u>

- **Soyabeans**

Registered uses in imported crops.
Critical GAP – imported crops (2 application of 0.26 kg as/hl, 0.53 kg as/ha, 30 days PHI).

0.015	0.06	0.08	0.10	0.10	0.20	0.20	0.21	0.25	0.30	0.30	0.40
0.40	0.42	0.60									

Method I (Normal distribution)

Number:	15
Mean:	0.246
Standard deviation:	0.167
k:	2.266
Rmax:	**0.67**

Method II (Percentage)

Number:	15
P:	0.75
(N+1)p:	12
J:	12
G:	0
R(J):	0.40
R(J+1):	0.42
R(0.75):	0.40
R(ber):	**0.80**

Proposed MRL: 1.0 mg/kg.

- **Cotton**

Registered uses in S. Europe and imported crops.

Critical GAP- S. Europe and imported crops (3 applications of 0.105 kg as/hl, 0.84 kg as/ha, 15 days PHI).

Seven residue trials at 0.105 kg as/hl, but using only 1 application.

0.02	0.05	0.05	0.07	0.10	0.12	0.25

Method I (Normal distribution)

Number:	7
Mean:	0.09
Standard deviation:	0.08
k:	3.40
Rmax:	**0.35**

Method II (Percentage)

Number:	7
P:	0.75
(N+1)p:	6
J:	6
G:	0
R(J):	0.12
R(J+1):	0.25
R(0.75):	0.12
R(ber):	**0.24**

Proposed MRL: 0.5 mg/kg (under estimated)

<u>Potatoes</u>

Registered uses in S. Europe.

Critical GAP- S. Europe (2 applications of 0.088 kg as/hl, 0.53 kg as/ha, 14 days PHI).

0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.015	0.015	0.015	0.015

Method I (Normal distribution)

Number:	13
Mean:	0.01
Standard deviation:	0.002
k:	2.67
Rmax:	**0.02**

Method II (Percentage)

Number:	13
P:	0.75
(N+1)p:	10.5
J:	10
G:	0.5
R(J):	0.015
R(J+1):	0.015
R(0.75):	0.015
R(ber):	**0.03**

Proposed MRL: 0.05 mg/kg.

<u>Tea</u>

Registered uses in imported crops.

Critical GAP- (3 applications of 0.126 kg as/hl, 0.44 kg as/ha, 7 days PHI). Insufficient an inconsistent data.

1.1-5.0	16.2-24.1

Coffee

Registered uses in imported crops.

Critical GAP- (3 applications of 1.05 kg as/hl, 1.05 kg as/ha, 30 days PHI). Insufficient data. 4 additional trials are required.

0.028	0.028	0.028	0.028

Provisional MRL: 0.05 mg/kg

Cacao

Registered uses in imported crops.

Critical GAP- (3 applications of 0.875 kg as/hl, 0.35 kg as/ha, 28 days PHI). **Insufficient data. 3 additional trials are required.**

0.015	0.015	0.015	0.015	0.015

Provisional MRL: 0.05 mg/kg.

The proposed MRL are summarised in Table 7.12-1.

Table 7.12-1: Proposed MRL

Crop/Commodity	Proposed MRL
Citrus	-
Tree nuts	-
Pome fruits	0.5
Stone fruits	1.0 (**)
Grapes	0.2 (*)
Tomatoes (field)	0.5
Cucurbits (inedible peel)	0.5
Soybean	1.0
Cotton	-
Potatoes	0.05
Sugarbeet	-
Tea	-
Coffee	0.05 (*)
Cacao	0.05 (*)
Pinapple	-

(*) Provisional MRL, calculated based on an insufficient number of residue trials. This value has to be confirmed by means of additional residue trials
(**) Provisional MRL based on residue trials performed only in N Europe
- Insufficient data to set up the MRL

B.7.13 Proposed EU Import tolerances and justification for the acceptability of those residues

The EU import tolerances could be the proposed MRL (Table 7.12-1)

Crop/Commodity	Proposed MRL
Citrus	-
Soybean	1.0
Cotton	-
Tea	-
Coffee	0.05 (*)
Cacao	0.05 (*)
Pineapple	-

