DIMETHOATE (27)

first draft prepared by Salwa Dogheim, Ministry of Agriculture, Egypt

EXPLANATION

Dimethoate was evaluated for residues by the JMPR in 1965-1967, 1970, 1973, 1977, 1978, 1983, 1984, 1986, 1987, 1988, 1990 and 1994. Under the CCPR periodic review programme, dimethoate was re-evaluated in 1998. The evaluation included consideration of omethoate (as a metabolite of dimethoate) and formothion (of which, dimethoate is a metabolite), in addition to dimethoate, as both of them are also pesticides. The 1998 Meeting recommended withdrawal of Codex MRLs for omethoate, as no data were submitted to support its existing MRLs. No data were submitted in support of formothion, which had no extant Codex MRLs. Currently, the definition of the residue for compliance with Codex MRLs is dimethoate, while the definition of the residue for the estimation dietary intake is the sum of dimethoate and omethoate, each considered separately. The Meeting identified wheat, tomatoes and potatoes as the main contributors to dietary exposure.

The toxicology of dimethoate was reviewed by the 1996 JMPR, under the CCPR periodic review programme. The 1996 Meeting allocated an ADI of 0-0.002 mg/kg bw/day, for the sum of dimethoate and omethoate expressed as dimethoate, although it was noted that omethoate is considerably more toxic than dimethoate. The 1996 Meeting concluded that a re-evaluation of the toxicity of dimethoate might be required if the periodic review of its residue chemistry showed omethoate to be a major part of the residue.

At the 34th (2002) session of the CCPR (Alinorm 03/24), the Committee decided to advance to step 8 only those draft MRLS which were proposed at the LOQ and, subject to residue evaluation by the 2003 JMPR, recommended revocation of the CXL for onion, bulb. The Committee noted that the 2003 JMPR would consider the establishment of acute RfD and requested information on current registrations of dimethoate within the EC, as the EC reported that it will establish most MRLs at the LOQ, because of acute intake concerns. The Committee decided to retain the CXLs for beetroot; celery; citrus fruits; olive oil, refined; olives, processed; and peppers, pending the residue evaluation by the 2003 JMPR. The 35th Session of CCPR requested that the JMPR should also include omethoate in the definition of residues for enforcement purposes.

Data and information were supplied by the governments of Thailand, the Netherlands, Germany, Brazil, Poland, Australia and by the manufacturers; BASF, Cheminova and Isagro (Dimethoate Task Force, DMT).

IDENTITY

ISO common name: dimethoate

Chemical names

IUPAC: *O*,*O*-dimethyl *S*-(*N*-methylcarbamoylmethyl) phosphorodithioate

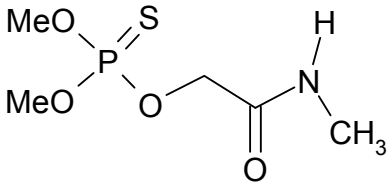
CA: 2-dimethoxyphosphinothioylthio-*N*-methylacetamide

CAS Registry No.: (60-51-5)

CIPAC No: 59

Synonyms and trade names: Perfekthion, Danadim, Rogor 40 L, Romefos, Afithion, Hermootrox, Dimetex, Romefos 40, Cypalm D 390 EC.

Molecular structure:



Molecular formula: $C_5H_{12}NO_3PS_2$

Molecular weight: 229.2 g/mol

Physical and chemical properties

Pure active ingredient

Appearance:	White crystalline solid	
Vapour pressure:	1.85 x 10^{-6} mm Hg at 25ºC 1.18 x 10^{-6} mm Hg at 35ºC	(Teeter, 1988)
Octanol/water partition coefficient:	5.06 (log Kow = 0.775)	(Mangels, 1987)
Solubility:	Water (mg/ml) 39.8 (25ºC); 23.3 at pH 5, 23.8 at pH 7 25.0 at pH 9 (20ºC). Other solvents (25ºC): 140 g/100 ml acetone 140 g/100 ml acetonitrile 120 g/100 ml cyclohexane 0.043 g/100 ml dodecane 150 g/100 ml ethanol 120 g/100 ml ethyl acetate 0.030 g/100 ml hexane 120 g/100 ml 2-propanol 160 g/100 ml methanol 150 g/100 ml dichloromethane 52 g/100 ml 1-octanol 100 g/100 ml toluene 31 g/100 ml xylene 120 g/100 ml 1,2-dichloroethane 0.024 g/100 ml *n*-heptane.	(Mangels, 1987) (Robson, *et al*., 1991) (Madsen, 1994)
Hydrolysis:	Half-lives at 25ºC: 68 days at pH 7, 156 days at pH 5, 4.4 days at pH 9. The main degradation products were *O*-demethyl-dimethoate and *O,O*-dimethyl hydrogen phosphorothioate acid at pH 9; *O*-demethyl-dimethoate at pH 5 and pH 7.	(Hawkins *et al*., 1986)
Photolysis:	Stable under artificial sunlight (15 days continuous exposure) in acetate buffer solution at 25ºC. Decomposed on sandy loam soil thin-layer plates under artificial sunlight (15 days continuous exposure). Half-lives 7-16 days, dark control half-life 40 days. Major degradation products were volatiles (9%), dimethyl hydrogen phosphate (15%) and omethoate (dimethoxon) (7%).	(Hawkins *et al*., 1986)

Thermal stability:	Stable up to 35ºC. Isomerization to *O,S*-dimethyl *O*-methylcarbamoyl methyl phosphorodithioate occurs at higher temperatures. Rapid decomposition when heated.	
Relative density (d_4^{20}):	1.31 (purity 99.1% w/w)	(Young, 2001a)
Melting point:	50.0-51.5°C (purity 99.5% w/w)	(Young, 2001b)

Technical material

Purity	99.1% w/w	
Appearance	White solid	
Melting range	45-47°c	
Stability	Min. 5 years	
Explosive properties:	Does not posses explosive properties	(Young, 2001d)
Auto-ignition temperature:	314°C at 1016 mbar	(Young, 2001c)
Flammability:	Not highly flammable	(Young, 2001e)

Formulations

All available formulations are emulsifiable concentrates (EC), typically 400 g/l but some of 500 g/l.

METABOLISM AND ENVIRONMENTAL FATE

Animal metabolism

No data were submitted.

Plant metabolism

Wheat

The metabolism of dimethoate (^{14}C-dimethoate, labelled in both methoxy groups, radiochemical purity: > 98%) was investigated in wheat plants, which were grown in eighteen individual plastic containers (77 x 50 x 30 cm deep*)* filled with a sandy loam soil (79% sand, 14% silt, 7% clay; organic carbon 1.7%, pH (H_2O) 7.3) (Corden, 2001a). Spring wheat (variety Axona) was planted at a depth of approximately 2 - 3 cm, with 192 seeds per container. The containers were placed outdoors, on tables in a fenced enclosure, arranged in groups of three containers per table (each considered to be a plot), each "plot" having a soil surface area of 1.2 m^2. A solution of ^{14}C-dimethoate in ethyl acetate was evaporated to dryness and the radiolabelled material then mixed with an EC formulation containing non-radiolabelled dimethoate. Water was added and the resulting emulsion was applied with an aerosol-powered sprayer. The test substance was applied to the wheat plants at BBCH growth stage 24 (early application), at a target rate of 680 g ai/ha and 41 days after the 1st application at BBCH growth stage 69 (late application) at a target rate of 400 g ai/ha. Three "plots" were treated at the normal application rate and three were treated at an exaggerated rate (i.e. 5 x the normal rate), to be analyzed if additional material was required for characterization of unknown metabolites. In each group of three "plots", one received a single early application, one single late application and the third received both the early and late applications. Treated wheat plants were sampled immediately after the early application (day 0); before ear emergence (day 14); after ear emergence (day 26); before late application (day 39); after late application (day 41); at early harvest (day 62); at normal commercial harvest (day 73); and at late commercial harvest (day 80). The plants were cut off just above the soil surface and separated into the commodities appropriate to the growth stage at sampling: whole plant; ear and remainder of plant; or grain, hulls and straw.

Plant samples were extracted 3-4 times with acetonitrile, then 1-3 times with acetonitrile/water (1:1 v/v) and finally 1-2 times with water. Levels of radioactivity in extracts were determined by liquid scintillation counting (LSC) and the levels in unextractable residues were determined by combustion followed by LSC. Extracts containing significant radioactivity were analyzed by HPLC and TLC and compared with reference substances. Sub-samples of the unextractable residues were treated with HCl (0.1 M), NaOH (0.1, 1 or 6 M) or protease enzyme, to

release further radioactivity. To investigate the nature of the metabolites, an aliquot of the extract from day 62 straw was partitioned with ethyl acetate, at pH 7 and pH 1-2. Levels of radioactivity were determined by LSC and the fractions investigated by TLC. Further aliquots of the extract from day 62 straw were dried under nitrogen, re-suspended in HCl (0.1 M), NaOH (0.1 M) or acetate buffer (pH 5) containing β-glucosidase, followed by incubation at 37°c (16 hours) and analysis by TLC. To investigate the nature unextractable residues in grain harvested at day 73, a sub-sample was treated sequentially with enzymes (cellulase, hemicellulase, α-amylase and β-amylase), followed by NaOH (0.1 and 1 M) and the levels of radioactivity were then determined by LSC.

Two of the metabolites (A and K) detected in wheat extracts did not co-chromatograph with any available reference substance. They were isolated by preparative TLC and HPLC and investigated by LC-MS and GC-MS. Extracts containing metabolite A were additionally analyzed by dialysis through membrane with a 3500 molecular weight cut-off. Normal phase TLC of wheat extracts showed that component K was non-polar, being close to the solvent front when eluted with a moderately polar solvent system. Analysis of this isolate, using a non-polar solvent system with normal phase TLC demonstrated that component K was composed of at least four minor components. Components D, G and H were not present at significant levels in samples of wheat, following treatment with ^{14}C-dimethoate.

Wheat samples treated at the exaggerated application rate (5x) were not investigated, except for day 73 grain samples, because sufficient characterization and identification was achieved using the samples from plant treated at the lower level. Day 80 samples were not analyzed.

In whole plants, TRR decreased from 29.74 mg/kg at day 0 (immediately after 1st application) to 1.67 mg/kg at day 14 (before ear emergence) (Table 1). This reflected a general decrease in the amount of radioactivity present, in addition to the increase in mass of the plants. Once the wheat plants had reached BBCH growth stage 51, they were sufficiently well developed to be separated into the ears and remainder of the plants. TRR in ears was 0.22 mg/kg at day 26 and increased slightly to 0.43 mg/kg, immediately prior to the late application. Immediately following the late application, TRR in ears increased to 22.73 mg/kg (day 41). TRR in the remainder of the plant showed a similar pattern, with a slight decrease from day 26 to 39 followed by a large increase to 16.10 mg/kg at day 41. At the later sampling times, when the wheat had reached BBCH growth stage 85, the wheat plants were sufficiently well developed to be separated into grain, hulls and straw. TRR in grain increased from 2.29 mg/kg at day 62 (early harvest taken 21 days after the late application) to 4.28 mg/kg at day 73 (normal harvest taken 32 days after the late application). This increase reflected the drying that occurred during ripening and the consequent decrease in fresh weight of the crop. Concentrations of radioactivity in the hulls showed a similar pattern, increasing from 23.26 mg/kg at day 62 to 33.69 mg/kg at day 73. TRR in straw showed a corresponding increase from 6.42 mg/kg to 7.83 mg/kg over the study period. TRR in grain receiving the exaggerated rates of 3500 g ai/ha (1st application) and 2100 g ai/ha (2nd application) was 20.16 mg/kg, which is approximately five times the concentration found in the equivalent sample receiving the normal application rate.

Table 1. Radioactivity in extracts and post-extraction solids of wheat samples, following one or two applications of ^{14}C-dimethoate.

Fraction	Day 0		Day 14		Day 26				Day 39 (before 2nd application)			
	Whole plant		Whole plant		Ear		Remaining plant		Ear		Remaining plant	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Extracts	99.8	29.68	82.9	1.38	86.5	0.19	84.1	1.03	91.4	0.39	78.3	0.70
PES	0.2	0.06	17.1	0.29	13.5	0.03	15.9	0.20	8.6	0.04	21.7	0.20
Total	100	29.74	100	1.67	100	0.22	100	1.23	100	0.43	100	0.90

	Day 41 (after 2nd application)				Day 62 (21 d after 2nd application)					
	Ear		Remaining plant		Grain		Hull		Straw	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Extracts	99.3	22.57	97.4	15.68	80.7	1.85	91.5	21.28	78.6	5.05
PES	0.7	0.16	2.6	0.42	19.3	0.44	8.5	1.98	21.4	1.37
Total	100	22.73	100	16.10	100	2.29	100	23.26	100	6.42

	Day 73 (32 d after 2nd application)						Day 73 (32 d after 2nd application) Exaggerated rate	
	Grain		Hull		Straw		Grain	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Extracts	65.7	2.81	84.5	28.47	72.1	5.65	62.7	12.64
PES	34.3	1.47	15.5	5.22	27.9	2.18	37.3	7.52
Total	100	4.28	100	33.69	100	7.83	100	20.16

PES = post-extraction solids.

The results of characterization and identification of residues in whole plant; in ear and remaining plant; and in grain, hulls and straw are presented in Table 2.

Major routes of dimethoate metabolism in wheat were:

(1) Oxidation to yield omethoate (II);
(2) *O*-demethylation and *N*-demethylation of omethoate to yield *O*-demethyl *N*-demethyl omethoate (XXIII);
(3) *O*-demethylation and rearrangement to yield *O*-demethyl *iso*-dimethoate (XII).

Minor routes of dimethoate metabolism in wheat were:

(4) Hydrolysis of the amide bond and subsequent degradation to give *O,O*-dimethyl dithiophosphoric acid (XV);
(5) Demethylation of omethoate and hydrolysis of the amide bond to give *O*-demethyl omethoate carboxylic acid (XX).

The proposed pathways of metabolism in wheat are shown in Figure 1.

Table 2. Proportions of metabolites found in wheat samples following application of ^{14}C-dimethoate.

Component/metabolite	Day 0		Day 14		Day 26 (after ear emergence)			
	Whole plant		Whole plant		Ear		Remaining plant	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Dimethoate (I)	97.5	29.00	4.1	0.07	<0.1	<0.01	1.4	0.02
Omethoate (II)	0.7	0.21	7.8	0.13	<0.1	<0.01	2.8	0.03
Metabolite A [1/]	<0.1	<0.03	0.8	0.01	<0.1	<0.01	2.7	0.03
O-demethyl omethoate carboxylic acid (XX)	<0.1	<0.03	1.1	0.02	6.4	0.01	3.8	0.05
O-demethyl *N*-demethyl omethoate (XXIII)	0.4	0.12	25.7	0.43	80.1	0.18	45.6	0.56
Metabolite D	<0.1	<0.03	1.7	0.03	<0.1	<0.01	<0.1	<0.01
O-demethyl *iso*-dimethoate (XII)	<0.1	<0.03	29.6	0.49	<0.1	<0.01	22.4	0.28
Dimethyl dithiophosphoric acid (XV)	<0.1	<0.03	4.5	0.08	<0.1	<0.01	<0.1	<0.01
Metabolite G	<0.1	<0.03	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Metabolite H	<0.1	<0.03	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Metabolite K [2/]	0.4	0.12	1.4	0.02	<0.1	<0.01	<0.1	<0.01
Other	0.8	0.24	6.2	0.10	<0.1	<0.01	5.4	0.07
Total extractables	99.8	29.68	82.9	1.38	86.5	0.19	84.1	1.03
Base extractable	NA	NA	14.1	0.24	7.6	0.02	11.0	0.14
Unextracted residues	0.2	0.06	3.0	0.05	5.9	0.01	4.9	0.06
Total	100	29.74	100	1.67	100	0.22	100	1.23

Component/metabolite	Day 39 (before 2nd application)				Day 41 (after 2nd application)			
	Ear		Remaining plant		Ear		Remaining plant	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Dimethoate (I)	<0.1	<0.01	<0.1	<0.01	92.2	20.96	83.2	13.40
Omethoate (II)	<0.1	<0.01	<0.1	<0.01	1.9	0.43	2.6	0.42
Metabolite A [1/]	<0.1	<0.01	2.6	0.02	<0.1	<0.02	<0.1	<0.02
O-demethyl omethoate carboxylic acid (XX)	1.4	0.01	5.7	0.05	<0.1	<0.02	<0.1	<0.02
O-demethyl *N*-demethyl omethoate (XXIII)	68.7	0.30	39.2	0.35	1.7	0.39	4.4	0.71
Metabolite D	<0.1	<0.01	<0.1	<0.01	<0.1	<0.02	<0.1	<0.02
O-demethyl *iso*-dimethoate (XII)	17.1	0.07	22.3	0.20	1.4	0.32	3.7	0.60
Dimethyl dithiophosphoric acid (XV)	<0.1	<0.01	2.6	0.02	0.5	0.11	2.0	0.32
Metabolite G	<0.1	<0.01	<0.1	<0.01	<0.1	<0.02	<0.1	<0.02
Metabolite H	<0.1	<0.01	<0.1	<0.01	<0.1	<0.02	<0.1	<0.02
Metabolite K [2/]	<0.1	<0.01	<0.1	<0.01	0.3	0.07	0.7	0.11
Other	4.2	0.39	5.9	0.05	1.3	0.30	0.8	0.13
Total extractables	91.4	0.39	78.3	0.70	99.3	22.57	97.4	15.68
Base extractable	NA	NA	17.0	0.15	NA	NA	NA	NA
Unextracted residues	8.6	0.04	4.7	0.04	0.7	0.16	2.6	0.42
Total	100	0.43	100	0.90	100	22.73	100	16.10

Component/metabolite	Day 62 (early harvest)					
	Grain		Hulls		Straw	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Dimethoate (I)	<0.1	<0.01	5.2	1.21	6.2	0.40
Omethoate (II)	<0.1	<0.01	10.2	2.37	3.4	0.22
Metabolite A [1/]	12.1	0.28	1.9	0.44	4.4	0.28
O-demethyl omethoate carboxylic acid (XX)	3.8	0.09	<0.1	<0.02	4.6	0.30
O-demethyl *N*-demethyl omethoate (XXIII)	42.4	0.97	30.4	7.07	31.3	2.01
Metabolite D	<0.1	<0.01	<0.1	<0.02	<0.1	<0.01
O-demethyl *iso*-dimethoate (XII)	11.3	0.26	31.0	7.21	20.1	1.29
Dimethyl dithiophosphoric acid (XV)	<0.1	<0.01	3.3	0.77	2.8	0.18
Metabolite G	<0.1	<0.01	<0.1	<0.02	<0.1	<0.01
Metabolite H	<0.1	<0.01	<0.1	<0.02	<0.1	<0.01
Metabolite K [2/]	3.7	0.08	2.5	0.58	1.3	0.08
Other	7.4	0.17	7.0	1.63	4.5	0.29
Total extractables	80.7	1.85	91.5	21.28	78.6	5.05
Base extractable	11.1	0.25	4.7	1.09	15.9	1.02
Organo-soluble	2.1	0.05	NA	NA	NA	NA
Aqueous soluble	9.0	0.21	NA	NA	NA	NA
Unextracted residues	8.2	0.19	3.8	0.88	5.5	0.35
Total	100	2.29	100	23.26	100	6.42

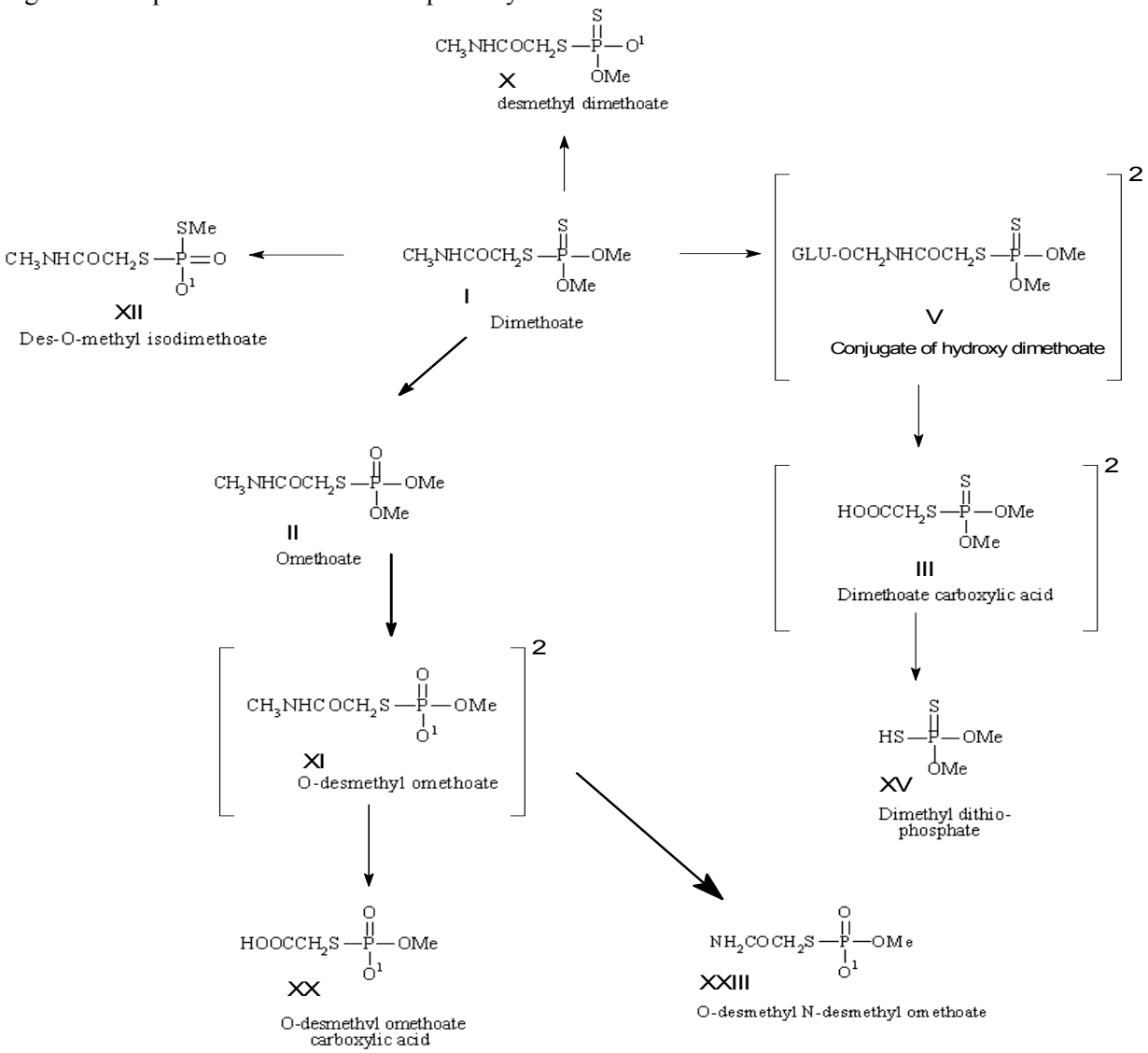
Component/metabolite	Day 73 (normal harvest)					
	Grain		Hulls		Straw	
	% TRR	mg/kg	% TRR	% TRR	mg/kg	% TRR
Dimethoate (I)	<0.1	<0.01	3.0	1.01	3.4	0.27
Omethoate (II)	<0.1	<0.01	5.5	1.85	3.6	0.28
Component A [1/]	11.5	0.49	7.2	2.43	6.8	0.53
O-desmethyl omethoate carboxylic acid (XX)	3.6	0.15	3.0	1.01	3.6	0.28
O-Desmethyl N-desmethyl omethoate (XXIII)	35.0	1.50	45.2	15.23	40.5	3.17
Metabolite D	<0.1	<0.01	<0.1	<0.03	<0.1	<0.01
O-Desmethyl isodimethoate (XII)	6.8	0.29	8.9	3.00	3.6	0.28
Dimethyl dithiophosphoric acid (XV)	<0.1	<0.01	2.1	0.71	2.0	0.16
Metabolite G	<0.1	<0.01	<0.1	<0.03	<0.1	<0.01
Metabolite H	<0.1	<0.01	<0.1	<0.03	<0.1	<0.01
Metabolite K [2/]	1.0	0.04	<0.1	<0.03	<0.1	<0.01
Other	7.8	0.33	9.6	3.23	8.6	0.67
Total extractables	65.7	2.81	84.5	28.47	72.1	5.65
Base extractable	34.4	1.47	10.7	3.60	27.8	2.18
Organo-soluble	NA	NA	NA	NA	NA	NA
Aqueous soluble	NA	NA	NA	NA	NA	NA
Unextracted residues	<0.1	<0.01	4.8	1.62	<0.1	<0.01
Total	100	4.28	100	33.69	100	7.83

[1/] Identified as *O*-demethyl *N*-demethyl omethoate, which was trapped by high molecular weight material at or near the origin on TLC plates.

[2/] Shown to be composed of up to six minor, non-polar components, all <0.05mg/kg.

NA = not analyzed.

Figure 1. Proposed biotransformation pathway of ^{14}C-dimethoate in wheat.



[1] Present as the anion.
[2] Not detected in wheat metabolism but observed in the potato metabolism study as intermediate metabolites.
GLU = glucose conjugate.

Significant radioactive residues were present in all wheat plant parts. Levels of radioactivity were highest in those parts of the plant directly exposed to the spray application, being up to 29.74 mg/kg in the whole plant immediately after the first application and up to 22.73 mg/kg in the ear immediately after the second application. After each application, the levels of radioactivity in wheat plant parts decreased with time. Concentrations of radioactivity in the ear and remaining plant, immediately after the second application, were 22.73 mg/kg and 16.10 mg/kg respectively. At the early harvest (day 62), the concentration of radioactivity in straw had decreased to 6.42 mg/kg, although the level in the hulls was 23.26 mg/kg. In grain, which was not directly exposed to the spray, the total radioactivity after application was 2.29 mg/kg. The level increased slightly at the normal harvest (day 73), as a result of drying of the crop, being 4.28, 33.69 and 7.83 mg/kg in grain, hulls and straw, respectively.

A small proportion of radioactivity in the plants was present as bound residues, which could only be released by strongly hydrolytic conditions. This suggested either more extensive metabolism of dimethoate to polar components which were strongly bound to plant macromolecules or incorporation of the radiolabelled carbon into natural products.

No dimethoate or omethoate was detected in the edible parts (grain) at either the early or normal harvests, indicating that significant translocation of dimethoate or omethoate did not occur within the wheat plant.

Potatoes

The metabolism of dimethoate (^{14}C-dimethoate, labelled in both methoxy groups, radiochemical purity: ≥ 98 %) was investigated in potatoes which were grown in individual plastic containers (35 cm x 35 cm x 25 cm deep) filled with a sandy loam soil (75% sand, 16% silt, 9% clay, organic carbon 1.0%, pH (H_2O) 7.7) (Corden, 2000; Corden, 2001b). One potato (variety Estima) was planted in each container and all were maintained outdoors in a fenced enclosure. ^{14}C-dimethoate was mixed into an EC formulation containing non-radiolabelled dimethoate. Using aerosol spray guns, the formulation was then applied to the potato plants at BBCH growth stage 45-47, as foliar spray at a target rate of 2 x 340 g ai/ha, with 14 days between each application. Additional plants were treated at twice the normal application rate, to be analyzed if additional material was required for isolation of unknown components. Plants were harvested immediately after the 1st application (day –14); immediately after the 2nd application (day 0); and on days 2, 7, 14, 21 and 28 after the 2nd application. The tops were cut off just above the soil surface and tubers were removed from the soil by hand.

The foliage was surface-washed with acetonitrile, then homogenized and extracted 3 times with acetonitrile; 2 times with acetonitrile/water (1:1); and 1-2 times with water, using a commercial blender. Tubers were cut into cubes, homogenized and extracted 3 times with acetonitrile and 2 times with acetonitrile/water (1:1), using a commercial blender. Levels of radioactivity in surface washes and extracts were determined by LSC and levels of radioactivity in unextractable residues were determined by combustion followed by LSC. Aliquots of the post-extraction solids were treated with HCl, NaOH or protease, to release further radioactive label. Extracts containing significant radioactivity were characterized by initially partitioning into ethyl acetate. Surface washes and extracts containing significant radioactivity were analyzed by HPLC and TLC, comparing chromatographic behaviour of detected components with reference substances.

Three of the metabolites (A, G and K) detected in potato surface washes and extracts did not co-chromatograph with any available reference substance. To investigate the nature of these unknown components, they were isolated by preparative TLC and HPLC and investigated by LC-MS and GC-MS. Extracts containing component A were additionally analyzed using a dialysis membrane with a 3500 molecular weight cut-off. Extracts containing metabolite G were additionally treated with HCl , NaOH and protease.

TRR values for foliage were calculated by summation of radioactivity in surface washes, extracts and residues. TRR values for tuber were determined by direct quantification of the homogenized sample. Concentrations of TRR in foliage increased from 7.12 mg/kg fresh tissue, after the first application, to 12.30 mg/kg. following the second application. but then declined to 1.32 mg/kg at14 days, after the second application. A slight increase in levels of radioactivity was evident in foliage taken 21 and 28 days after the second application, probably reflecting the drying of the plants as they approached senescence. In tubers, TRR after the 2nd application (day 0) was 0.30 mg/kg, decreasing to 0.19 mg/kg at day 14, then slightly increase to 0.23 and 0.24 mg/kg at 21 and 28 days after application, respectively. The results of characterization and identification of residues in foliage and tubers are presented in Tables 3, 4 and 5.

Major routes of dimethoate metabolism in potatoes were:

(1) Oxidation to yield omethoate (II).
(2) *O*-demethylation and *N*-demethylation of omethoate, to yield *O*-demethyl *N*-demethyl omethoate (XXIII).

Minor routes of dimethoate metabolism in potatoes were:

(3) Hydrolysis of the amide bond to give dimethoate carboxylic acid (III) and subsequent degradation to give *O*,*O*-dimethyl dithiophosphoric acid (XV).
(4) Demethylation to yield *O*-demethyl dimethoate (X) or *O*-desmethyl iso-dimethoate (XII).

(5) Demethylation of omethoate to give *O*-demethyl omethoate (XI) and subsequent hydrolysis of the amide bond to give *O*-demethyl omethoate carboxylic acid (XX).

The proposed pathways of metabolism in potatoes are presented in Figure 2.

Metabolite A was shown to be a very polar compound, remaining at the origin of TLC plates after elution with a moderately polar solvent system. A concentrated extract of potato foliage containing component A was dialyzed against water, using a membrane with a 3500 molecular weight cut-off. Levels of radioactivity in the dialysate and the remaining concentrate were determined by LSC. The dialysate was analyzed by TLC and the results compared with the chromatogram obtained before dialysis. Metabolite A was almost completely removed into the water by dialysis, indicating that it was not of high molecular weight but was interpreted to be a chromatographic artefact, caused by the co-extracted high molecular weight material present in the extract. It was proposed that the high molecular weight material caused some radioactivity to bind at or near origin of the TLC plate. The apparent "metabolite A" removed by dialysis was shown by co-chromatography to be *O*-demethyl *N*-demethyl omethoate.

Hydrolysis of the extracts containing metabolite G demonstrated that it was a glucose-conjugate of dimethoate hydroxylated at the *N*-methyl group. Metabolite K was shown to be composed of up to six minor, non-polar components, all <0.05 mg/kg.

Table 3. Proportions of radioactivity in surface washes and extracts of potato foliage and extracts of potato tuber, following two applications of ^{14}C-dimethoate at a rate of ca. 340 g ai/ha.

Fraction	Day 0		Day 2		Day 7		Day 14		Day 21		Day 28	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
	Foliage											
Washes	40.7	5.01	31.0	1.35	13.3	0.62	12.9	0.17	5.0	0.08	0.5	0.02
Extracts	44.5	4.47	46.1	2.01	70.1	3.25	42.8	0.56	25.6	0.41	46.0	1.59
Residue [1/]	14.8	1.82	22.8	1.00	16.6	0.77	44.2	0.58	69.3	1.11	53.5	1.85
Total	100	12.30	100	4.37	100	4.63	100	1.32	100	1.60	100	3.46
	Tubers											
Extracts	89.9	0.27	Na	Na	88.2	0.22	85.3	0.16	81.6	0.19	81.8	0.20
Residue [1/]	10.1	0.03	Na	Na	11.8	0.03	14.7	0.03	18.4	0.04	18.2	0.04
Total	100	0.30	100	0.25	100	0.25	100	0.19	100	0.23	100	0.24

Day 14 (after 1st application): foliage surface washes, 66.0 % TRR (4.7 mg/kg); extracts, 26.6 % TRR (1.89 mg/kg); post-extraction solids, 7.5 % TRR (0.53 mg/kg); total, 100 % TRR (7.12 mg/kg).

NA = not analyzed.

[1/] Residue not extracted with solvents of increasing polarity (acetonitrile, acetonitrile/water (1:1) and water).

Table 4. Proportions of components in potato foliage, following two applications of 340 g ai/ha ^{14}C-dimethoate (results expressed as % sample radioactivity and mg equivalent/kg tissue fresh weight).

Component	Day 0		Day 2		Day 7		Day 14	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Dimethoate (I)	68.1	8.38	54.8	2.39	40.9	1.89	15.0	0.20
Omethoate (II)	5.9	0.73	7.3	0.32	15.6	0.72	9.3	0.12
O-demethyl omethoate carboxylic acid (XX)	<0.2	<0.02	<0.2	<0.01	<0.2	<0.01	1.5	0.02
O-demethyl *N*-demethyl omethoate (XXIII)	1.8	0.22	4.2	0.18	5.2	0.24	8.7	0.11
O-demethyl omethoate (XI)	3.2	0.39	0.7	0.03	4.6	0.21	3.2	0.04
O-demethyl iso-dimethoate or dimethoate carboxylic acid (XII, III)	0.8	0.10	<0.2	<0.01	3.7	0.17	3.1	0.04
O,O-dimethyl dithiophosphoric acid (XV)	0.3	0.04	<0.2	<0.01	<0.2	<0.01	4.5	0.06
O-demethyl dimethoate (X)	<0.2	<0.08	<0.2	<0.01	<0.2	<0.01	1.2	0.02
Metabolite A [1/]	0.8	0.10	<0.2	<0.01	<0.2	<0.01	0.5	0.01
Metabolite G [2/]	2.3	0.28	4.3	0.19	7.7	0.36	4.8	0.06
Metabolite K [3/]	0.8	0.10	1.1	0.05	1.5	0.07	3.2	0.04
Other	1.2	0.15	4.7	0.21	4.2	0.19	0.8	0.01
Total extracts	85.2	10.48	77.1	3.37	83.4	3.86	55.7	0.74
Water extractable	NA	NA	NA	NA	3.1	0.14	5.7	0.08
Protease extractable	4.3	0.53	9.4	0.41	5.5	0.25	16.8	0.22
Organic solvent-soluble	NA	NA	NA	NA	NA	NA	0.8	0.01
Water-soluble	NA	NA	NA	NA	NA	NA	16.0	0.21

Component	Day 0		Day 2		Day 7		Day 14	
	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg	% TRR	mg/kg
Base extractable	NA	NA	NA	NA	NA	NA	14.9	0.20
Unextracted residues	10.5	1.29	13.4	0.54	8.0	0.37	6.9	0.09
Total	100	12.30	100	4.37	100	4.63	100	1.32

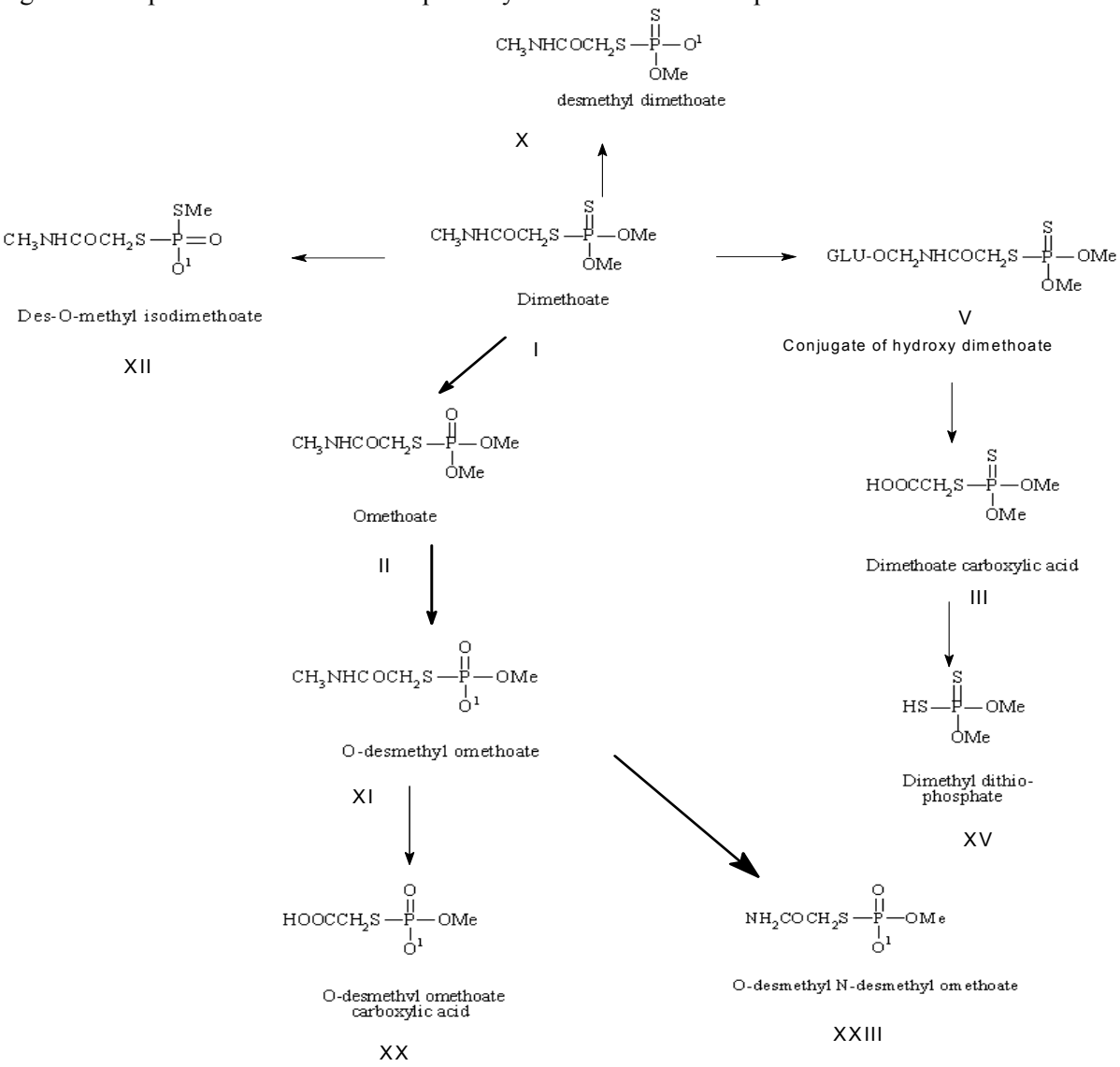
[1/] Identified as *O*-demethyl *N*-demethyl omethoate, which was trapped by high molecular weight material at or near the origin on TLC plates.
[2/] Glucose conjugate of dimethoate hydroxylated at the *N*-methyl group.
[3/] Shown to be composed of up to six minor components, all <0.05 mg/kg.
NA = not analyzed.

Table 5. Proportions of metabolites in potato tubers, following two applications of 340 g ai/ha ^{14}C-dimethoate (results expressed as % sample radioactivity and mg equivalent/kg tissue fresh weight).

Component	Day 0		Day 7		Day 14		Day 21		Day 28	
	%	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg	%	mg/kg
Dimethoate (I)	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Omethoate (II)	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
O-demethyl omethoate carboxylic acid (XX)	6.1	0.02	9.7	0.02	18.4	0.03	11.1	0.03	12.1	0.03
O-demethyl *N*-demethyl omethoate (XXIII)	76.4	0.23	46.0	0.12	45.5	0.09	40.3	0.09	43.6	0.10
O-demethyl omethoate (XI)	<0.1	<0.01	28.1	0.07	12.5	0.02	17.7	0.04	14.8	0.04
O-demethyl *iso*-dimethoate or dimethoate carboxylic acid (XII, III)	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
O,O-dimethyl dithiophosphoric acid (XV)	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
O-demethyl dimethoate (X)	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Metabolite A [1/]	7.4	0.02	2.0	0.01	5.5	0.01	3.2	0.01	3.1	0.01
Metabolite G [2/]	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Metabolite K [3/]	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01	<0.1	<0.01
Other	<0.1	<0.01	2.4	0.01	3.4	0.01	6.7	0.02	5.3	0.01
Total extracts	89.9	0.27	88.2	0.22	85.3	0.16	79.0	0.18	78.9	0.19
Water extractable	NA	NA	0.5	<0.01	0.3	<0.01	4.5	0.01	4.7	0.01
Protease extractable	1.8	0.01	1.1	<0.01	1.4	<0.01	0.7	<0.01	0.8	<0.01
Organic solvent-soluble	NA	NA	NA	NA	0.4	<0.01	NA	NA	NA	NA
Water-soluble	NA	NA	NA	NA	1.0	<0.01	NA	NA	NA	NA
Base extractable	NA	NA	NA	NA	3.6	0.01	4.0	0.01	4.0	0.01
Unextractable residues	8.3	0.02	10.2	0.03	9.4	0.02	11.8	0.03	11.6	0.03
Total	100	0.30	100	0.25	100	0.19	100	0.23	100	0.24

[1/] Identified as *O*-demethyl *N*-demethyl omethoate, which was trapped by high molecular weight material at or near the origin on TLC plates.
[2/] Glucose conjugate of dimethoate hydroxylated at the *N*-methyl group.
[3/] Shown to be composed of up to six minor components, all <0.05 mg/kg.
NA = not analyzed.

Figure 2. Proposed biotransformation pathway of ^{14}C-dimethoate in potatoes.



[1] Present as the anion.

Residues in potato foliage decreased from 12.3 mg/kg fresh tissue after the second application (day 0) to 1.32 mg/kg at day 14 and slightly increased to 3.46 mg/kg at day 28, as a result of drying of the foliage at maturation of potato plants), resulting in a concentration of the residue. Residues in tubers remained constant throughout the study period, in the range 0.19-0.30 mg/kg.

A small proportion of radioactivity in the tubers was characterized as bound and could only be released by strong hydrolytic treatment. This suggested more extensive metabolism of dimethoate to polar components which were strongly bound to the crop matrix or alternatively incorporation of the radioactivity into natural products.

Metabolites of dimethoate were identified by comparison with reference standards. Dimethoate was extensively metabolized via oxidation and demethylation reactions, producing a large number of polar metabolites. The major metabolites were omethoate and *O*-demethyl *N*-demethyl omethoate. Minor metabolites were dimethoate carboxylic acid, *O,O*-dimethyldithiophosphoric acid, *O*-demethyl dimethoate, *O*-demethyl *iso*-dimethoate, *O*-demethyl omethoate and *O*-demethyl omethoate carboxylic acid. In foliage, some components, accounting for ≤ 0.2 mg/kg, were characterized as either water-soluble following protease treatment or base-extractable following protease treatment. These components were shown by chromatography to be very polar components. All metabolites and components > 0.05 mg/kg were identified in tubers.

Although dimethoate is described as a systemic insecticide, neither dimethoate nor the metabolite omethoate were translocated from foliage to tuber. Metabolism appeared to take place mainly in the foliage. Following two spray applications of ^{14}C-Dimethoate to potatoes, at a mean rate of 346 g/ha per application with 14 days between the applications, significant residues were present in foliage: decreasing from 12.30 mg/kg fresh tissue after the second application (day 0) to 1.32 mg/kg at day 14 and slightly increasing to 3.46 mg/kg at day 28, as a result of moisture loss from the crop which led to a concentration of the residue.

The metabolism of dimethoate in wheat and potatoes was very similar, with only minor differences. In potato foliage, a minor metabolites was identified as the glucose conjugate of dimethoate that had been hydroxylated at the *N*-methyl group ("hydroxy-dimethoate"), which was most probably hydrolyzed to dimethoate carboxylic acid (III) and subsequent degraded to give *O,O*-dimethyldithiophosphoric acid (XV). Four degradation products detected in potato metabolism were not be observed in the metabolism of wheat: *O*-demethyl dimethoate (X), dimethoate carboxylic acid (III), *O*-demethyl omethoate (XI) and the glucose conjugate of hydroxy-dimethoate. Except for the *O*-demethyl dimethoate, detected at low concentration in potato foliage at one time point only (day 14, 1.2 %, 0.02 mg/kg), these metabolites are intermediate products in the hydrolytic degradation pathway, leading *via* dimethoate carboxylic acid to phosphoric acid. Although these intermediates were not detected in wheat metabolism, the principal biotransformation pathways in potato and wheat are substantially similar and involve mainly oxidation and demethylation, followed by degradation of the side chain. In earlier plant metabolism studies on various crops, rapid degradation of dimethoate was observed, following the same pathways.

No dimethoate or omethoate was detected in the tubers of potatoes or the grain of wheat at any time point in the studies, indicating that dimethoate or omethoate is not significantly translocated to the edible parts.

Environmental fate in soil

No data were submitted.

Environmental fate in water-sediment systems

Biodegradability. Dimethoate (21.1 mg, purity: 99.1 % w/w) was mixed into 5 l of an aqueous mineral test medium, prepared according to OECD guideline 301d, resulting in a nominal concentration of 4.22 mg ai/l, equivalent to a theoretical oxygen demand ($ThOD_{NH4}$) of 4.92 mg O_2/l (Hertl, 2000). This test solution was inoculated with 2.5 ml of filtered activated sludge, obtained from a domestic waste water treatment plant. In addition, a positive control (aniline + test medium + inoculum), an inoculum control (test medium + inoculum) and a toxicity control (dimethoate + aniline + test medium + inoculum) were prepared. The test solutions were then incubated for 28 days at 21-22°C in the dark. Oxygen measurements were performed in duplicate on days 0, 2, 6, 7, 13, 14, 21 and 28, using an O_2-electrode. Measurements on the toxicity control were performed only on days 0, 7, 14, 21 and 28. Based on the measured oxygen concentrations in the test solutions, the BOD (biochemical oxygen demand) was calculated as follows:

$$\text{BOD} = \frac{\text{mg } O_2 \text{ / L of test item and / or Aniline} - \text{mg } O_2 \text{ / L of inculum control}}{\text{mg test item and / or Aniline / L in flask}}$$

The BOD is a measure of the amount of oxygen consumed by micro-organisms when metabolising a test item. It is expressed as mg oxygen uptake per mg test item. The percentage biodegradation of dimethoate and of the reference item, aniline, was calculated as follows:

$$\% \text{ degradation} = \frac{\text{BOD (mg } O_2 \text{ / mg test item or Aniline)}}{ThOD_{NH4} \text{ (mg } O_2 \text{ / mg test item or Aniline)}} \times 100$$

Where $THOD_{NH4}$ is the theoretical oxygen demand, which is the total amount of oxygen required to oxidize a chemical completely. It is calculated from the molecular formula, assuming no nitrification occurs, and is expressed as mg oxygen required per mg test item.

The oxygen depletion in the inoculum control was 0.4 mg O_2/l, at the end of the test, and thus did not exceed 1.5 mg O_2/l after 28 days. The residual oxygen concentration in the test flasks did not drop below 0.5 mg O_2/l at any time. In the positive control, the readily bidegradable aniline declined by 61% after 14 days and 72% after 28 days, indicating that the activated sludge inoculum used was suitable for the test. However, the percentage biodegradation of dimethoate reached only 1% after 28 days and the compound cannot be considered as readily biodegradable. In the toxicity control, containing both dimethoate and aniline, 26 % biodegradation was noted within 14 days and 31 % biodegradation after 28 days of incubation. The dimethoate was assumed to be not inhibitory towards activated sludge microorganisms, because degradation was >25 % within 14 days.

Table 6. Biodegradability test of dimethoate and the positive control, aniline (Hertl, 2000).

Treatment	Concentration (mg/l)	% biodegradation after n days of exposure						
		2	6	7	13	14	21	28
Dimethoate	4.22	1	1	0	0	2	3	1
Procedural control (aniline)	2.04	-1	35	52	58	61	63	72
Toxicity control	D, 4.22 A, 2.04	ND	ND	23	ND	26	29	31

ND = not determined.
D = dimethoate.
A = aniline.

RESIDUE ANALYSIS

Analytical methods

The received information on validated analytical methods for the determination of residues of dimethoate and omethoate in different various fruit, vegetables, wheat, olives, olive oil, milk, eggs and animal tissues. Recoveries and limits of quantification for each analytical method are summarized in Tables 7.1 and 7.2 for dimethoate and omethoate respectively.

Fruit, vegetables and cereals

Cordon (2001a) validated a GC-FPD method for determination of dimethoate and omethoate residues in citrus matrices. Samples (40g) were extracted with acetone and filtered through glass wool. Sodium chloride and dichloromethane were added prior to partition. The aqueous phase was adjusted to pH ≥4 with 0.04 M NaOH and re-extracted twice with dichloromethane (100 ml). The combined dichloromethane extracts were dried by passing through anhydrous sodium sulfate, with rinsing. Charcoal and kieselguhr were added to the extract for 5 min., before filtering under vacuum through a pad of kieselguhr, rinsing with dichloromethane. The extract was evaporated to a low volume, using a rotary film evaporator at <30ºC and 4 drops of *n*-dodecane as a 'keeper'. After dissolving the extract in acetone/hexane (1:3 v/v), it was subjected to column chromatography on activated silica gel, eluting with increasing proportions of acetone in hexane, to separate the dimethoate and omethoate. Dimethoate and omethoate were determined by GC-FPD, using a DB 17 column. Recovery ranged from 80.7 to 87.4% for dimethoate and from 79.4 to 86.5% for omethoate. The LOQ was 0.01 mg/kg and LOD was 0.0002 mg/kg for both compounds.

For the analysis of lemons, an LC-MS method was developed by Cordon (2001a). Lemon samples (10 g) were extracted twice with dichloromethane An aliquot (equivalent to 1 g matrix) was evaporated to dryness and redissolved in hexane. The residues were partitioned into water which was rinsed with further hexane before being analyzed by LC-MS. Dimethoate and omethoate were separated on a C-8 column and detected as the ions at *m/z* 230 and 214, respectively. Recovery of dimethoate and omethoate was 95.1-102% and 92.5-103%, respectively. The LOQ was 0.01 mg/kg and LOD was 0.002 mg/kg for both compounds.

Cordon (2001a) validated a GC-FPD method for the determination of residues in cherries. A sub-sample (40 g) of cherry homogenate was macerated with dichloromethane and the extract was dried with anhydrous sodium sulfate. Activated charcoal was added before filtering through anhydrous sodium sulfate, addition of *n*-dodecane (4 drops) as a 'keeper, removal of the solvent under vacuum and redissolving in acetone. Dimethoate and omethoate were determined by GC-FPD, using an HP-17 column. Mean recoveries of dimethoate and omethoate were 83.4 and 82.1% respectively.

The LOQ was 0.01 mg/kg for dimethoate and omethoate. The LOD was 0.0005 mg/kg for dimethoate and 0.0009 mg/kg for omethoate.

Todd, (2001) validated an LC-MS method for analysis of olives and olive oil. Olives (10 g) were extracted twice with dichloromethane. An aliquot of the combined extracts was evaporated to dryness at 40ºC, redissolved in *n*-hexane and the residues partitioned into water, which was washed with further hexane, prior to quantification by LC-MS. Dimethoate and omethoate were separated on a C-8 column and ion monitored by MS were: omethoate *m/z* 214 and dimethoate *m/z* 230. Recovery of dimethoate was 81% from olive flesh and 93% from olive oil, while recovery of omethoate was 100% from flesh and 104% from oil. The LOQ was 0.01 mg/kg for dimethoate and omethoate in both olive flesh and oil. The LOD was 0.002 mg/kg for both compounds in both matrices.

Schulz, (2000a) developed a GC-FPD method for residue determination in cabbage. A sample (30 g) was extracted with ethyl acetate in the presence of anhydrous sodium sulfate and an aliquot of extract was concentrated, diluted with cyclohexane and cleaned-up by gel-permeation chromatography (GPC). The GPC column (400 mm x 25 mm) was of Bio Beads SX 3, eluted with ethyl acetate/cyclohexane (1:1 v/v). Dimethoate and omethoate were quantified by GC-FPD, using a DB-17 column. Recoveries of dimethoate were 81.2% and 73.4% from the raw and cooked white cabbage, respectively, and of omethoate were 90.2% and 75.6%, respectively. The LOQ for both analytes was 0.01 mg/kg.

Harrison, (1998a) developed a GC-FPD method for residue determination in lettuce. Samples (30 g) were extracted with ethyl acetate in the presence of anhydrous sodium sulfate, cyclohexane was added to the filtered extract, prior to clean-up on a 450 mm x 55 mm GPC column of SX-3 Envirobeads, eluted with cyclohexane/ethyl acetate (1:1 v/v). Dimethoate and omethoate were quantified by GC-FPD, using a DB-1301 column. Mean recoveries were 81% for dimethoate and 76% for omethoate. The LOQ for both dimethoate and omethoate was 0.01 mg/kg.

An LC-MS method, validated by Harper (2001a), was used to determine residues in cherries, melons, tomatoes, lettuce, sugar beet, artichokes, asparagus, celery and wheat. Samples (10 g) were extracted twice with dichloromethane, the solvent was evaporated from an aliquot, and the residue dissolved in hexane, which was partitioned with water. The aqueous phase was diluted, as required, with water, prior to quantification by LC-MS. Dimethoate and omethoate were separated on a C-8 column and, using MS detection, the ions monitored were: omethoate *m/z* 214 and dimethoate *m/z* 230. Recoveries of dimethoate were 90-102% and of omethoate 76-100%. The LOQ was 0.01 mg/kg and LOD was 0.002 mg/kg in all matrices for both dimethoate and omethoate.

Harper, (2001b) validated a method for residue determination in bran, bread, flour, wheat germ and wheat grain. Samples (10 g) were extracted twice with dichloromethane and an aliquot (equivalent to 2g matrix) of extract was cleaned up on an EnviCarb Bond-Elut cartridge eluted with dichloromethane. The eluate was evaporated to dryness, redissolved in hexane and then partitioned with water. The aqueous phase was diluted with water, if necessary, prior to quantification by LC-MS. Dimethoate and omethoate were separated on C-8 column and, using MS, the ions monitored were: omethoate *m/z* 214 and dimethoate *m/z* 230. Recoveries were 48-97% for dimethoate and 78-90% for omethoate. The LOQ was 0.001 mg/kg and the LOD was 0.0002 mg/kg in all matrices for both dimethoate and omethoate.

Jones, (2002, 2003) developed and validated methods for the determination of dimethoate and omethoate in olive flesh, olive oil, orange whole fruit, lettuce and wheat grain, which, for most matrices, consisted of extraction with ethyl acetate, followed by GPC clean-up on Biobeads S-X3 eluted with cyclohexane/ethyl acetate, 1:1 v/v. Olive oil was dissolved in hexane and the residues partitioned into acetonitrile. Cleaned-up extracts were analyzed using GC-FPD with a DB-17 column, with confirmation on a DB-1701 column. Recoveries were 77-100% for dimethoate and 70-84% for omethoate. The LOQ was 0.01 mg/kg for both dimethoate and omethoate in all matrices. LODs were 0.0007-0.001 mg/kg for dimethoate and 0.001-0.002 mg/kg for omethoate.

Method No. OC-2 (Osborne, 2002) was developed for the determination of residues in mangoes and capsicums (sweet peppers). Mangoes were separated into seeds, peel and flesh, whereas

capsicums were homogenized before analysis. Samples (50 g) were blended with acetone, the extract was filtered and partitioned with hexane/dichloromethane (1: v/v). The lower aqueous layer was re-extracted with dichloromethane, which was then combined with the original upper organic phase, evaporated to a small volume and diluted with acetone for GC analysis. LOQs were 0.02 mg/kg for dimethoate and omethoate in mango flesh and peel and 0.02 and 0.04 mg/kg for dimethoate and omethoate, respectively, in capsicum. Mean recoveries of dimethoate and omethoate from mango flesh were 83.7 and 101.6% and from capsicum were 92.9 and 87.6%, respectively.

Mammalian and poultry products

Residues of dimethoate and omethoate in goat and hen tissues, milk and eggs were determined by GC-FPD (Jalali and Hiler 1999, Jalali, 1998). Samples were extracted with acetone or acetonitrile, followed by protease treatment of the dried post-extraction solids. The combined extract and enzyme hydrolysate was partitioned into dichloromethane. Clean-up was by hexane/acetonitrile partition and SPE using a ChemElut CE minicolumn. Cleaned-up extracts were evaporated and redissolved in benzene for GC-FPD determination. Clean-up of goat liver, goat kidney, hen muscle, whole eggs and egg whites was by elution through a column of Celite 545/carbon (4:1 w/w), initially with benzene then with benzene-acetonitrile 1:1. The extracts were redissolved in acetonitrile and passed through a C-18 SPE column, evaporated to dryness and redissolved in benzene for GC-FPD. Recoveries of dimethoate and omethoate were 70-120%. LOQs were 0.001 mg/kg for milk and eggs and 0.01 mg/kg for tissues.

Multi-residue methods

Ambrus (2000) provided a method validation example using 12 representative pesticides, including dimethoate and 5 representative commodities (cabbage, apple, orange, wheat, sunflower seed). Plant samples were extracted with ethyl acetate and cleaned-up by GPC. Dimethoate was determined by GC-NPD.

Thier (1980 and 1987) reported development of the German official method, DFG S-19. Samples (100 g plant material with water content >70% or 10-50 g with water content <70%) were extracted with acetone, the volume added being adjusted according to the water content of the sample, to achieve a ratio of acetone to water of 2:1 (v/v) during extraction. Celite was added as a filter aid. Sodium chloride was added to the filtrate, which was partitioned into dichloromethane and the organic layer was dried with sodium sulfate. The extract was evaporated to dryness and redissolved for clean-up by GPC (Bio-Beads S-X3), eluting with cyclohexane/ethyl acetate (1:1, v/v). Further clean-up involved a silica gel microcolumn and a sequence of five eluents (hexane/toluene 65:35 v/v; toluene; toluene/acetone 95:5 v/v; toluene/acetone 8:2 v/v; and acetone). The fraction containing the residues was concentrated prior to GC-NPD determination.

Stan and Linkerhängner (1996) reported a modification of the DFG S-19 method. Samples (20 g) of homogenized plant material were extracted with 40 ml acetone but, before extraction, 2 µg aldrin in toluene was added as a surrogate standard (SSTD), at the equivalent of 0.1 ppm. The extract was saturated with sodium chloride, then partitioned with 25 ml dichloromethane in order to separate excess water. The organic phase was cleaned-up by GPC (Bio-Beads S-X3), using a mixture of cyclohexane/ethyl acetate (1:1 v/v) as eluent. The supplemental clean-up and fractionation on silica microcolumns involved three fractions, namely fraction 1 in toluene, fraction 2 in toluene/acetone (80:20, v/v) and fraction 3 in acetone. The fraction containing the pesticides was evaporated to dryness under vacuum and redissolved in toluene. This solution was analyzed by GC, using an atomic emission detector (AED) after separation on a HP-1 column.

Table 7. Validation data for analytical methods for the determination of residues of dimethoate.

Reference	Matrix	Fortification level, mg/kg	Recovery, %		RSD, %	n
			Mean	Range		
Cordon (2001a), DTF Doc. No. 522-030	Oranges (whole fruit)	0.01 [1/]	86	78 – 90	5.4	6
		0.10	89	76 – 96	8.1	6
		1.00	87	83 – 94	4.8	6
	Orange (peel)	0.01 [1/]	82	74 – 91	6.7	6
		0.10	81	73 – 91	7.6	6
		1.00	79	71 – 87	6.9	6
	Orange (pulp)	0.01 [1/]	85	81 – 89	3.5	6
		0.10	87	81 – 91	4.2	6
		1.00	82	76 – 91	6.5	6
	Lemons (whole fruit)	0.01 [1/]	88	78 – 94	6.2	6
		0.10	97	92 – 105	5.1	6
		1.00	100	96 – 110	4.9	6
	Lemon (peel)	0.01 [1/]	101	95 – 105	4.1	7
		0.10	100	92 – 110	5.9	6
		1.00	106	92 – 110	6.3	6
	Lemon (pulp)	0.01 [1/]	91	80 – 102	10.6	6
		0.10	103	89 – 111	7.8	6
		1.00	106	95 – 111	5.4	6
Cordon (2001a), DTF Doc. No. 522-029	Cherries	0.01 [1/]	82	79 – 86	3.2	6
		0.10	85	83 – 88	2.2	6
		1.00	84	81 – 85	1.9	6
Harper (2001a), DTF Doc. No. 522-028	Cherries	0.01 [1/]	91	85 –100	6.2	5
		0.10	103	99 – 106	2.5	5
		1.00	102	96 – 105	3.8	5
Todd, 2001, DTF Doc. No. 522-036	Olives (RAC)	0.01 [1/]	75	71 - 82	5.6	6
		0.10	72	71 - 73	1.5	6
		1.00	96	87 - 100	5.5	6
		10	102	97 - 108	4.3	6
Todd, 2001, DTF Doc. No. 522-036	Olive oil	0.01 [1/]	104	100 - 108	2.9	6
		0.10	83	76 - 87	4.8	6
		1.00	91	86 - 97	4.5	6
Schulz (2000a), DTF Doc. No. 522-027	Cabbages	0.01 [1/]	81	77 – 83	3.3	5
		5.0	79	75 – 84	4.8	5
Harper (2001a), DTF Doc. No. 522-028	Melon (peel)	0.01 [1/]	101	93 – 108	6.3	5
		0.10	85	81 – 88	3.1	5
		1.00	95	86 – 102	6.9	5
	Melon (pulp)	0.01 [1/]	94	87 – 97	4.4	5
		0.10	103	101 – 106	2.0	5
		1.00	97	94 – 100	2.3	5
Harper (2001a), DTF Doc. No. 522-028	Tomatoes	0.01 [1/]	102	95 - 108	5.0	5
		0.1	89	86 - 91	2.1	5
		1.0	99	96 - 102	2.7	5
Harper (2001a), DTF Doc. No. 522-028	Lettuce	0.01 [1/]	106	103 – 109	2.3	5
		0.1	101	96 – 106	4.0	5
		1.0	95	89 - 102	5.4	5
Harrison, (1998a) DTF Doc. No. 533-4225	Lettuce	0.01 [1/]	77	80 – 74	5.5	2
		0.1	83.5	84 – 83	0.8	2
		1.0	82	83 - 81	1.7	2
Harper (2001a), DTF Doc. No. 522-028	Sugar beet: tops	0.01 [1/]	98	97 - 100	1.2	5
		0.1	95	92 - 98	2.7	5
		1.0	106	103 – 109	2.3	5
	roots	0.01 [1/]	107	102 - 110	2.9	5
		0.1	102	100 - 105	2.0	5
		1.0	96	92 - 102	3.8	5

Reference	Matrix	Fortification level, mg/kg	Recovery, %		RSD, %	n
			Mean	Range		
Harper (2001a), DTF-Doc. No. 522-028	Artichokes	0.01 [1/]	98	89 – 107	7.8	5
		0.1	92	86 – 97	5.3	5
		1.0	98	94 – 100	2.6	5
Harper (2001a), DTF-Doc. No. 522-028	Asparagus	0.01 [1/]	103	97 – 107	3.8	5
		0.1	99	89 – 110	10.4	5
		1.0	93	83 – 104	9.7	5
Harper (2001a), DTF-Doc. No. 522-028	Celery	0.01 [1/]	89	88 – 91	1.9	5
		0.1	102	97 – 110	5.6	5
		1.0	101	95 – 108	4.7	5
Harper (2001a), DTF Doc. No. 522-028	Wheat, grain	0.01 [1/]	95	85 – 99	6.3	5
		0.1	79	71 – 83	5.8	5
		1.0	96	83 – 104	8.5	5
	green plant	0.01 [1/]	108	107 – 109	0.9	5
		0.1	81	75 – 86	5.6	5
		1.0	87	83 – 90	3.9	5
	straw	0.01 [1/]	103	98 – 109	4.8	5
		0.1	92	86 - 96	5.2	5
		1.0	82	73 - 96	10.3	5
Harper (2001b), DTF Doc. No. 522-031	Wheat (grain)	0.001 [1/]	97	86 – 101	5.2	5
Harper (2001b), DTF Doc. No. 522-031	Wheat:					
	bran	0.001 [1/]	89	82 – 94	7.0	3
		0.1	78	77 – 79	1.5	3
	bread	0.001 [1/]	92	84 – 104	11.3	3
		0.1	87	79 – 91	8.3	3
	flour	0.001 [1/]	90	86 – 93	3.3	3
		0.1	88	80 – 93	7.8	3
	wheat germ	0.001 [1/]	99	97 – 100	1.5	3
		0.1	87	82 – 94	7.4	3
Jalali and Hiler, 1999, DTF Doc. No. 523-005	Goat:					
	Milk	0.001 [1/]	115	112 - 119	4.2	2
		0.01	102	97 - 107	6.9	2
		0.1	92	89 - 95	4.8	2
	Liver	0.01 [1/]	83	79 - 87	7.0	2
		0.05	102	91 - 113	15.5	2
		0.5	101	97 - 105	5.9	2
	Kidney	0.01 [1/]	120	117 - 123	3.7	2
		0.05	114	112 - 116	2.0	2
		0.5	100	93 - 107	9.9	2
	Fat	0.01 [1/]	116	113 - 120	4.0	2
		0.05	91	88 - 93	3.8	2
		0.5	118	117 - 119	1.4	2
	Hen:					
	Muscle	0.01 [1/]	93	79 - 106	21.2	2
		0.05	101	92 - 110	12.6	2
		0.5	100	91 - 108	11.6	2
	Whole egg	0.05 [1/]	76	75 - 78	2.4	2
		0.5	84	84 - 85	1.5	2
	Egg white	0.001 [1/]	92	84 - 100	12.7	2
		0.01	96	89 - 103	10.3	2
		0.1	102	102 - 103	0.6	2

Reference	Matrix	Fortification level, mg/kg	Recovery, %		RSD, %	n
			Mean	Range		
Jalali 1998,	Goat:					
DTF Doc. No. 523-006	Milk	0.001 [1/]	115	112 - 119	4.2	2
		0.01	102	97 - 107	6.9	2
		0.1	92	89 - 95	4.8	2
	Liver	0.01 [1/]	83	79 - 87	7.0	2
		0.05	102	91 - 113	15.5	2
		0.5	101	97 - 105	5.9	2
	Kidney	0.01 [1/]	120	117 - 123	3.7	2
		0.05	114	112 - 116	2.0	2
		0.5	100	93 - 107	9.9	2
	Fat	0.01 [1/]	116	113 - 120	4.0	2
		0.05	91	88 - 93	3.8	2
		0.5	118	117 - 119	1.4	2
	Hen:					
	Muscle	0.01 [1/]	93	79 - 106	21.2	2
		0.05	101	92 - 110	12.6	2
		0.5	100	91 - 108	11.6	2
	Whole egg	0.05 [1/]	76	75 - 78	2.4	2
		0.5	84	84 - 85	1.5	2
	Egg white	0.001 [1/]	92	84 - 100	12.7	2
		0.01	96	89 - 103	10.3	2
		0.1	102	102 - 103	0.6	2
Ambrus 2000,	Cabbage	0.02 [1/]	77.0	-	20.5	5
DTF Doc. No. 592-023		0.3	75.0	-	13.3	5
		1	78.0	-	11.5	5
		2	76.0	-	14.5	5
	Apple	0.02 [1/]	80.0	-	16.3	5
		0.3	81.0	-	16.0	5
		1	86.0	-	15.1	5
		2	87.0	-	12.6	5
	Orange	0.02 [1/]	78.5	-	17.8	5
		0.3	79.0	-	15.2	5
		1	83.0	-	12.0	5
		2	84.8	-	14.5	5
	Wheat	0.02 [1/]	81.6	-	16.1	5
		0.3	88.0	-	13.6	5
		1	86.0	-	15.2	5
		2	87.4	-	14.4	5
	Sunflower seed	0.02 [1/]	69.4	-	21.3	5
		0.3	90.0	-	12.2	5
		1	85.5	-	15.9	5
		2	88.5	-	14.2	5

Reference	Matrix	Fortification level, mg/kg	Recovery, %		RSD, %	n
			Mean	Range		
Jones 2003,	DB-17 column					
DTF Doc. No. 522-032	Olives	0.01	86.2	82.4 – 90.6	3.5	5
		0.1	85.4	79.8 – 87.8	4.0	5
	Olive oil	0.01	82.8	73.8 – 95.0	5.2	5
		0.1	82.2	76.6 – 91.4	6.9	5
	Oranges	0.01	85.8	83.2 – 90.6	3.3	5
		0.1	82.2	79.1 – 84.7	2.7	5
	Lettuce	0.01	76.5	74.8 – 77.3	1.3	5
		0.1	78.5	76.8 – 83.8	4.3	5
	Wheat, grain	0.01	70.5	66.8 – 73.5	3.7	5
		0.1	76.8	70.1 – 83.0	6.3	5
	DB-1701 column					
	Olives	0.01	79.8	78.2 – 83.7	2.8	5
		0.1	89.3	84.9 – 94.1	3.7	5
	Olive oil	0.01	85.2	79.3 – 89.4	5.1	5
		0.1	84.2	73.1 – 93.5	8.7	5
	Oranges	0.01	80.5	76.7 – 83.9	3.3	5
		0.1	81.7	71.9 – 86.6	7.0	5
	Lettuce	0.01	70.5	67.7 – 71.8	2.1	5
		0.1	78.7	76.4 – 81.0	2.5	5
	Wheat, grain	0.01	72.9	72.1 – 73.7	0.9	5
		0.1	71.9	64.9 – 74.6	5.6	5

[1/] Limit of quantification.