(*) Provisional MRL, calculated based on an insufficient number of residue trials. This value has to be confirmed by means of additional residue trials
- Insufficient data to set up the MRL

B.7.14 Estimation of potential and actual dietary exposure through diet and other means (IIA, 6.9; IIIA, 8.8)

Table 7.14: Revised TMDI estimation Endosulfan (according to Eurolabel GAP-98_4.doc from 16.12.1998)

Food commodity	MRL [mg/kg]	Consumption of food commodity [g/person]	Intake of residue [µg/person]	ADI-contribution per crop
Citrus	1	49.0	49	13.6%
Oil of cotton seed	0.5	0.0	0	0.0%
Pome fruits	1	51.3	51.3	14.3%
Table and wine grapes	0.5	13.8	6.9	1.9%
Solanacea (Tomatoes)	0.5	66.0	33	9.2%
Potatoes	0.05	240.8	12.04	3.3%
Stone fruit (peaches)	0.5	12.5	6.25	1.7%
Cucurbits – inedible peel	0.5	26.1	13.05	3.6%
Sugarbeet	0.05	2.0	0.1	0.0%
Sugar, refined	0.05	96.8	4.84	1.3%
Soybeans		0.0	0	0.0%
Oil of soja beans	0.5	4.3	2.15	0.6%
Tea	30	2.3	69	19.2%
Coffee	0.1	7.8	0.78	0.2%
Cacao	0.1	3.0	0.3	0.1%
Hazelnut	0.1	0.3	0.03	0.0%
Milk	0.05	326.8	16.34	4.5%
Pineapples	2	3.3	6.6	1.8%
		Total	271.68	75.5%

Intake [µg/kg BW]:	4.528
ADI [mg/kg BW/day]:	0.006
ADI contribution [%]	75.5

The TMDI should be recalculated taking into account the new MRL proposed and considering the results of the information required in the Level 4 of this Monograph.

B.7.15 Summary and evaluation of residue behaviour (IIA, 6.10; IIIA, 8.9)

Investigations on the metabolism and distribution of endosulfan and its relevant metabolites in plants have been carried out with the ^{14}C-labelled active substance on relevant crops like tomato and cucumber plants and apple trees.

According to the assessment under point B.7.1 the relevant residue of endosulfan in plant material consists of the total of the two stereoisomers α-endosulfan and β-endosulfan, as well as of their transformation product endosulfan sulphate. Whereas shortly after the first application the residue consists only of the two stereoisomers, the metabolite endosulfan sulphate is formed later and accounts for a considerable part of the total residue in plant material.

The sum of main residue components of endosulfan (i.e. α-endosulfan, β-endosulfan and endosulfan sulphate) vary a great deal depending upon the crop investigated. Thus, these main components reach around 95% in apple and tomato, while only reaching 50% in cucumber. Additional information should be provided dealing with the nature of metabolites found in cucumber, in particular about those present in the non-polar and polar fractions. Special attention should also be given to the lactone metabolite due to its high toxicity as it is shown in the toxicity studies.

Additional experiments on metabolism in plants are required for oils seeds and root and tuber vegetables.

Animal tissue residue studies have been conducted in sheep, lactating diary cows and lactating goats. From the results of these studies it can be stated that endosulfan residues in livestock organs, in fat and muscular tissues, and milk fat consisted mainly of endosulfan sulphate and α- and β-endosulfan and in urine of endosulfan diol. Muscular tissue contained generally lower residues than offal and fatty tissues. The highest residue levels were detected in kidney and/or kidney fat. The unchanged parent substance occurred mainly in the faeces.

Studies performed are clearly insufficient and additional experiments must be carried out. Moreover, the metabolic pathway in animals should be indicated

Only one study using radiolabelled chemicals has been carried out (Doc A14216). Moreover, this was performed using a too low dose (0.3 mg/kg). A dose around 10 mg/kg would have been adequate for this study.