Table 8. Validation data for analytical methods for the determination of residues of omethoate.

Reference DTF Doc. No.	Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD, %	n
			mean	range		
Cordon (2001a), DTF Doc. No. 522-030	orange (whole fruit)	0.01 [1/]	90	82 – 96	6.5	5
		0.10	88	78 – 100	9.1	6
		1.00	83	77 – 89	5.2	6
	orange (peel)	0.01 [1/]	83	76 – 92	8.3	6
		0.10	81	72 – 94	8.7	6
		1.00	75	66 – 82	7.2	6
	orange (pulp)	0.01 [1/]	89	80 – 95	5.9	6
		0.10	85	79 – 96	7.5	6
		1.00	74	68 – 84	8.3	6
	lemon (whole fruit)	0.01 [1/]	95	91 – 99	3.2	6
		0.10	106	104 – 108	1.6	6
		1.00	101	92 – 107	5.7	6
	lemon (peel)	0.01 [1/]	108	101 – 109	3.0	6
		0.10	100	96 – 107	4.5	6
		1.00	101	97 – 109	4.4	6
	lemon (pulp)	0.01 [1/]	89	84 – 94	4.4	6
		0.10	92	86 – 100	5.1	6
		1.00	96	90 – 103	4.6	6
Cordon (2001b), DTF Doc. No. 522-029	cherries	0.01 [1/]	85	79 – 92	6.1	6
		0.10	84	80 – 87	3.2	6
		1.00	78	75 – 80	2.4	6
Harper, (2001a), DTF-Doc. No. 522-028	artichokes	0.01 [1/]	105	102 – 109	3.4	5
		0.1	91	87 – 94	3.4	5
		1.0	93	90 – 101	5.4	5

Reference DTF Doc. No.	Matrix	Fortification level (mg/kg)	Recovery rate (%) mean	Recovery rate (%) range	RSD, %	n
Harper, (2001a), DTF-Doc. No. 522-028	asparagus	0.01 [1/]	103	99 – 110	4.8	5
		0.1	89	82 – 97	7.9	5
		1.0	93	87 – 97	5.4	5
Harper, (2001a), DTF-Doc. No. 522-028	celery	0.01 [1/]	102	97 – 102	4.4	5
		0.1	97	88 - 110	11.2	5
		1.0	90	79 – 96	7.5	5
Harper (2001a), DTF Doc. No. 522-028	cherries	0.01 [1/]	84	76 – 87	5.4	5
		0.10	109	107 – 110	1.2	5
		1.00	76	70 – 88	9.7	5
Schulz (2000a) DTF Doc. No. 522-027	cabbage	0.01 [1/]	90	85 – 95	4.1	5
		5.0	78	70 – 84	7.6	5
Harper (2001a), DTF Doc. No. 522-028	melons (peel)	0.01 [1/]	106	103 – 109	2.1	5
		0.10	76	73 – 77	2.2	5
		1.00	83	80 – 90	4.9	5
	melons (pulp)	0.01 [1/]	73	71 – 75	2.6	5
		0.10	78	72 – 102	16.8	5
		1.00	76	71 – 88	9.6	5
Harper, (2001a), DTF Doc. No. 522-028	wheat: grain	0.01 [1/]	107	104 – 109	1.8	5
		0.1	88	81 – 94	6.7	5
		1.0	105	94 – 110	6.2	5
	green plant					
		0.01 [1/]	106	102 – 107	2.6	5
		0.1	89	85 – 91	2.6	5
	straw	1.0	73	70 – 76	3.5	5
		0.01 [1/]	99	93 – 104	4.7	5
		0.1	95	92 – 99	3.4	5
		1.0	79	71 - 102	16.4	5
Harper, (2001b), DTF Doc. No. 522-031	wheat (grain)	0.001 [1/]	78	76 – 80	2.0	5
Harper, (2001a), DTF Doc. No. 522-028	sugar beet:	0.01 [1/]	84	82 - 85	1.3	5
	tops	0.1	88	86 - 91	2.3	5
		1.0	97	95 - 99	1.9	5
	roots	0.01 [1/]	103	100 - 105	2.5	5
		0.1	95	92 - 96	2.1	5
		1.0	87	84 - 91	3.5	5
Todd, 2001, DTF Doc. No. 522-036	olives (RAC)	0.01 [1/]	86	81 - 94	5.3	6
		0.10	105	101 - 110	3.3	6
		1.00	108	105 - 110	2.0	6
Todd, 2001, DTF Doc. No. 522-036	olive oil	0.01 [1/]	106	103 - 109	1.9	6
		0.10	102	99 - 105	2.0	6
		1.00	104	94 - 109	5.4	6
Harper, (2001a), DTF Doc. No. 522-028	tomatoes	0.01 [1/]	101	91 - 105	5.6	5
		0.1	82	78 - 86	4.9	5
		1.0	81	80 - 83	1.4	5
Harper, (2001a), DTF Doc. No. 522-028	lettuce	0.01 [1/]	109	108 – 109	0.5	5
		0.1	92	88 – 96	3.3	5
		1.0	83	73 - 108	17.2	5
Harrison, (1998a), DTF Doc. No. 533-4225	lettuce	0.01 [1/]	75.7	72 – 79	4.6	3
		0.1	74	73 – 75	1.9	2
		1.0	79	76 - 82	5.4	2

Reference DTF Doc. No.	Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD, %	n
			mean	range		
Jalali and Hiler, 1999, DTF Doc. No. 523-005	Goat:					
	milk	0.001 [1/]	100	98 - 102	3.0	2
		0.01	88	86 - 91	4.3	2
		0.1	90	89 - 92	2.5	2
	liver	0.01 [1/]	93	81 - 105	18.1	2
		0.05	95	80 - 110	22.4	2
		0.5	92	90 - 95	3.4	2
	kidney	0.01 [1/]	114	103 - 124	13.2	2
		0.05	100	97 - 103	4.2	2
		0.5	105	91 - 119	18.8	2
	fat	0.01 [1/]	89	86 - 91	4.4	2
		0.05	80	77 - 82	3.8	2
		0.5	87	74 - 100	20.8	2
	Hen:					
	muscle	0.01 [1/]	92	88 - 96	6.0	2
		0.05	93	84 - 102	13.6	2
		0.5	94	91 - 98	5.8	2
	whole egg:	0.05 [1/]	81	81	0.4	2
		0.5	85	78 - 92	10.9	2
	egg whites:	0.001 [1/]	64	60 - 67	8.2	2
		0.01	93	81 - 105	18.6	2
		0.1	86	85 - 86	1.2	2
Jalali, 1998, DTF Doc. No. 523-006	Goat:					
	milk	0.001 [1/]	100	98 - 102	3.0	2
		0.01	88	86 - 91	4.3	2
		0.1	90	89 - 92	2.5	2
	liver	0.01 [1/]	93	81 - 105	18.1	2
		0.05	95	80 - 110	22.4	2
		0.5	92	90 - 95	3.4	2
	kidney	0.01 [1/]	114	103 - 124	13.2	2
		0.05	100	97 - 103	4.2	2
		0.5	105	91 - 119	18.8	2
	fat	0.01 [1/]	89	86 - 91	4.4	2
		0.05	80	77 - 82	3.8	2
		0.5	87	74 - 100	20.8	2
	Hen:					
	muscle	0.01 [1/]	92	88 - 96	6.0	2
		0.05	93	84 - 102	13.6	2
		0.5	94	91 - 98	5.8	2
	whole egg:	0.05 [1/]	81	81	0.4	2
		0.5	85	78 - 92	10.9	2
	egg whites:	0.001 [1/]	64	60 - 67	8.2	2
		0.01	93	81 - 105	18.6	2
		0.1	86	85 - 86	1.2	2

Reference DTF Doc. No.	Matrix	Fortification level (mg/kg)	Recovery rate (%)		RSD, %	n
			mean	range		
Harper, (2001b), DTF Doc. No. 522-031	wheat: bran	0.001 [1/]	89	87 – 92	3.3	3
		0.1	78	76 – 80	2.7	3
	bread	0.001 [1/]	87	86 – 86	0.7	3
		0.1	73	70 – 76	4.1	3
	flour	0.001 [1/]	98	94 – 104	5.4	3
		0.1	81	79 – 84	3.3	3
	wheat germ	0.001 [1/]	89	87 – 93	3.6	3
		0.1	72	70 – 72	2.8	3
Jones 2003, DTF Doc. No. 522-032	DB-17 Column Olives	0.01	74.8	71.4 – 80.2	4.6	5
		0.1	83.8	78.3 – 87.9	5.6	5
	Olive oil	0.01	74.6	66.5 – 82.9	8.6	5
		0.1	80.7	76.1 – 91.4	7.7	5
	Oranges	0.01	75.4	69.4 – 82.5	7.2	5
		0.1	77.2	69.4 - -89.0	10.7	5
	Lettuce	0.01	87.2	83.4 - -91.4	4.0	5
		0.1	82.6	79.4 - -91.1	6.0	5
	Wheat, grain	0.01	71.2	64.8 – 76.7	6.1	5
		0.1	67.5	59.1 – 76.4	10.0	5
	DB-1701 Column Olives	0.01	72.8	68.0 – 78.5	5.8	5
		0.1	90.2	85.4 – 96.7	4.7	5
	Olive oil	0.01	72.0	60.2 – 84.7	12.0	5
		0.1	86.2	71.1 – 99.7	11.9	5
	Oranges	0.01	76.4	74.8 – 78.8	2.0	5
		0.1	75.2	61.2 – 86.2	12.7	5
	Lettuce	0.01	81.6	79.7 - -82.6	1.6	5
		0.1	79.7	71.1 – 83.0	2.7	5
	Wheat, grain	0.01	70.7	68.0 – 74.3	3.7	5
		0.1	63.2	54.8 – 69.4	9.2	5

[1/] Limit of quantification.

Stability of residues in stored analytical samples

Cherries

The stability of dimethoate and omethoate residues in cherries, during storage at approximately -18ºC, was assessed over a period of 6 months (Harper, 2001c). Samples of cherries (de-stoned and homogenized) were fortified with either dimethoate or omethoate at 0.1 mg/kg and placed in storage at –18°C, along with untreated control samples. Samples were analyzed at 0 days and 6 months. After extraction with dichloromethane, an aliquot equivalent to 1 g cherries was evaporated to dryness and cleaned-up by partition between hexane and water, prior to quantification by LC-MS (Harper, 2001a). A summary of the results is given in Table 9, which shows that dimethoate and omethoate are stable in cherries for up to 6 months at –18ºC. Procedural recoveries were 95-97% for dimethoate and 93-96% for omethoate, showing the methodology to be working satisfactorily on the day of analysis.

Table 9. Stability of dimethoate and omethoate in cherries during storage at –18ºC.

Commodity	Storage interval, months	Recovery (%) of added:	
		Dimethoate	Omethoate
Cherries	0	104, 104	94, 95
	6	103, 106	92, 84

Mangoes

The stability of dimethoate and omethoate residues was investigated in mango peel and flesh (cv. Keitt) from fruit which had previously been treated by dipping in a diluted EC formulation of dimethoate. The deposits were allowed to dry naturally, before the fruit were peeled and samples of the peel and flesh analyzed. The analytical method of Bodnaruk (2002d) was used. The separated peel and flesh was then stored at –18ºC for 3 months, when further samples were analyzed. The results are given in Table 10, showing that residue levels declined slightly over the 3-month period. Procedural recovery was not determined at either 0 days or 3 months.

Table 10. Stability of dimethoate and omethoate residues in mangoes (cv. Keitt) in samples stored frozen for 3 months.

Product application rate	Part of fruit	Dimethoate		Omethoate	
		Day 0	3 months	Day 0	3 months
Dip, 100 ml/100 l	Peel	0.6	0.48	0.04	0.03
	Flesh	0.15	0.1	0.07	0.05

USE PATTERN

Dimethoate is registered in many countries as an insecticide and acaricide, to control pests on fruit, vegetables, field crops, cereals, oil seed crops and forage crops. Data on GAP were submitted by the governments of Germany, the Netherlands, Poland, Thailand, Brazil and Australia and by the manufacturers, BASF, Cheminova and Isagro (Dimethoate Task Force, DMT). The information available to the meeting on registered uses is summarized in Table 11.

Table 11. Registered uses of dimethoate.

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Apples	Belgium	F	EC 400 g/l	Spray		0.02 to 0.04		21	50-100 ml/L water
	Brazil*	F	EC 400 g/l	Spray		0.06		3	
	Brazil*	G	EC 400 g/l	Lacquer		0.20		90	baits, 500cc+5 kg sugar/100 l water
	Finland	F	EC 400 g/l	Spray at budding, before start of flowering or no later than one week after end of flowering		0.02 to 0.04		28	
	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		30	
	Ireland	F	EC 400 g/l	Spray LV	0.34 to 0.68			7 days after last appl.	
	Ireland	F	EC 400 g/l	Spray HV		0.017 to 0.034		7 days after last appl.	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Apples	Sweden	F	EC 400 g/l	Spray at budding before the start of, or no later than one week after blossoming has ceased		0.02	only one spray after blossoming	28	
Artichokes	Italy	F	EC 400 g/l	Spray		0.06		20	
Asparagus	Belgium	F	EC 400 g/l	Spray	0.20			21	
	Denmark	F	EC 500 g/l	Spray	0.30			14	
	Germany	F	EC 400 g/l	Spray, application after sprouting	0.40	0.067	3 (8-10 days) Max. 3.0 L/ha per vegetation period	not stated	do not eat harvest produce
	Germany	F	EC 400 g/l	Spray, application after cutting	0.40	0.067	3 (8-10 days) max. 3.0 l/ha per season	not stated	yield areas, crop plants
	Germany	F	EC 400 g/l	Band spray,, after sprouting	0.24	0.06	5 (8-10 days) max. 3.0 l/ha per season	not stated	young stands, not in production
	Germany	F	EC 400 g/l	Band spray, application after cutting,	0.24	0.06	5 (8-10 days) max. 3.0 l/ha per season	not stated	yield areas, crop plants
	Greece	F	EC 400 g/l	Spray, 1st, plant 3 to 5cm; 2nd, plant 30 to 35cm; 3rd, 10-15 days later		0.03 to 0.05	3	20	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.04	not stated	14	
Barley	Germany	F	EC 400 g/l	Spray <23-30 days	0.68		1	21	
	Germany	F	EC 400 g/l	Spray 1st appl. 23 to 30 days 2nd appl. <55 days	1st appl. 0.68 2nd appl. 0.34		2	21	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	1	14	Winter barley and spring barley
	Portugal	F	EC 400 g/l	Spray		0.04		2 weeks	
Beans	Belgium	F	EC400 g/l	Spray	0.20			3 weeks	Field beans 500 ml/ha
	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 3 weeks of eating	Feed
	Ireland	F	EC 400 g/l	Spray, LV	0.34			At least 7 days after last appl.	Broad, French and runner

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Beet	Austria	F	EC 500 g/l	Spray	0.160				
	Denmark	F	EC 500 g/l	Spray	0.30 to 0.75			Not to be treated within 3 weeks of eating	
	Morocco	F	EC 400 g/l	Spray		0.12 to 0.20			
Beet crops (sugar beet, fodder beet, mangels, red beet) Spinach	Ireland	F	EC 400 g/l	Spray, LV, late May to early June	0.084 to 0.40		Repeat as necessary	At least 7 days after last appl.	
Beet leaves	Belgium	F	EC 400 g/l	Spray	0.20			3 weeks	
	Denmark	F	EC 400 g/l	Spray	0.32	0.106 to 0.213		35	
Beetroot	Denmark	F	EC 500 G/L	Spray	0.30			Not to be treated within 3 weeks of eating	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.040		30	
Berries and other small fruits	Finland	F	EC 400 g/l	Spray, before flowering or within one week of end of flowering		0.02 to 0.04		28	0.1% if using an atomizing spray
	Poland	F	EC 400 g/l	Spray, HV	0.60	0.06 to 0.08	1 – 2	21, 30 for black-currants	Raspberries and straw-berries, spray to 14 days before blooming and after harvest
	Poland	F	EC 400 g/l	Spray, HV	0.60	0.07 to 0.12	1 – 2	21, 30 for black-currants	Raspberries and straw-berries, spray to 14 days before blooming and after harvest
	Poland	F	EC 222 g/l	Spray, HV	0.33	0.03 to 0.04	1 – 2	30	(m)
Blackcurrants	Ireland	F	EC 400 g/l	Spray, LV, immediately before first flowers open	0.34			At least 7 days after last appl.	
	Ireland	F	EC 400 g/l	Spray, HV, immediately before first flowers open		0.022		At least 7 days after last appl.	
Black salsify	Poland	F	EC 400 g/l	Spray, HV	0.24	0.04 to 0.12	1 – 2	21	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Brassicas (cabbage, cauliflower, broccoli, Brussels sprouts	Ireland	F	EC 400 g/l	Spray, LV	0.40			At least 7 days after last appl.	
Broad bean	Poland	F	EC 400 g/l	Spray, HV	0.24	0.04 to 0.12	1 – 2	21	
Broccoli	Germany	F	EC 400 g/l	Band spray, ≤16 leaf stage	0.40		1	42	
	Netherlands	F	EC 400 g/l	Spray	0.20		Repeat as necessary	21	
	UK	F	EC 400 g/l	Spray	0.40	0.067 to 0.04	6	21	
	UK	F	EC 400 g/l	Spray	0.40	0.059 to 0.024	6	21	
Brussels sprouts	Germany	F	EC 404 g/l	Spray	0.24 to 0.36	0.02 to 0.04, 0.03 to 0.061	2	14	
	Germany	F	EC 400 g/l	Spray apply up-to ≤16 leaf stage	0.24 to 0.36	0.02 to 0.04, 0.03 to 0.06	2	14	
	Netherlands	F	EC 400 g/l	Spray before 16th leaf stage	0.20	0.025 to 0.05	1 – 2	21	
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		21	1-1.5 l/ha
	UK	F	EC 400 g/l	Spray	0.40	0.067 to 0.04	6	21	Brussels sprouts >30cm, 1000l/ha of diluted spray and authorized wetting agent
	UK	F	EC 400 g/l	Spray, LV	0.40	0.059 to 0.024	6	21	
Cabbages	Denmark	F	EC 400 g/l	Spray	0.32	0.106 to 0.213		21	
	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 3 weeks of eating	
	Finland	F	EC 400 g/l	Spray, on plant by plant basis at beginning of July	0.12 to 0.24			28	0.24 kg/ha when 33000 plants/ha and 0.12kg/ha when 16000 plants/ha
	Germany	F	EC 400 g/l	Band spray, ≤16 leaf stage	0.40	0.067 to 0.20	1	?42	Savoy, red, white Cabbage
	Germany	F	EC 400 g/l	Spray, ≤16 leaf stage	0.24 to 0.36	0.02 to 0.12	2	?14	Savoy, red, white cabbage
	Germany	F	EC 404 g/l	Band spray, ≤16 leaf stage	0.40	0.067	1	?42	Savoy, red, white Cabbage

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Cabbages	Germany	F	EC 404 g/l	Spray, ≤16 leaf stage	0.24	0.02 to 0.04	2	?14	Savoy, red, white Cabbage
	Netherlands	F	EC 400 g/l	Spray before 16th leaf stage	0.30	0.038 to 0.075	1 – 2	21	Red, white, pointed, Savoy, and oxheart cabbage
	Norway	F	EC 500 g/l	Spray	0.05	(100ml in 20 to 30 l water/ha		21	
	Poland	F	EC 400 g/l	Spray, HV	0.24	0.04 - 0.12	1 – 2	21	Late cabbage
	Poland	F	EC 400 g/l	Spray, HV	0.08 l of spray liquid/ plant	0.04	2	60	Early cabbage
	Poland	F	EC 222 g/l	Spray, HV	0.1 l of spray liquid/ plant	0.02	1 – 2	60	Cabbage (watering)
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		21	1-1.5 l/ha
	Sweden	F	EC 400 g/l	Spray, best at beginning of July and directed to root area		0.02		28	0.5 l/linear metre
Calabrese	UK	F	EC 400 g/l	Spray	0.40	0.067 to 0.04	6	21	
	UK	F	EC 400 g/l	Spray, LV	0.40	0.059 to 0.024	6	21	
Capsicums	Australia	F	EC 400 g/l	Dip		0.04	1	0	Quarantine use
	Australia	F	EC 400 g/l	Spray		0.03	As necessary	7	
Carrots	Finland	F	EC 400 g/l	Spray, direct the spray solution at the base of the plants		0.02		28	0.5 l/row metre(4.1 l/ha when the raw interval is 60 cm)
	Germany	F	EC 400 g/l	Spray	0.24 to 0.36		2	14 - 28	
	Germany	F	EC 400 g/l	Spray	1.2	0.12	1 per season	28	
	Ireland	F	EC 400 g/l	Spray, LV	0.34		Repeat at 2 week intervals	At least 7 days after last appl.	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.025 to 0.10	1 - 3	21	
	Poland	F	EC 400 g/l	Spray, HV	0.24	0.04 to 0.12	1 – 2	21	
	Poland	F	EC 400 g/l	Spray, HV, for late harvest		0.04	2	60	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Carrots	Sweden	F	EC 400 g/l	Spray		0.02		28	Directed with irrigation water towards roots application rate 0.05%
Cauliflowers	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
	Germany	F	EC 400 g/l	Band spray, ≤16 leaf stage	0.40	0.067 to 0.20	1	42	
	Germany	F	EC 404 g/l	Band spray, ≤16 leaf stage	0.40	0.067	1	42	
	Netherlands	F	EC 400 g/l	Spray before 16th leaf stage	0.20	0.025 to 0.05	1 – 2 (or repeat as necessary)	21	
	Poland	F	EC 400 g/l	Spray, HV	0.08 l spray liquid/ plant	0.04	2	42	
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		21	1-1.5 l/ha
	UK	F	EC 400 g/l	Spray	0.40	0.067 to 0.04	6	21	
	UK	F	EC 400 g/l	Spray, LV	0.40	0.059 to 0.024	6	21	
Celery	Belgium	F	EC 400 g/l	Spray	0.2			3 weeks	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.04		20	
Cereals	Denmark	F	EC 500 g/l	Spray	0.30 to 0.75			Not to be treated within 2 weeks of eating	
	Sweden	F	EC 400 g/l	Spray, only permitted at sprouting and tillering stage	0.16 to 0.32			28	(0.4-0.8 l/h)
Cereals and herbage seed crops	Ireland	F	EC 400 g/l	Spray, LV	0.34			at least 7 days after last appl.	
Cereal grains	Finland	F	EC 400 g/l	Spray, only at sprouting/ germinating stage	0.16 to 0.32 (0.4 to 0.8 l/ha)			28	
	Norway	F	EC 500 g/l	Spray	0.04	80ml in 20-30 l water/ha		21	
	Poland	F	EC 400 g/l	Spray, HV, early growth stage	0.20	0.05 to 0.13	1 – 2	21	
	Poland	F	EC 400 g/l	Spray, HV, after earing to milk stage	0.20	0.05 to 0.13	1 – 2	21	
	Poland	F	EC 400 g/l	Spray, HV	0.20	0.05 to 0.13	1 – 2	21	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Cereal grains	Poland	F	EC 400 g/l	Spray, HV at beginning of growth stage	0.24	0.06 to 0.16	1 – 2	21	
Cherries	Australia	F	EC 400 g/l	Spray or dip		0.04		Not stated	
	Austria	F	EC 500 g/l	Spray		0.01		21	application rate 0.025%
	Belgium	F	EC 400 g/l	Spray		0.02 to 0.03		2 weeks	
	Germany	F	EC 400 g/l	Spray, (m height of tree crown)	0.20, 0.6 for standard tree, 3 m	0.04	1 not more than 3 applications	21	Cherry sweet and sour
	Germany	F	EC 400 g/l	Spray (m height of tree crown)	0.20	0.04	2 (8 – 14 days)	21	
	Germany	F	EC 400 g/l	Spray (m height of tree crown)	0.20, 0.6 for standard tree, 3 m	0.04	3 (8 – 14 days) not more than 3 applications	21	
	Germany	F	EC 404 g/l	Spray (m height of tree crown)	0.20, 0.6 for standard tree, 3 m	0.04	3	21	
	Italy	F	EC 400 g/l	Spray, at ripening of fruit		0.02		20	
	Portugal	F	EC 400 g/l	Spray, one month from harvest		0.02 to 0.04	repeated if necessary	2 weeks	
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		14	1-1.5 l/ha
Chick-peas	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		28	1-1.5 l/ha
Chives	Germany		EC 400 g/l	Nursery bed	0.24	0.04 to 0.06	3 (6-10 days)	Not required	Do not eat harvest produce
	Germany		EC 400 g/l	Nursery bed	1.2	0.12	1	Not required	Do not eat harvest produce
Citrus	Australia	F	EC 400 g/l	Dip, topping up		0.04	1	0	100 ml/100 l quarantine use
	Australia	F	EC 400 g/l	Spray		0.03	2 - 3	7	
	Brazil*	F	EC 400 g/l	Spray		0.04		3	
	Brazil	G	EC 400 g/l	Lacquer		0.2		90	Bait, 500 cc+ 2kg sugar/100 l water
	Greece	F	EC 400 g/l	Spray, cover spray, low-volume bait spray, ULV bait spray		0.03		20	Grapefruit, lemons, mandarins, oranges. 0.9% for ULV in bait

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Citrus	Italy	F	EC 400 g/l	Spray, 1st appl. May-June, 2nd appl. June-July		0.048	Repeat as necessary	Not required	Plants not yet in production
	Italy	F	EC 400 g/l	Spray		0.028 to 0.036		Not required	Plants not yet in production
	Italy	F	EC 400 g/l	Spray, Sep/Oct		0.048		Not required	Plants not yet in production
	Italy	F	EC 400 g/l	Spray		0.05		Not required	Plants not yet in production
	Italy	F	EC 400 g/l	Spray		0.04		20	
	Italy	F	EC 400 g/l	Spray		0.05		20	
	Morocco	F	EC 400 g/l	Spray		0.03 to 0.06			
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06			Only for plants without fruit production. 1-1.5 l/ha
	Spain	F	EC 400 g/l	Spray		0.04-0.06		21	
	Thailand	F	EC 400 g/l	Spray	0.3 to 0.6	0.02 to 0.04		3	
Cotton	Brazil	F	EC 400 g/l	Spray	0.160 to 0.500			14	
	France	F	EC 390 g/l	Spray	0.36 (1 l/h)				(mm)
	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		14	
	Spain	F	EC 400 g/l	Spray		0.04 to 0.06		28	
Cruciferous crops	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
Cruciferous root crops	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
Currants and gooseberries	Sweden	F	EC 400 g/l	Spray, before blossoming starts or within a week after blossoming has ceased		0.02		28	application rate 0.05%
Eggplants	Australia	F	EC 400 g/l	Spray or dip		0.04		Not stated	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.040		21	
Fodder beet	Germany	F	EC 400 g/l	Spray	0.16	0.027 to 0.08	1	35	
	Germany	F	EC 404 g/l	Spray	0.16	0.027	1	35	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	1	Not stated	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Fodder beet	Netherlands	F	EC 400 g/l	Spray	0.10	0.0166 to 0.05	max. 2	Not stated	
	Poland	F	EC 400 g/l	Spray, HV	0.32 to 0.40	0.08 to 0.21, 0.10 to 0.27	1 – 2	21	Same use for two pests
	Poland	F	EC 400 g/l	Spray, HV	0.32	0.08 to 0.21	1 – 2	21	
	Poland	F	EC 222 g/l	Spray, HV	0.33	0.08 to 0.22	1 – 2	30	(m)
	UK	F	EC 400 g/l	Spray, before 30 June, LV	0.084	0.038	1	Latest timing 30 June in year of harvest	For aerial appl., 25-60 l water/ha.
	UK	F	EC 400 g/l	Spray, LV	0.40	0.089	1		
	UK	F	EC 400 g/l	Spray, before 30th June	0.084	0.042 to 0.008	1		
	UK	F	EC 400 g/l	Spray, before 30th June	0.40	0.10 to 0.04	1		
Fruit bushes	Denmark	F	EC 500 g/l	Spray	0.35 to 0.60			Not to be treated within 2 weeks of eating	
Fruit trees	Austria	F	EC 500 g/l	Spray		0.02	Repeat spray after 3 – 5 days	35	(0.05%) 5ml in 10L water
	Morocco	F	EC 400 g/l	Spray		0.04 to 0.06			
	Poland	F	EC 400 g/l	Spray, HV	0.6 to 0.9	0.06 to 0.12, 0.09 to 0.18	1 – 2	21	
	Poland	F	EC 400 g/l	Spray, HV	0.6 to 0.9	0.06 to 0.08, 0.12 to 0.18	1 – 2	21	
	Poland	F	EC 222 g/l	Spray, HV	0.33	0.03 to 0.07	1 – 2	30	(m)
Figs	Greece	F	EC 400 g/l	Spray		0.03		25	
Grass and grass seed	Denmark	F	EC 500 g/l	Spray	0.30 to 0.75			Not to be treated within 2 weeks of eating	
	Norway	F	EC 500 g/l	Spray	0.04	(80ml in 20-30 l water/ha		21	
Herbs	Poland	F	EC 400 g/l	Spray, HV	0.24 to 0.40	0.04	1 – 2	21	
	UK	F	EC 400 g/l	Spray, LV	0.34	0.155	4	14	Herbage seed crop
Hops	Ireland	F	EC 400 g/l	Spray, HV, late May to early June, repeat as necessary		0.034		At least 7 days after last appl.	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Horticulture	Austria	F	EC 500 g/l	Spray		0.02		35	(0.05%) 5ml in 10 L water
Kale; small radishes (feed)	Germany	F	EC 400 g/l	Spray	1.2		1 per season	42	
Kale; Chinese leaves	Netherlands	F	EC 400 g/l	Spray	0.20		Repeat as necessary	21	
Stone fruit	Germany	F	EC 400 g/l	Spray	0.40 (0.1%)		1, ≥ 5 appl. total	21	
	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		25 Except cherries; 21 – 30 according to dose	Apricot, Morello cherries, peach
	Spain	F	EC 400 g/l	Spray		0.04 to 0.06		21	
Leafy vegetables green (lettuce, spinach, Chinese leaves, cabbage)	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating, or 3 weeks for lettuce	
Legumes: beans dry, lentils, clover, lucerne, peas, chickpeas, broad beans	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		14	Dosage depends on the growth stage and severity of attack
Lettuce, head	Denmark	F	EC 400 g/l	Spray	0.32	0.106 to 0.213		21	
	Germany	F	EC 400 g/l	Spray, ≤16 leaf stage	0.24 to 0.36	0.02 to 0.12	2	21	
	Germany	F	EC 404 g/l	Spray	0.24	0.04 to 0.12	2	21	
	Germany	F	EC 400 g/l	Spray, ≤16 leaf stage	0.40		1	21	
	Ireland	F+G	EC 400 g/l	Spray, LV	0.34		Repeat as necessary	At least 7 days after last appl.	28 days in glasshouses
	Ireland	F+G	EC 400 g/l	Spray, HV		0.034	Repeat as necessary	At least 7 days after last appl.	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.040		14	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.025 to 0.10	1 – 2	21	cabbage lettuce, lamb's lettuce, iceberg lettuce
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		14	1-1.5 l/ha
	UK	F	EC 400 g/l	Spray	0.34	0.17 to 0.034	6	14	
	UK	F	EC 400 g/l	Spray	0.34	0.155	6	14	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Maize	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
	Greece	F	EC 400 g/l	Spray		0.03		14	
	Netherlands	F	EC 400 g/l	Spray, grains and for fodder	0.20	0.033 to 0.10	1	Not stated	green fodder maize and green maize
Mangels	UK	F	EC 400 g/l	Spray, before 30 June, LV	0.084	0.038	1		for aerial appl., 25-60 l water/ha
	UK	F	EC 400 g/l	Spray, LV	0.4	0.089	1		
	UK	F	EC 400 g/l	Spray, LV	0.4	0.089	1		Mangel seed crops
	UK	F	EC 400 g/l	Spray, before 30 June	0.084	0.042 to 0.008	1		
	UK	F	EC 400 g/l	Spray, before 30 June	0.40	0.10 to 0.04	1		
Mangoes	Australia	F	EC 400 g/l	Spray or dip		0.04		Not stated	dip 1 min. Quarantine use
Nuts (almonds, walnuts, hazel nuts)	Greece	F	EC 400 g/l	Spray		0.03 to 0.04		25	
Oats	Germany	F	EC 400 g/l	Spray, <23-30 days	0.68		1	21	
	Germany	F	EC 400 g/l	Spray, 1st appl. 23-30 2nd appl. <55	1st appl. 0.68 2nd appl. 0.34		2	21	
	Netherlands	F	EC 400 g/l	Spray,	0.20	0.033 to 0.10	1	14	
	Portugal	F	EC 400 g/l	Spray		0.04		2 weeks	
Olives	Greece	F	EC 400 g/l	Spray, repeated in not less than 20 days, LV bait spray from ground, starting end June to beginning of July, ULV from air only		0.03 (0.3% in bait LV) (0.9% in Bait ULV)		20 (cover spray), 15 (LV and ULV)	
	Italy	F	EC 400 g/l	Spray, 1st appl. Sept./Oct.		1st appl. 0.056, 2nd, 3rd appls. 0.03 to 0.04	3	28	#1
	Italy	F	EC 400 g/l	Spray		0.028 to 0.056		28	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Olives	Italy	F	EC 400 g/l	Spray, July or Sept./Oct.		0.056		28	
	Italy	F	EC 400 g/l	Spray, August		0.03		28	
	Morocco	F	EC 400 g/l	Spraying		0.04 to 0.06			
	Portugal	F	EC 400 g/l	Spray, 1st appl. Jul/Aug, 2nd appl. Sept/Oct.		1st appl. 0.03 2nd appl. 0.06	2	6 weeks	
	Portugal	F	EC 400 g/l	Spray, Sept./Oct.		0.06	1	6 weeks	
	Portugal	F	EC 400 g/l	Spray, close to harvest		0.03	1	3 weeks	
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		60	#2 1-1.5 l/ha
	Spain	F	EC 400 g/l	Spray, LV		0.05 to 0.06		60	#3 1-1.5 l/ha
Onions	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
	Finland	F	EC 400 g/l	Immersion of seedlings for 15 min. before planting		0.04		28	for watering 0.5 l/row metre
	Germany	F	EC 400 g/l	Spray	0.24 to 0.36	0.02 to 0.12	2	14	
	Germany	F	EC 404 g/l	Spray	0.24	0.02 to 0.04	2	14	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.025 to 0.10	1	21	1st and 2nd year planted onions, sown onions, picklers, silverskin onions and shallots
	Poland	F	EC 400 g/l	Spray, HV		0.04	1 – 2	60	
	Sweden	F	EC 400 g/l	Spray		0.02		28	Also, 0.1% for dip treatment, 15 min. for onion sets before planting
Parsley	Poland	F	EC 400 g/l	Spray, HV	0.24	0.04 to 0.12	1 – 2	21	
	Poland	F	EC 400 g/l	Spray, HV, for late harvest		0.04	2	60	
Parsnips	Italy	F	EC 400 g/l	Spray		0.028 to 0.040		30	
Pears	Australia	F	EC 400 g/l	Spray or dip		0.04		Not identify	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Pears	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		30	
	Ireland	F	EC 400 g/l	Spray, LV	0.52 to 0.68			At least 7 days after last appl.	
	Ireland	F	EC 400 g/l	Spray, HV		0.026 to 0.034		At least 7 days after last appl.	
Peas	Belgium	F	EC 400 g/l	Spray	0.20			3 weeks	Field peas, 500 ml/ha
	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
	Ireland	F	EC 400 g/l	Spray, LV, at early green bud stage, repeat after 7 days in heavily infested crops	0.34			At least 7 days after last appl.	
	Portugal	F	EC 400 g/l	Spray		0.02 to 0.04		2 weeks	
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		14	1-1.5 l/ha
Plums	Australia	F	EC 400 g/l	Spray or dip		0.02 to 0.04		Not stated	
	Belgium	F	EC 400 g/l	Spray		0.02		3 weeks	
	Germany	F	EC 400 g/l	Spray	0.40 (0.1%)		1	14	
	Germany	F	EC 400 g/l	Spray	0.40 (0.1%)		3	14	
	Ireland	F	EC 400 g/l	Spray, LV	0.52 to 0.68			At least 7 days after last appl.	
	Ireland	F	EC 400 g/l	Spray, HV		0.026 to 0.034		At least 7 days after last appl.	
Pome fruit	Australia	F	EC 400 g/l	Spray		0.03	2 - 3	7	
	Denmark	F	EC 500 g/l	Spray	0.60 to 1.00			Not to be treated within 2 weeks of eating	
	Germany	F	EC 400 g/l	Spray	0.40 (0.1%)		1 Not more than 5 applications	21	
	Germany	F	EC 400 g/l	Spray	0.40 (0.1%)		3 Not more than 5 applications	21	
Potatoes	Australia	F	EC 400 g/l	Spray		0.03		7	
	Belgium	F	EC 400 g/l	Spray	0.20			3 weeks	500 ml/ha

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Potatoes	Denmark	F	EC 500 g/l	Spray	0.30			Not to be treated within 2 weeks of eating	
	Germany	F	EC 400 g/l	Spray	0.24	0.04 to 0.12	1	14	
	Germany	F	EC 404 g/l	Spray	0.24	0.04	1	14	
	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		14	Dose range depends on growth stage and severity of attack
	Ireland	F	EC 400 g/l	Spray, LV	0.34			At least 7 days after last appl.	Ware crops, seed crops
	Ireland	F	EC 400 g/l	Spray, HV		0.03		At least 7 days after last appl.	Seed crops
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	Max. 2	21	Seed, ware, starch (eating and industrial potatoes)
	Netherlands	F	EC 400 g/l	Spray, a emergence and 10-14 days later	0.40	0.066 to 0.20	1	21	Seed
	Netherlands	F	EC 400 g/l	Glasshouse appl., 2-3 days before selection	0.40	0.066 to 0.20	1	21	Seed
	Poland	F	EC 400 g/l	Spray, HV, 1st treatment 7-19 days after sprouting	0.40	0.10 to 0.27	1 - 3	21	
	Poland	F	EC 400 g/l	Spray, HV.	0.40	0.10 to 0.27	1 – 3	21	
	Poland	F	EC 222 g/l	Spray, HV, 7-10 days after sprouting	0.33	0.08 to 0.22	1 – 2	30	(m)
	Poland	F	EC 222 g/l	Spray, HV	0.22 to 0.33	0.06 to 0.15, 0.08 to 0.22	1 – 3	30	(m)
	Spain	F	EC 400 g/l	Spray		0.04 to 0.06		60	
Radishes	Germany	F	EC 400 g/l	Spray	1.2		2 per season	21	
	Poland	F	EC 400 g/l	Spray, HV		0.04	1 – 2	21	Black radishes
Raspberries	Australia	F	EC 400 g/l	Spray or dip		0.04		Not stated	
Raspberries and gooseberries	Ireland	F	EC 400 g/l	Spray, LV, immediately before first flowers open	0.68			At least 7 days after last appl.	
	Ireland	F	EC 400 g/l	Spray, HV		0.034		At least 7 days after last appl.	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Rye	Denmark	F	EC 400 g/l	Spray, deadline 3 weeks, no later than GS 69	0.32	0.106 to 0.213		21	
	Germany	F	EC 400 g/l	Spray, <55 days	0.24	0.04 to 0.12	1	21	Earliest commercial harvest
	Germany	F	EC 404 g/l	Spray	0.24	0.04	1	21	
	Germany	F	EC 400 g/l	Spray, <23-30 days	0.68	-	1	21	
	Germany	F	EC 400 g/l	Spray, 1st appl.23-30 2nd appl.<55	1st appl. 0.68, 2nd appl. 0.34		2	21	
	Italy	F	EC 400 g/l	Spray, end of flowering		0.028		28	
	Italy	F	EC 400 g/l	Spray		0.020 to 0.022		28	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	1	14	Winter and spring rye
	UK	F	EC 400 g/l	Spray, do not apply after GS 30, LV	0.68	0.309	1		Winter and spring rye. For aerial appl., 25-60 l water/ha, permitted up to 13 March
	UK	F	EC 400 g/l	Spray, LV	0.34	0.155	1		Winter and spring rye. For aerial appl., 25-60 l water/ha, permitted up to 13 March
	UK	F	EC 400 g/l	Spray, do not apply after GS 30	0.34	0.17 to 0.085	2		
Red beet (table)	Poland	F	EC 400 g/l	Spray, HV.	0.32	0.05 to 0.16	1 – 2	21	
	UK	F	EC 400 g/l	Spray, before 30 June, LV	0.084	0.038	1		For aerial appl., 25-60 l water/ha
	UK	F	EC 400 g/l	Spray, LV	0.4	0.089	1		
Root vegetables	Netherlands	F	EC 400 g/l	Spray, open ground	0.20				21
Stone fruit	Denmark	F	EC 500 g/l	Spray	0.60 to 1.00			Not to be treated within 2 weeks of eating	
	Spain	F	EC 400 g/l	Spray		0.04 to 0.06		21	
Strawberries	Australia	F	EC 400 g/l	Spray		0.03	As necessary	1	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Strawberries	Denmark	F	EC 500 g/l	Spray	0.35 to 0.60			Not to be treated within 2 weeks of eating	
	Germany	F	EC 400 g/l	Spray plants, LV, before flowering or after harvesting fruit	0.40		2 (8-14 days interval)	Covered by permitted use	
	Ireland	F	EC 400 g/l	Spray, before flowering, repeat if necessary up to 7 days before picking or immediately afterwards	0.34			At least 7 days after last appl.	
Sugar beet	Finland	F	EC 400 g/l	Spray, start end May-beginning June	0.16 to 0.32, (0.4 to 0.8 l/h)			28	
	Germany	F	EC 400 g/l	Spray	0.16	0.027 to 0.08	1	35	
	Germany	F	EC 404 g/l	Spray	0.16	0.027	1	35	
	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		14	
	Italy	F	EC 400 g/l	Spray		0.020 to 0.040		30	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	1	Not stated	
	Netherlands	F	EC 400 g/l	Spray	0.10	0.017 to 0.05	Max. 2	Not stated	
	Poland	F	EC 400 g/l	Spray, HV	0.32-0.40	0.08 to 0.21, 0.10 to 0.27	1 – 2	21	Same use for two pests
	Poland	F	EC 400 g/l	Spray, HV	0.32	0.08 to 0.21	1 – 2	21	
	Poland	F	EC 222 g/l	Spray, HV	0.33	0.08 to 0.22	1 – 2	30	(m)
	Spain	F	EC 400 g/l	Spray, LV		0.04 to 0.06		60	1-1.5 l/ha
	Sweden	F	EC 400 g/l	Spray	0.16 to 0.32			28	(0.4-0.8 l/ha)
	UK	F	EC 400 g/l	Spray, before 30 June, LV	0.084	0.038	1		For aerial appl., 25-30 l water/ha
	UK	F	EC 400 g/l	Spray, LV	0.4	0.089	1		
	UK	F	EC 400 g/l	Spray, LV	0.4	0.089	1		Sugar beet seed crop
	UK	F	EC 400 g/l	Spray, before 30 June	0.084	0.042 to 0.008	1		
	UK	F	EC 400 g/l	Spraying before 30th June	0.40	0.10-0.04	1		

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Sugar beet and mangel stecklings	Ireland	F	EC 400 g/l	Spray, LV	0.34			At least 7 days after last appl.	
Sugar beet and mangel seed crops	Ireland	F	EC 400 g/l	Spraying LV, repeat after 2-3 weeks if re-infestation occurs	0.40			At least 7 days after last appl.	
Swedes	Denmark	F	EC 500 g/l	Spraying	0.30			Not to be treated within 2 weeks of eating	
Swedes “turnips”, “rutabagas”	Germany	F	EC 400 g/l	Spray	0.16		1	35	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.040		30	
Tomatoes	Australia	F	EC 400 g/l	Dip		0.04	1	0	Quarantine use
	Australia	F	EC 400 g/l	Spray		0.03		7	
	Brazil*	F	EC 400 g/l	Spray		0.04		14	
	Germany	G	EC 400 g/l	Spray, <50 cm	0.24		3	3	
	Germany	G	EC 400 g/l	Spray, 50 – 125 cm	0.36		3	3	
	Germany	G	EC 400 g/l	Spray, >25 cm	0.48		3	3	
	Ireland	F	EC 400 g/l	Spray		0.034		At least 7 days after last appl.	
	Italy	F	EC 400 g/l	Spray		0.028 to 0.040		21	
Triticale	Denmark	F	EC 400 g/l	Spray, deadline 3 weeks, no later than GS 69	0.32	0.106 to 0.213		21	
	Germany	F	EC 400 g/l	Spray <23-30 days	0.68	-	1	21	
	Germany	F	EC 400 g/l	Spray, 1st appl. 23-30, 2nd appl. <55	1st appl. 0.68, 2nd appl. 0.34	-	2	21	
	Italy	F	EC 400 g/l	Spray, end of flowering		0.028		28	
	Italy	F	EC 400 g/l	Spray		0.020 to 0.022		28	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	1	14	
	UK	F	EC 400 g/l	Spray, do not apply after GS 30, LV	0.68	0.309	1		For aerial appl. 25-60 l water/ha, permitted up to 31 March

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Triticale	UK	F	EC 400 g/l	Spray, do not apply after GS 69, LV	0.34	0.155	1		For aerial appl. 25-60 l water/ha, permitted up to 31 March
	UK	F	EC 400 g/l	Spray, do not apply after GS 30	0.34	0.17 to 0.085	2		
Turnip	USA	F	EC 400 g/l	Spray	0.234			14	
Vegetables (beetroot, carrot, radish, onion, tomato, peppers, aubergines, broccoli, cauliflower, cabbage, lettuce, spinach)	Greece	F	EC 400 g/l	Spray		0.03 to 0.05		20 Except cabbage 40, onion 45	Dose depends on the growth stage and severity of attack
Vegetables	Morocco	F	EC 400 g/l	Spray		0.03 to 0.04			
Vines or viniculture	Austria	F	EC 500 g/l	Spray		(0.05%)		35	
Vines	Greece	F	EC 400 g/l	Spray		0.04 to 0.05		25	
Wheat	Brazil*	F	EC 400 g/l	Spray	0.252			28	
	Denmark	F	EC 400 g/l	Spray, deadline 3 weeks, no later than GS 69	0.32	0.106 to 0.213		21	
	Germany	F	EC 400 g/l	Spray, <55 days	0.24	0.04 to 0.12	1	21	Earliest commercial harvest
	Germany	F	EC 404 g/l	Spray	0.24	0.04	1	21	
	Germany	F	EC 400 g/l	Spray <23-30 days	0.68	-	1	21	
	Germany	F	EC 400 g/l	Spray, 1st appl. 23-30, 2nd appl.<55	1st appl. 0.68, 2nd appl. 0.34	-	2	21	
	Ireland	F	EC 400 g/l	Spray, LV	0.68			At least 7 days after last appl.	
	Italy	F	EC 400 g/l	Spray, end of flowering		0.028		28	
	Italy	F	EC 400 g/l	Spray		0.020 to 0.022		28	
	Netherlands	F	EC 400 g/l	Spray	0.20	0.033 to 0.10	1	14	Winter and spring wheat
	Portugal	F	EC 400 g/l	Spray		0.04		2 weeks	

Crop	Country	F/G*	Form	Application				PHI, days	Remarks
				Method	Rate, kg ai/ha	Spray conc. kg ai/hl	Number (interval) Limits		
Wheat	UK	F	EC 400 g/l	Spray, do not apply after GS 30, LV	0.68	0.309	1		Winter and spring wheat (aerial appl., 25-60 l water/ha, permitted up to 31 March)
	UK	F	EC 400 g/l	Spray, do not apply after GS 30, LV	0.68	0.34 to 0.17	1		Winter and spring wheat (aerial appl., 25-60 l water/ha, permitted up to 31 March)
	UK	F	EC 400 g/l	Spray, do not apply after GS 69, LV	0.34	0.17 to 0.034	1		Winter and spring wheat (aerial appl., 25-60 l water/ha, permitted up to 31 March)
	UK	F	EC 400 g/l	Spray, do not apply after GS 69, LV	0.34	0.155	1		Winter and spring wheat (aerial appl., 25-60 l water/ha, permitted up to 31 March)
Witloof chicory	Belgium	F	EC 400 g/l	Spray	0.30			3 weeks	
	Netherlands	F	EC 400 g/l	Spray	0.30				Pegged cultivation
	Netherlands	F	EC 400 g/l	Spray	0.20		1	21	Open ground of the pegged cultivation
Witloof chicory and endive (staked)	Netherlands	F	EC 400 g/l	Spray	0.20		1	21	(ch-1) (ch-2) (ch-3)

HV High volume spray.
LV Low volume spray.
ULV Ultra low volume spray.
(m) Mixture of dimethoate (22.2%) + chlorpyrifos (27.8%).
#1 If poisoned bait is used: 230 ml Rogor l40 + 1 l of protein bait per hl water. The first treatment must be carried out at the onset of infestation. It must be followed by a further 2-4 l, 15-20 days apart, to be repeated in the case of heavy and prolonged rainfall. The mixture of poisoned bait must be applied at 250-500 ml per plant, in relation to the volume of foliage, branches and tree top, giving preference to higher branches and those exposed to the south.
#2 In the case of green olive varieties (for cooking Seville-style), the minimum safe period for harvesting is 12 days.
#3 Treatment of strips or patches with a solution of 2.5 l of formulation + 2.5 l of hydrolyzed protein for every 100 l of water, for aerial application, and 0.65 l of formulation + 0.056 l of hydrolyzed protein for every 100 l of water, for patches of land.
* Brazil: spraying to be carried out when infestations reach levels which are economically harmful to the crops; areas must be checked weekly after each application.
(mm) Mixture of 30 g/l cypermethrin + 360 g/l dimethoate.
(ch-1) Staked cultivation of chicory and endive (0.30 kg ai/ha).
(ch-2) Traction cultivation of endive. Treat when setting out the stakes (12.5 ml/ 10 m^2).
(ch-3) Draught cultivation of witloof. Treat when setting out the pegs (12.5 ml/ 10 m^2).

RESIDUES RESULTING FROM SUPERVISED TRIALS ON CROPS

The meeting received information from supervised field trials on: citrus fruits, cherries, olives, cauliflowers, Brussels sprouts, cabbages, capsicums (sweet peppers), melons, tomatoes, lettuce, sugar beet, turnips, artichokes, asparagus, celery and wheat. The results are summerized in Tables 12-28.

Fruit	Table 12	Citrus fruit: orange, pomelo, mandarin/clementine, lemon
	Table 13	Cherries
	Table 14	Mangoes
	Table 15	Olives
Vegetables	Table 16	Cauliflowers
	Table 17	Brussels sprouts
	Table 18	Cabbages
	Table 19	Capsicums (sweet peppers)
	Table 20	Melons
	Table 21	Tomatoes
	Table 22	Lettuce
	Table 23	Sugar beet
	Table 24	Turnips
	Table 25	Artichokes
	Table 26	Asparagus
	Table 27	Celery
Cereals	Table 28	Wheat

Table 12. Residues data summary from supervised trials of dimethoate EC 400 g/l on citrus fruit.

CITRUS FRUIT	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
Location, year, variety, report No.	kg ai/ha	kg ai/hl	water l/ha	No.			Dimethoate	Omethoate
Oranges								
Spain (Santiponce), 1999,	2.07	0.06	3483	3	Whole fruit	0	1.39	<0.01
Naveline (FC 0004)	2.05	0.06	3461			7	0.75	0.05
Wilson (2001a)	2.16	0.06	3494			14	0.66	0.04
DTF Doc. No.532-0404 [1/]						21	0.65	0.05
SCI 022 / 004697						29	0.43	0.03
					Peel	21	2.60	0.13
						29	1.90	0.11
					Pulp	21	0.02	0.03
						29	0.02	0.03
Spain (Benimamet), 2000	2.18	0.06	3503	3	Whole fruit	0	1.98	0.02
Naveline (FC 0004)	2.22	0.06	3561			7	2.21	0.06
Wilson (2001b)	2.20	0.06	3523			15	0.98	0.08
DTF Doc. No.532-0301 [2/]						22	0.85	0.04
SCI 039 / 012960						28	0.73	0.04
					Peel	22	4.94	0.16
						28	2.76	0.07
					Pulp	22	0.03	0.03
						28	<0.01	0.02
Spain (Benimamet), 2001	2.19	0.06	3513	3	Whole fruit	0	2.35	0.04
Naveline (FC 0004)	2.19	0.06	3507			21	0.83	0.05
Wilson (2002a)	2.19	0.06	3505			29	0.36	0.03
DTF Doc. No.532-0405 [3/]								
SCI 073 / 022774					Peel	21	3.48	0.20
						29	2.18	0.09
					Pulp	21	0.01	0.08
						29	0.02	0.02

CITRUS FRUIT Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			Dimethoate	Omethoate
Italy (Territorio), 1999	2.08	0.06	3507	3	Whole fruit	0	1.24	<0.01
Naveline (FC 0004)	2.08	0.06	3501			7	0.63	0.05
Wilson (2001a)	2.16	0.06	3488			14	0.56	0.05
DTF Doc. No.532-0404 [1/]						21	0.29	0.03
SCI 022 / 004697						28	0.18	0.03
					Peel			
						21	0.74	0.06
						28	0.72	0.06
					Pulp			
						21	<0.01	0.01
						28	<0.01	0.01
Italy (Cagnano Varano), 2001	2.18	0.06	3500	3	Whole fruit	0	2.33	0.02
Naveline (FC 0004)	2.19	0.06	3504			21	0.89	0.02
Wilson (2001b)	2.19	0.06	3507			28	1.50	0.04
DTF Doc. No.532-0301 [2/]								
SCI 039 / 012960					Peel	21	4.12	0.06
						28	4.84	0.08
					Pulp	21	0.06	0.01
						28	0.07	0.02
Greece (Karies), 2000	2.18	0.06	3503	3	Whole fruit	0	1.85	<0.01
Naveline (FC 0004)	2.19	0.06	3504			22	0.77	0.02
Wilson (2001b)	2.18	0.06	3499			28	0.47	<001
DTF Doc. No.532-0301 [2/]								
SCI 039 / 012960					Peel	22	1.94	0.02
						28	1.70	0.02
					Pulp	22	0.02	<0.01
						28	<0.01	<0.01
Greece (Koutsopodio), 2000	2.19	0.06	3805	3	Whole fruit	0	0.83	<0.01
Naveline (FC 0004)	2.18	0.06	3497			7	0.82	<0.01
Wilson (2001b)	2.19	0.06	3506			14	0.26	<0.01
DTF Doc. No.532-0301 [2/]						21	0.41	<0.01
SCI 039 / 012960						27	0.41	0.03
					Peel	21	1.93	0.03
						27	0.47	<0.01
					Pulp	21	<0.01	<0.01
						27	<0.01	<0.01
Greece (Koutsopodio), 2001	2.19	0.06	3504	3	Whole fruit	0	1.25	<0.01
Naveline (FC 0004)	2.18	0.06	3502			21	0.37	<0.01
Wilson (2002a)	2.18	0.06	3496			28	0.02	<0.01
DTF Doc. No.532-0405 [4/]								
SCI 073 / 022774					Peel	21	1.69	0.02
						28	0.07	<0.01
					Pulp	21	0.01	<0.01
						28	<0.01	<0.01

CITRUS FRUIT Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			Dimethoate	Omethoate
Brazil (Iracemapolis/SP), 2002	0.80	0.04	2000	3	Whole fruit	0	0.23	<0.30
Citrus, variety Pear (FC 0004),	0.80	0.04	2000			3	0.20	<0.30
(Anonymous 2002a) [5/]	0.80	0.04	2000			7	0.24	<0.30
CDRI/02/RCHE280/plantec-02,						14	0.45	<0.30
(Report 1)						21	0.11	<0.30
					Peel	0	0.67	<0.30
						3	0.56	<0.30
						7	0.53	<0.30
						14	0.54	<0.30
						21	1.69	<0.30
					Pulp	0	0.05	<0.30
						3	0.08	<0.30
						7	0.09	<0.30
						14	0.03	<0.30
						21	0.04	<0.30
Brazil (Iracemapolis/SP), 2002	1.60	0.08	2000	3	Whole fruit	3	0.97	<0.30
Citrus, variety Pear (FC 0004)	1.60	0.08	2000					
(Anonymous 2002a) [5/]	1.60	0.08	2000					
CDRI/02/RCHE280/plantec-03,					Peel	3	1.81	<0.30
(Report 1)								
					Pulp	3	0.32	<0.30
Brazil (Santa Rita do Passa	0.80	0.04	2000	3	Whole fruit	3	0.15	<0.30
Quatro/SP), 2002	0.80	0.04	2000					
Citrus, variety Pear (FC 0004),	0.80	0.04	2000					
(Anonymous 2002b) [5/]					Peel	3	0.77	<0.30
R/02/RCHE281/ Plantec-02,								
(Report 2)					Pulp	3	0.13	<0.30
Brazil (Santa Rita do Passa	1.60	0.08	2000	3	Whole fruit	3	0.77	<0.30
Quatro/SP), 2002	1.60	0.08	2000					
Citrus, variety Pear (FC 0004)	1.60	0.08	2000					
(Anonymous 2002b) [5/]					Peel	3	2.42	<0.30
R/02/RCHE281/ Plantec-03,								
(Report 2)					Pulp	3	0.59	<0.30
Brazil (Tatui/SP), 2002	0.80	0.04	2000	3	Whole fruit	3	0.48	<0.30
Citrus, variety Pear (FC 0004)	0.80	0.04	2000					
(Anonymous 2002c) [5/]	0.80	0.04	2000					
R/02/RCHE282/ Plantec-02,					Peel	3	0.71	<0.30
(Report 3)								
					Pulp	3	0.09	<0.30
Brazil (Tatui/SP), 2002	1.60	0.08	2000	3	Whole fruit	3	1.33	<0.30
Citrus, variety Pear (FC 0004)	1.60	0.08	2000					
(Anonymous 2002c) [5/]	1.60	0.08	2000					
R/02/RCHE282/ Plantec-03,					Peel	3	2.33	<0.30
(Report 3)								
					Pulp	3	0.71	<0.30
Thailand (Ratchaburi), 2001	0.60	0.04	1500	4	Whole fruit	0	0.45	-
Khao Namphung (FC 4020),	0.60	0.04	1500			1	0.26	-
No author or document number	0.60	0.04	1500			3	0.21	-
provided	0.60	0.04	1500			7	0.04	-
RT 44 11 F DMA-I						14	0.01	-
						21	0.01	-
Thailand (Nakhon-nayok), 2001	0.60	0.04	1500	4	Whole fruit	0	0.14	-
Khao Namphung (FC 4020)	0.60	0.04	1500			1	0.11	-
No author or document number	0.60	0.04	1500			3	0.02	-
provided	0.60	0.04	1500			7	0.01	-
RT 44 11 F DMA-II						14	<0.01	-
						21	<0.01	-

CITRUS FRUIT Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			Dimethoate	Omethoate
Thailand (Phichit/northern) 2002	0.60	0.04	1500	4	Whole fruit	0	0.20	-
Khao Namphung (FC 4020)	0.60	0.04	1500			1	0.11	-
No author or document number	0.60	0.04	1500			3	0.06	-
provided	0.60	0.04	1500			7	0.02	-
RT 45 13 F DMA-III						14	<0.01	-
Thailand (Prachinburi/eastern),	0.60	0.04	1500	4	Whole fruit	0	0.22	-
2002	0.60	0.04	1500			3	0.11	-
Thongdi (FC 4020)	0.60	0.04	1500			7	0.06	-
No author or document number provided	0.60	0.04	1500					
RT 45 13 FDMA-IV								
Mandarins/clementines								
Spain (Cartaya), 1999	2.07	0.06	3482	3	Whole fruit	0	1.75	0.01
Mandarin/clementine (FC 0003)	2.08	0.06	3503			7	1.22	0.06
Wilson (2001a)	2.17	0.06	3508			14	0.53	0.07
DTF Doc. No.532-0404 [1/]						21	0.37	0.08
SCI 022 / 004697						28	0.31	0.07
					Peel	21	1.14	0.13
						28	0.74	0.14
					Pulp	21	<0.01	0.04
						28	<0.01	0.03
Spain (Benimamet), 2000	2.18	0.06	3503	3	Whole fruit	0	5.24	0.01
Clementine (FC 0003)	2.20	0.06	3520			7	3.55	0.06
Wilson (2001b)	2.19	0.06	3509			15	1.59	0.07
DTF Doc. No.532-0301 [2/]						22	1.48	0.08
SCI 039 / 012960						28	0.94	0.07
					Peel	22	11.70	0.29
						28	6.75	0.22
					Pulp	22	0.02	0.11
						28	<0.01	0.08
Spain (Benimamet), 2001	2.18	0.06	3493	3	Whole fruit	0	2.71	0.02
Mandarin/clementine (FC 0003)	2.18	0.06	3504			21	0.35	0.08
Wilson (2002a)	2.18	0.06	3503			29	0.28	0.06
DTF Doc. No.532-0405 [4/]								
SCI 073 / 022774					Peel	21	4.43	0.18
						29	2.14	0.15
					Pulp	21	0.02	0.03
						29	0.002	0.05
Italy (Foce Varano), 2001	2.18	0.06	3488	3	Whole fruit	22	3.10	0.13
Clementine Isabella (FC 0003)	2.18	0.06	3499					
Wilson (2001b)	2.20	0.06	3524					
DTF Doc. No.532-0301 [2/]					Peel	22	8.72	0.31
SCI 039 / 012960					Pulp	22	0.07	0.13
Italy (Papa-Gianello) 2001	2.18	0.06	3499	3	Whole fruit	0	3.65	0.08
Clementine Clemention di	2.19	0.06	3516			22	1.17	0.13
Paterno (FC 0003)	2.19	0.06	3506			29	1.07	0.11
Wilson (2002a)								
DTF Doc. No.532-0405 [4/]					Peel	22	4.55	0.33
SCI 073 / 022774						29	3.54	0.31
					Pulp	22	0.01	0.04
						29	0.01	0.05

CITRUS FRUIT Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			Dimethoate	Omethoate
Italy (Bernalda), 2001	2.19	0.06	3504	3	Whole fruit	0	2.42	0.01
Mandarin Avana (FC 0003)	2.18	0.06	3497			22	1.34	0.06
Wilson (2002a)	2.20	0.06	3521			29	1.06	0.14
DTF Doc. No.532-0405 [4/]								
SCI 073 / 022774					Peel	22	1.64	0.04
						29	4.17	0.28
					Pulp	22	0.01	<0.01
						29	0.01	0.05
Greece (Koustopodio), 1999	2.07	0.06	3493	3	Whole fruit	0	1.59	<0.01
Mandarin/clementine (FC 0003)	2.08	0.06	3497			7	1.16	0.07
Wilson (2001a)	2.16	0.06	3499			14	0.55	0.06
DTF Doc. No.532-0404 [1/]						21	0.52	0.08
SCI 022 / 004697						28	0.44	0.08
					Peel	21	1.47	0.21
						28	1.13	0.24
					Pulp	21	0.02	0.02
						28	<0.01	0.02
Greece (Koustopodio), 2001	2.19	0.06	3505	3	Whole fruit	0	2.48	0.02
Clementine (FC 0003)	2.19	0.06	3508			7	1.72	0.06
Wilson (2002a)	2.18	0.06	3495			14	1.24	0.07
DTF Doc. No.532-0405 [4/]						21	0.61	0.06
SCI 073 / 022774						28	1.04	0.08
					Peel	21	1.71	0.11
						28	2.13	0.19
					Pulp	21	<0.01	<0.01
						28	<0.01	<0.01
Lemons								
Italy (C. de Pezza Grande	2.08	0.06	3503	3	Whole fruit	0	2.02	0.02
Siracusa), 1999	2.08	0.06	3503			7	1.49	0.09
Lemon Fammine Ilo Zagara	2.16	0.06	3496			13	1.21	0.09
Bianca (FC 0002)						21	0.76	0.10
Wilson (2001a)						28	0.32	0.07
DTF Doc. No.532-0404 [1/]								
SCI 022 / 004697					Peel	21	1.46	0.17
						28	0.75	0.18
					Pulp	21	0.05	0.04
						28	0.04	0.05
Greece (Geliniatike), 1999	2.08	0.06	3501	3	Whole fruit	0	1.80	<0.01
Lemon Maglino (FC 0002)	2.08	0.06	3500			7	2.53	0.04
Wilson (2001a)	2.16	0.06	3497			14	1.72	0.07
DTF Doc. No.532-0404 [1/]						21	0.87	0.08
SCI 022 / 004697						28	1.10	0.11
					Peel	21	3.92	0.24
						28	3.23	0.23
					Pulp	21	0.18	0.05
						28	0.19	0.06

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.0002-0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.0002-0.002 mg/kg.
[2/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.
[3/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.
[4/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.
[5/] Dimethoate LOQ 0.02 mg/kg; omethoate LOQ 0.30 mg/kg.

Table 13. Residues data from supervised trials of dimethoate EC 400 g/l on cherries (Wilson 2000 and 2002b).