There is a lack of data on recoveries of radioactivity with reference to the measured radioactivity in specific tissues, and also on the extraction schemes used. Data on the extractability of residues should be given.

Studies on laying poultry (chickens) must be carried out, including residue data in different tissues and in animal products (eggs).

Consequently, the applicants must perform additional experiments on metabolism in livestock, and these experiments should be carried out according to the objectives and recommendations of the EU Directive.

The definition of the residue for both risk assessment and GAP monitoring purposes should provisionally be considered as the parent compound (α and β isomers) and its main and most toxic metabolite endosulfan sulphate. **This is subject to a confirmation of the validity of the proposed plant metabolic behaviour and the metabolism in animals, which must be carried out in additional experiments that will be required from the applicants.**

Many of the residue trials carried out did not follow the GAP conditions. Consequently, only those residue data generated according to the GAPs were considered in MRLs calculation.

Table 7.15-1 shows the additional trials required from the applicant in order to establish the adequate MRLs for each crop:

Table 7.15-1: Residue trials required

Crop	Region	No. Trials	No. applications	Rate (kg as/hl)	Rate (kg as/ha)	PHI days
Mandarins	S	4 DC, 4 AH	2	0.035	1.05	21
Oranges	S	4 DC, 4 AH	2	0.035	1.05	21
Hazelnuts	S	2 DC, 2 AH	2	0.08	0.8	28
Peaches	S	4 DC, 4 AH	3	0.053	0.8	21
Grapes	S	5 AH	2	0.105	1.05	28
Cucurbits	S	1 AH	3	0.053	0.53	7
Tea	W	3 DC, 3 AH	3	0.126	0.44	7
Coffee	W	4 AH	3	1.05	1.05	30
Cacao	W	3 AH	3	0.875	0.35	28
Sugar beet	S	8 AH	2	0.125	0.50	25
Cotton	S	4 AH	3	0.105	0.84	15
Pineapple	W	4 AH	2	0.84	1.68	60

The fate of endosulfan residues during processing of raw agricultural commodities was investigated in several major registered crops and for the important processing procedures.

Endosulfan residues are effectively reduced in various commodities by heating processes. The remaining residues are most often found in waste or feedingstuff fractions. Concurrently, the parts for human consumption contain considerably less residues than the raw crop material.

After solvent extraction of oil containing crop material the residue may concentrate in the crude oil, but is effectively removed during the refining process.

The high transfer factor found for pomace in tomatoes (10-20) makes it advisable to present residue data in pomace for citrus fruit and other crops. Besides, additional experiments in prunes and raisins would be necessary to demonstrate if a residue concentration takes place in these products. The same can be applied for essential oils in citrus.

Special attention should be given to the high concentration factor found in pomace, due to the important part that this product can play in animal feeding. Therefore, residue data on orange pomace should also be presented and results on livestock feeding must be considered carefully.

High deviations in the residue data for dried tea were found in the residue trials performed, which lead to excessive MRLs. Although data available seem to demonstrate a small transfer of residues to tea infusions, the high residue levels found in some of the trials together with the importance of the tea infusion in the diet make advisable to perform additional residue trials and processing studies in tea.

It is important to emphasised the high transfer factor found in soybean crude oil, which can reach a value up to 4.3 and would lead to high residue levels. Although experiments demonstrate that refined oil did not contain endosulfan residues, it is convenient to consider the unfavourable situation for crude oil.

Livestock feeding studies were performed in lactating dairy cows and lactating goats. In order to assess the residue situation in food of animal origin after feeding of fodder contaminated with endosulfan, a hypothetical feeding ratio was composed and the theoretical residue concentration in the daily diet was calculated to be 0.1 mg/kg. **However, because animal feeding diets vary enormously, and the composition of animal feed varies from one country to another, different diets should be considered by the applicant trying to construct a worst case diet in calculate the 1x dose for relevant domestic animals.**

The feeding trials should comprise a control group, a group treated with the expected residue level (1x dose), and groups treated with excess doses (3-5x dose and 10x dose). Accordingly, additional experiments on livestock feeding are required to compliance the EU Directive.