CHERRIES Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Spain (Navaloncejo), 1999 Cherry, California, (FC 0013) Wilson (2000) DTF Doc. No.532-3121 [1/] SCI 024 / 995008	0.74	0.05	1505	1	Flesh	0 7 10 13 21	1.91 0.34 0.30 0.12 0.04	0.01 0.10 0.15 0.12 0.12
Spain (Alcalá de la Jovada), 2000 Cherry, Burlat (FC 0013) Wilson (2002b) DTF Doc. No.532-3123 [2/] SCI 038 / 012074	0.782	0.05	1507	1	Flesh	0 14 21	1.91 0.33 0.08	<0.01 0.12 0.18
Italy (Collebeato), 1999 Cherry, Moretta di Cesena (FC 0013) Wilson (2000) DTF Doc. No.532-3121 [1/] SCI 024 / 995008	0.74	0.05	1500	1	Flesh	0 7 10 14 21	1.11 0.33 0.60 0.18 0.12	<0.01 0.03 0.07 0.05 0.07
Italy (Pescantina), 2001, Cherry, Solimary, (FC 0013) Wilson (2002b), DTF Doc.no.532-3123 [1/] SCI 024 / 012074	0.782	0.05	1504	1	Flesh	14 21	0.21 0.03	0.17 0.06

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.0002-0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.0002-0.002 mg/kg.
[2/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 14. Residues data summary from supervised trials of dimethoate EC 400 g/l on mangoes (Bodnaruk, 2002d).

MANGOES Location, year, variety, site	Application					Portion analyzed	PHI, days	Residues, mg/kg	
	Method	kg ai/ha	kg ai/hl	water l/ha	No.			dimeth.	ometh.
Australia (Channel Rd), 2001, Mango, Kensington Pride (FI 0345), QFVG1 / Site 1	Foliar	0.675	0.03	2250	3	Peel	0 1 3 7	0.60 0.40 0.24 0.06	0.07 0.04 0.07 0.04
						Flesh	0 1 3 7	0.15 0.10 0.09 0.05	0.04 0.03 0.04 0.03
						Whole fruit	0 1 3 7	0.27 0.17 0.12 0.04	0.04 0.03 0.04 0.03
	foliar + dip, 100 ml/100 l	0.675	0.03 0.04	2250 (500)	3 1	Peel Flesh Whole fruit	3 3 3	1.22 0.06 0.34	0.19 0.03 0.06
	dip only, 100 ml/100 l		0.04	(500 l)	1	Peel Flesh Whole fruit	0 0 0	0.89 0.02 0.25	0.09 <0.02 0.03
Australia, (Northy Rd), 2002, Mango, Palmer (FI 0345), QFVG1 / Site 2	Foliar	0.1	0.03	333	3	Peel	0 1 3 7	<0.02 0.10 0.03 <0.02	<0.02 0.16 <0.02 <0.02
						Flesh	0 1 3 7	<0.02 <0.02 <0.02 <0.02	<0.02 0.02 0.02 0.02

MANGOES Location, year, variety, site	Application					Portion analyzed	PHI, days	Residues, mg/kg	
	Method	kg ai/ha	kg ai/hl	water l/ha	No.			dimeth.	ometh.
						Whole fruit	0	0.02	0.02
							1	0.4	0.05
							3	0.02	0.02
							7	0.02	0.02
	Foliar + dip	0.1	0.03	333	3	Peel	3	1.13	0.2
	100 ml/100 l		0.04	(25 l)	1	Flesh	3	0.04	<0.02
						Whole fruit	3	0.25	0.05
	Dip only		0.04	(25 l)	1	Peel	3	0.16	<0.02
	100 ml/100 l					Flesh	3	0.04	<0.02
						Whole fruit	3	0.06	0.02
Australia (Chewco Rd), 2001, Mango, Kensington Pride (FI 0345), QFVG1 / Site 3	foliar	0.576	0.03	1920	3	Peel	3	0.15	0.05
						Flesh	3	0.04	<0.02
						Whole fruit	3	0.07	0.02
	foliar + dip	0.576	0.03	1920	3	Peel	3	0.90	<0.02
	100 ml/100 l		0.04	(500)	1	Flesh	3	0.07	<0.02
						Whole fruit	3	0.26	0.02
	dip only		0.04	(500)	1	Peel	3	0.56	<0.02
	100 ml/100 l					Flesh	3	0.09	<0.02
						Whole fruit	3	0.21	0.02
Australia (Rocky Creek), 2001, Mango, Kensington Pride (FI 0345), QFVG1 / Site 4	foliar	0.576	0.03	1920	3	Peel	3	0.51	0.03
						Flesh	3	0.22	0.02
						Whole fruit	3	0.25	0.02
	foliar + dip	0.576	0.03	1920	3	Peel	3	0.7	<0.02
	100 ml/100 l		0.04	(500)	1	Flesh	3	0.48	0.02
						Whole fruit	3	0.43	0.02
	dip only		0.04	(500)	1	Peel	3	0.31	0.02
	100 ml/100 l					Flesh	3	0.17	<0.02
						Whole fruit	3	0.18	0.02
Australia, (Northy Rd), 2002, Mango, Palmer (FI 0345), QFVG1 / Site 5	Foliar	0.1	0.03	333	3	Peel	3	<0.02	0.09
						Flesh	3	<0.02	0.03
						Whole fruit	3	0.02	0.04
	Foliar + dip	0.1	0.03	333	3	Peel	3	0.47	0.04
	100 ml/100 l		0.04	(25 l)	1	Flesh	3	0.09	0.03
						Whole fruit	3	0.18	0.03
	Dip only	0.1	0.04	(25 l)	1	Peel	3	0.22	<0.02
	100 ml/100 l					Flesh	3	0.15	<0.02
						Whole fruit	3	0.15	0.02

In all trials, whole fruit residues = sum of dimethoate and omethoate residues in peel and in flesh, taking into account weight of the seed. Reporting limits, 0.02 mg/kg for dimethoate and omethoate. Dipping is a quarantine use.

Table 15. Residues data summary from supervised trials of dimethoate EC 400 g/l on olives (Wilson 2001c, 2002c, 2002d).

OLIVES Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Spain (Arahal), 1999	0.42	0.06	711	4	Olive flesh	0	4.32	0.43
Olive Manzanello (FT 0305)	0.42	0.06	698			7	0.06	0.76
Wilson (2002c)	0.42	0.06	703			14	0.01	0.41
DTF Doc. No.532-5006 [1/]	0.42	0.06	706			21	<0.01	0.14
SCI 023 / 003604						28	<0.01	0.06

OLIVES Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Spain (Bormujos), 1999	0.43	0.06	721	4	Olive flesh	0	4.15	0.86
Olive Manzanello (FT 0305)	0.43	0.06	717			7	0.04	0.88
Wilson (2002c)	0.42	0.06	703			14	0.01	0.40
DTF Doc. No.532-5006 [1/]	0.43	0.06	702			21	<0.01	0.11
SCI 023 / 003604						28	0.01	0.06
Spain (Lliria), 2000	0.44	0.06	699	4	Pulp	0	11.31	0.25
Olive Villalonga (FT 0305)	0.44	0.06	702			21	0.78	0.50
Wilson (2001c)	0.44	0.06	702			28	0.15	0.26
DTF Doc. No.532-5004 [2/]	0.44	0.06	700			35	0.02	0.25
SCI 037 / 013024						42	0.01	0.25
Italy (San Bartolomeo al Mare), 2001	0.76	0.06	1212	4	Olive	0	5.30	0.28
Olive Taggiasca (FT 0305)	0.76	0.06	1213		Flesh	7	0.97	0.65
Wilson (2002c)	0.75	0.06	1205			14	0.21	0.40
DTF Doc. No.532-5006 [1/]	0.76	0.06	1212			21	0.11	0.30
SCI 023 / 003604						28	0.03	0.07
						35	0.03	0.03
						42	0.03	0.06
Italy (Dolceacqua), 2000	0.75	0.06	1202	4	Pulp	0	3.45	0.16
Olive Taggiasca (FT 0305)	0.75	0.06	1205			22	0.17	0.34
Wilson (2001c)	0.75	0.06	1194			28	<0.01	0.20
DTF Doc. No.532-5004 [2/]	0.75	0.06	1205			36	<0.01	0.15
SCI 037 / 013024						43	<0.01	0.06
Italy (Stornara), 2000	0.45	0.06	722	4	Pulp	0	8.79	0.12
Olive Coratina (FT 0305)	0.44	0.06	704			21	0.15	0.41
Wilson (2001c)	0.44	0.06	707			28	0.04	0.22
DTF Doc. NO.532-5004 [2/]	0.44	0.06	698			35	0.04	0.15
SCI 037 / 013024						42	<0.01	0.06
Greece (Magoula), 1999	0.71	0.06	1200	4	Olive flesh	0	4.43	0.05
Olive Nanaki (FT 0305)	0.71	0.06	1203			7	1.90	0.32
Wilson (2002c)	0.73	0.06	1174			14	1.38	0.47
DTF Doc. No.532-5006	0.74	0.06	1199			21	1.13	0.67
SCI 023 / 003604						28	0.34	0.40
Greece (Koutsopodio), 2000	0.44	0.06	704	4	Pulp	0	5.00	0.03
Olive Ladolia (FT 0305)	0.44	0.06	703			7	2.31	0.34
Wilson (2001c)	0.44	0.06	699			14	1.27	0.29
DTF Doc. No.532-5004 [2/]	0.44	0.06	698			21	1.02	0.52
SCI 037 / 013024						28	0.21	0.31
						34	0.08	0.21
						41	0.20	0.33
Greece (Karies), 2000	0.756	0.06	1212	4	Olive pulp	0	4.37	0.09
Olive Ladolia (FT 0305)	0.749	0.06	1201			14	1.06	0.48
Wilson (2002d)	0.747	0.06	1198			21	0.50	0.54
DTF Doc. No.532-5005 [2/]	0.749	0.06	1201			29	0.11	0.39
SCI 051 / 013403						35	0.13	0.40
						42	0.13	0.44

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.0002-0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.0002-0.002 mg/kg.
[2/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 16. Residues data summary from supervised trials of dimethoate EC 400 g/l on cauliflower (Harrison, 1998b).

CAULIFLOWERS Location, year, variety, report No.	Foliar application					Portion analyzed	PHI, days	Residues, mg/kg	
	Form.	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Birchington), 1996	EC	0.4	0.067	600	6	Curd	0	0.51	<0.01
Cauliflower Balmoral (VB 0404)							3	0.44	<0.01
Harrison (1998b)							7	0.34	0.01
DTF Doc. No.533-3109 [1/]							14	0.21	<0.01
AK/3378/CN/1							21	0.11	<0.01

CAULIFLOWERS Location, year, variety, report No.	Foliar application					Portion analyzed	PHI, days	Residues, mg/kg	
	Form.	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Kings Newton), 1996	EC	0.4	0.067	600	6	Curd	0	0.06	<0.01
Cauliflower Dova (VB 0404)							3	0.02	<0.01
Harrison (1998b)							7	0.03	<0.01
DTF Doc. No.533-3109 [1/]							14	0.03	<0.01
AK/3378/CN/2							21	0.02	<0.01
UK (Gosberton Clough), 1996	EC	0.4	0.067	600	6	Curd	0	0.37	<0.01
Cauliflower White Rock							3	0.42	<0.01
(VB 0404)							7	0.11	<0.01
Harrison (1998b)							14	0.02	<0.01
DTF Doc. No.533-3109 [1/]							21	<0.01	<0.01
AK/3378/CN/3									
UK (Gullane), 1996	EC	0.4	0.067	600	6	Curd	0	0.3	<0.01
Cauliflower Fargo (VB 0404)							3	0.19	<0.01
Harrison (1998b)							7	0.09	<0.01
DTF Doc. No.533-3109 [1/]							14	0.05	<0.01
AK/3378/CN/4									
UK (Manston), 1997	EC	0.4	0.067	600	6	Curd	0	0.12	<0.01
Cauliflower Aviso (VB 0404)							3	0.02	<0.01
Harrison (1998b)							7	0.02	<0.01
DTF Doc. No.533-3109 [1/]							14	<0.01	<0.01
AK/3378/CN/5							21	<0.01	<0.01
UK (Elford), 1997	EC	0.4	0.067	600	6	Curd	0	0.7	0.03
Cauliflower White Rock							3	0.27	0.01
(VB 0404)							7	0.09	<0.01
Harrison (1998b)							14	0.02	<0.01
DTF Doc. No.533-3109 [1/]									
AK/3378/CN/6									
UK (Friskney), 1997	EC	0.4	0.067	600	6	Curd	0	0.05	<0.01
Cauliflower Tulchan (VB0404)							3	0.04	<0.01
Harrison (1998b)							7	0.04	<0.01
DTF Doc. No.533-3109 [1/]							14	0.03	<0.01
AK/3378/CN/7							21	<0.01	<0.01
UK (Longniddsy), 1997	EC	0.40	0.067	600	6	Curd	0	0.04	<0.01
Cauliflower Fargo (VB 0404)							3	0.02	<0.01
Harrison (1998b)							7	0.02	<0.01
DTF Doc. No.533-3109 [1/]							14	<0.01	<0.01
AK/3378/CN/8							21	<0.01	<0.01

[1/] Dimethoate LOQ 0.01 mg/kg, omethoate LOQ 0.01 mg/kg.

Table 17. Residues data summary from supervised trials of dimethoate EC 400 g/l on Brussels sprouts (Harrison, 1998c).

BRUSSELS SPROUTS Location, year, variety, report No.	Foliar application				Portion analyzed	PHI days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Bicker), 1996	0.40	0.067	600	6	Buttons	0	0.45	0.02
Brussels sprouts Oliver (VB 0402)						3	0.21	0.02
Harrison (1998c)						7	0.11	0.02
DTF Doc. No.533-3205 [1/]						14	0.03	<0.01
AK/3379/CN/1						21	0.02	0.01
UK (Bicker), 1996	0.40	0.067	600	6	Buttons	0	0.62	0.04
Brussels sprouts Oliver (VB 0402)						3	0.38	0.04
Harrison (1998c)						7	0.17	0.06
DTF Doc. No.533-3205 [1/]						14	0.06	0.03
AK/3379/CN/2						21	0.04	0.01
UK (Gosberton Clough), 1996	0.40	0.067	600	6	Buttons	0	0.30	0.04
Brussels sprouts Revenge (VB 0402)						3	0.10	0.02
Harrison (1998c)						7	0.10	<0.01
DTF Doc. No.533-3205 [1/]						14	0.11	<0.01
AK/3379/CN/3						21	0.03	<0.01

BRUSSELS SPROUTS Location, year, variety, report No.	Foliar application				Portion analyzed	PHI days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Longniddry), 1996	0.40	0.067	600	6	Buttons	0	0.31	0.05
Brussels sprouts Ottoline (VB 0402)						3	0.33	0.05
Harrison (1998c)						7	0.17	0.04
DTF Doc. No.533-3205 [1/]						14	0.10	0.04
AK/3379/CN/4						21	0.06	0.03
UK (Ickham), 1997	0.40	0.067	600	6	Buttons	0	0.18	0.03
Brussels sprouts Cavalier (VB 0402)						3	0.08	0.02
Harrison (1998c)						7	0.07	0.03
DTF Doc. No.533-3205 [1/]						14	0.03	0.02
AK/3379/CN/5						21	0.02	0.02
UK (Gosberton Clough), 1997	0.40	0.067	600	6	Buttons	0	0.23	0.03
Brussels sprouts Diablo (VB 0402)						3	0.17	0.03
Harrison (1998c)						7	0.08	0.03
DTF Doc. No.533-3205 [1/]						14	0.04	0.03
AK/3379/CN/6						21	0.02	0.02
UK (Friskney), 1997	0.40	0.067	600	6	Buttons	0	0.40	0.06
Brussels sprouts Top Line (VB 0402)						3	0.23	0.04
Harrison (1998c)						7	0.21	0.08
DTF Doc. No.533-3205 [1/]						14	0.11	0.07
AK/3379/CN/7						21	0.04	0.04
UK (Londniddry), 1997	0.40	0.067	600	6	Buttons	0	1.11	0.13
Brussels sprouts Ottoline (VB 0402)						3	0.88	0.13
Harrison (1998c)						7	0.46	0.17
DTF Doc. No.533-3205 [1/]						14	0.10	0.11
AK/3379/CN/8						21	0.03	0.07

[1/] Dimethoate LOQ 0.01 mg/kg, omethoate LOQ 0.01 mg/kg.

Table 18. Residues data summary from supervised trials of dimethoate EC 400 g/l on cabbages.

CABBAGES Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Birlingham), 1996	0.4	0.067	600	6	Whole plant/	0	5.02	0.65
Cabbage Compacta (VB 0041)					trimmed head	3	2.81	0.89
Harrison (1998d)						7	0.29	0.29
DTF Doc. No.533-3311 [1/]						14	0.67	0.64
AK/3377/CN/1						21	0.20	0.36
UK (Shepshed), 1996	0.4	0.067	600	6	Whole plant/	0	4.60	0.81
Cabbage Winchester (VB 0041)					trimmed head	3	3.87	1.53
Harrison (1998d)						7	1.20	0.63
DTF Doc. No.533-3311 [1/]						14	0.34	0.30
AK/3377/CN/2						21	0.25	0.46
UK (Kings Newton), 1996	0.4	0.067	600	6	Whole plant/	0	5.27	0.29
Cabbage Compacta (VB 0041)					trimmed head	3	2.72	0.29
Harrison (1998d)						7	1.05	0.15
DTF Doc. No.533-3311 [1/]						14	0.82	0.22
AK/3377/CN/3						21	0.99	0.35
UK (Gullane), 1996	0.4	0.067	600	6	Whole plant/	0	1.94	0.30
Cabbage Winchester (VB 0041)					trimmed head	3	2.48	0.68
Harrison (1998d)						7	0.25	0.05
DTF Doc. No.533-3311 [1/]						14	0.11	0.07
AK/3377/CN/4						21	0.04	0.03
UK (Margate), 1997	0.4	0.067	600	6	Whole plant/	0	2.94	0.58
Cabbage Tundra (VB 0041)					trimmed head	3	0.52	0.30
Harrison (1998d)						7	0.07	<0.01
DTF Doc. No.533-3311 [1/]						14	0.05	<0.01
AK/3377/CN/5						21	0.06	0.02
UK (Friskney), 1997	0.4	0.067	600	6	Whole plant/	0	0.68	0.13
Cabbage Krypton (VB 0041)					trimmed head	3	0.55	0.19
Harrison (1998d)						7	0.14	0.04
DTF Doc. No.533-3311 [1/]						14	0.04	0.02
AK/3377/CN/6						21	0.02	0.02

CABBAGES Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Kings Newton), 1997 Cabbage Compacta (VB 0041) Harrison (1998d) DTF Doc. No.533-3311 [1]/AK/3377/CN/7	0.4	0.067	600	6	Whole plant/ trimmed head	0 3 7 14 21	2.78 1.52 0.82 0.71 0.23	0.11 0.25 0.28 0.25 0.17
UK (Aberlady), 1997 Cabbage Tundra (VB 0041) Harrison (1998d) DTF Doc. No.533-3311 [1]/ AK/3377/CN/8	0.4	0.067	600	6	Whole plant/ trimmed head	0 3 7 14 21	0.85 0.70 0.04 0.01 0.01	0.27 0.38 0.02 <0.01 0.01
Poland (Skierniewice), 1996 [3] Cabbage Kamienna Glowa (VB 0041) No author or document number provided [2]	0.24	0.04	600	1	Head	15 29	<0.01 <0.01	- -

[1] Dimethoate LOQ 0.01 mg/kg, omethoate LOQ 0.01 mg/kg.
[2] Reporting limit, 0.01 mg/kg.
[3] Date of treatment.

Table 19. Residues data summary from supervised trials of dimethoate EC 400 g/l on capsicums (sweet peppers) (Bodnaruk, 2002a, 2002b, 2002c).

CAPSICUMS Location, year, variety, report No.	Application					Portion analyzed	PHI, days	Residues, mg/kg		
	Method	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate	total
Australia, (Gilmore Rd.), 2001 Capsicum Merlin (VO 0445) Bodnaruk, 2002a [1], VG00097-1, Site1	Foliar	0.3	0.03	485-518	3	whole fruit	0 3 5	0.05 0.04 0.03	<0.02 0.02 0.02	0.07 0.06 0.05
	Foliar + post-harvest [2]	0.3	0.03 0.04	485-518	3 1	whole fruit	7	1.71	<0.04	1.73
	post-harvest [2] on-line		0.04		1	whole fruit	0	1.50	<0.04	1.52
Australia, (Chili Lane), 2001 Capsicum Aries (VO 0445) Bodnaruk, 2002a [1], VG00097-1, Site 2	Foliar	0.3	0.03	496-509	3	whole fruit	0 3 5 7	0.15 0.08 0.04 0.03	0.02 <0.02 0.02 <0.02	0.17 0.10 0.06 0.05
	Foliar + post-harvest [2] on-line	0.3	0.03 0.04		3 1	whole fruit	7	0.23	<0.04	0.25
	Post-harvest [2] on-line		0.04		1	whole fruit	0	0.27	<0.04	0.29
Australia, (Randazzo Rd), 2002 Capsicum Green Giant (VO 0445) Bodnaruk, 2002b [1] VG00097-2, Site1	Post-harvest [2]		0.04	[3]	1	whole fruit	0	1.80	0.19	1.99
Australia, (Maloberti Rd), 2002 Capsicum Green Giant (VO 0445) Bodnaruk, 2002b [1] VG00097-2, Site2	Post-harvest [2]		0.04	[3]	1	whole fruit	0	1.46	0.19	1.65
Australia, (Miller Lane), 2002 Capsicum Warlok (VO 0445) Bodnaruk, 2002b [1] Vg00097-2, site3	Post-harvest [2]		0.04	[3]	1	Whole fruit	0	2.95	<0.04	2.99

CAPSICUMS Location, year, variety, report No.	Application				Portion analyzed	PHI, days	Residues, mg/kg		
	Method	kg ai/ha	kg ai/hl	water l/ha	No.		dimethoate	omethoate	total
Australia, (Woodlands Rd), 2002 Capsicum Merlin (VO 0445) Bodnaruk, 2002b [1] VG00097-2, Site4	Post-harvest [2]		0.04	[3]	1	whole fruit	0	1.56	<0.04	1.60
Australia, (Chili Lane), 2002 Capsicum Aries (VO 0445) Bodnaruk, 2002c [1] VG 00097-3, Site1	Foliar	0.3		250	3	whole fruit	0	0.16	<0.04	0.20
							1	0.10	<0.04	0.14
							3	0.12	<0.04	0.16
							7	0.14	<0.04	0.18
	Foliar + post-harvest [2] on-line	0.3	0.04	250	3 1	whole fruit	7	1.75	<0.04	1.79
	Post-harvest [2] on-line		0.04		1	whole fruit	0	1.26	<0.04	1.30

[1] Reporting limits: dimethoate 0.02 mg/kg, omethoate 0.04 mg/kg.
[2] Post-harvest treatment for quarantine use.
[3] Commercial flood spray unit.

Table 20. Residue data summary from supervised trials of dimethoate EC 400 g/l on melons (Wilson, 2001d, 2002e).

MELONS Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Mantova), 2000 Melon Jaguar (VC 0046) Wilson (2001d) DTF Doc. No.533-2504 [1] SCI 047/ 012055	0.62	0.06	999	2	Whole	0	0.22	0.01
	0.63	0.06	1009			7	0.10	0.02
						14	<0.01 [C]	<0.01 [2]
						21	<0.01 [C]	<0.01 [2]
						28	<0.01 [C]	<0.01 [2]
					Peel	14	<0.01	<0.01
						21	<0.002	<0.01
						28	<0.01	<0.01
					Pulp	14	<0.01	<0.01
						21	<0.01	<0.01
						28	<0.01	<0.01
Italy (Cantu), 2000 Melons Supermarket (VC 0046) Wilson (2001d) DTF Doc. No.533-2504 [1] SCI 047/ 012055	0.64	0.06	1022	2	Whole	0	0.41	<0.01
	0.62	0.06	999			7	0.34	0.02
						14	0.11 [C]	<0.01 [2]
						21	0.02 [C]	<0.01 [2]
						28	0.02 [C]	<0.01 [2]
					Peel	14	0.15	0.02
						21	0.03	<0.01
						28	0.03	<0.01
					Pulp	14	0.05	<0.01
						21	<0.01	<0.01
						28	<0.01	<0.01
Italy (Rodigo), 2001 Melon Yakur (VC 0046) Wilson (2002e) DTF Doc.No..533-2506 [1] SCI 071/022401	0.631	0.06	1012	2	Whole	0	0.26	<0.01
	0.651	0.06	987			23	<0.01 [C]	<0.01 [2]
						30	<0.01 [C]	<0.01 [2]
					Peel	23	<0.01	<0.01
						30	<0.01	<0.01
					Pulp	23	<0.01	<0.01
						30	<0.01	<0.01

MELONS Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Rodigo), 2001	0.627	0.06	1005	2	Whole	0	0.09	<0.01
Melon Dolmen (VC 0046)	0.627	0.06	1005			21	0.03[C]	0.01 [2/]
Wilson (2002e)						28	0.01[C]	<0.01 [2/]
DTF Doc. No.533-2506 [1/]								
SCI 071/ 022401					Peel	21	0.04	0.02
						28	0.01	0.01
					Pulp	21	0.02	<0.01
						28	0.01	<0.01
Spain (La Aljorra), 2000	0.62	0.06	987	2	Whole	0	0.04	<0.01
Melon Amarillo (VC 0046)	0.62	0.06	1000			7	<0.01	<0.01
Wilson (2001d)						13	<0.01[C]	<0.01 [2/]
DTF Doc. No.533-2504 [1/]						20	<0.01[C]	<0.01 [2/]
SCI 047/ 012055						27	<0.01[C]	<0.01 [2/]
					Peel	13	<0.01	0.01
						20	<0.01	<0.01
						27	<0.01	<0.01
					Pulp	13	<0.01	<0.01
						20	<0.01	<0.01
						27	<0.01	<0.01
Spain (La Aljorra), 2001	0.662	0.06	1062	2	Whole	0	0.17	0.01
Melon Galia (VC 0046)	0.605	0.06	970			20	<0.01[C]	<0.01 [2/]
Wilson (2002e)						27	<0.01[C]	<0.01 [2/]
DTF Doc. No.533-2506 [1/]								
SCI 071/ 022401					Peel	20	<0.01	<0.01
						27	<0.01	<0.01
					Pulp	20	<0.01	<0.01
						27	<0.01	<0.01
Spain (Albujon), 2001	0.614	0.06	985	2	Whole	0	0.1	<0.01
Melon Galia (VC 0046)	0.640	0.06	1027			20	<0.01[C]	<0.01 [2/]
Wilson (2002e)						27	<0.01[C]	<0.01 [2/]
DTF Doc. No.533-2506 [1/]								
SCI 071/ 022401					Peel	20	<0.01	<0.01
						27	<0.01	<0.01
					Pulp	20	<0.01	<0.01
						27	<0.01	<0.01
Greece (Loutoufi), 2000	0.63	0.06	1007	2	Whole	0	0.11	<0.01
Melon Thrakiotiko (VC 0046)	0.63	0.06	1010			7	<0.01	<0.01
Wilson (2001d)						14	<0.01[C]	0.01 [2/]
DTF Doc. No.533-2504 [1/]						21	<0.01[C]	<0.01 [2/]
SCI 047/012055						28	<0.01[C]	<0.01 [2/]
					Peel	14	<0.01	<0.01
						21	<0.01	<0.01
						28	<0.01	<0.01
					Pulp	14	<0.01	<0.01
						21	<0.01	<0.01
						28	<0.01	<0.01

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.
[2/] Calculated from the peel and pulp analyses.

Table 21. Residue data summary from supervised trials of dimethoate 400 g/l on tomatoes (Wilson, 2001e, 2002f).

TOMATOES Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Stagno Lombardo), 2000	0.639	0.10	615	2	Fruit	0	0.30	0.02
Tomato 690 (VO 0448),	0.631	0.10	607			7	0.01	<0.01
Wilson (2001e)						14	<0.01	<0.01
DTF Doc.No.533-2019 [1/]						21	<0.01	<0.01
SCI 040/ 004726						28	<0.01	<0.01
Italy (Mulazzano Lodi), 2000	0.631	0.10	607	2	Fruit	0	0.65	0.02
Tomato PSI 296 (VO 0448)	0.633	0.10	609			7	0.02	0.02
Wilson (2001e)						14	<0.01	0.02
DTF Doc.No.533-2019 [1/]						21	<0.01	0.01
SCI 040/ 004726						28	<0.01	<0.01
Italy (Fiorenzuola), 2001	0.627	0.10	604	2	Fruit	0	0.30	<0.01
Tomato Fufus (VO 0448)	0.625	0.10	601			23	<0.01	<0.01
Wilson (2002f)								
DTF Doc. No.533-2020 [1/]								
SCI 074/ 014407								
Italy (Mulazzano) 2001	0.621	0.10	597	2	Fruit	0	0.37	0.02
Tomato Isola (VO 0448)	0.623	0.10	600			21	<0.01	<0.01
Wilson (2002f)								
DTF Doc. No.533-2020 [1/]								
SCI 074/ 104407								
Spain (Miranda), 2000	0.621	0.10	598	2	Fruit	0	0.33	0.02
Tomato Bodar (VO 0448)	0.619	0.10	596			7	0.01	0.02
Wilson (2001e)						14	<0.01	0.02
DTF Doc. No.533-2019 [1/]						21	<0.01	<0.01
SCI 040/ 004726						28	<0.01	<0.01
Spain (Albujon), 2000	0.614	0.10	591	2	Fruit	0	0.38	0.03
Tomato Brillante (VO 0448)	0.642	0.10	618			8	0.02	0.04
Wilson (2001e)						13	<0.01	0.03
DTF Doc. No.533-2019 [1/]						20	<0.01	0.01
SCI 040/ 004726						27	<0.01	<0.01
Spain (El Pinoso), 2001	0.624	0.10	600	2	Fruit	0	0.34	0.02
Tomato Rollesta (VO 0448)	0.643	0.10	619			21	<0.01	<0.01
Wilson (2002f)								
DTF Doc. No.533-2020 [1/]								
SCI 074/ 014407								
Spain (Mazarron), 2001	0.620	0.10	597	2	Fruit	0	0.29	0.02
Tomato Lustro (VO 0448)	0.653	0.10	628			21	<0.01	<0.01
Wilson (2002f)								
DTF Doc. No.533-2020 [1/]								
SCI 074/ 014407								

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 22. Residue data summary from supervised trials of dimethoate 400 g/l on lettuce (Wilson, 2001f, 2002g and 2002h; Harrison 1998a, 1998e and 1999).

LETTUCE Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Caleppia di Sattala), 2000	0.42	0.04	1005	1	Plant	0	29.97	0.15
Lettuce Funly (VL 0482)						7	0.18	0.06
Wilson (2001f)						14	<0.01	<0.01
DTF Doc. No.533-4228 [1/]						21	<0.01	<0.01
SCI 041/ 004399						28	<0.01	<0.01
Italy (Mediglia), 2000	0.42	0.04	1010	1	Plant	0	23.32	0.10
Lettuce Canasta (VL 0482)						7	0.07	0.02
Wilson (2001f)						14	<0.01	<0.01
DTF Doc. No.533-4228 [1/]						21	<0.01	<0.01
SCI 041/ 004726						28	<0.01	<0.01

LETTUCE Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Mediglia), 2001 Lettuce Canasta (VL 0482) Wilson (2002g) DTF Doc. No.533-4229 [1/] SCI 075/ 023703	0.416	0.04	1001	1	Plant	0 14 21	64.22 <0.01 4.18	0.27 <0.01 0.12
Italy (Caleppia di Settala), 2001 Lettuce Funly (VL 0482) Wilson (2002g) DTF Doc. No.533-4229 [1/] SCI 075/ 023703	0.416	0.04	1001	1	Plant	0 14 21	50.61 <0.01 <0.01	0.31 <0.01 <0.01
Spain (Benimamet), 2000 Lettuce Tudela (VL 0482) Wilson (2001f) DTF Doc. No.533-4228 [1/] SCI 041/ 004399	0.41	0.04	981	1	Plant	0 7 14 20 28	11.75 0.12 <0.01 <0.01 0.01	0.10 0.09 0.01 0.01 <0.01
Spain (Burjassot), 2001 Lettuce Romance (VL 0482) Wilson (2002g) DTF Doc. No.533-4229 [1/] SCI 075/ 023703	0.419	0.04	1008	1	Plant	0 14 21	18.03 0.11 0.08	0.07 0.06 0.03
Spain (Burjassot), 2001 Lettuce Romana (VL 0482) Wilson (2002g) DTF Doc. No.533-4229 [1/] SCI 075/ 023703	0.417	0.04	1002	1	Plant	0 14 21	6.73 0.07 0.04	0.12 <0.01 <0.01
Spain (Burjassot), 2002 Lettuce /Rubia deVerano (VL 0482) Wilson (2002h) DTF Doc. No.533-4230 [1/] SCI 092/ 024303	0.414	0.04	994	1	Plant	0 14 21	14.41 <0.01 <0.01	0.09 0.02 <0.01
Greece (Menidi), 2000 Lettuce Paris Cos (VL 0482) Wilson (2001f) DTF Doc. No.533-4228 [1/] SCI 041/ 004399	0.41	0.04	990	1	Plant	0 7 14 20 28	13.85 0.30 0.03 <0.01 <0.01	0.07 0.08 0.04 0.02 <0.01
UK (Barway), 1996 Lettuce Saladin (VL 0482), Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/1	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14	7.2 3.4 0.14 0.07	0.38 0.37 0.02 0.02
UK (Melbourne), 1996 Lettuce Yates (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/2	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	7.2 1.7 0.65 0.11 0.03	0.34 0.20 0.21 0.03 0.01
UK (Barrow-on-Trent), 1996 Lettuce Juden (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/ 3376/CN/3	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	8.3 1.1 0.42 <0.01 0.01	0.38 0.16 0.11 <0.01 <0.01
UK (Rosebank) 1996 Lettuce Roxette (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/4	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	6.6 2.0 0.09 0.06 0.07	0.28 0.30 <0.01 <0.01 <0.01
UK (Miford) 1997 Lettuce Target (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/5	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	4.6 0.38 0.06 0.02 <0.01	0.15 0.08 0.01 0.03 <0.01

LETTUCE Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Gedney Drove End), 1997 Lettuce Enza (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/6	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	5.2 <0.01 <0.01 0.04 0.01	0.19 <0.01 <0.01 <0.01 <0.01
UK (Swarkestone), 1997 Lettuce Saladin (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/7	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	4.5 1.5 0.08 0.02 <0.01	0.28 0.38 0.02 <0.01 <0.01
UK (Rosebank), 1997 Lettuce Roxette (VL 0482) Harrison (1998e) DTF Doc. No.533-4226 [2/] AK/3376/CN/8	0.34	0.17	200	6	Whole plant/ Trimmed head	0 3 7 14 21	4.0 1.3 0.06 0.02 0.01	0.07 0.16 <0.01 <0.01 <0.01
Greenhouse application (indoor)								
UK (Cranleigh), 1998 Lettuce Commander(VL 0482) Harrison (1999) DTF Doc. No.533-4227 [2/] AK/4088/CN/1	0.34	0.17	200	1	Whole plant/ Trimmed head	28	0.17	0.03
UK (Great Abington), 1998 Lettuce Vagas (VL 0482) Harrison (1999) DTF Doc. No.533-4227 [2/] AK/4088/CN/2	0.34	0.17	200	1	Whole plant/ Trimmed head	28	0.01	<0.01
UK (Banks), 1998 Lettuce Wendal (VL 0482) Harrison (1999) DTF Doc. No.533-4227 [2/] AK/4088/CN/3	0.34	0.17	200	1	Whole plant/ Trimmed head	0 3 7 14 28	17.0 7.3 2.7 0.55 0.16	0.04 0.19 0.17 0.06 0.04
UK (Carlton), 1996 Lettuce /Vegas (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/1	0.34	0.17	198	1	Whole plant Trimmed head	0 3 7 14 28	56.0 9.1 2.1 0.46 <0.01	0.26 0.26 0.18 0.09 <0.01
UK (Carlton), 1996 Lettuce Flandra (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/2	0.34	0.17	202.7	1	Whole plant Trimmed head	0 3 7 14 28	62.0 8.7 2.9 0.11 0.02	0.22 0.34 0.31 0.29 <0.01
UK (Cranleigh), 1996 Lettuce Cortina (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/3	0.34	0.17	198	1	Trimmed head	28	0.02	0.01
UK (Great Abington), 1996 Lettuce Vagas (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/4	0.34	0.17	204.7	1	Trimmed head	28	0.01	<0.01
UK (Great Abington), 1996 Lettuce Wendal (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/5	0.34	0.17	201.3	1	Whole plant Trimmed head	0 3 7 14 28	18.0 14.0 9.7 4.3 1.1	0.04 0.17 0.45 0.49 0.29

LETTUCE Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
UK (Hesketh Bank), 1997 Lettuce Wendal (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/6	0.34	0.17	201.2	1	Whole plant Trimmed head	0 3 7 14 28	42.0 9.0 3.4 0.71 <u>0.06</u>	0.22 0.40 0.30 0.13 <u>0.03</u>
UK (Cranleigh), 1996 Lettuce Luxor (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/7	0.34	0.17	201.7	1	Trimmed head	28	<u>1.1</u>	<u>0.17</u>
UK (Banks), 1996 Lettuce Rachel (VL 0482) Harrison (1998a) DTF Doc. No.533-4225 [2/] AK/3375/CN/8	0.34	0.17	200	1	Trimmed head	28	<u>2.2</u>	<u>0.20</u>

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.
[2/] Dimethoate LOQ 0.01 mg/kg, omethoate LOQ 0.01 mg/kg.

Table 23. Residues data from supervised trials on dimethoate EC 400 g/l on sugar beet (Wilson, 2001g, 2002i and 2002j).

SUGAR BEET Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Vignate), 2000 Sugar beet Monodora (VR 0596) Wilson (2001g) DTF Doc. No.533-0001 [1/] SCI 045/ 012615	0.625 0.624	0.06 0.06	1003 1001	2	Whole Leaves/ Tops Roots 	0 14 21 32 64 14 21 32 64	8.60 0.04 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	0.17 0.20 0.1 0.02 <0.002 <0.01 <0.01 <0.01 <0.01
Italy (Liscate), 2001 Sugar beet Opera (VR 0596) Wilson (2002i) DTF Doc. No.534-5010 [1/] SCI 069/ 014457	0.624 0.622	0.06 0.06	1000 997	2	Whole Leaves/ Tops Roots 	0 13 20 30 62 13 20 32 64	9.70 0.06 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	0.10 0.10 0.04 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01
Italy (Melzo), 2001 Sugar beet Nubia (VR 0596) Wilson (2002i) DTF Doc. No.534-5010 [1/] SCI 069/ 014457	0.624 0.628	0.06 0.06	1001 1007	2	Whole Leaves/ Tops Roots 	0 31 62 31 62	8.40 <0.01 <0.01 <0.01 <0.01	0.13 <0.01 <0.002 <0.01 <0.01
Italy (Pantigilate) 2001 Sugar beet Monodoro (VR 0596) Wilson (2002i) DTF Doc. No.534-5010 [1/] SCI 069/ 014457	0.623 0.625	0.06 0.06	999 1002	2	Whole Leaves/ Tops Roots 	0 32 60 32 60	4.11 <0.01 <0.01 <0.01 <0.01	0.06 <0.01 <0.01 <0.01 <0.01

SUGAR BEET Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Spain (Leon), 2001 Sugar beet Ramona (VR 0596), Wilson (2002i) DTF Doc. No.534-5010 [1/] SCI 069/ 014457	0.620 0.618	0.06 0.06	994 991	2	Whole Leaves/ Tops Roots	0 30 62 30 62	14.84 <0.01 <0.01 <0.01 <0.01	0.13 <0.01 <0.01 <0.01 <0.01
Spain (Leon), 2001 Sugar beet Ramona (VR 0596) Wilson (2002i) DTF Doc. No.534-5010 [1/] SCI 069/ 014457	0.621 0.629	0.06 0.06	996 1008	2	Whole Leaves/ Tops Roots	0 29 61 29 61	11.85 <0.01 <0.01 <0.01 <0.01	0.05 0.02 <0.002 <0.01 <0.01
Spain (Leon), 2001 Sugar beet Doral (VR 0596) Wilson (2001g) DTF Doc. No.533-0001 [1/] SCI 045 / 012615	0.629 0.625	0.06 0.06	1009 1003	2	Whole Leaves/ Tops Roots 	0 14 20 30 62 14 20 30 62	3.48 0.13 0.04 <0.01 <0.01 <0.01 <0.01 <0.01 <0.01	0.06 0.14 0.12 0.04 <0.01 <0.01 <0.01 <0.01 <0.01
UK (Tendring), 2001 Sugar beet Roberta (VR 0596) Wilson (2002j) DTF Doc. No.534-4033 [1/] SCI 082/ 022134	0.08 0.42	0.02 0.09	433 460	2	Whole Leaves /tops Roots	0 30 30	5.9 <0.01 <0.01	0.08 0.02 <0.01
Germany (Fehrbellin), 2001 Sugar beet Alexis (VR 0596) Wilson (2002j) DTF Doc. No.534-4033 [1/] SCI 082/ 022134	0.09 0.41	0.02 0.09	451 445	2	Whole Leaves/ tops Roots	0 29 29	5.09 <0.01 <0.01	0.04 0.01 <0.01

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 24. Residues data summary from supervised trials of dimethoate EC 400 g/l on turnips (Samoil 1998).

TURNIP Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
USA (Arkansas), 1994 Turnip Purple Top (VR 0497) Samoil (1998) DTF Doc. No.534-5901 [1/] IR-4 PR No. 04451	0.28 0.28 0.28			3	Tops Roots	14 14	<0.1/<0.1 <0.1/<0.1	<0.1/<0.1 <0.1/<0.1
USA (California), 1994 Turnip Purple Top (VR 0497) Samoil (1998) DTF Doc. No.534-5901 [1/] IR-4 PR No. 04451	0.28 0.28 0.28			3	Tops Roots	14 14	0.180/0.129 <0.1/<0.1	0.341/0.277 <0.1/<0.1
USA (Florida), 1994 Turnip All Top (VR 0497) Samoil (1998) DTF Doc. No.534-5901 [1/] IR-4 PR No. 04451	0.28 0.28 0.28			3	Tops Roots	14 14	0.534/0.562 <0.1/<0.1	0.207/0.210 <0.1/<0.1
USA (Georgia), 1994 Turnip Purple Top (VR 0497) Samoil (1998) DTF Doc. No.534-5901 [1/] IR-4PR No. 0497	0.28 0.28 0.28			3	Tops Roots	14 14	0.114/0.179 <0.1/<0.1	0.068/0.092 <0.1/<0.1

TURNIP	Foliar application				Portion	PHI,	Residues, mg/kg	
Location, year, variety, report No.	kg ai/ha	kg ai/hl	water l/ha	No.	analyzed	days	dimethoate	omethoate
USA (Ohio), 1994	0.28			3	Tops	14	<0.1/<0.1	<0.1/<0.1
Turnip Purple Top (VR 0497)	0.28			3	Roots	14	<0.1/<0.1	<0.1/<0.1
Samoil (1998)	0.28							
DTF Doc. No.534-5901 [1/]								
IR-4PR No. 04451								
USA (Ohio/ ARS), 1994	0.28			3	Tops	14	<0.1/<0.1	<0.1/<0.1
Turnip Purple Top (VR 0497)	0.28			3	Roots	14	<0.1/<0.1	<0.1/<0.1
Samoil (1998)	0.28							
DTF Doc. No.534-5901 [1/]								
IR-4PR No. 04451								
USA (Texas), 1994	0.28			3	Tops	14	<0.1/<0.1	<0.1/<0.1
Turnip Purple Top (VR 0497)	0.28				Roots	14	<0.1/<0.1	<0.1/<0.1
Samoil (1998)	0.28							
DTF Doc. No.534-5901 [1/]								
IR-4PR No. 04451								

[1/] Dimethoate LOQ 0.1 mg/kg, LOD 0.063 mg/kg; omethoate LOQ 0.1 mg/kg, LOD 0.063 mg/kg.

Table 25. Residue data summary from supervised trials of dimethoate EC 400 g/l on globe artichokes (Wilson 2001h, 2002k).

GLOBE ARTICHOKES	Foliar application				Portion	PHI,	Residues, mg/kg	
Location, year, variety, report No.	kg ai/ha	kg ai/hl	water l/ha	No.	analyzed	days	dimethoate	omethoate
Italy (San Remo), 2001	0.419	0.04	1007	3		0	2.08	0.15
Globe artichoke Carciofo di Liguria	0.419	0.04	999		Artichoke	7	0.86	0.13
(VS0620)	0.419	0.04	1021		heads	15	0.43	0.07
Wilson (2001h)						22	0.15	0.04
DTF Doc. No.533-6401 [1/]						28	0.04	0.02
SCI 044/ 013775								
Italy (Ordona), 2000	0.419	0.04	1007	3		0	0.23	<0.002
Globe artichoke Violetto di	0.416	0.04	1001		Artichoke	7	0.16	0.03
Borgogna (VS 0620)	0.416	0.04	1001		Heads	14	0.02	<0.01
Wilson (2001h)						21	<0.01	<0.01
DTF Doc. No.533-6401 [1/]						29	<0.01	<0.01
SCI 044/ 013775								
Spain (Burjassot), 2001	0.426	0.04	1024	3		0	1.52	0.02
Globe artichoke Tudela (VS 0620)	0.421	0.04	1013		Artichoke	19	0.07	0.03
Wilson (2002k)	0.419	0.04	1008		Heads	28	0.02	<0.01
DTF Doc. No.533-6403 [1/]								
SCI 078/ 022800								
Spain (Benimamet), 2001	0.425	0.04	1021	3		0	1.08	0.02
Globe artichoke Tudela (VS 0620)	0.418	0.04	1005		Artichoke	20	0.04	0.02
Wilson (2002k)	0.419	0.04	1008		Heads	29	0.02	<0.01
DTF Doc. No.533-6403 [1/]								
SCI 078/ 022800								

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 26. Residues data from supervised trials of dimethoate EC 400 g/l on asparagus (Wilson 2001i, 2002l and 2002m).

ASPARAGUS	Foliar application				Portion	PHI,	Residues, mg/kg	
Location, year, variety, report No.	kg ai/ha	kg ai/hl	water l/ha	No.	analyzed	days	dimethoate	omethoate
Italy (Montanaso Lombardo), 2000	0.419	0.04	1008	2	Spears	0	1.40	0.02
Asparagus Hybrid SF144	0.421	0.04	1012			7	<0.01	<0.002
(VS 0621)						14	<0.01	<0.01
Wilson (2002l)						21	<0.01	<0.01
DTF Doc. No.533-6001 [1/]						28	<0.01	<0.01
SCI 042/ 013774						29	<0.01	<0.01
Italy (Dronero), 2000	0.414	0.04	997	2	Spears	0	1.0	<0.01
Asparagus Eros (VS 0621)	0.417	0.04	1003			7	0.01	<0.01
Wilson (2002l)						14	<0.01	<0.01
DTF Doc. No.533-6001 [1/]						21	<0.01	0.01
SCI 042/ 013774						28	<0.01	<0.01
						31	<0.01	<0.01

ASPARAGUS Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Arcagna), 2002 Asparagus Eros (VS 0621) Wilson (2002m) DTF Doc. No.533-6003 [1/] SCI 087/ 023998	0.420	0.0417	1008	1	Spears	0 3 7	1.00 0.06 <0.01	0.01 0.02 <0.01
Italy (Albenga), 2002 Asparagus Violetto di Albenga (VS 0621) Wilson (2002m) DTF Doc. No.533-6003 [1/] SCI 087/ 023998	0.421	0.417	1009	1	Spears	0 3 7	0.92 <0.01 <0.01	0.04 <0.01 <0.01
Spain (Huetor Tajar), 2001 Asparagus Plaver (VS 0621) Wilson (2001i) DTF Doc. No.533-6002 [1/] SCI 076/ 013679	0.42	0.10	1003	1	Stems	0 3 7 10 14	2.02 0.06 <0.01 <0.01 <0.01	0.05 0.02 <0.01 <0.01 <0.01
Spain (Huetor Tajar), 2001 Asparagus /Plaver (VS 0621) Wilson (2001i) DTF Doc. No.533-6002 [1/] SCI 076/013679	0.43	0.10	1033	1	Stems	0 3 7 10 14	1.08 0.02 <0.01 <0.01 <0.01	0.01 <0.01 <0.01 <0.01 <0.01

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 27. Residues data summary from supervised trials of dimethoate EC 400 g/l on celery (Wilson 2001j and 2002n).

CELERY Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Italy (Dronero), 2000 Celery Dorato d'Asti(VS 624) Wilson (2001j) DTF Doc. No.533-6203 [1/] SCI 043/ 004696	0.50 0.51	0.05 0.05	1001 1013	2	Plant	0 7 14 21 28	37.54 3.29 0.43 0.07 <0.01	0.47 0.62 0.15 0.04 <0.01
Italy (Caleppio), 2000 Celery Pascal (VS 624) Wilson (2001j) DTF Doc. No.533-6203 [1/] SCI 043/ 004696	0.50 0.49	0.05 0.05	1004 989	2	Plant	0 7 14 21 28	26.97 0.98 0.05 <0.01 <0.01	0.29 0.16 0.03 <0.01 <0.01
Spain (Murcia), 2001 Celery Celebrity (VS 624) Wilson (2002n) DTF Doc. No.533-6205 [1/] SCI 077/ 022873	0.50 0.51	0.05 0.05	1005 1013	2	Plant	0 14 21	7.58 0.55 0.09	0.06 0.07 0.02
Spain (Cartagena), 2001 Celery Golden Boy (VS 624) Wilson (2002n) DTF Doc. No.533-6205 [1/] SCI 077/ 022873	0.50 0.51	0.05 0.05	1006 1016	2	Plant	0 14 21	3.52 0.77 0.28	0.05 0.08 0.04

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.

Table 28. Residues data summary from supervised trials of dimethoate EC 400 g/l on wheat (Wilson, 2001k, 2002o, 2002p and 2002q).

WHEAT	Foliar application				Portion	PHI,	Residues, mg/kg	
Location, year, variety, report No.	kg ai/ha	kg ai/hl	water l/ha	No.	analyzed	days	dimethoate	omethoate
Italy (San Martino Olearo), 2000	0.42	0.10	401	1	Plant	0	11.15	0.07
Wheat Soisson (GC 0654)						7	2.42	0.39
Wilson (2001k)						14	0.68	0.21
DTF Doc. No.534-4022 [1/]								
SCI 046/ 004815					Grain	21	<0.01	<0.01
						28	<0.01	<0.01
						35	<0.01	<0.01
					Straw	21	0.04	<0.01
						28	0.02	<0.01
						35	0.03	<0.01
Italy (Magenta), 2000	0.42	0.10	402	1	Plant	0	9.12	0.21
Wheat Eridano (GC 0654)						7	2.48	0.32
Wilson (2001k)						14	0.08	0.02
DTF Doc. No.534-4022 [1/]								
SCI 046/ 004815					Grain	14	<0.01	<0.01
						21	<0.01	<0.01
						28	<0.01	<0.01
						35	<0.01	<0.01
					Straw	14	0.05	<0.01
						21	0.05	<0.01
						28	<0.01	<0.01
						35	<0.01	<0.01
Italy (Pantigliati), 2000	0.416	0.10	400	1	Plant	0	11.71	0.11
Wheat Argelato (GC 0654)								
Wilson (2002o)					Grain	27	<0.001	<0.001
DTF Doc. No.534-4030 [2/]						35	<0.001	<0.001
SCI 070/ 014248								
					Straw	27	0.03	<0.01
						35	0.01	<0.01
Italy (Mediglia), 2000	0.418	0.10	402	1	Plant	0	14.60	0.11
Wheat Farnese (GC 0654)								
Wilson (2002o)					Grain	28	0.014	0.002
DTF Doc. No.534-4030 [2/]						35	0.011	0.002
SCI 070/ 014248								
					Straw	28	0.15	0.02
						35	0.16	0.01
Spain (Quintanar del Rey), 2000	0.42	0.10	401	1	Plant	0	5.50	0.11
Wheat Pane (GC 0654)						7	3.03	0.24
Wilson (2001k)						15	1.40	0.14
DTF Doc. No.534-4022 [1/]								
SCI 046/ 004815					Ears	15	1.67	0.20
					Grain	21	0.05	<0.01
						28	<0.01	<0.01
						35	<0.01	<0.01
					Straw	15	0.98	0.14
						21	0.37	0.05
						28	0.05	<0.01
						35	0.10	0.0

WHEAT Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Spain (Quintanar del Rey), 2000 Wheat Pane (GC 0654) Wilson (2001k) DTF Doc. No.534-4022 [1/] SCI 046/ 004815	0.42	0.10	404	1	Plant	0	8.80	0.23
						7	1.71	0.25
						15	1.70	0.25
					Ears	15	1.56	0.33
					Grain	21	0.05	<0.01
						28	<0.01	<0.01
						35	<0.01	<0.01
					Straw	15	0.82	0.11
						21	0.47	0.08
						28	0.09	<0.01
						35	0.11	<0.01
Spain (Quintanar del Rey), 2001 Wheat Pane (GC 0654) Wilson (2002o) DTF Doc. No.534-4030 [2/] SCI 070/ 014248	0.435	0.10	419	1	Plant	0	13.94	0.21
					Grain	28	0.024	0.002
						34	0.002	<0.001
					Straw	28	0.45	0.07
						34	0.32	0.08
Spain (Quintanar del Rey), 2001 Wheat Pane (GC 0654) Wilson (2002o) DTF Doc. No.534-4030 [2/] SCI 070/ 014248	0.398	0.10	383	1	Plant	0	14.4	0.12
					Grain	28	0.007	<0.001
						34	0.003	<0.001
					Straw	28	0.37	0.06
						34	0.26	0.07
Germany (Blumberg), 2001 Wheat Pegassus (GC 0654) Wilson (2002p) DTF Doc. No.534-4032 [2/] SCI 080/ 014431	0.728 0.356	0.35 0.18	206 207	2	Plant	0	5.38	0.11
					Grain	28	<0.001	<0.001
						34	<0.001	<0.001
					Straw	28	0.07	<0.01
						34	0.03	<0.01
Germany (Brunne), 2001 Wheat Thasos, (GC 0654) Wilson (2002p) DTF Doc. No.534-4032 [2/] SCI 080/ 014431	0.713 0.345	0.35 0.18	202 195	2	Plant	0	4.10	0.05
					Grain	22	<0.001	<0.001
						30	<0.001	<0.001
					Straw	22	<0.01	<0.01
						30	<0.01	<0.001
Germany (Brunne), 2001 Wheat Bussard (GC 0654) Wilson (2002p) DTF Doc. No.534-4032 [2/] SCI 080/ 014431	0.737 0.349	0.35 0.18	209 198	2	Plant	0	3.39	0.07
						7	0.49	0.26
						14	0.13	0.06
					Ears	21	0.006	0.008
					Grain	28	<0.001	<0.001
						35	<0.001	<0.001
					Straw	21	0.02	<0.01
						28	0.01	<0.01
						35	<0.01	<0.01

WHEAT Location, year, variety, report No.	Foliar application				Portion analyzed	PHI, days	Residues, mg/kg	
	kg ai/ha	kg ai/hl	water l/ha	No.			dimethoate	omethoate
Germany (Brunne), 2002	0.738	0.35	208	2	Plant	0	4.54	0.08
Wheat Asketis (GC 0654)	0.354	0.18	200			7	0.25	0.11
Wilson (2002q)						14	0.14	0.05
DTF Doc. No.534-4034 [2/]								
SCI 086/ 024290					Ears	21	0.023	0.047
					Grain	28	0.001	0.001
						35	<0.001	<0.001
					Straw	21	0.04	0.01
						28	0.02	<0.01
						35	<0.01	<0.01
UK (Tendring) 2001	0.766	0.35	217	2	Plant	0	8.93	0.21
Wheat Cadenza (GC 0654)	0.387	0.18	219			28	<0.01	0.01
Wilson (2002p)								
DTF Doc. No.534-4032 [2/]					Grain	42	<0.001	<0.001
SCI 080/ 014431						49	<0.001	<0.001
					Straw	42	<0.01	<0.01
						49	<0.01	<0.01
UK (Manningtree), 2001	0.740	0.35	209	2	Plant	0	5.85	0.10
Wheat Cadenza (GC 0654),	0.369	0.18	209			7	0.09	0.10
Wilson (2002p)						14	0.02	0.03
DTF Doc. No.534-4032 [2/]						28	<0.01	<0.01
SCI 080/ 014431								
					Grain	43	<0.001	<0.001
						49	<0.001	<0.001
					Straw	43	<0.01	<0.01
						49	<0.01	<0.01
UK (Tendring), 2002	0.763	0.35	215	2	Plant	0	4.36	0.03
Wheat Consort (GC 0654)	0.392	0.18	221					
Wilson (2002q)					Grain	29	0.001	0.002
DTF Doc. No.534-4034 [2/]						35	<0.001	<0.001
SCI 086/ 024290								
					Straw	29	0.05	<0.01
						35	<0.01	<0.01

[1/] Dimethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg.
[2/] Dimethoate/omethoate LOQ 0.01 mg/kg, LOD 0.002 mg/kg; except grain LOQ 0.001 mg/kg, LOD 0.0002 mg/kg.

FATE OF RESIDUES IN STORAGE AND PROCESSING

In storage

Dimethoate and omethoate are stable in cherries for up to 6 months in storage at –18ºC, according to the study and results presented in Table 9 (Harper, H 2001c). Dimethoate and omethoate are stable in mangoes for up to 3 months in frozen storage, according to an Australian study presented in Table 10 (Bodnaruk, 2002d).

In processing

Simulated processing

A study of simulated processing was performed to provide information on the effects of hydrolysis on the dimethoate and omethoate (Aikens 1999). ^{14}C-dimethoate or ^{14}C-omethoate, labelled in both methoxy groups, were incubated in buffer solutions under the following conditions, prior to analysis:

- pH 4, 90°C, 20 minutes (process represented pasteurization);
- pH 5, 100°C, 60 minutes (process represented baking, brewing, boiling);
- pH 6, 120°C, 20 minutes (process represented sterilization).

Certain hydrolysis products, such as *O*-demethyl dimethoate, *O*-demethyl *iso*-dimethoate, *O,O*-dimethyl phosphoric acid and *O*-demethyl omethoate, represented more than 5% of the applied radioactivity (Tables 29 and 30). At least 3 other radioactive degradation products of dimethoate

were detected (components 1, 2 and 3), none of which exceeded 2.5% AR and one radioactive degradation product (A) of omethoate did not exceed 3% AR. These compounds were also found in animal metabolism studies, e.g. rat metabolism, or they have been shown to have no toxicological relevance. Dimethoate was hydrolyzed to various extents by the conditions used. At the end of the 90, 100 and 120ºC incubations which represent pasteurization, baking/brewing/boiling and sterilization, respectively, dimethoate represented 93.3, 66.4 and 29.5% of the applied radioactivity, respectively. Omethoate was hydrolyzed to various extents by the conditions used. At the end of the 90, 100 and 120ºC incubations omethoate represented 92.9, 61.3 and 5.5% of the applied radioactivity, respectively.

Table 29. Proportions of radioactive components detected in the processed aqueous buffers which contained ^{14}C-dimethoate at a nominal concentration of 1.0 µg/ml (Aikens 1999).

Component	Recovery of radioactivity (results expressed as % applied radioactivity)		
	pH 4, 90°C, 20 min	pH 5, 100°C, 60 min	pH 6, 120°C, 20 min
1	0.5	1.2	2.4
2	0.4	0.8	1.2
3	0.9	2.5	2.4
O-demethyl *iso*-dimethoate	0.3	0.9	5.3
O-demethyl dimethoate	4.7	28.1	59.5
Dimethoate	93.3	66.4	29.5

Table 30. Proportions of radioactive components detected in the processed aqueous buffers which contained ^{14}C-omethoate at a nominal concentration of 1.0 µg/ml (Aikens 1999).

Component	Recovery of radioactivity (results expressed as % applied radioactivity)		
	pH 4, 90°C, 20 min	pH 5, 100°C, 60 min	pH 6, 120°C, 20 min
A	ND	0.1	3.0
O,O-dimethyl phosphoric acid	0.2	1.5	19.2
O-demethyl omethoate	6.3	36.2	62.6
Omethoate	92.9	61.3	5.5

ND = not detected.

Processing

Studies had been conducted to determine the effect of processing on dimethoate residues in olives, cabbage and wheat (Tables 31-33).

Processing olives into raw or refined oil reduces the level of dimethoate residues and omethoate residues were not detectable above the LOQ in raw or refined oil. Most of the dimethoate and omethoate residues are found in the cake and margines. Dimethoate and omethoate residues are lower in canned olives than in olives prior to processing and both compounds decline during the storage of olives prior to canning. Residues of dimethoate and omethoate in non-sterilized canned olives decreased during 6 months storage. For residues <LOQ (<0.01 mg/kg), values were taken as 0.01 mg/kg for the calculation of processing factors; where residues were not detected (<LOD, <0.002 mg/kg), values were taken as 0.002 mg/kg for the calculation.

Table 31. The effects of processing on residues of dimethoate and omethoate in olives (Wilson 2002d and 2002r).

Commodity/fraction	Residues concentration, mg/kg				Processing factor (mean)	
	dimethoate		omethoate		dimethoate	omethoate
	study 1 [1/]	study 2 [2/]	study 1 [1/]	study 2 [2/]		
Olive pulp (RAC)	0.39	3.01	0.37	0.92	1	1
Cake	0.35	2.75	0.26	0.64	0.91	0.70
Margines + water (after centrifugation)	0.33	2.32	0.24	0.59	0.81	0.65
Soap	ND	ND	ND	ND	0.01	0.01
Raw olive oil	0.17	1.26	ND	<0.01	0.43	0.01
Refined olive oil	<0.01	0.02	ND	ND	0.02	0.01
0 day canned olives (sterilized)	0.12	0.34	0.07	0.04	0.21	0.12
0 day canned brine (sterilized)	0.08	0.23	0.03	0.02	0.15	0.05
0 day canned olives (non-sterilized)	0.36	4.02	0.33	0.98	0.13	0.98
0 day canned brine (non-sterilized)	0.03	0.19	0.03	0.07	0.07	0.08
10 day canned olives (sterilized)	0.03	0.08	0.01	0.02	0.06	0.03

Commodity/fraction	Residues concentration, mg/kg				Processing factor (mean)	
	dimethoate		omethoate		dimethoate	omethoate
	study 1 [1/]	study 2 [2/]	study 1 [1/]	study 2 [2/]		
10 day canned brine (sterilized)	0.02	0.05	<0.01	0.01	0.04	0.02
10 day canned olives (non-sterilized)	0.29	3.22	0.27	0.77	0.91	0.79
10 day canned brine (non-sterilized)	0.08	0.46	0.05	0.11	0.18	0.13
6 months canned olives (sterilized)	0.02	0.20	ND	0.02	0.06	0.02
6 months canned brine (sterilized)	0.01	0.10	ND	ND	0.03	0.01
6 months canned olives (non-sterilized)	0.11	0.92	0.02	0.06	0.30	0.06
6 months canned brine (non-sterilized)	0.08	0.62	0.03	0.07	0.21	0.08

[1/] Wilson 2002d, DTF Doc. No.532-5005.
[2/] Wilson 2002r, DTF Doc. No.532-5007.
ND = not detected
<0.01 = below the LOQ 0f 0.01 mg/kg for dimethoate and omethoate.

In processing cabbages, the highest residue concentration of dimethoate was found in the outer leaves. The second highest concentration was found in the white cabbage heads (RAC), followed by the stalks and then the core (cut for salad). No residue above the limit of quantification was found in cooked white cabbage samples or in the water used for boiling the samples. The highest residue concentration of omethoate highest residue was also in the outer leaves of cabbage, followed by the white cabbage head (RAC). No residue above the limit of quantification was found in the stalks, the core (cut for salad), cooked white cabbage or in the water used for boiling the samples. For residues <LOQ (<0.01 mg/kg), values were taken as 0.01 mg/kg for the calculation of processing factors.

Table 32. The effects of processing on residues of dimethoate and omethoate in cabbages (Schulz 2002b DTF Doc. No.533-3525).

Commodity/fraction	Residues concentration, mg/kg		Processing factor (mean)	
	dimethoate	omethoate	dimethoate	omethoate
White Cabbage (RAC)	0.051	0.082	1	1
Outer leaves	0.187	0.495	3.67	5.96
Inner and outer stalks	0.041	<0.01	0.80	0.12
Core, cut to salad	0.011	<0.01	0.20	0.12
Cooked white cabbage	<0.01	<0.01	0.20	0.12
Boiled water	<0.01	<0.01	0.20	0.12

<0.01 = below the LOQ of 0.01 mg/kg for dimethoate and omethoate.

In trials of processing wheat, the residues of dimethoate and omethoate detected in the field RAC samples were used to determine the concentration and dilution factors during processing, rather than the RAC after the drying required prior to processing. For residues <LOQ (<0.001 mg/kg), values were taken as 0.001 mg/kg for the calculation of processing factors; where residues were not detected (<LOD, <0.0002 mg/kg), values were taken as 0.0002 mg/kg for the calculation.

Table 33. The effects of processing on residues of dimethoate and omethoate in wheat (Wilson, 2003 DTF Doc. No. 538-011).

Commodity/fraction	Residues concentration, mg/kg								Processing factor (mean)	
	Trial 1		Trial 2		Trial 3 [1/]		Trial 4			
	Dim.	Ome.	Dim.	Ome.	Dim.	Ome.	Dim.	Ome.	Dim.	Ome.
Wheat, field grain (RAC)	0.013	0.002	0.018	0.003	0.005	<0.001	0.075	0.002	1	1
Cleaned grain					0.004	ND			0.03	0.01
Screening					0.07	0.003			0.45	0.18
Wholemeal flour	0.008	<0.001	0.004	<0.001	0.016	<0.001	0.051	0.002	0.31	0.27
Middlings					0.015	<0.001			0.10	0.06
White flour	0.004	<0.001	0.001	<0.001	0.004	<0.001	0.01	<0.001	0.09	0.18
Cleaned bran	0.052	0.007	0.025	0.004	0.076	0.005	0.363	0.01	2.03	1.40
Germ rich fraction	0.037	0.004	0.015	0.002	0.048	0.003	0.225	0.008	1.31	0.99
Toppings	0.015	0.001	0.007	<0.001	0.024	<0.001	0.094	0.002	0.56	0.27
Type 550 flour	0.003	<0.001	<0.001	<0.001	0.003	<0.001	0.009	<0.001	0.08	0.18
Wholemeal bread	0.023	0.003	0.013	0.001	0.027	0.002	0.154	0.005	0.85	0.63

ND = Not detected.
<0.001 = below the LOQ of 0.001 mg/kg for dimethoate and omethoate.
[1/] Trial 3 was treated at 5 fold (1st application) and 5 fold (2nd application) the recommended label rate.

Residues in the edible portions of food commodities

The Meeting received data on dimethoate and omethoate residues in the edible portion of oranges, clementine/mandarin and lemons included within the data on residues resulting from supervised trials on citrus fruits from Spain, Italy , Greece and Brazil.

Table 34. Dimethoate and omethoate residues in pulp and peel of citrus fruit.