Studies on poultry (laying hens) are needed, including dosage groups of at least 9 animals. In this case, residue data on eggs should also be included.

The stepwise approach developed by the German BBA in their guideline Part IV, 3-10, May 1988, was followed for the theoretical estimate of the residues in rotational crops.

At harvest, the crops contained lower residue concentrations than the corresponding soil samples.

However, uptake factors (soil/plant) found for different crops show significative variations. Field tests which provide information on the actual residue situation in rotational crops are required for selected leafy vegetables in different types of soil and climatic conditions.

Based on the residue data obtained from those residue trials that were performed according to the GAPs, most of MRLs proposed by the applicant were not consistent. Consequently, most of MRLs have to be considered just as provisional until more data is made available from the additional residue trials that have been required to the applicant.

The provisional theoretical maximum daily intake (TMDI) of endosulfan residues for a 60 kg body weight person has been estimated in 0.004528 mg/kg bw. This value does not exceed the toxicologically determined Acceptable Daily Intake (ADI) of 0.006 mg/kg bw. The theoretical maximum daily intake (TMDI) of endosulfan residues has to be recalculated taking into account the new MRL resulting from the residue trials required in the Level 4 of this Monograph.

B.7.15 References relied on

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.1.2	1990	Buerkle, W.L.; Wuerz, S.; Mueller, A. Hoe 002671 (Endosulfan)-14C, Metabolism in Tomato Plants after Three Applications at a Rate of 635 g/ha Hoechst C Produktentwicklung Oekologie 1, DEU. Report No. : A44894	Yes	No	AgrEvo	No
IIA, 6.1.3	1995	Schwab, W. Endosulfan (Hoe 002671): Metabolism in apples (Malus sylvestris var. domestica) following single treatment of a young tree with 14C-labelled test substance Hoechst Schering AgrEvo GmbH, Umweltforschung, Germany. Report No.: A53662	Yes	No	AgrEvo	Yes
IIA, 6.1.4	1995	Buerkle W.L. Endosulfan Code: Hoe 002671 00 ZE97 0005 Metabolism in cucumber (Cucumis sativus) following three treatments with the 14C-labelled test substance at 7-day intervals and a nominal rate of 530 g a.i./ha each Hoechst Schering AgrEvo GmbH, {Abs}Environmental Sciences, Ecotoxicology, Germany. Report No.: A56011	Yes	No	AgrEvo	Yes
IIA, 6.1.5	1992a	Baedelt, H.; Idstein, H.; Krebs, B. Endosulfan - emulsifiable concentrate - (352 g/l) (Code: Hoe 002671 00 EC33 B317) Investigation of the degradation behaviour in soil under field conditions (Stufe 2 in accordance with the BBA Guideline Part IV, 4-1) Hoechst C Produktentwicklung Oekologie 2, Germany. Report No.: A53554	Yes	No	AgrEvo	No
IIA, 6.1.5	1992b	Baedelt, H.; Idstein, H.; Krebs, B. Endosulfan - emulsifiable concentrate 352 g/l (Code: Hoe 002671 00 EC33 B317). Investigation of the degradation behaviour in soil under field conditions Hoechst C Produktentwicklung Oekologie 2, Germany. Report No.: A54025	Yes	No	AgrEvo	No
IIA, 6.1.5	1986	Krebs,B., Eickhoff, H., Raquet, H., Thier, W. Endosulfan – Quantitation of residues in vegetable Crops following uptake from contaminated soil Agric. Development Dept./Analytical Laboratory,{Abs}Hoechst AG, Frankfurt, Germany-West. Report No.: A53399	No	No	AgrEvo	No

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.2	1965	Gorbach Investigations on Thiodan in the Metabolism of Milk Sheep Hoechst AG, Analytical Laboratory, Germany. Report No.: A14209	No	No	AgrEvo	No
IIA, 6.2	1968	Gorbach, S. G.; Christ, O. E.; Kellner, H. M.; Kloss, G.; Boerner, E. Metabolism of ENDOSULFAN in Milk Sheep Hoechst AG, Germany. Report No. A14216 J. Agr. Food Chem. Vol. 16, No. 6. page 950. 1968	No	Yes	Publ.	No
IIA, 6.2 / 6.4	1993	Indranignsih, McSweeney, C.S., Ladds, P.W. Residues of endosulfan in the tissues of lactating goats University of North Queensland, Australia. Report No.: A51447 Australian Vet. Journal. Vol. 70. pages 59 - 62. 1993	No	Yes	Publ.	No
IIA, 6.2	1965	Stanovick, R. P. Determination of Thiodan I, II and Sulphate. Residues in Milk and Cow Tissues R & D Department, Niagara Chemical Division, FMC Corporation, USA. Report No.: A14210	No	No	AgrEvo	No
IIA, 6.3.1 / 6.5.4	1996a	Huth, G., Wurm, W. Endosulfan Collection of residue data from supervised trials and processing studies conducted prior to 1992 in CITRUS FRUIT Hoechst Schering AgrEvo GmbH, Development Regulatory Affairs Residue and Consumer Safety, Germany. Report No.: A57134	Yes	No	AgrEvo	No
IIA, 6.3.1	1996a	Idstein H., Junker H., Klein E.H.-J. Endosulfan; Emulsifiable concentrate 352 g/l; Code: Hoe 002671 00 EC33 B325 - Determination of residues of Hoe 002671 to establish a maximum residue level following 3 applications in mandarines Hoechst Schering AgrEvo GmbH, Residues and User Safety, Frankfurt. Report No.: A55213	Yes	No	AgrEvo	Yes
IIA, 6.3.1	1996a	Klein E.H.-J., Idstein H., Becker D. Endosulfan; Emulsifiable concentrate 352 g/l; Code: Hoe 002671 00 EC33 B325 Determination of residues of Hoe 002671 to establish a maximum residue level following 3 applications in oranges Hoechst Schering AgrEvo GmbH, Residues and User Safety, Frankfurt. Report No.: A55226	Yes	No	AgrEvo	Yes

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.3.1/6.5.4	1996a	Krebs, B., Buerstell, H., Huth, G. Endosulfan. Residues data summary from supervised trials and processing studies in CITRUS FRUIT Generated by: Hoechst Schering AgrEvo GmbH, Germany. Report No: A57130, related documents, A57134, A55213, A55226,	No	No	AgrEvo	Yes
IIA, 6.3.3 / 6.5.3	1996b	Huth, G., Wurm, W. Endosulfan Collection of residue data from supervised trials and processing studies conducted prior to 1989 POME FRUIT Hoechst Schering AgrEvo GmbH, Development Regulatory Affairs, Residue and Consumer Safety, Germany. Report No.: A57138	Yes	No	AgrEvo	No
IIA, 6.3.3 / 6.5.3	1996b	Krebs, B., Buerstell, H., Huth, G. Endosulfan Residue data summary from supervised trials and processing studies in POME FRUIT Hoechst Schering AgrEvo GmbH, Development Regulatory Affairs, Residue and Consumer Safety, Germany. Report No: A57131; related documents: A55874, A54359, A57138	Yes	No	AgrEvo	Yes
IIA, 6.3.3 / 6.5.3	1996a	Sonder, K.-H., Idstein, H., Junker, H. Endosulfan, emulsifiable concentrate, 352 g/l Code: Hoe 002671 00 EC33 B324 Determination of Residues of Hoe 002671 to establish a Maximum Residue Level following 2 Applications in Apples Hoechst Schering AgrEvo GmbH, Development Residues and Consumer Safety, Germany. Report No.: A54359	Yes	No	AgrEvo	Yes
IIA, 6.3.5	1996c	Krebs, B., Buerstell, H., Huth, G. Endosulfan. Residues data summary from supervised trials and processing studies in BERRIES AND SMALL FRUIT Hoechst Schering AgrEvo GmbH, Germany. Report No: A57132; related documents, A57139, A55225	No	No	AgrEvo	Yes
IIA, 6.3.5/6.5.7	1996c	Huth, G., Wurm, W. Endosulfan Collection of residue data from supervised trials and processing studies conducted prior to 1987 in BERRIES AND SMALL FRUIT Hoechst Schering AgrEvo GmbH, Development, Regulatory Affairs, Residues and Consumer Safety, Germany. Report No.: A57139	No	No	AgrEvo	No