Location, year, report	Appl., kg ai/hl, No.	Fraction	Dimethoate residues, mg/kg, days after last application									
			0		7		13/14/15		21/22		28/29	
			Dim	Om	Dim	Om	Dim	Om	Dim	Om	Dim	Om
Oranges												
Santiponce, Spain, 1999 SCI 022/ 004697	0.06 (3)	Pulp	--	--	--	--	--	--	0.02	0.03	0.02	0.03
		Peel	--	--	--	--	--	--	2.60	0.13	1.90	0.11
		Whole fruit	1.39	<0.01	0.75	0.05	0.66	0.04	0.65	0.05	0.43	0.03
Benimamet, Spain, 2000 SCI 039/ 012960	0.06 (3)	Pulp	--	--	--	--	--	--	0.03	0.03	<0.01	0.02
		Peel	--	--	--	--	--	--	4.94	0.16	2.76	0.07
		Whole fruit	1.98	0.02	2.21	0.06	0.98	0.08	0.85	0.04	0.73	0.04
Benimamit, Spain, 2001 SCI 073/022774	0.06 (3)	Pulp	--	--	--	--	--	--	0.01	0.08	0.02	0.02
		Peel	--	--	--	--	--	--	3.48	0.20	2.18	0.09
		Whole fruit	2.35	0.04	--	--	--	--	0.83	0.05	0.36	0.03
Territorio, Italy, 1999 SCI 022/004697	0.06 (3)	Pulp	--	--	--	--	--	--	<0.01	0.01	<0.01	0.01
		Peel	--	--	--	--	--	--	0.74	0.06	0.72	0.06
		Whole fruit	1.24	<0.01	0.36	0.05	0.56	0.05	0.29	0.03	0.18	0.03
Cagnano varano, Italy, 2001 SCI 039/012960	0.06 (3)	Pulp	--	--	--	--	--	--	0.06	0.01	0.07	0.02
		Peel	--	--	--	--	--	--	4.12	0.06	4.84	0.08
		Whole fruit	2.33	0.02	--	--	--	--	0.89	0.02	1.50	0.04
Karies, Greece, 2000 SCI 039/012960	0.06 (3)	Pulp	--	--	--	--	--	--	0.02	<0.01	<0.01	<0.01
		Peel	--	--	--	--	--	--	1.94	0.02	1.70	0.02
		Whole fruit	1.85	<0.01	--	--	--	--	0.77	0.02	0.47	<0.01
Koutsopodio, Greece, 2000 SCI 039/012960	0.06 (3)	Pulp	--	--	--	--	--	--	<0.01	<0.01	0.002*	0.002*
		Peel	--	--	--	--	--	--	1.93	0.03	0.47	<0.01
		Whole fruit	0.83	<0.01	0.82	<0.01	0.26	<0.01	0.41	<0.01	0.41	0.03
Koutsopodio, Greece, 2001 SCI 073/022774	0.06 (3)	Pulp	--	--	--	--	--	--	0.01	0.002*	0.002*	0.002*
		Peel	--	--	--	--	--	--	1.69	0.02	0.07	<0.01
		Whole fruit	1.25	<0.01	--	--	--	--	0.37	<0.01	0.02	<0.01
			0 day		3 days		7 days		14 days		21 days	
Iracemapolis Brazil, 2002 Anonymous, 2002a CDRI/02/RCHE280 plantec-02, (Report 1)	0.04 (3)	Pulp	0.05	<0.30	0.08	<0.30	0.09	<0.30	0.03	<0.30	0.04	<0.30
		Peel	0.67	<0.30	0.56	<0.30	0.53	<0.30	0.54	<0.30	1.69	<0.30
		Whole fruit	0.23	<0.30	0.20	<0.30	0.24	<0.30	0.45	<0.30	0.11	<0.30
Iracemapolis Brazil, 2002 Anonymous, 2002a CDRI/02/RCHE280 plantec-03, (Report 1)	0.08 (3)	Pulp			0.32	<0.30						
		Peel			1.81	<0.30						
		Whole fruit			0.97	<0.30						
Santa Rita do Passa Quatro Brazil, 2002 Anonymous, 2002b CDRI/02/RCHE281 plantec-02, (Report 2)	0.04 (3)	Pulp			0.13	<0.30						
		Peel			0.77	<0.30						
		Whole fruit			0.15	<0.30						
Santa Rita do Passa Quatro Brazil, 2002 Anonymous, 2002b CDRI/02/RCHE281 plantec-03, (Report 2)	0.08 (3)	Pulp			0.59	<0.30						
		Peel			2.42	<0.30						
		Whole fruit			0.77	<0.30						
Tatui Brazil, 2002 Anonymous, 2002c CDRI/02/RCHE282 plantec-02, (Report 3)	0.04 (3)	Pulp			0.09	<0.30						
		Peel			0.71	<0.30						
		Whole fruit			0.48	<0.30						
Tatui Brazil, 2002 Anonymous, 2002c CDRI/02/RCHE282 plantec-02, (Report 3)	0.08 (3)	Pulp			0.71	<0.30						
		Peel			2.33	<0.30						
		Whole fruit			1.33	<0.30						

Location, year, report	Appl., kg ai/hl, No.	Fraction	Dimethoate residues, mg/kg, days after last application									
			0		7		13/14/15		21/22		28/29	
			Dim	Om	Dim	Om	Dim	Om	Dim	Om	Dim	Om
Clementine/Mandarin												
Cartaya, Spain, 1999	0.06	Pulp	--	--	--	--	--	--	<0.01	0.04	<0.01	0.03
SCI 022/004697	(3)	Peel	--	--	--	--	--	--	1.14	0.13	0.74	0.14
		Whole fruit	1.75	0.01	1.22	0.06	0.53	0.07	0.37	0.08	0.31	0.07
Benimamet Spain,	0.06	Pulp	--	--	--	--	--	--	0.02	0.11	<0.01	0.08
2000	(3)	Peel	--	--	--	--	--	--	11.70	0.29	6.75	0.22
SCI 022- 004697		Whole fruit	5.24	0.01	3.55	0.06	1.59	0.07	1.48	0.08	0.94	0.07
Benimamet, Spain,	0.06	Pulp	--	--	--	--	--	--	0.02	0.03	0.002	0.05
2001	(3)	Peel	--	--	--	--	--	--	4.43	0.18	2.14	0.15
SCI 073- 0022774		Whole fruit	2.71	0.02	--	--	--	--	0.35	0.08	0.28	0.06
Foce Varano, Italy,	0.06	Pulp	--	--	--	--	--	--	0.07	0.13	--	--
2001	(3)	Peel	--	--	--	--	--	--	8.72	0.31	--	--
SCI 039/012960		Whole fruit	--	--	--	--	--	--	3.10	0.13	--	--
Papa-Gianello, Italy,	0.06	Pulp	--	--	--	--	--	--	0.01	0.04	0.01	0.05
2001	(3)	Peel	--	--	--	--	--	--	4.55	0.33	3.54	0.31
SCI 073/022774		Whole fruit	3.65	0.08	--	--	--	--	1.17	0.13	1.07	0.11
Bernalda, Italy, 2001	0.06	Pulp	--	--	--	--	--	--	0.01	<0.01	0.01	0.05
SCI 073/022774	(3)	Peel	--	--	--	--	--	--	1.64	0.04	4.17	0.28
		Whole fruit	2.42	0.01	--	--	--	--	1.34	0.06	1.06	0.14
Koutsopodio, Greece,	0.06	Pulp	--	--	--	--	--	--	0.02	0.02	<0.01	0.02
1999	(3)	Peel	--	--	--	--	--	--	1.47	0.21	1.13	0.24
SCI 022/004697		Whole fruit	1.59	<0.01	1.16	0.07	0.55	0.06	0.52	0.08	0.44	0.08
Koustopodio Greece,	0.06	Pulp	--	--	--	--	--	--	<0.01	<0.01	<0.01	<0.01
2001	(3)	Peel	--	--	--	--	--	--	1.71	0.11	2.13	0.19
SCI 073/022774		Whole fruit	2.48	0.02	1.72	0.06	1.24	0.07	0.61	0.06	1.04	0.08
Lemons												
C.de Pezza Grande	0.06	Pulp	--	--	--	--	--	--	0.05	0.04	0.04	0.05
Siracusa, Italy, 1999	(3)	Peel	--	--	--	--	--	--	1.46	0.17	0.75	0.18
SCI 022/004697		Whole fruit	2.02	0.02	1.49	0.09	1.21	0.09	0.76	0.10	0.32	0.07
Geliniatike, Greece,	0.06	Pulp	--	--	--	--	--	--	0.18	0.05	0.19	0.06
1999	(3)	Peel	--	--	--	--	--	--	3.92	0.24	3.23	0.23
SCI 022/004697		Whole fruit	1.80	<0.01	2.53	0.04	1.72	0.07	0.87	0.08	1.10	0.11

Dim = dimethoate; Om = omethoate.
* LOD = 0.002 mg/kg, LOQ = 0.01 mg/kg.

RESIDUES IN ANIMAL COMMODITIES

No data submitted.

RESIDUES IN FOOD IN COMMERCE OR AT CONSUMPTION

A one-year market basket survey of residues of organophosphorus pesticides in food was conducted by the USDA´s Pesticide Data Program, which was focused upon single serving samples (Polakoff, 2002). Samples of 13 conventionally-grown fresh fruit and vegetables were collected during the period January 1999 to January 2000. Samples were collected from 500 randomly selected grocery stores, throughout the continental USA, and the statistical design of the study ensured that the samples were representative of the national food supply. Nine of the commodities (apples, broccoli, cherries, grapes, green beans, head lettuce, oranges, potatoes and tomatoes) were analyzed for residues of dimethoate and omethoate. Prior to residue analysis, the samples were prepared in the same way that consumers would typically prepare their food before eating. A multi-residue analytical method was used, with a limit of quantification of 0.001 ppm for each analyte. The limit of detection (LOD) was calculated for each chromatographic run and varied between 0.00001 and 0.00087 ppm, depending on the matrix within each analytical set, i.e. the survey method was more sensitive than typical residue methods, by at least a factor of ten. A total of 4086 single serving samples were analyzed for the presence of dimethoate and omethoate (Tables 35 and 36). The survey showed that the frequency and magnitude of organophosphorus pesticide residues, including dimethoate and omethoate, are low in conventionally-produced single servings of fresh fruit and vegetables.

Table 35. Market basket survey of residues of dimethoate and omethoate in single serving samples of apples, broccoli, cherries, grapes and green beans in the USA, 1999-2000.

Commodity	Apples		Broccoli		Cherries		Grapes		Green beans	
Analyte	Dim	Om	Dim	Om	Dim	Om	Dim	Om	Dim	Om
No samples analyzed	500	500	493	493	144	144	491	491	465	465
Number non detect	341	467	337	326	130	108	331	276	376	376
% non detect	68	93	68	66	90	75	67	56	81	81
No. non-quantifiable	133	20	125	116	12	29	72	101	37	27
% Non-quantifiable	27	4	25	24	8	20	15	21	8	6
Number quantifiable	26	13	31	51	2	7	88	114	52	62
% Quantifiable	5	3	6	10	1	5	18	23	11	13
Average residue [mg/kg]	0.00062	0.00034	0.00131	0.00064	0.00005	0.00082	0.00493	0.00560	0.00849	0.00195
Standard deviation	0.00574	0.00318	0.02065	0.00462	0.00025	0.00448	0.02449	0.02270	0.04373	0.00780
Maximum quantifiable residue [mg/kg]	0.10123	0.05517	0.45686	0.09758	0.00260	0.04441	0.42206	0.32742	0.46068	0.06456

Dim = dimethoate; Om = Omethoate.

Table 36. Market basket survey of residues of dimethoate and omethoate in single serving samples of head lettuce, oranges, potatoes and tomatoes in the USA, 1999-2000.

Commodity	Head lettuce		Oranges		Potatoes		Tomatoes	
Analyte	Dim	Om	Dim	Om	Dim	Om	Dim	Om
No samples analyzed	496	496	499	499	500	500	498	498
Number non detect	341	331	468	479	499	496	490	442
% non detect	69	67	94	96	> 99	> 99	98	89
Number non-quantifiable	80	90	28	16	0	3	6	35
% Non-quantifiable	16	18	6	3	0	< 1	1	7
Number quantifiable	75	75	3	4	1	1	2	21
% Quantifiable	15	15	< 1	< 1	< 1	< 1	< 1	4
Average residue [mg/kg]	0.00193	0.00062	0.00003	0.00005	< 0.00005	< 0.00005	0.00002	0.00028
Standard deviation	0.00989	0.00190	0.00026	0.00052	NA	0.00006	0.00018	0.00148
Maximum quantifiable residue [mg/kg]	0.12745	0.02506	0.00447	0.00844	0.00151	0.00106	0.00279	0.01530

Dim = dimethoate; Om = Omethoate; NA = not available.

NATIONAL MAXIMUM RESIDUE LIMITS

Table 37. National residue limits for dimethoate.

Country/area	MRL for various crops in mg/kg	MRL, mg/kg
EU MRLs for sum of dimethoate and omethoate EU Directive 2002/71/CE2, 19 August 2002	Wheat, rye, triticale	0.3
	Other cereals	0.02
	Citrus fruit	0.02
	Tree nuts	0.05
	Pome fruit	0.02
	Cherries	1
	Other stone fruit	0.02
	Berries and small fruit	0.02
	Olives	2
	Miscellaneous (others)	0.02
	Root and tuber vegetables	0.02
	Spring onions	2
	Other bulb vegetables	0.02
	Cauliflower	0.2
	Other flowering brassicas	0.02
	Brussels sprouts	0.3
	Head cabbages	1
	Head brassicas, others	0.02
	Leafy brassicas	0.02
	Kohlrabi	0.02
	Lettuce	0.5
	Lettuce, others	0.02
	Spinach and similar	0.02
	Water cress	0.02
	Witloof chicory	0.02
	Herbs	0.02
	Peas (with pods)	1
	Legume, vegetables (fresh), others	0.02
	Stem vegetables (fresh)	0.02
	Fungi	0.02
	Pulses	0.02
	Oilseeds	0.05
	Potatoes	0.02
	Tea	0.05
	Hops	0.05
Germany 7th Amendment to RhmV, Appendix 2, List A	Fruit	1
	Vegetables	1
	Tea	0.2
	Camomile	1
	Mint	1
	Other products similar to tea	0.1
	Cereals	0.2
	Other foods of plant origin	0.05
The Netherlands MRLs for sum of dimethoate and omethoate Ministry of Health, Welfare and Sport; The Hague, the Netherlands; Jan. 2003	Nuts	0.05
	Cherries	1
	Olives	2
	Spring onions	2
	Cauliflowers	0.2
	Brussels sprouts	0.3
	Head cabbages	1
	Lettuce	0.5
	Peas with pods	1
	Oil seed	0.05
	Tea	0.05
	Hops	0.05
	Wheat, rye, triticale	0.3
	Other	0.02
Australia	Cereal grain	0.05
	Edible offal (mammalian)	0.05
	Eggs	0.05
	Fruiting vegetables, cucurbits	2
	Fruit (except strawberries, litchi,	2

Country/area	MRL for various crops in mg/kg	MRL, mg/kg
Australia, continued	peaches)	
	Litchis	5
	Lupin (dry)	0.5
	Lupin, forage	1
	Meat (mammalian)	0.05
	Milks	0.05
	Oilseed (except peanut)	0.1
	Peaches	5 (T)
	Peanuts	0.05
	Peppers sweet (capsicums)	1
	Poultry, edible offal	0.05
	Poultry meat	0.05
	Strawberries	5
	Tomatoes	1
	Vegetables (except lupin, dry; peppers, sweet; tomato)	2
USA (1)	Alfalfa	2
	Apples	2
40 CFR – Chapter 1 – Part 180	Beans, dry	2
	Beans, Lima	2
	Beans, snap	2
	Blueberries (1)	1
	Broccoli	2
	Cabbages	2
	Cattle, fat	0.02
	Cattle, meat by-products	0.02
	Cattle, meat	0.02
	Cauliflowers	2
	Celery	2
	Citrus, pulp, dried	5
	Collards	2
	Corn, fodder	1
	Corn, forage	1
	Corn, grain	0.1
	Cottonseed	0.1
	Eggs	0.02
	Endive (escarole)	2
	Goat, fat	0.02
	Goat, meat by-products	0.02
	Goat, meat	0.02
	Grapefruit	2
	Grapes	1
	Hog, fat	0.02
	Hog, meat by-products	0.02
	Hog, meat	0.02
	Horse, fat	0.02
	Horse, meat by-products	0.02
	Horse, meat	0.02
	Kale	2
	Lemons	2
	Lentils	2
	Lettuce	2
	Melons	1
	Milk	0.002
	Mustard greens	2
	Oranges	2
	Pears	2
	Peas	2
	Pecans	0.1
	Peppers	2
	Potatoes	0.2
	Poultry, fat	0.02
	Poultry, meat by-products	0.02
	Poultry, meat	0.02
	Safflower, seed	0.1

Country/area	MRL for various crops in mg/kg	MRL, mg/kg
USA, continued	Sheep, fat	0.02
	Sheep, meat by-products	0.02
	Sheep, meat	0.02
	Sorghum, forage	0.2
	Sorghum, grain	0.1
	Soya beans	0.05
	Soya bean, forage	2
	Soya bean, hay	2
	Spinach	2
	Swiss chard	2
	Tangerines	2
	Tomatoes	2
	Turnip, roots	2
	Turnip, tops	2
	Wheat, grain	0.04
	Wheat, green fodder	2
	Wheat, straw	2

(1)→There were no U.S. registrations as of August 16, 1995.
(T)→Temporary.

APPRAISAL

Dimethoate is a systemic insecticide, typically applied as an emulsifiable concentrate (EC) at a rate of 0.2-0.9 kg ai/ha. The latest evaluation of dimethoate residues was in 1998, within the CCPR Periodic Review Programme, and the toxicology was reviewed in 1996, when an ADI of 0-0.002 mg/kg bw was allocated for the sum of dimethoate and omethoate expressed as dimethoate.

The 1998 JMPR recommended the definition of the residue to be dimethoate for compliance with MRLs and the sum of dimethoate and omethoate, each considered separately, for the estimation of dietary intake.

The manufacturers reported information on physical and chemical properties, plant metabolism and toxicity of metabolites, environmental fate in water-sediment systems, stability of residues in stored analytical samples, use patterns, residues resulting from supervised trials on crops, fate of residues in storage and processing, residues in food in commerce or at consumption and national MRLs. Information on national GAP was provided by the governments of Thailand, The Netherlands, Germany, Brazil, Poland and Australia.

The Meeting considered the new information and reviewed the residue data, taking into account the revised use patterns. Where sufficient residue data reflecting the changed use conditions were available, new MRLs were recommended. However the previously estimated maximum residue levels were not changed if the GAP on which they depended was still in effect.

Plant metabolism

Two new plant metabolism studies with [^{14}C]dimethoate on potatoes and wheat were evaluated.

After two spray applications of [^{14}C]dimethoate to potatoes at a mean rate of 340 g/ha per application with 14 days between applications, significant residues were present in foliage, decreasing from 12.3 mg/kg as dimethoate after the second application (day 0) to 1.3 mg/kg at day 14 and slightly increasing to 3.5 mg/kg fresh weight at day 28, as moisture loss from the crop caused concentration of the residue. ^{14}C residues in tubers remained constant throughout the study and ranged from 0.19 to 0.30 mg dimethoate equivalent/kg.

After two spray applications of [^{14}C]dimethoate to wheat at 710 g/ha and 420 g/ha with 41 days between applications, significant residues were present in all plant parts. Levels of radioactivity were highest in those parts of the plant directly exposed to the spray, representing dimethoate equivalents up to 29.7 mg/kg in the whole plant immediately after the first application. Concentrations of radioactivity in ears and the remainder of the plant represented 22.7 mg/kg and 16.1 mg/kg, respectively, immediately after the second application. At the early harvest (day 62) the concentration of radioactivity in straw had decreased to 6.4 mg/kg dimethoate equivalents, although levels in hulls represented 23.3 mg/kg. In grain, which was not directly exposed to the spray, the total

radioactivity represented 2.3 mg/kg. The levels increased slightly at the normal harvest (day 73), as a result of drying of the crop, and were 4.3, 33.7 and 7.8 mg/kg in grain, hulls and straw, respectively.

A similar metabolic profile was found in potato and wheat plants:

- oxidation to yield omethoate (metabolite II);
- *O*- and *N*-demethylation of omethoate to yield *O*-demethyl *N*-demethyl omethoate (XXIII);
- hydrolysis at the amide bond to give dimethoate carboxylic acid (III) and subsequent degradation to give *O,O*-dimethyl dithiophosphoric acid (XV);
- demethylation and rearrangement to yield *O*-demethyl dimethoate (X) or *O*-demethyl isodimethoate (XII);
- demethylation of omethoate to give *O*-demethyl omethoate (XI) and subsequent hydrolysis of the amide bond to give *O*-demethyl omethoate carboxylic acid (XX).

No dimethoate or omethoate was detected in the edible parts of potatoes or wheat (i.e. tubers or grain) at any time, indicating that translocation of dimethoate or omethoate did not take place to a significant extent. The plant metabolites III, XI, XII and XX were found to be toxicologically insignificant.

Methods of analysis

The method used for white cabbage and lettuce involved extraction with ethyl acetate and clean-up of the extract by gel permeation chromatography. Quantification of both dimethoate and omethoate was carried out by gas chromatography with a flame photometric detector in the phosphorus mode or mass selective detection. The LOQ was 0.01 mg/kg.

Whole fruit, peel and pulp of citrus fruits (except lemons) were analyzed by extraction with acetone, followed by partitioning into dichloromethane. The extract was treated with activated charcoal and final clean-up was by column chromatography with activated silica gel. Quantification was by GC with an FPD in the phosphorus mode with an LOQ of 0.01 mg/kg.

Lemon homogenates were extracted with dichloromethane. The solvent was changed to hexane and dimethoate and omethoate were partitioned into water. The aqueous extract was analyzed by LC-MS providing an LOQ of 0.01 mg/kg. This method was also applied to olives with the same LOQ. Olive oil was extracted with acetonitrile after dissolution in hexane.

Cherry homogenate was extracted into dichloromethane and, after removal of water with anhydrous sodium sulfate, cleaned up with activated charcoal. Quantification of dimethoate and omethoate was by GC with an FPD in the phosphorus mode with an LOQ of 0.01 mg/kg.

Apples, artichokes, celery, cherries, lettuce, tomatoes, wheat (grain, green plants and straw), sugar beet, (tops and roots), asparagus and melons (peel and pulp) were analyzed using dichloromethane for extraction, followed by clean-up by liquid/liquid partition with hexane. Dimethoate and omethoate were partitioned into water for quantification by liquid chromatography with mass spectrometric detection (LOQ 0.01 mg/kg for all samples). A small modification using an ENVI-Carb Bondelut cartridge pre-wetted with dichloromethane and a double aliquot of the extract (20 ml, equivalent to 2 g of sample) was validated and the limit of quantification was decreased to 0.001 mg/kg in wheat grain.

Methods were validated for the determination of dimethoate and omethoate residues in milk, eggs and animal tissues, where the LOQ was 0.001 mg/kg for milk and eggs and 0.01 mg/kg for tissues.

In a multi-residue method, ethyl acetate was used to extract plant samples, followed by a GPC clean-up. Quantification was by GC with an NPD.

In the DFG S-19 multi-residue method, acetone was used for extraction, its volume adjusted according to the water content of the sample to achieve an acetone to water ratio of 2:1 during extraction. To separate the excess water, the extract was saturated with sodium chloride and partitioned with dichloromethane. The clean-up was by GPC with cyclohexane-ethyl acetate elution. Quantification of dimethoate and omethoate was by GC with an NPD.

A modified DFG S-19 method used GC with an atomic emission detector for determination, with an internal standard added before extraction (2 µg aldrin dissolved in toluene). Extraction was with acetone. After saturation with sodium chloride and dilution with dichloromethane, clean-up was by GPC with cyclohexane/ethyl acetate as eluent. The residue was dissolved in 200 µl toluene for the final determination.

Another multi-residue method for olives, oranges, lettuce and wheat grain consisted of extraction with ethyl acetate followed by clean-up by gel permeation chromatography. Olive oil was extracted with acetonitrile after dissolution in hexane. Extracts were analyzed by GC with an FPD on a DB-17 column. Quantification was by comparison with matrix-matched external standards. Confirmation was by GC with an FPD on a 30 m DB 1701 column.

Stability of residues in stored analytical samples

Dimethoate and omethoate in cherries were stable up to 6 months during storage at -18°C. The government of Australia reported the stability of dimethoate and omethoate in mangoes stored for 3 months at -10°C.

Results of supervised trials on crops

The toxicological evaluation of omethoate, the major plant metabolite of dimethoate, revealed that it is about 10 times as toxic as dimethoate. As consumers are exposed to both dimethoate and omethoate residues at the time of consumption, the difference in toxicity was taken into account (1998 JMPR residue evaluations, p. 510) by multiplying the omethoate residues by a factor of 10 for calculation of the sum of the residues. The total toxicologically significant residues, calculated in this way, were used for the estimation of dietary exposure. The present meeting followed the same practice. In the case of undetectable residues, the concentration of omethoate residues was calculated by taking into account the average ratio of dimethoate to omethoate in the edible portions of the crop at the specified pre-harvest interval. The sum (C_T) of dimethoate (C_D) and omethoate (C_O) residues reported for the specific commodities was calculated as $C_T = C_D + (10 \times C_O)$. The HRs and STMRs were estimated on the basis of the calculated C_T values.

Citrus fruits (oranges, mandarins/clementines and lemons). Dimethoate EC is registered for use on citrus in Spain, Italy, Greece, Brazil, Thailand and Morocco. The highest application rate according to GAP in southern Europe is 0.06 kg ai/hl. The application rate in Thailand is 0.3 to 0.6 kg ai/ha (0.02-0.04 kg ai/hl) and in Brazil 0.04 kg ai/hl. The PHIs are 3 days in Thailand and Brazil and 20-21 days in Spain, Italy and Greece. The number of applications is not specified in any country.

Eight supervised trials were conducted on oranges and eight on mandarins and clementines in Spain, Italy and Greece, using dimethoate EC 400 g/l at application rates between 2.05 and 2.22 kg ai/ha (0.06 g ai/hl), applied three times as a foliar spray. In 1999, two lemon trials were reported from Italy and Greece where dimethoate EC 400 g/l was applied three times at a rate of 2.08-2.16 kg ai/ha (0.06 kg ai/hl).

Dimethoate residues in whole orange fruit in southern Europe, in trials complying with Greek or Spanish GAP, in rank order were 0.29, 0.37, 0.41, 0.65, 0.77, 0.83, 0.85 and 1.50 mg/kg. The omethoate residues were <0.01, 0.02, 0.03 (2), 0.04 (2) and 0.05 (2) mg/kg. The residue concentrations in the orange pulp were <0.01 (2), 0.01, 0.02 (3), 0.03, 0.07 mg/kg for dimethoate and 0.002, <0.01(2), 0.01, 0.02, 0.03(2), 0.08 for omethoate. The average ratio of dimethoate to omethoate was 2.63.

Dimethoate residues in whole mandarins or clementines, based on Greek or Spanish GAP, in rank order were 0.35, 0.37, 0.52, 1.04, 1.17, 1.34, 1.48 and 3.10 mg/kg. The omethoate residues were 0.06, 0.08 (5) and 0.13 (2) mg/kg. The residues in the edible portions of the samples were <0.01 (2), 0.01 (2), 0.02 (3) and 0.07 mg/kg for dimethoate and <0.01, 0.02, 0.04, 0.05 (3), 0.11 and 0.13 mg/kg for omethoate. The average ratio of dimethoate to omethoate was 0.53.

Residues in whole lemon fruit at a 21- or 28-day PHI were 0.76 and 1.10 mg/kg dimethoate and 0.10 and 0.11 mg/kg omethoate. The residues in the edible portions were 0.05 and 0.19 mg/kg dimethoate and 0.05 and 0.06 mg/kg omethoate.

In supervised trials according to GAP in Brazil in 2002, dimethoate EC 400 g/l was sprayed 3 times on oranges at 0.8-1.60 kg ai/ha (0.04-0.08 kg ai/hl) with 3 days PHI. The LOQs were 0.02 mg/kg for dimethoate and 0.30 mg/kg for omethoate. The dimethoate residues in whole fruit were 0.15, 0.20 and 0.48 mg/kg. Residues of omethoate were <0.30 mg/kg in all trials.

In four supervised trials in Thailand in 2001 and 2002, dimethoate EC 400 g/l was sprayed on pomelos 4 times at 0.60 kg ai/ha (0.04 kg ai/hl). The residue results were reported only for dimethoate (LOQ 0.01 mg/kg). The trials complied with Thai GAP. The residues in whole fruit at 3 days PHI were 0.02, 0.06, 0.11 and 0.21 mg/kg.

The dimethoate residues from GAP applications in whole oranges, mandarins/clementines, lemons and pomelos were in the same range and were combined for estimating a maximum residue level. In rank order (median underlined) they were 0.02, 0.06, 0.11, 0.15, 0.2, 0.21, 0.29, 0.35, 0.37 (2), 0.41, 0.48, 0.52, <u>0.65</u>, <u>0.76</u>, 0.77 (2), 0.83, 0.85, 0.97, 1.04, 1.1, 1.17, 1.33, 1.34, 1.48, 1.50 and 3.1 mg/kg..

The dimethoate equivalents of the sum of dimethoate and omethoate residues in the citrus pulp (excluding the Brazilian trials) in rank order (median underlined) were 0.03, 0.049, 0.059, 0.11, 0.16, 0.20, 0.2, 0.22, <u>0.22</u>, <u>0.32</u>, 0.33, 0.41, 0.41, 0.45, 0.68, 0.81, 1.12, 1.37 mg/kg.

The Meeting estimated a maximum residue level of 5 mg/kg for citrus fruits, and an HR of 1.4 mg/kg and STMR of 0.27 mg/kg for the edible portion of citrus fruits. For the purpose of estimating STMR-Ps for processed commodities, the STMRs are 0.71 mg/kg for dimethoate and 0.08 mg/kg for omethoate.

<u>Cherries</u>. Four residue trials were conducted in southern Europe between 1999 and 2001. Cherries were sprayed once with dimethoate EC 400 g/l at a rate between 0.74 and 0.78 kg ai/ha (0.05 kg ai/hl). GAP in Austria, Belgium, Germany, Italy, Portugal and Spain specifies application rates between 0.02 and 0.04 kg ai/hl, except in Spain (0.04-0.06 kg ai/hl), and a PHI of 20-21 days in Austria, Germany and Italy, and 14 days in Belgium, Portugal and Spain. The maximum number of applications is 3 in Germany (with 8-14 days intervals) but is not specified in other countries. Thus, the residue trials complied with GAP in Spain and represented the worst-case situation.

The residues in cherries from southern European trials, evaluated with respect to Spanish GAP, in rank order were 0.12, 0.18, 0.21 and 0.33 mg/kg dimethoate, 0.05, 0.12(2) and 0.17 mg/kg omethoate.

The dimethoate equivalents of the sum of dimethoate and omethoate residues in cherries (median underlined) were 0.68, <u>1.32</u>, <u>1.53</u> and 1.91 mg/kg.

The Meeting recommended an MRL of 2 mg/kg, confirming the existing CXL.

<u>Mangoes</u>. Five supervised trials were conducted in Australia in 2001 and 2002 on mangoes, with dimethoate EC 400 g/l as 3 foliar sprays, 3 foliar sprays plus one dip application, and one dip application only. Application rates were 0.03 kg ai/hl for foliar and 0.04 kg ai/hl for dip applications. Post-harvest treatment of mango fruits by dipping in dimethoate solution for one minute is compulsory, whether or not mangoes have previously received a foliar application of dimethoate. The residue trials complied with GAP in Australia. The residues were determined separately as dimethoate and omethoate in the peel and pulp, then calculated as dimethoate (sum of dimethoate and omethoate) in the whole fruit, allowing for the weight of the stone. The limit of reporting was 0.02 mg/kg for both dimethoate and omethoate.

Dimethoate residues in whole mango fruit from the Australian trials at a PHI of 3 days for the pre-harvest application and 0 days for the post-harvest application, in rank order, were 0.18, 0.25, 0.26, 0.34 and 0.43 mg/kg for dimethoate and 0.02 (2), 0.03, 0.05 and 0.06 mg/kg for omethoate.

The average ratio of dimethoate to omethoate was 2.5. The dimethoate equivalents of the sum of dimethoate and omethoate residues in mango pulp were (median underlined) 0.12, 0.15, <u>0.36</u>, 0.39 and 0.68 mg/kg.

The Meeting estimated a maximum residue level of 1 mg/kg Po for mangoes, and an HR of 0.68 mg/kg and STMR of 0.36 mg/kg for the edible portion of mangoes.

Olives. Nine trials were conducted in Spain, Italy and Greece from 1999 to 2001. Dimethoate EC 400 g/l was applied four times to olives, at application rates of 0.42-0.45 kg ai/ha (0.06 kg ai/hl; water volume 700 l/ha) and 0.71-0.76 kg ai/ha (0.06 kg ai/hl; water volume 1200 l/ha). Dimethoate EC 400 g/l is registered for foliar application to olives in Greece, at the rate of 0.03 kg ai/hl repeated at 20-day intervals, and PHIs of 20 days for high volume sprays and 15 days for LV and ULV sprays (ULV from air only). In Italy, the rate is 0.028-0.056 kg ai/hl with up to 3 applications and 28 days PHI, in Portugal 0.03-0.06 kg ai/hl with one or two sprays and 21-42 days PHI, in Spain 0.04-0.06 kg ai/hl with 60 days PHI and in Morocco 0.04-0.06 kg ai/hl. The highest GAP application rate in southern Europe is 0.06 kg ai/hl, which matches the rates in the residue trials.

The dimethoate residues in olives at 28 days PHI in rank order (median underlined) were <0.01 (2), 0.01, 0.03, 0.04, 0.13, 0.15, 0.21 and 0.34 mg/kg. The omethoate residues were 0.06 (2), 0.07, 0.20, 0.22, 0.26, 0.33, 0.40 and 0.44 mg/kg.