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.3.6	1996	Hees M., Idstein H., Junker H. Endosulfan, emulsifiable concentrate 352 g/l, Code: Hoe 002671 00 EC33 B324 Determination of residues of Hoe 002671 to establish a maximum residue level following 2 applications in tomatoes under greenhouse conditions Hoechst Schering AgrEvo GmbH, Residues and User Safety, Frankfurt, Germany. Report No.: A54361	Yes	No	AgrEvo	Yes
IIA, 6.3.6 / 6.5.6	1996d	Huth, G., Wurm, W. Endosulfan Collection of residue data from supervised trials and processing studies conducted prior to 1992 in FRUITING VEGETABLES Hoechst Schering AgrEvo GmbH, Development, Regulatory Affairs, Residues and Consumer Safety, Germany. Report No.: A57140	No	No	AgrEvo	No
IIA, 6.3.6	1996c	Idstein, H., Junker, H., Klein, E. H-J. Endosulfan, emulsifiable concentrate, 352 g/l Code: Hoe 002671 00 EC33 B325 Residues of Hoe 002671 to establish a Maximum Residue Level following 2 Applications in Tomatoes under Greenhouse Conditions. Hoechst Schering AgrEvo GmbH, Development Residues and User Safety, Germany. Report No.: A54360	Yes	No	AgrEvo	Yes
IIA, 6.3.6 / 6.5.6	1996d	Krebs, B., Buerstell, H., Huth, G. Endosulfan Residue data summary from supervised trials and processing studies in FRUITING VEGETABLES Hoechst Schering AgrEvo GmbH, Development, Regulatory Affairs, Residues and Consumer Safety, Germany. Report No: A57133; related documents, A57140, A54363, A54362	Yes	No	AgrEvo	Yes
IIA, 6.3.6	1996b	Sonder, K.-H. Endosulfan, emulsifiable concentrate, 352 g/l, Code: Hoe 002671 00 EC33 B325 Determination of Residues of Hoe 002671 and its metabolites to establish a Maximum Residue Level following 3 Applications in Musk Melons (Cucumis melo) under Field Conditions, European Union (Southern Zone) 1994 Hoechst Schering AgrEvo GmbH, Development Residues and User Safety, Germany. Report No.: A54358	Yes	No	AgrEvo	Yes

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.3.7	1994b	Krebs, B. Endosulfan.Residues data summary from supervised trials in LEGUME VEGETABLES (fresh) Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53964	No	No	AgrEvo	No
IIA, 6.3.9/6.5.1	1994c	Krebs, B. Endosulfan. Residues data summary from supervised trials and processing studies in OILSEEDS Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53965	No	No	AgrEvo	No
IIA, 6.3.10	1996e	Huth, G., Wurm, W. Endosulfan Collection of residue data from supervised trials conducted prior to 1983 POTATOES Hoechst Schering AgrEvo GmbH, Development, Regulatory Affairs, Residues and Consumer Safety, Germany. Report No.: A57141	Yes	No	AgrEvo	No
IIA, 6.3.10	1996d	Idstein H., Junker H., Klein E.H.-J. Endosulfan emulsifiable concentrate 352 g/l Code: Hoe 002671 00 EC33 B325 Determination of residues of Hoe 002671 to establish a maximum residue level following 2 applications in potatoes Hoechst Schering AgrEvo GmbH, Residues and User Safety, Frankfurt, Germany. Report No.: A55214	Yes	No	AgrEvo	Yes
IIA, 6.3.10	1996e	Krebs, B., Buerstell, H., Huth, G. Endosulfan. Residues data summary from supervised trials in POTATOES Hoechst Schering AgrEvo GmbH, Germany. Report No: A57135, related documents, A57141, A55214	No	No	AgrEvo	Yes
IIA, 6.3.11 / 6.5.8	1994d	Krebs, B. Endosulfan. Residues data summary from supervised trials and processing studies in TEA Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53967	No	No	AgrEvo	No

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.3.12 / 6.5.2	1994e	Krebs, B. Endosulfan. Residues data summary from supervised trials and processing studies in WHEAT Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53969	No	No	AgrEvo	No
IIA, 6.3.13	1994f	Krebs, B. Endosulfan. Residues data summary from supervised trials in MAIZE Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53970	No	No	AgrEvo	No
IIA, 6.3.14	1994g	Krebs, B. Endosulfan. Residues data summary from supervised trials in COFFEE Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53972	No	No	AgrEvo	No
IIA, 6.3.15	1994h	Krebs, B. Endosulfan. Residues data summary from supervised trials in CACAO Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53973	No	No	AgrEvo	No
IIA, 6.3.16	1995	Fuchsbichler, G. Hoe 002671 (endosulfan), Hoe 051327 (endosulfansulfate) and Hoe 051329 (endosulfandiol) Storage stability in soil Bayerische Hauptversuchsanstalt für Landwirtschaft, Germany. Report No.: A53652	Yes	No	AgrEvo	Yes
IIA, 6.4	1965	Stanovick, R. P. Determination of Thiodan I, II and Sulphate. Residues in Milk and Cow Tissues R & D Department, Niagara Chemical Division, FMC Corporation, USA. Report No.: A14210	No	No	AgrEvo	No
IIA, 6.5.3 / 6.3.3	1996b	Idstein, H., Junker, H., Klein, E. H-J. Endosulfan, emulsifiable concentrate, 352 g/l Code: Hoe 002671 00 EC33 B325 Residue trials in apples to establish a Maximum Residue Level. Determination of active substances and the metabolite decline following 2 applications in apples and processing to apple puree and apple juice Hoechst Schering AgrEvo GmbH, Development Residues and Consumer Safety, Germany. Report No.: A55874	Yes	No	AgrEvo	Yes

Annex IIA, or Annex IIIA point(s)	Year	Author (s) Title Company (insert name) Report No. Source (where different)	GLP GEP Y / N	Published Y / N	Owner	Data Protection
IIA, 6.5.5 / 6.3.4	1994a	Krebs, B. Endosulfan. Residues data summary from supervised trials and processing studies in STONE FRUIT Hoechst Schering AgrEvo GmbH, Germany. Report No.: A53960	No	No	AgrEvo	No
IIA, 6.5.6 / 6.3.6	1996b	Sonder K.-H., Idstein H., Junker H. Endosulfan; Emulsifiable concentrate 352 g/l; Code: Hoe 002671 00 EC33 B324 - Determination of residues of Hoe 002671 to establish a maximum residue level following 2 applications in tomatoes for industrial use under field conditions Hoechst Schering AgrEvo GmbH, Residues and User Safety, Frankfurt. Report No.: A54363	Yes	No	AgrEvo	Yes
IIA, 6.5.6 / 6.3.6	1996c	Sonder, K.-H., Idstein, H., Junker, H. Endosulfan, emulsifiable concentrate, 352 g/l Code: Hoe 002671 00 EC33 B325 Determination of Residues of Hoe 002671 to establish a Maximum Residue Level following 2 Applications in Tomatoes for Industrial Use under Field conditions Hoechst Schering AgrEvo GmbH, Development Residues and User Safety, Germany. Report No.: A54362	Yes	No	AgrEvo	Yes
IIA, 6.6/01	1972	Elkins, E.R.; Farrow, R.P.; Kim, E.S. The effect of heat processing and storage on pesticide residues in spinach and apricots. J. Agr. Food Chem., vol. 20, no. 2: 286-291	No	Yes	Publ.	No
	1968	FAO/WHO Evaluations of some pesticide residues in food, endosulfan. Rome, food and Agriculture Organisation of the United Nations.		Yes	Publ.	No
	1984	World Health Organisation IPCS (international Programme on Chemical Safety), environmental Health Criteria, 40, endosulfan. World Health Organization, Geneva		Yes	Publ.	No

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