The average ratio of dimethoate to omethoate was 0.4. The dimethoate equivalents of the sum of the dimethoate and omethoate residues in olives were 0.61, 0.61, 0.73, 2.01, 2.24, 2.75, 3.31, 4.01 and 4.34 mg/kg.

The Meeting estimated a maximum residue level of 0.5 mg/kg for fresh olives, and an STMR of 2.24 mg/kg and an HR of 4.3 mg/kg for the estimation of dietary intake. For the purpose of estimating the STMR-Ps for processed commodities, the STMRs are 0.04 mg/kg for dimethoate and 0.22 mg/kg for omethoate.

Cauliflowers. A set of 8 trials, conducted in the UK in 1996 and 1997, was described in the 1998 JMPR evaluation. Dimethoate EC 400 g/l was sprayed at 0.4 kg ai/ha (0.067 kg ai/hl) six times per year, the last application at growth stage BBCH 43-49.

Dimethoate EC 400 g/l is registered for use on cauliflower in Denmark, Germany, The Netherlands, Poland, the UK and Spain. Rates of application are 0.2-0.4 kg ai/hl, with PHIs of 14-42 days and 1-6 applications. Six of the trials were evaluated against UK GAP. Dimethoate residue levels at 21 days in rank order were <0.01 (4), 0.02 and 0.11 mg/kg and the omethoate residues were <0.01 (6) mg/kg.

The average ratio of dimethoate to omethoate was 6.5. The dimethoate equivalents of the sum of dimethoate and omethoate residues were 0.025 (4), 0.035 and 0.13 mg/kg.

Noting that the critical GAP in the UK has been changed from a PHI of 7 days to 21 days, the Meeting estimated a maximum residue level of 0.2 mg/kg for cauliflowers, to replace the existing draft MRL of 0.5 mg/kg, and an STMR of 0.025 mg/kg and HR of 0.13 mg/kg.

Brussels sprouts. Eight trials in the UK in 1996 and 1997 were described in the 1998 JMPR evaluation. According to UK GAP, dimethoate EC 400 g/l may be applied 6 times at the rate of 0.4 kg ai/ha (0.067 kg ai/hl), the last application at growth stage BBCH 43-49, with a PHI of 14 days. Dimethoate EC (400-404 g/l) is registered for use in Germany (0.24-0.36 kg ai/ha twice with a PHI of 14 days), The Netherlands (0.20 kg ai/ha, once or twice and PHI 21 days), and Spain (0.04-0.06 kg ai/hl and PHI 21 days). The GAP of the UK has the highest application rate in northern Europe and represents the worst-case situation.

The residues in Brussels sprouts at 14 days PHI, in rank order, were dimethoate 0.03 (2), 0.04, 0.06, 0.10 (2) and 0.11 (2) mg/kg and omethoate <0.01 (2), 0.02, 0.03 (2), 0.04, 0.07 and 0.11 mg/kg. The average ratio of dimethoate to omethoate was 2.98. The dimethoate equivalents of the sum of dimethoate and omethoate residues in Brussels sprouts were 0.064, 0.14, 0.23, 0.34, 0.36, 0.50, 0.81, 1.20 mg/kg.

Noting that the critical GAP in the UK has been changed from a PHI of 7 days to 21 days, and that the residues from other trials were <0.1 mg/kg, the Meeting estimated a maximum residue level

of 0.2 mg/kg for Brussels sprouts to replace the existing draft MRL of 1 mg/kg, an STMR of 0.35 mg/kg and an HR of 1.2 mg/kg.

Head cabbages. Eight residue trials were conducted outdoors in the UK in 1996 and 1997 (evaluated by the 1998 JMPR) and one trial in Poland in 1996 (only dimethoate residues were reported). GAP was reported from Denmark, Finland, Germany, The Netherlands, Norway, Sweden, Spain and Poland but not from the UK. Dimethoate at 0.4 kg ai/ha (0.067 kg ai/hl) was applied six times in the UK trials, which were evaluated against German GAP. The residues of dimethoate at 14 days PHI in rank order were 0.01, 0.04, 0.06, 0.11, 0.34, 0.67, 0.71 and 0.99 mg/kg and of omethoate 0.01, 0.02 (2), 0.07, 0.25, 0.35, 0.46 and 0.64 mg/kg.

The average ratio of dimethoate to omethoate was 2.47. The dimethoate equivalents of the sum of dimethoate and omethoate residues in cabbage were 0.05, 0.09, 0.12, 0.39, 1.55, 1.71, 1.72 and 3.26 mg/kg.

The Meeting confirmed its previous recommendation (2 mg/kg, now a CXL) for head cabbages (excluding Savoy cabbage). The Meeting estimated an STMR of 0.97 mg/kg and an HR of 3.26 mg/kg.

Sweet peppers. Seven supervised trials were conducted in 2001 and 2002 in Australia. Dimethoate EC 400 g/l was applied either as a post-harvest dip at 0.04 kg ai/hl or as a pre-harvest foliar treatment at 0.3 kg ai/ha with 7 days PHI followed by post-harvest application at 0.04 kg ai/hl. The residues were determined in the whole fruit. The limits of reporting were 0.02 mg/kg for dimethoate and 0.02-0.04 mg/kg for omethoate. The trials complied with Australian GAP.

The residues of dimethoate after foliar application at a 7-day PHI were 0.03 (2) and 0.14 mg/kg. As the residues after foliar and post-harvest application were 0.23, 1.71 and 1.75 mg/kg, it was concluded that the contribution of foliar application to the residues after post-harvest application was negligible and that residues from all post-harvest trials could be used for evaluation.

The dimethoate residues after post-harvest (with or without foliar) application were 0.23, 0.27, 1.26, 1.46, 1.5, 1.56, 1.71, 1.75, 1.8 and 2.95 mg/kg. Omethoate residues were 0.19 (2) and not detected.

The average ratio of dimethoate to omethoate was 39. The dimethoate equivalents of the sum of dimethoate and omethoate residues were (median underlined) 0.24, 0.28, 1.27, 1.51, 1.57, 1.72, 1.76, 2.96, 3.36 and 3.7 mg/kg.

The Meeting estimated a maximum residue level of 5 mg/kg, an STMR of 1.64 mg/kg and an HR of 3.7 mg/kg for sweet peppers. The maximum residue level is recommended to replace the existing CXL of 1 mg/kg for peppers.

Melons. Eight residue trials were conducted in Italy, Spain and Greece in 2000 and 2001. No information on GAP for dimethoate use on melons, pumpkins or watermelons was available. The Meeting could not estimate a maximum residue level, STMR or HR.

Tomatoes. Eight supervised trials in 2000 and 2001 were reported from Spain and Italy. Tomatoes were treated twice at 0.614-0.653 kg ai/ha (0.1 kg ai/hl). GAP in Germany on tomatoes in glasshouses is 0.24 to 0.48 kg ai/ha with three applications and 3 days PHI, and in Ireland 0.034 kg ai/hl by foliar application and 7 days PHI. Brazil requires 0.04 kg ai/hl foliar application and 14 days PHI. GAP in Italy is 0.028 to 0.040 kg ai/hl and 21 days PHI. The supervised trials in Italy and Spain did not comply with the corresponding GAP and the results could not be evaluated. The Meeting recommended withdrawal of the draft MRL of 2 mg/kg.

Head lettuce. Nine residue trials were conducted in Spain, Italy and Greece in 2000 and 2001. Lettuce were sprayed outdoors once at 0.41-0.42 kg ai/ha (0.04 kg ai/hl). GAP in Spain is 0.04-0.06 kg ai/hl LV with 14 days PHI, in Greece 0.03-0.05 kg ai/hl and 20 days PHI and in Italy 0.028-0.040 kg ai/hl and 14 days PHI. The number of sprays is not specified. The trials were evaluated against GAP in Italy.

The residues of dimethoate at 14 days PHI in rank order were <0.002 (3), <0.01 (3), 0.03, 0.07 and 0.11 mg/kg and of omethoate <0.01 (5), 0.01, 0.02, 0.04 and 0.06 mg/kg.

In northern Europe, residue trials on lettuce were conducted in 1996 and 1997. Lettuce were sprayed outdoors at a rate of 0.34 kg ai/ha (0.17 kg ai/hl) six times. GAP in Denmark is 0.30-0.32 kg ai/ha (number of application not specified) with a 21-day PHI, in the UK 0.34 kg ai/ha 6 times with a 14-day PHI, in Germany 0.24-0.36 kg ai/ha twice or 0.40 kg ai/ha once with a 21-day PHI, in Ireland 0.34 kg ai/ha repeated as necessary with a 7-day PHI, and in The Netherlands 0.20 kg ai/ha 1 or 2 times with a 21-day PHI. Thus, the trials complied with UK GAP and represent the worst-case situation.

The residues of dimethoate at 14 days PHI in ranked order were 0.01, 0.02 (3), 0.04, 0.07 (2) and 0.11 mg/kg and of omethoate <0.01 (5), 0.02 and 0.03 (2) mg/kg.

The residues from southern and northern Europe appeared to be from the same population and were evaluated together, giving residues at 14 days in ranked order of <0.002 (3), <0.01 (3), 0.01, 0.02 (3), 0.03, 0.04, 0.07 (3) and 0.11 (2) mg/kg for dimethoate, and <0.01 (10), 0.01, 0.02 (2), 0.03 (2), 0.04 and 0.06 mg/kg for omethoate.

Eleven residue trials were conducted in glasshouses in the UK in 1996 and 1998. Dimethoate EC 400 g/l was applied once at 0.34 kg ai/ha (0.17 kg ai/hl) with a PHI of 28 days**.** GAP for glasshouse use was reported from Ireland (0.34 kg ai/ha, repeated as necessary, 28-day PHI). The supervised trials complied with Irish GAP.

The residues in ranked order were <0.01, 0.01 (2), 0.02 (2), 0.06, 0.16, 0.17, 1.1 (2) and 2.2 mg/kg for dimethoate and <0.01 (4), 0.01, 0.03 (2), 0.04, 0.17, 0.20 and 0.29 mg/kg for omethoate.

As the indoor uses resulted in higher residues, the glasshouse trials were used for estimation of a maximum residue level, an STMR and an HR.

The average ratio of dimethoate to omethoate was 11. The dimethoate equivalents of the sum of dimethoate and omethoate residues in indoor lettuce were (median underlined) 0.03 (4), 0.11, <u>0.31</u>, 0.31, 0.41, 1.71, 2.01 and 2.70 mg/kg.

The Meeting estimated a maximum residue level of 3 mg/kg for head lettuce, recommended to replace the draft MRL of 0.5 mg/kg, and an STMR of 0.31 mg/kg and HR of 2.7 mg/kg.

<u>Sugar beet</u>. Eight trials were conducted in 2000 and 2001 in southern Europe (including 2 decline trials and 2 at-harvest trials in Spain, and 2 decline curve trials and 2 at harvest trials in Italy). Rates of 0.62-0.64 kg ai/ha (0.06 kg ai/hl) were applied twice, with a 30-day PHI. Dimethoate EC 400 g/l is registered for use on sugar beet in many countries (Finland, Germany, Greece, Italy, The Netherlands, Poland, Spain, Sweden, the UK and Ireland), with GAP in Italy 0.02-0.04 kg ai/hl, 30 days PHI, Spain 0.04-0.06 kg ai/hl, 60 days PHI, and Greece 0.03-0.05 kg ai/hl, 14 days PHI. In one trial in Spain, the residue of dimethoate in sugar beet leaves or tops was 0.13 mg/kg at 14 days. The residues of dimethoate at 30 days in sugar beet leaves or tops in rank order were <0.002 (7) and <0.01 mg/kg, and of omethoate <0.01 (4), 0.02 (2), 0.03 and 0.04 mg/kg. No residues of dimethoate or omethoate (<0.01 mg/kg) were found in sugar beet root at PHIs of 30-60 days.

Six residue trials conducted in 1994 and 1995 in Germany, the UK and The Netherlands were described in the 1998 JMPR evaluations. No residues were detected in sugar beet roots. In addition, 2 new trials were conducted in 2001 in the UK and Germany. The first application was 0.08-0.09 kg ai/ha (0.02-0.09 kg ai/hl) and the second (at BBCH 38-39) was of 0.41-0.42 kg ai/ha (0.02-0.09 kg ai/hl) with PHIs of 29-30 days. Residues in roots were undetectable (<0.002 mg/kg, LOQ 0.01 mg/kg).

The results of the recent supervised trials evaluated by the present Meeting confirm the recommendations (0.05 mg/kg for root and 0.1 mg/kg for leaves or tops) made by the 1998 JMPR.

<u>Globe artichokes</u>. Four trials were conducted in Italy and Spain in 2000 and 2001. Dimethoate EC 400 g/l was applied three times to artichokes at 0.42-0.43 kg ai/ha (0.04 kg ai/hl) with a PHI of 28 days. The only GAP for dimethoate is in Italy, for 0.06 kg ai/hl and a PHI of 20 days. Thus the

residue trials approximated GAP in Italy. The residues in the trials at 28 days PHI in ranked order were <0.01, 0.02 (2) and 0.04 mg/kg for dimethoate, and <0.01 (3) and 0.02 mg/kg for omethoate.

The average ratio of dimethoate to omethoate was 5.0, on the basis of the LOQ and LOD values.

The dimethoate equivalents of the sum of dimethoate and omethoate residues in artichokes were 0.1 (3) and 0.2 mg/kg.

The Meeting estimated a maximum residue of 0.05 mg/kg, an STMR of 0.1 mg/kg and an HR 0.2 mg/kg for globe artichokes.

Asparagus. Six residue trials at rates of 0.41-0.43 kg ai/h (0.04 kg ai/hl) applied twice, the second application at the fern stage, were conducted in Spain and Italy in 2000, 2001 and 2002. GAP in Italy is 0.028-0.04 kg ai/hl with a PHI of 14 days and in Greece is 0.03-0.05 kg ai/hl (3 applications). The trials were evaluated against GAP in Italy.

The residues of dimethoate and omethoate were below the limit of detection (<0.002 mg/kg), except in one sample where 0.01 mg/kg dimethoate was found.

As the trials in compliance with US GAP evaluated by the 1998 JMPR indicated higher residues, the results of the new trials did not affect the previously estimated maximum residue level.

Celery. Four residue trials were conducted in Italy and Spain in 2000 and 2001. Celery was sprayed with dimethoate EC 400 g/l twice at 0.49-0.51 kg ai/ha (0.05 kg ai/hl). The highest GAP application rate in southern Europe is 0.04 kg ai/hl with PHI 20-21 days (Italy). Thus the residue trials complied with GAP. The residues were <0.01, 0.07, 0.09 and 0.28 mg/kg for dimethoate, and <0.01, 0.02 and 0.04 (2) mg/kg for omethoate.

The average ratio of dimethoate to omethoate was 4.42. The dimethoate equivalents of the sum of dimethoate and omethoate residues in celery were (median underlined) 0.03, 0.2 and 0.4 (2) mg/kg.

The Meeting estimated a maximum residue level of 0.5 mg/kg, an STMR of 0.2 mg/kg and an HR of 0.4 mg/kg for celery.

Wheat grain. Eight residue trials were conducted in Italy and Spain in 2000 and 2001. Wheat was sprayed once at 0.40-0.44 kg ai/ha (0.10 kg ai/hl). GAP in Italy is 0.020-0.028 kg ai/hl, PHI 28 days and in Portugal 0.04 kg ai/hl, PHI 14 days.

Only one grain sample from day 14 was analyzed. The residues in grain at 28 days were <0.001, <0.01 (4), 0.007, 0.014 and 0.024 mg/kg of dimethoate, and <0.001 (2), 0.002 (2) and <0.01 (4) mg/kg of omethoate.

Seven residue trials were conducted in Germany and the UK in 2001 and 2002. Dimethoate was applied at 0.71-0.77 kg ai/ha (0.35 kg ai/hl) at the first application and 0.35-0.39 kg ai/ha (0.18 kg ai/hl) at the second. The highest GAP application rate in northern Europe is 0.68 kg ai/ha in Germany, Ireland and the UK at the first application and 0.34 kg ai/ha at the second. The PHI in Germany is 21 days and the trials were evaluated against German GAP.

Residues in wheat grain at 28 days (2 trials at 42 days) in ranked order were <0.001 (5) and 0.001 (2) mg/kg of dimethoate, and <0.001 (5), 0.001 and 0.002 mg/kg of omethoate.

In 1998, the critical GAP was from the UK, allowing 4 applications and a PHI of 14 days. Current GAP permits one application before 31 March. The higher residues in 1998 derived from the UK trials according to UK GAP at that time should therefore be excluded from the current evaluation.

The average ratio of dimethoate to omethoate was 9.5. The dimethoate equivalents of the sum of dimethoate and omethoate residues in wheat grain were 0.021 (13), 0.029 and 0.049 mg/kg.

The Meeting estimated a maximum residue level of 0.05 mg/kg for wheat, to replace the previous estimate of 0.2 mg/kg, an STMR of 0.021 mg/kg and an HR of 0.05 mg/kg.

Wheat straw. The residues in wheat straw from the above trials in southern Europe, at a 28-day PHI, were <0.01, 0.03 (2), 0.10, 0.11, 0.16, 0.37 and 0.45 mg/kg of dimethoate, and <0.01 (4), 0.01, 0.02, 0.07 and 0.08 mg/kg of omethoate.

The residues in wheat straw from northern Europe at PHI 28 days (or at earliest commercial harvest) in ranked order were <0.01 (3), 0.01, 0.02, 0.05 and 0.07 mg/kg of dimethoate, and <0.002, <0.01 (6) mg/kg of omethoate.

The average ratio of dimethoate to omethoate was 7.06. The adjusted sums of dimethoate and omethoate residues in wheat straw were (median underlined) 0.002, 0.006 (2), 0.01, 0.02, 0.05 (2) and 0.07 mg/kg (fresh weight).

Allowing for the standard 88% dry matter for wheat straw (FAO Manual, p. 149), the Meeting estimated a maximum residue level of 1 mg/kg for wheat straw, to replace the draft MRL of 10 mg/kg, and an STMR of 0.017 mg/kg for wheat straw.

Fate of residues during processing

Processing studies were reported on olives, cabbages and wheat. The STMR-P values of dimethoate and omethoate were calculated from their STMRs in the raw agricultural commodities and the corresponding processing factors and then the combined STMR-P was calculated from the individual STMR-P values, taking into account the multiplying factor of 10 for omethoate.

In studies on processing olives treated with dimethoate, 0.39-3.01 mg/kg in the RAC yielded dimethoate at 0.17-1.26 mg/kg in crude olive oil. The results are in line with the studies reported in the 1984 evaluation.

Processing studies on oranges treated with dimethoate were evaluated in 1998 (Residue Evaluations, p. 490). The estimated processing factors were used to estimate the STMR-P values from the STMRs for citrus fruits (dimethoate 0.71, omethoate 0.08 mg/kg) estimated by the present Meeting.

The estimated processing factors and STMR-Ps for orange juice, dry orange pulp, processed olive products and wheat products are summarized in Table 38.

Table 38. Estimated processing factors and STMR-Ps for orange, olive and wheat products.

Processed commodity	Processing factor		STMR of RAC, mg/kg		STMR-P[1], mg/kg
	Dimethoate	Omethoate	Dimethoate	Omethoate	
Orange juice	0.14 [2]	0.21 [2]	0.71	0.08	0.27
Orange pulp, dry	2.1 [2]	1.7 [2]	0.71	0.08	1.6 [3]
Olive oil, crude	0.43	0.019	0.04	0.22	0.059
Olive oil, refined	0.016	0.019	0.04	0.22	0.042
Olive, processed	0.21	0.12	0.04	0.22	0.272
Wheat wholemeal [2]	0.19	0.1	0.09	0.01	0.027
White wheat flour	0.079	0.071	0.09	0.01	0.014

[1] Based on sum of dimethoate and 10 times omethoate (except dry orange pulp).
[2] Based on processing factors reported by 1998 JMPR.
[3] Based on sum of dimethoate and omethoate.

The outer leaves of cabbages contained the highest concentration of residues (0.19 mg/kg compared with 0.05 mg/kg in whole cabbage) but are usually removed as part of kitchen processing. Both dimethoate and omethoate were decomposed during cooking.

Residues in animal commodities

On the basis of the metabolism studies, the 1998 JMPR concluded that it was unlikely that residues would occur in animal commodities and did not calculate the animal dietary burden. Consequently the animal dietary burden was not calculated by the present Meeting and MRLs for animal commodities are recommended to be maintained.

RECOMMENDATIONS

On the basis of data from supervised trials, the Meeting concluded that the residue levels listed in Table 39 are suitable for establishing MRLs and for dietary risk assessment.

Definition of the residue for compliance with MRLs: *dimethoate*
Definition of the residue for estimation of dietary intake: *dimethoate and omethoate*.

Table 39. Summary of recommendations.

Commodity		MRL, mg/kg		STMR or STMR-P [1/]	HR or HR-P [1/]
CCN	Name	New	Previous	mg/kg	mg/kg
VS 0620	Artichoke, Globe	0.05	-	0.1	0.2
VB 0402	Brussels sprouts	0.2	1	0.35	1.2
VB 0041	Cabbage, Head [2/,3/]	2	2	0.97	3.26
VB 0404	Cauliflower	0.2	0.5	0.025	0.13
VS 0624	Celery	0.5	W [5]	0.2	0.4
FC 0001	Citrus fruits	5	W [5]	0.27	1.4
AB 0001	Citrus pulp, dry			1.7	
VL 0482	Lettuce, Head [3/]	3	0.5	0.31	2.7
FI 0345	Mango	1Po	-	0.36	0.68
FT 0305	Olives	0.5	W [5/]	2.24	4.3
OC 0305	Olive oil, virgin			0.059	0.23
OR 0305	Olive oil, refined			0.042	0.09
DM 0305	Olives, processed			0.34	0.58
VO 0051	Peppers	W	1 Po		
VO 0445	Peppers, Sweet [4/]	5 Po		1.64	3.7
VO 0448	Tomato	W	2		
GC 0654	Wheat	0.05	0.2	0.021	0.05
AS 0654	Wheat straw and fodder, dry	1	10	0.017	
CF 1211	Wheat flour			0.014	
CF 1212	Wheat wholemeal			0.027	
JF 0004	Orange juice			0.27	

NB. The information provided to the JMPR precluded an estimate that the long-term dietary intake would be below the ADI.

[1/] Based on the sum of dimethoate and 10 times omethoate, except dry citrus pulp which is based on the simple sum.

[2/] Except Savoy cabbage.

[3/] The information provided to the JMPR precluded an estimate that the short-term dietary intake would be below the acute reference dose.

[4/] The information provided to the JMPR precluded an estimate that the short-term dietary intake of children would be below the acute reference dose.

[5/] Withdrawal of the CXL was recommended by the 1998 JMPR, but it was retained pending the present review.

DIETARY RISK ASSESSMENT

The toxicological evaluation of omethoate revealed that it is about 10 times as toxic as dimethoate. As consumers are exposed to both the dimethoate and omethoate residues present at the time of consumption, the difference in toxicity was taken into account by multiplying the omethoate residues with a factor of 10 for calculation of the sum of residues. The total toxicologically significant residues, calculated in this way, were used for the estimation of dietary exposure. The sum (C_T) of dimethoate (C_D) and omethoate (C_O) residues was calculated as $C_T = C_D + (10 \times C_O)$. The HR and STMRs were estimated from the calculated C_T values.

Long-term intake

The International Estimated Dietary Intakes (IEDIs) were calculated for the five GEMS/Food regional diets using a range of STMRs and STMR-Ps (Table 40). The IEDI was 150% of the ADI (0-0.002 mg/kg bw) for the European diet. IEDIs for the other four regional diets were in the range of 10-90% of the ADI.

The information provided to the JMPR precluded an estimate that the dietary intake would be below the ADI.

Table 40. International Estimated Dietary Intakes (IEDIs) of dimethoate and omethoate for the five GEMS/Food regional diets (dimethoate ADI = 0-0.002 mg/kg bw/day).

Code	Commodity	STMR or STMR-P mg/kg	Diets: g/person/day. Intake = daily intake: µg/person									
			Mid-East		Far-East		African		Latin American		European	
			diet	intake	diet	intake	diet	intake	diet	intake	diet	intake
FC 0001	Citrus fruits	0.27	47.1	12.7	6.3	1.7	5.1	1.4	54.6	14.7	44.6	12.0
FP 0009	Pome fruits	0.5	10.8	5.4	7.5	3.8	0.3	0.2	6.5	3.3	51.3	25.7
FS 0013	Cherries	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	8.1
DF 0014	Prunes	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.3
FB 0269	Grapes (fresh, wine, dried)	1.1	16.1	17.7	1.0	1.1	0.0	0.0	1.6	1.8	16.1	17.7
FT 0305	Olives	2.24	1.3	2.9	0.0	0.0	0.0	0.0	0.3	0.7	2.8	6.3
DM 0305	Olives, processed	0.34	-	-	-	-	-	-	-	-	-	-
OC 0305	Olive oil, crude	0.059	1.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	7.8	0.5
FI 0345	Mangoes	0.36	2.3	0.8	5.3	1.9	3.4	1.2	6.3	2.3	0.0	0.0
VR 0506	Turnip, garden	1	0.5	0.5	0.0	0.0	0.0	0.0	0.3	0.3	2.0	2.0
VR 0589	Potatoes	0.1	59.0	5.9	19.2	1.9	20.6	2.1	40.8	4.1	240.8	24.1
VR 0596	Sugar beet	0.1	0.5	0.1	0.0	0.0	0.0	0.0	0.3	0.0	2.0	0.2
VA 0385	Onions, bulb	0.2	23.0	4.6	11.5	2.3	7.3	1.5	13.8	2.8	27.8	5.6
VO 0448	Tomatoes (fresh, peeled)	0.5	75.4	37.7	6.8	3.4	16.3	8.2	25.5	12.8	60.6	30.3
JF 0448	Tomato juice	0.09	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.2
-d	Tomato paste	0.7	5.8	4.1	0.2	0.1	0.3	0.2	0.0	0.0	4.0	2.8
-d	Cabbages (head & leafy brassicas, kohlrabi)	0.97	5.0	4.9	9.7	9.4	0.0	0.0	10.5	10.2	26.8	26.0
VB 0403	Cabbages, Savoy	0.175	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0
VB 0402	Brussels sprouts	0.35	0.5	0.2	1.0	0.4	0.0	0.0	1.1	0.4	2.7	0.9
VB 0404	Cauliflowers	0.025	1.3	0.0	1.5	0.0	0	0.0	0.3	0.0	13	0.3
VL 0482	Lettuce, head	0.31	2.3	0.7	0.0	0.0	0.0	0.0	5.8	1.8	22.5	7.0
VP 0063	Peas (green pods & immature seeds)	0.2	5.5	1.1	2.0	0.4	0.0	0.0	0.8	0.2	14.0	2.8
VS 0620	Artichokes globe	0.1	2.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.6
VS 0621	Asparagus	0.02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0
VS 0624	Celery	0.2	0.5	0.1	0.0	0.0	0.0	0.0	0.3	0.1	2.0	0.4
GC 0640	Barley (fresh)	0.15	1.0	0.2	3.5	0.5	1.8	0.3	6.5	1.0	19.8	3.0
GC 0651	Sorghum	0.1	2.0	0.2	9.7	1.0	26.6	2.7	0.0	0.0	0.0	0.0
GC 0654	Wheat (excluding flour)	0.021	4.3	0.1	0.8	0.0	0.0	0.0	4.8	0.1	2.2	0.0
CF 1211	Wheat flour	0.014	323.0	4.5	114.0	1.6	28.3	0.4	112.0	1.6	175.8	2.5
CF 1212	Wheat wholemeal	0.027	-	-	-	-	-	-	-	-	-	-
Total intake (µg/person)=				104.7		29.5		18.0		57.9		179.1
Bodyweight per region (kg bw) =				60		55		60		60		60
ADI (µg/person)=				120		110		120		120		120
%ADI=				87.2		26.9		15.0		48.2		149.3
Rounded %ADI=				90		30		10		50		150

Short-term intake

The International Estimated Short-Term Intakes (IESTIs) were calculated for commodities for which maximum residue levels or STMR(P)s were estimated by the current Meeting. An acute reference dose of 0.02 mg/kg bw was established by the 2003 JMPR. The results are shown in Tables 41 and 42.

The IESTI represented 0-320% of the acute RfD for the general population and 1-760% of the acute RfD for children. The values 320 and 130% represent the estimated short-term intakes from head cabbages and head lettuce respectively for the general population. The values 760, 200 and 140% represent the estimated short-term intake from head cabbages, head lettuce and sweet peppers respectively for children. The information provided to the JMPR precluded an estimate that the dietary intakes calculated for these three commodities would be below the acute reference dose. The Meeting concluded that the short-term intake of residues of dimethoate and omethoate from uses of

dimethoate on commodities, other than these three, that have been considered by the JMPR is unlikely to present a public health concern.

The Meeting noted that the acute RfD could be refined upon re-evaluation of the whole toxicological profile of dimethoate.

Table 41. Assessment of risk to the general population from the short-term dietary intake of residues of dimethoate and omethoate (dimethoate acute RfD = 0.02 mg/kg bw or 20 µg/kg bw/day).

Codex Code	Commodity	STMR or STMR-P mg/kg	HR or HR-P mg/kg	Large portion diet				Unit weight		Variability factor	Case	IESTI µg/kg bw/day	% acute RfD rounded
				Country	Body wt (kg)	Large portion, g/person	Unit wt, g	Country	Unit wt, edible portion, g				
VS 0620	Artichokes globe	-	0.2	FRA	62.3	534	230	FRA	99	3	2a	2.35	10
VB 0402	Brussels sprouts	-	1.2	NLD	63.0	394	7	FRA	5	1	1	7.50	40
VB 0041	Cabbages, head	-	3.26	SAF	55.7	362	771	UNK	540	3	2b	63.57	320
VB 0404	Cauliflowers	-	0.13	UNK	70.1	579	1500	JPN	1500	3	2b	3.22	20
VS 0624	Celery (stalk)	-	0.4	FRA	62.3	225	33	UNK	30	3	2a	1.83	9
FC 0001	Citrus fruits	0.27	-	-	-	-	-	-	-	-	-	-	-
VL 0482	Lettuce, head	-	2.7	USA	65.0	213	450	JPN	450	3	2b	26.49	130
FI 0345	Mangoes	-	0.68	FRA	62.3	567	207	USA	139	3	2a	9.22	50
OC 0305	Olive oil, crude	0.059	-	-	-	ND	-	-	-	-	3	-	-
OR 0305	Olive oil, refined	0.042	-	FRA	62.3	57	-	-	-	-	3	0.04	0
FT 0305	Olives	2.24	-	NLD	63.0	63	-	-	-	-	-	-	-
DM 0305	Olives, processed	0.34	-	AUS	67.0	80	-	-	-	-	-	-	-
VO 0445	Peppers, sweet (incl. pim(i)ento)	-	3.7	FRA	62.3	207	40	JPN	40	3	2a	17.07	90
GC 0654	Wheat	0.021	-	USA	65.0	383	-	-	-	-	3	0.12	1
CF 1211	Wheat flour	0.014	-	USA	65.0	365	-	-	-	-	3	0.08	0
CF 1212	Wheat wholemeal	0.027	-	USA	65.0	155	-	-	-	-	3	0.06	0

Table 42. Assessment of risk to children up to 6 years, from the short-term dietary intake of residues of dimethoate and omethoate (dimethoate acute RfD = 0.02 mg/kg bw or 20 µg/kg bw/day).

Codex code	Commodity	STMR or STMR-P mg/kg	HR or HR-P mg/kg	Large portion diet			Unit weight			Variability factor	Case	IESTI µg/kg bw/day	% acute RfD rounded
				Country	Body wt, kg	Large portion, g/person	Unit wt, g	Country	Unit wt, edible portion, g				
VS 0620	Artichokes globe	-	0.2	FRA	17.8	89	230	FRA	99	3	2b	3.00	20
VB 0402	Brussels sprouts	-	1.2	NLD	17.0	213	7	FRA	5	1	1	15.00	80
VB 0041	Cabbages, head	-	3.26	SAF	14.2	220	771	UNK	540	3	2b	151.59	760
VB 0404	Cauliflowers	-	0.13	NLD	17.0	209	1500	JPN	1500	3	2b	4.80	20
VS 0624	Celery (stalk)	-	0.4	FRA	17.8	111	33	UNK	30	3	2a	3.85	20

Codex code	Commodity	STMR or STMR-P mg/kg	HR or HR-P mg/kg	Large portion diet			Unit weight			Variability factor	Case	IESTI µg/kg bw/day	% acute RfD rounded
				Country	Body wt, kg	Large portion, g/person	Unit wt, g	Country	Unit wt, edible portion, g				
FC 0001	Citrus fruits	0.27	-	-	-	-	-	-	-	-	-	-	-
VL 0482	Lettuce, head	-	2.7	NLD	17.0	84	450	JPN	450	3	2b	39.85	200
FI 0345	Mangoes	-	0.68	AUS	19.0	207	207	USA	139	3	2a	17.34	90
OC 0305	Olive oil, crude	0.059	-	-	-	-	-	-	-	-	3	-	-
OR 0305	Olive oil, refined	0.042	-	FRA	17.8	63	-	-	-	-	3	0.15	1
FT 0305	Olives	2.24	-	FRA	17.8	49	-	-	-	-	-	-	-
DM 0305	Olives, processed	0.34	-	FRA	17.8	49	-	-	-	-	-	-	-
VO 0445	Peppers, sweet (incl. pim(i)ento)	-	3.7	AUS	19.0	60	40	JPN	40	3	2a	27.27	140
GC 0654	Wheat	0.021	-	USA	15.0	151	-	-	-	-	3	0.21	1
CF 1211	Wheat flour	0.014	-	AUS	19.0	194	-	-	-	-	3	0.14	1
CF 1212	Wheat wholemeal	0.027	-	USA	15.0	74	-	-	-	-	3	0.13	1

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